From: John Anderson <johnanderson33@hotmail.com>
To: "mwilson@co.slo.ca.us" <mwilson@co.slo.ca.us>
Date: 01/18/2014 05:46 PM
Subject: Phillips Rail Spur Project

January 18, 2014

Murray Wilson
Environmental Resource Specialist
County of San Luis Obispo

Dear Mr. Wilson,

I am writing to express my concerns regarding the proposed two thousand percent increase of rail operations at the Phillips Santa Maria Refinery (SMR). The refinery is located one half mile from residential areas and less than two miles from schools. It is not a project that only affects those living on the Nipomo / Arroyo Grande mesa. It will affect all of San Luis Obispo County and communities well beyond its borders.

In my opinion the Project Description prepared by Arcadis does not adequately address several issues that need to be addressed and resolved before this project is approved or mitigated.

Greatly Increased Rail Transportation of Hazardous Materials The SMR has been in operation since 1955 using locally produced oil transported with relative safety via pipeline. The only conceivable source of the oil arriving via rail is the highly volatile Bakken Oil from North Dakota. The Project Description states the trains carrying the oil will arrive from the north. Every community along the rail lines between Nipomo and North Dakota will be exposed to much greater danger from potential explosions / fires and from the hazardous vapors emitted by the locomotives and Bakken oil. AJ-1

Increased Emissions of Volatile Organic Compounds (VOCs) A September 2012 permit application to the Missouri Department of Natural Resources for construction of Bakken crude oil storage and loadout operation in Hayti, Missouri revealed that Bakken oil contains significant quantities of Benzene (a known carcinogen), Toluene, Xylone, and Hexane. I am not aware that the U.S. Government Pipeline and Hazardous Materials Safety Administration currently has requirements for reducing the amount of VOCs in the crude oil before it is shipped or mandates specific requirements for the rail cars that will transport the crude. The Missouri Department of Natural Resources Permit to Construct the Marquis Terminal mandated Capture and Control System conditions including Vapor Collection System and Open Flame Air Assisted Smokeless Flare requirements for handling the Bakken crude. (http://www.desmogblog.com/2014/01/05/exclusive-permit-shows-bakken-oil-casselton-train-contained-high-levels-volatile-chemicals) (http://www.dnr.mo.gov/env/apcp/permits/marquis-hayti012cp.pdf) AJ-2

A February 2010 Environmental Integrity Project report titled U.S. Refinery Benzene Emissions Increase in 2008 revealed that the Santa Maria Refinery stack emissions of Benzene increased from 225 pounds per year in 2000 to

250 pounds per year in 2008 and Fugitive emissions (leaking valves, fittings, vents, cooling towers, tanks, and the coker area) increased from 160 to 200 pounds per year. Given that Bakken crude contains higher levels of Benzene and the SMR wishes to increase the amount of crude it processes by nearly 15 million barrels of Bakken crude per year there appears to be an enormous potential for increased emissions of this carcinogen. The Project Description reveals that the rail crude will be stored in existing tanks. How old are those tanks? Are they state of the art? I doubt it. AJ-2
The Industrial Professionals for Clean Air (IPCA) fears that the amount of emissions reported reflects only 50% of true emissions and recommends replacement of traditional flares with fuel gas recovery systems or other systems that are more efficient and less susceptible to wind. (
http://www.environmentalintegrity.org/news_reports/documents/BENZENEWPFINALwAttachments20100204_000.pdf
)

The above issues are minimally addressed in the Project Description by referring to CCR Title 8 Sec 5189 and 29 CFR 1910.119 which are OSHA requirements for the safety of workers and do not address specific equipment or procedural requirements for dealing with the increased risk of Bakken crude or the safety of the communities affected. I hope they are addressed in the EIR. This project should not be approved until the U.S. AJ-3
Government and the State of California address the unique dangers of Bakken and similar crude and mandate safety and environmental protections relating to the reduction of VOCs, rail and rail car safety.

My last comment refers to the proposed additional Coastal Access Route. AJ-4
Those of us who breathe the silica from the Oceano Dunes State Vehicular Recreation area and listen to the revving engines of the OHVs would like to see less access to the dunes, not more. In no way should additional access be approved.

Thank you for your attention to this matter.

John Anderson
1895 Northwood Road
Nipomo CA 93444
805-619-0344

From: John Anderson <johnanderson33@hotmail.com>
To:
Date: 01/28/2014 09:17 AM
Subject: NY Times_Oil Trains

Re: Santa Maria, California Phillip's Oil Refinery request to receive crude oil shipments by rail.

I urge you to read the Sunday January 26, 2014 New York Times front page article on the safety of transporting crude oil by rail car.

http://www.nytimes.com/2014/01/26/business/energy-environment/accidents-surge-as-oil-industry-takes-the-train.html?_r=0

AJ-5

A hasty decision on whether or not to approve all or part of the proposal is not in the best interest of the communities affected.

Thank you for your consideration.

John Anderson
818-429-6085

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STEVE HORN (/user/steve-horn)

Exclusive: Permit Shows Bakken Shale Oil in Casselton Train Explosion Contained High Levels of Volatile Chemicals

On January 2, the Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a major safety alert (http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/1_2_14%20Rail_Safety_Alert.pdf) , declaring oil obtained via hydraulic fracturing ("fracking") (http://www.desmogblog.com/fracking-the-future/) in the Bakken Shale (http://www.desmogblog.com/directory/vocabulary/7174) may be more chemically explosive than the agency or industry previously admitted publicly.

This alert came three days after the massive Casselton, ND explosion of a freight rail train (http://www.desmogblog.com/2013/12/30/north-dakota-crude-oil-train-derails-cars-explode-residents-warned-stay-inside) owned by Warren Buffett (http://www.desmogblog.com/directory/vocabulary/7461) 's Burlington Northern Santa Fe (http://www.desmogblog.com/directory/vocabulary/8243) (BNSF) and was the first time the U.S. Department of Transportation agency ever made such a statement about Bakken crude. In July 2013, another freight train carrying Bakken crude exploded in Lac-Mégantic, vaporizing and killing 47 people.

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Yet, an exclusive *DeSmogBlog* investigation reveals the company receiving that oil (http://www.chicagotribune.com/news/sns-rt-us-northdakota-derailment-energy-20131231,0,4807285.story) downstream from BNSF — Marquis Missouri Terminal LLC, incorporated in April 2012 (https://www.sos.mo.gov/BusinessEntity/soskb/Corp.asp?3329225) by Marquis Energy (http://www.marquisenergy.com/) — already admitted as much in a September 2012 permit application to the Missouri Department of Natural Resources (DNR) (http://www.dnr.mo.gov/env/apcp/permits/marquis-hayti012cp.pdf) .

The BNSF Direct (https://tankterminals.com/news_detail.php?id=2286) "bomb train (https://www.facebook.com/BombTrains) " that exploded in Casselton was destined for Marquis' terminal in Hayti, Missouri, according to *Reuters* (http://www.chicagotribune.com/news/sns-rt-us-northdakota-derailment-energy-20131231,0,4807285.story) . Hayti is a city of 2,939 located along the Mississippi River. From there, Marquis barges the oil southward along the Mississippi, where *Platts* reported the oil may eventually be refined (http://www.platts.com/latest-news/oil/houston/north-dakota-crude-by-rail-shipments-to-have-21020134) in a Memphis, Tennessee-based Valero refinery (http://www.valero.com/ourbusiness/ourlocations/refineries/pages/memphis.aspx) .

According to Marquis' website, its Hayti, Missouri terminal receives seven of BNSF Direct's 118-unit cars per week (http://www.marquisenergy.com/terminals/logistics.html) , with an on-site holding terminal capacity of 550,000 barrels of oil.

Marquis was one of many companies (http://www.crude-by-rail-destinations-2013.com/9/history/80/series-history/) in attendance at a major industry conference in Houston, Texas in February 2013, called "Upgrading Crude By Rail Capacity (http://www.crude-by-rail-destinations-2013.com/) ." Its September 2012 Missouri DNR permit application lends additional insight into how and why BNSF's freight train erupted so intensely in Casselton.

"Special Conditions"

Rather than a normal permit, Marquis was given a "special conditions" permit because the Bakken oil it receives from BNSF contains high levels of volatile organic compounds (VOCs), the same threat PHMSA noted in its recent safety alert.

Among the most crucial of the special conditions: Marquis must flare off the VOCs before barging the oil down the Mississippi River. (Flaring is already a highly controversial practice in the Bakken Shale region, where gas is flared off at rates comparable to Nigeria (http://www.desmogblog.com/investors-no-more-flaring-fracked-oil-and-gas-bakken-shale) .)

It's a tacit admission that the Bakken Shale oil aboard the exploded BNSF train in Casselton, ND is prone to such an eruption.

"Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment," explains the Marquis permit (http://www.dnr.mo.gov/env/apcp/permits/marquis-hayti012cp.pdf) . "There will be evaporative losses of Toluene, Xylene, Hexane, and Benzene from the crude oil handled by the installation."

Benzene is a carcinogen (http://www.cancer.org/cancer/cancercauses/othercarcinogens/intheworkplace/benzene) , while toluene (http://www.ccohs.ca/oshanswers/chemicals/chem_profiles/toluene.html) , xylene (http://www.epa.gov/ttn/atw/hlthef/xylenes.html) and hexane (http://www.epa.gov/iris/toxreviews/0486tr.pdf) are dangerous volatiles that can cause severe illnesses or even death at high levels of exposure.

Scientific Vindication

In a December 31 *Google Hangout* conversation (https://www.youtube.com/watch?v=QUEieToUeNg) between actor Mark Ruffalo, founder of *Water Defense,* (http://waterdefense.org/content/about-us) and the group's chief scientist Scott Smith (http://waterdefense.org/blog/mark-ruffalo-appoints-scott-smith-chief-scientist-water-defense) , Mr. Smith discussed the oil samples he collected on a previous visit to North Dakota's Bakken Shale (http://www.desmogblog.com/sites/beta.desmogblog.com/files/Baseline%20Oil%20Sands%20Dilbit%20%26%20Bakken%20Crude.pdf) .

"What I know from the testing I've done on my own — I went out to the Bakken oil fields and pumped oil from the well — I know there are unprecedented levels of these explosive volatiles: benzene, toluene, xylene," said Smith (https://www.youtube.com/watch?v=QUEieToUeNg) .

"And from the data that I've gotten from third parties and tested myself, 30 to 40 percent of what's going into those rail cars are explosive volatiles, again that are not in typical oils."

In an interview with *DeSmogBlog*, Smith said Marquis Energy's Missouri DNR permit application is in line with his own scientific findings, a vindication of sorts in the aftermath of the Casselton explosion.

"We must work to better understand the risks involved with the transportation of unconventional crude oil, whether diluted bitumen or Bakken fracked oil," Smith told *DeSmogBlog*.

"It all starts with scientifically and transparently understanding exactly what is in these crude oils, and working to set new safety standards to protect human lives and all waterways, wetlands, marshes and sensitive ecosystems."

It may be the dead of winter in North Dakota, but the Casselton explosion has shined a bright light on the myriad serious threats of Bakken oil rolling down the tracks through the backyards of thousands of Americans. The industry's secrecy about the explosiveness of this oil just went up in flames.

But how will the public react to the news that industry knew this could happen all along? With the Dec. 30 explosion in Casselton, and the deadly Bakken oil train explosion in Lac Megantic, Quebec last July, all North Americans ought to question the wisdom of extracting and transporting this highly dangerous oil.

Photo Credit: Kyle Potter (https://twitter.com/kpottermn/status/417794105649795072) | *Forum of Fargo-Moorhead* (http://www.inforum.com/)

Tags: casselton (/directory/vocabulary/14812) volatile organic compounds (/directory/vocabulary/14842) benzene (/directory/vocabulary/6159) toluene (/directory/vocabulary/10600) xylene (/directory/vocabulary/10601) hexane (/directory/vocabulary/14844) Valero North Dakota (/directory/vocabulary/14841) Bakken Shale (/directory/vocabulary/7174) shale oil (/directory/vocabulary/7277) fracking (/directory/vocabulary/5133) hydraulic fracturing (/directory/vocabulary/5137) Missouri Department of Natural Resources (/directory/vocabulary/14833) Water Defense (/directory/vocabulary/9326) Missouri DNR (/directory/vocabulary/14834) Marquis Energy (/directory/vocabulary/14835) Marquis Missouri Terminal LLC (/directory/vocabulary/14836) Missouri Department of State (/directory/vocabulary/14837) Mississippi River (/directory/vocabulary/7421) barging (/directory/vocabulary/14338) Louisiana (/directory/vocabulary/6181) Hayti Missouri (/directory/vocabulary/14838) Warren Buffett (/directory/vocabulary/7461) BNSF Railway (/directory/vocabulary/9053) BNSF Direct (/directory/vocabulary/14839) Berkshire Hathaway (/directory/vocabulary/7463) Burlington Northern Santa Fe (/directory/vocabulary/8243) Bomb Trains (/directory/vocabulary/14840)

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U.S. Refinery Benzene Emissions Increase in 2008:
Data Quality Concerns Undermine Confidence in Reported Data

Photo Credit: U.S. EPA, http://www.epa.gov/oust/graphics/miscpix2.htm.

The Environmental Integrity Project

Washington, D.C.

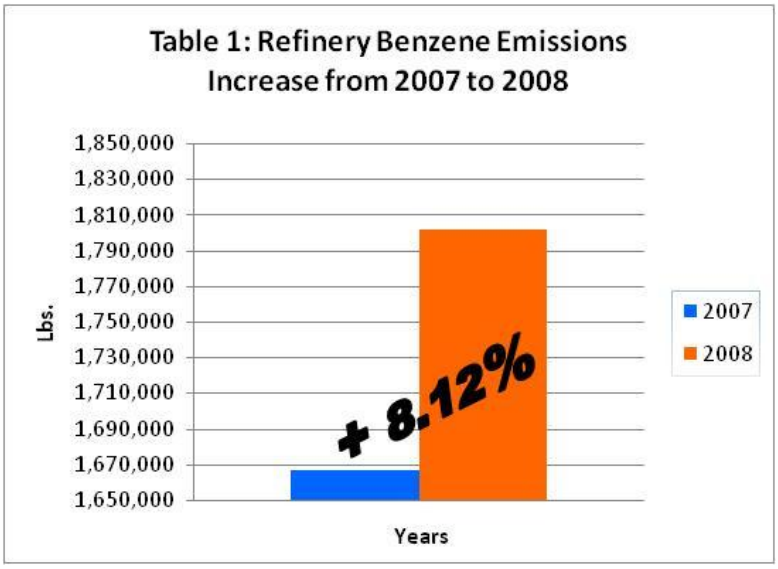
February 4, 2010

U.S. Refinery Benzene Emissions Increase in 2008: Data Quality Concerns Undermine Confidence in Reported Data

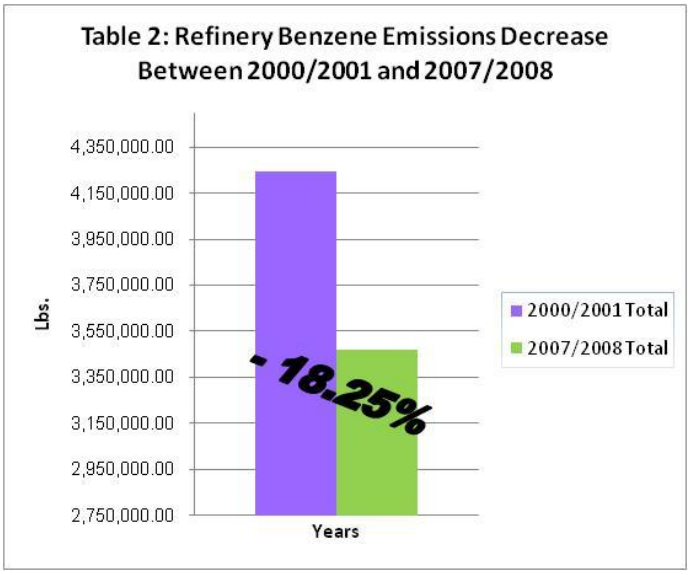
A Report by the Environmental Integrity Project

Trends in Benzene Emissions from U.S. Refineries

Refinery emissions of benzene, a known human carcinogen, increased more than 8% between 2007 and 2008, according to company reports to the Environmental Protection Agency's (EPA) Toxics Release Inventory (TRI). See Table 1. This came despite a decline in the demand for petroleum products in 2008, which led some U.S. refineries to reduce production.[1] Of all U.S. refineries, the four refineries with the largest total emissions increases between 2007 and 2008 were Citgo's Westlake refinery in Louisiana, BP's Texas City refinery in Texas, Sunoco's Philadelphia refinery in Pennsylvania, and Sunoco's Marcus Hook refinery also in Pennsylvania. See Attachment A for complete refinery totals.[2] In addition, concerns over inconsistent emissions reporting and inaccurate emissions factors used to predict actual discharges suggest that these numbers significantly *underreport* actual benzene emissions, creating problems for the agencies relying on this data for permitting and enforcement.[3]



The good news is that long-term emissions of benzene appear to have declined. In fact, benzene emissions from all refineries decreased by more than 18% when comparing emissions from 2000/2001 to 2007/2008. See Table 2. For example, the Conoco Wood River refinery in Illinois decreased its emissions by 400,277 pounds from 2000/2001 to 2007/2008. See Table 3 and Attachment B, "U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)." The reductions at Wood River actually account for more than half the total reductions in benzene emissions from all U.S. refineries between

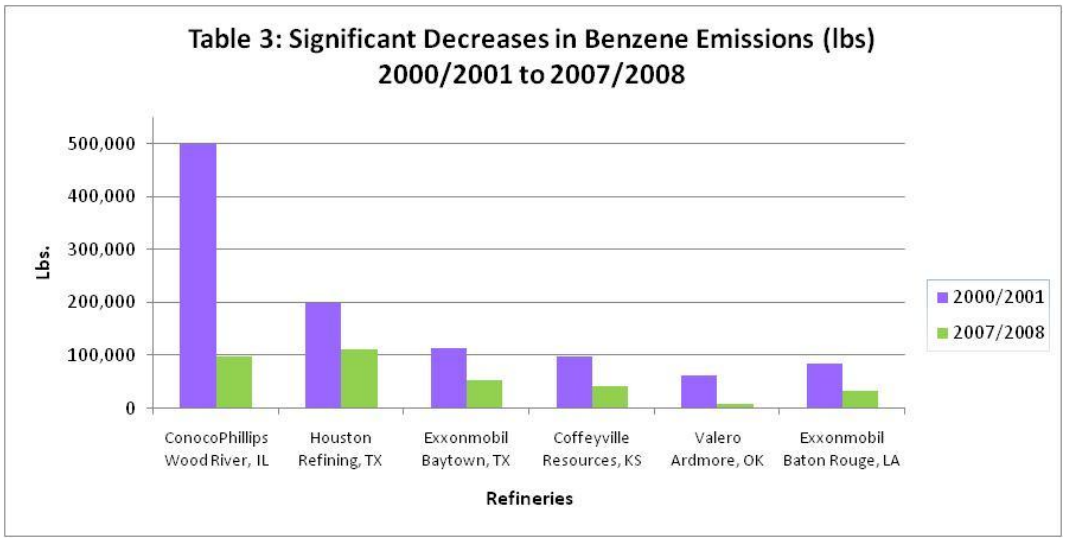


[1] U.S. Department of Energy, Office of Oil and Gas, Energy Information Administration, "Petroleum Marketing Annual 2008" (Aug. 2009).

[2] This research represents all U.S. refineries identified on EPA's TRI website, with the exception of several asphalt plants mislabeled as refineries, terminals and docks with separately reported emissions, plants that reported zero emissions for two years or more, and plants for which data was not available.

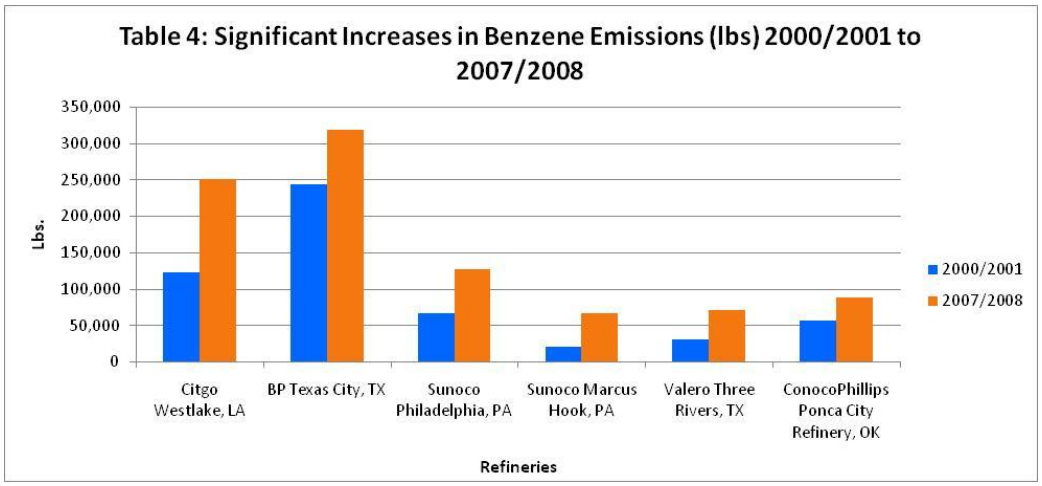
[3] See discussion below, entitled "Data Quality Concerns Regarding Benzene Emissions Monitoring and Reporting."

2001/2002 and 2007/2008.[4] In addition, Houston Refining LP's refinery reduced its emissions by 88,227 pounds from 2000/2001 to 2007/2008. These reductions have been driven in part by Clean Air Act rules that limit emissions of smog-forming chemicals like benzene, as well as enforcement actions that require new controls for flares, process units, and wastewater treatment systems.



See Attachment B, "U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)."

Nevertheless, while overall emissions have declined, reported benzene emissions at some refineries continue to increase. See Table 4. For example, combined fugitive and stack emissions at Citgo's Westlake refinery in Louisiana increased by 129,112 pounds from 2000/2001 to 2007/2008. At BP's Texas City refinery, emissions increased by 76,200 pounds from 2000/2001 to 2007/2008. In addition, Sunoco's Philadelphia refinery increased emissions by 60,434 pounds from 2000/2001 to 2007/2008. The increase at Citgo's Westlake refinery appears to be the result of an accident that leaked 92,578 pounds of benzene in December 2008.[5] The leak occurred over a period of less than four hours, and nearly all of the benzene volatilized into the air.



See Attachment B, "U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)."

[4] Excluding Wood River, which accounted for 52% of emissions reductions, emissions from all other refineries declined only 10% since the beginning of the decade.

[5] The Westlake refinery is also known as the Lake Charles refinery. Citgo filed a notification report for the unauthorized discharge on January 6, 2009 with Louisiana environmental authorities, Case No. 08-07877.

Data Quality Concerns Regarding Benzene Emissions Monitoring and Reporting

Continued uncertainty over the quality and accuracy of reporting makes it difficult to know how much real progress has been made in the effort to decrease benzene emissions. Some companies that report relatively high emissions may actually be doing a more careful job measuring their releases than others. However, there is also evidence that benzene emissions on the whole are being underreported due to outdated and inaccurate emission factors and conflicting reports submitted by industry.

Inconsistent Emissions Reports Submitted by Refineries

Some refineries have submitted conflicting reports on their emissions that undermine confidence in the quality of their data. See Table 5. For example, the Delek refinery in Tyler, Texas reported releasing 40,920 pounds of benzene to the state's emissions inventory (EI) in 2007, but reported only 5,977 pounds to EPA's Toxics Release Inventory (TRI) for the same year. Also, Valero Refining's Corpus Christi East refinery reported 27,366 pounds to EI and 38,561 pounds to TRI. These inconsistencies cast doubt on industry reports and may compromise the efforts of regulators who rely on that data for permitting and enforcement efforts.

Table 5: Inconsistent Emissions Reports Submitted by Refineries

COMPANY	EI (Lbs.)	TRI (Lbs.)
Delek	40,920	5,977
Valero Corpus Christi East	27,366.20	38,561

Actual Emissions Much Higher Than Reported Emissions

Remote sensing measurements have recorded much higher emissions of benzene and other pollutants than are typically reported by industry. For example, a 2006 report prepared by the Alberta Research Council monitored emissions at a Canadian refinery from fugitive sources such as leaking valves and fittings, vents, cooling towers, tanks, and the coker area.[6] The highest fugitive benzene emissions were recorded from the coker area (including the vacuum unit and water pond), final product tanks, and crude feed tanks. The report was conducted using remote sensing technology called DIAL (Differential Absorption Light Detection and Ranging), which measures quantities of fugitive emissions over a short period of time and then extrapolates the data to estimate annual emissions.

The Alberta study concluded that emissions can be significantly affected by variables such as tank size, design, type of liquid, level of fill, and wind speed, among other factors.

Measurements taken at the Alberta refinery depicted a four-fold increase in benzene emissions from facility tanks when wind speed increased from 10 km/hr (6.2 mph) to 30 km/hr (18.6 mph).

However, Canada's NPRI (National Pollutant Release Inventory) emissions factors do not account well for these variables. For example, the NPRI estimated benzene releases from storage or handling to be 0.265 tons (530 pounds) per year, while the DIAL method predicted annual emissions of 25.4

[6] Allan Chambers, P. Eng., & Mel Strosher, Alberta Research Council, Inc., Refinery Demonstration of Optical Technologies for Measurement of Fugitive Emissions and for Leak Detection (revised Nov. 1, 2006).

tons (50,800 pounds) – nearly 100 times that of the NPRI estimates. These results are particularly significant to Americans because Canada's NPRI emission factors are based on factors developed more than 25 years ago by the U.S. EPA that are still used to estimate emissions at U.S. refineries.

Because of DIAL's greater accuracy, the City of Houston has petitioned EPA use DIAL and other remote sensing technologies to obtain more accurate data on refinery emissions, and to use the information to revise or replace the outmoded emission factors upon which EPA and the refinery industry have relied for decades.

Refineries also frequently underestimate emissions from flares, using EPA approved methodologies that assume that 98% of the volatile organic compounds (which include benzene) that are released to a flare are destroyed in the combustion process. But a DIAL remote sensing study performed by the UK's National Physical Laboratory and conducted at BP's Texas City refinery identified a flare with combustion efficiencies closer to 50%.[7] In other words, half the pollutants were being released directly to the environment instead of being consumed by the flare. That same study found that one flare released emissions of volatile organic compounds at a rate 25 times higher than the standard methods used to estimate emissions from this source.

In 2006, a study by Houston-based Industrial Professionals for Clean Air (IPCA) further corroborated the underestimation of fugitive emissions from flares. The IPCA study concluded that large amounts of unrecognized emissions were being emitted from facility flare stacks due to a poor understanding of the effect that variables such as wind speed have on flare combustion benzene reduction. As a result, regulators and facilities were underestimating the release of benzene and other pollutants coming from flare stacks.[8]

According to IPCA, refineries in Texas report flare emissions based on 1983 estimation methods developed by EPA and the Texas Commission on Environmental Quality that assume flares operate under ideal weather conditions with maximum wind speeds of 5 miles per hour. But in the real world, the winds can blow much harder, and combustion inefficiency increases exponentially with crosswinds at just 10 miles per hour. Chemical compounds must be burned within a flare flame for a certain period of time in order to break down. The IPCA report points out that crosswinds can cause a flare to separate from the tip, leading to major increases in emissions during emergency flaring events. Furthermore, operation variables such as steam input used to balance the flare combustion can be affected by crosswinds that separate the flare from the burner. Inadequate estimates that do not factor in these types of variables lead to a significant underreporting of benzene emissions.

Alternative technologies do exist, however. The IPCA's report recommends replacement of traditional flares with fuel gas recovery systems that recapture and recycle gases from anticipated facility emissions. Also, in lieu of the traditional elevated flare, enclosed ground flares, incinerators, and thermal oxidizers are more combustion efficient and less susceptible to wind.

Other major sources of benzene are not just poorly measured – often they are not measured at all. For example, refinery coker ponds represent a huge source of unregulated fugitive toxic pollutant emissions, including benzene, toluene, ethyl benzene, and xylene (BTEX). Coker units used in oil

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[7] National Physical Laboratory (UK), Measurements of VOC Emissions from Petrochemical Industry Sites in the Houston Area Using Differential Absorption Lidar (DIAL) for Summer 2007 (unpublished report for Texas CEQ) (Feb. 2008).
[8] Robert E. Levy, Lucy Randel, Meg Healy, & Don Weaver, Industrial Professionals for Clean Air, Reducing Emissions from Plant Flares (revised Apr. 24, 2006).

refining are cleaned out with water that is sometimes routed to wastewater settling ponds. Once discharged into the pond, toxic pollutants can volatilize into the air. A 1991 EPA study identified the coker pond area as the largest source of unregulated benzene emissions at Amoco's refinery in Yorktown, Virginia.[9] Despite these shockingly high toxic emissions, EPA has yet to set standards of performance to control emissions from the coker pond area.

Table 6: Causes of Uncertainty in Benzene Emissions Data

Problems	Research Conclusions
Inaccurate Fugitive Emission Estimates	While Canada's NPRI methodology estimated a facility's storage handling benzene emissions to be 530 pounds a year, Alberta Research Council's DIAL system determined that 50,800 pounds are actually emitted – a 9,485% difference. (Alberta Research Council's 2006 Report: "Refinery Demonstration of Optical Technologies for Measurement of Fugitive Emissions and for Leak Detection.")
Inaccurate Flare Emissions Estimates	EPA relies upon decades old data to predict benzene emissions from flares, which presumes that flares operate under ideal weather conditions with no more than five mph crosswinds. However, the benzene reduction efficiency of flares reduces exponentially when winds reach just 10 mph, a common occurrence for elevated flare stacks. (Industrial Professionals for Clean Air's 2006 Paper: "Reducing Emissions from Plant Flares.")
No Emissions Measurement or Standards for Coker Ponds	EPA determined that coker settling ponds at an Amoco refinery released 97,400 ug/min/m^2 of toxic pollutants such as benzene, toluene, ethyl benzene, and xylene. Although EPA performed that study in 1991, it has yet to promulgate standards of performance to regulate emissions from coker ponds, meaning that coker pond benzene emissions are not factored into overall emissions. (EPA's 1991 study: Amoco-EPA, Pollution Prevention Project, Yorktown, Virginia: Measurements of Hydrocarbon Emissions and Ambient Air Concentrations at the Amoco Yorktown Refinery.")
Conflicting Emission Reports	In 2007, the Delek refinery in Texas reported 40,920 pounds of benzene emissions to EPA's Emissions Inventory (EI), but only 5,977 pounds to EPA's Toxics Release Inventory (TRI). Also in 2007, Valero Refining's Corpus Christi East refinery reported 27,366 pounds to EI and 38,561 pounds to TRI. (EPA databases: http://www.epa.gov/ttn/chief/eiinformation.html, http://www.epa.gov/tri/)

Virtually every U.S. refinery now operates under a consent decree with U.S. EPA that requires significant reductions of benzene and other pollutants.[10] These enforcement actions, combined with tighter standards and voluntary action by some refineries have no doubt made a difference – the question is just how much. See Table 6. EPA should take the following actions to improve monitoring, and build greater public confidence in the industry's emission reports.

[9] Amoco-EPA, Pollution Prevention Project, Yorktown, Virginia: Measurements of Hydrocarbon Emissions and Ambient Air Concentrations at the Amoco Yorktown Refinery: Air Quality Data, vol. 1 (Sept. 30, 1991).
[10] See EPA, Petroleum Refinery National Priority Case Results, available at http://www.epa.gov/compliance/resources/cases/civil/caa/oil/index.html.

Recommendations:

- Refineries should be required to use remote sensing technology such as DIAL to check and recalibrate emissions factors.
- Regulators should recalibrate emissions estimates to factor in variables such as wind speed. This should take place when EPA revisits emissions factors as promised in a recent Federal Register notice.[11]
- Emissions from cokers and coker ponds need to be better measured, and EPA should develop standards to limit benzene releases from these sources.
- Toxic emissions reporting to EPA's EI and TRI databases needs to be consistent and represent an accurate picture of refinery emissions.

[11] "Emissions Factors Program Improvements," 74 Fed. Reg. 52,723 (Oct. 14, 2009).

ATTACHMENT A

U.S. Refinery Benzene Emissions

Attachment A: U.S. Refinery Benzene Emissions (pounds/year)

Facility, City, State	2000		2001		2007		2008	
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack
Age Refining Inc., San Antonio, TX	250	250	250	250	750	250	1,360	2,900
Alon Refining Krotz Springs Inc., Krotz Springs, LA	4,163	1,297	2,392	1,644	2,819	2,989	2,659	3,909
Alon USA - Big Spring Refinery, Big Spring, TX	18,037	12,780	9,370	21,334	811	16,462	2,837	15,391
American Refining Group Inc., Bradford, PA	554	140	250	250	67	272	77	282
Big West Of California Refinery, Bakersfield, CA	250	250	250	750	250	750	210	828
Big West Oil LLC, North Salt Lake, UT	4,796	0	4,762	0	5,686	0	5,642	0
BP Cherry Point Refinery, Blaine, WA	41,000	2,200	17,000	3,000	3,100	3,900	2,940	3,680
BP Products North America Inc. Texas City Refinery, Texas City, TX	57,000	110,000	4,800	71,000	40,000	110,000	19,000	150,000
BP Products North America Inc. Toledo Refinery, Oregon, OH	4,800	8,300	4,900	6,400	6,900	2,700	5,600	3,800
BP Products North America Whiting, Whiting, IN	12,000	42,000	9,500	4,300	1,253	9,500	19,000	6,500
BP West Coast Products LLC Carson, Carson, CA	908	1,238	684	1,172	846	946	731	786
Calcasieu Refining Co., Lake Charles, LA	2,379	250	1,544	157	496	17,174	553	8,864
Catlettsburg Refining LLC, Catlettsburg, KY	25,068	12,460	25,341	5,365	7,671	11,944	7,588	9,849
Chalmette Refining LLC, Chalmette, LA	46,000	6,000	48,000	8,000	19,400	19,200	12,600	16,500
Chevron Products Co. - Hawaii Refinery, Kapolei, HI	5,970	2,840	1,343	3,393	3,500	1,000	3,700	1,100
Chevron Products Co. - Salt Lake Refinery, Salt Lake City, UT	250	1,200	750	2,200	250	2,000	250	2,500
Chevron Products Co. Div Of Chevron USA Inc., El Segundo, CA	305	1,345	256	1,765	236	975	310	2,200
Chevron Products Co. Pascagoula Refinery, Pascagoula, MS	20,000	26,000	28,000	24,000	33,000	19,000	35,000	17,000
Chevron Products Co. Richmond Refinery, Richmond, CA	3,900	6,700	3,800	2,500	1,500	2,800	2,000	2,300
CHS Inc. Laurel Refinery, Laurel, MT	2,200	1,500	2,600	1,400	2,200	1,700	2,200	2,000
Citgo Petroleum Corp., Westlake, LA	27,673	28,404	33,182	32,521	28,172	53,172	27,391	142,157
Citgo Refining & Chemicals Co. LP - West Plant, Corpus Christi, TX	776	22	1,210	23	229	6	601	19
Citgo Refining & Chemicals Co. LP East Plant, Corpus Christi, TX	19,266	15,064	19,949	15,234	8,418	8,618	16,608	7,610
Coffeyville Resources Refining & Marketing, Coffeyville, KS	1,400	46,720	1,400	48,320	31,806	804	9,140	1,145
ConocoPhillips Co. - Bayway Refinery, Linden, NJ	23,000	9,000	3,100	5,900	2,200	4,600	3,700	4,000

Attachment A: U.S. Refinery Benzene Emissions (pounds/year)

Facility, City, State	2000		2001		2007		2008	
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack
ConocoPhillips Co. - Trainer Refinery, Trainer, PA	1,730	1,192	1,477	1,382	1,452	2,030	1,769	1,998
ConocoPhillips Co. Billings Refinery, Billings, MT	3,100	2,100	2,300	2,400	8,500	2,200	6,300	2,100
ConocoPhillips Co. Sweeny Refinery Complex, Old Ocean, TX	5,510	39,693	6,633	27,872	12,000	9,300	26,000	9,200
ConocoPhillips Ferndale Refinery, Ferndale, WA	610	1,400	571	1,438	4,900	2,200	5,388	2,387
ConocoPhillips La Refinery Wilmington Plant, Wilmington, CA	61	412	73	378	290	600	320	570
ConocoPhillips Lake Charles Refinery, Westlake, LA	4,810	6,362	4,774	9,085	8,673	5,979	10,117	7,308
ConocoPhillips Los Angeles Refinery Carson Plant, Carson, CA	63	387	68	165	90	490	110	480
ConocoPhillips Ponca City Refinery, Ponca City, OK	17,892	8,935	3,072	25,840	29,250	5,451	34,250	18,998
ConocoPhillips San Francisco Refinery, Rodeo, CA	750	1,000	1,800	1,000	2,000	700	1,900	660
ConocoPhillips Santa Maria Facility-Refinery, Arroyo Grande, CA	160	225	180	230	190	270	200	250
ConocoPhillips Wood River Refinery, Roxana, IL*	280,000	16,000	190,000	12,000	27,590	21,518	24,580	24,035
ConocoPhilllips Co. Borger Refinery, Borger, TX**	36,696	24,405	35,758	9,395	22,000	13,000	34,000	12,000
Convent Refinery, Convent, LA	1,500	1,400	1,300	1,700	682	2,923	771	2,354
Countrymark Refinery, Mount Vernon, IN	3,572	771	1,930	465	392	269	398	241
Delek Refining Ltd., Tyler, TX	19,000	1,900	21,000	2,300	1,367	4,610	4,440	4,440
Ergon West Virginia Inc., Newell, WV	1,150	974	950	796	383	1,553	53	1,023
ExxonMobil Billings Refinery, Billings, MT	3,100	6,500	1,300	6,200	970	3,000	1,800	2,200
ExxonMobil Oil Beaumont Refinery, Beaumont, TX	12,000	6,200	12,000	11,000	3,700	5,700	3,700	7,202
ExxonMobil Oil Corp. - Torrance Refinery, Torrance, CA	740	3,000	670	3,200	530	5,400	560	5,600
ExxonMobil Oil Corp. Joliet Refinery, Channahon, IL	1,357	1,203	2,215	1,641	1,928	3,101	1,826	1,713
ExxonMobil Refining & Supply Baton Rouge Refinery, Baton Rouge, LA	24,334	13,190	19,423	28,173	11,000	7,800	8,800	5,000
ExxonMobil Refining & Supply Baytown Refinery, Baytown, TX	7,642	54,239	9,809	42,385	4,300	21,700	4,300	23,900
Flint Hills Resources Alaska LLC, North Pole, AK	2,900	3,300	2,900	3,200	3,200	2,400	3,200	1,570
Flint Hills Resources LP - East Plant, Corpus Christi, TX	12,010	5,053	3,765	3,487	3,986	3,926	3,840	2,914

Attachment A: U.S. Refinery Benzene Emissions (pounds/year)

Facility, City, State	2000		2001		2007		2008	
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack
Flint Hills Resources LP - West Plant, Corpus Christi, TX	28,813	20,634	31,621	14,863	38,479	22,503	33,189	18,798
Flint Hills Resources LP, Rosemount, Clark Rd, MN	2,500	8,000	5,400	9,000	340	5,700	380	5,600
Frontier El Dorado Refining Co., El Dorado, KS	16,000	15,000	11,000	14,000	7,182	19,347	11,637	11,259
Frontier Refining Inc., Cheyenne, WY	3,885	2,020	3,703	1,787	1,075	5,413	1,085	5,454
Hess Corp. - Port Reading Refinery, Port Reading, NJ	162	2,378	177	2,531	1,120	3,652	509	1,693
Holly Refining & Marketing Co. Woods Cross Refinery, Woods Cross, UT	6,400	1,700	6,500	2,100	12,100	3,900	8,700	1,300
Houston Refining LP, Houston, TX	51,113	53,428	57,527	37,614	63,827	14,158	24,187	9,283
Hovensa LLC, Christiansted, VI	5,684	18,480	4,192	19,364	4,647	19,220	4,816	19,538
Hunt Refining Co. A Corp., Tuscaloosa, AL	7,569	1,220	7,637	1,064	4,710	692	4,268	788
Hunt Southland Refining Co. - Sandersville, Heidelberg, MS	500	7,400	500	7,400	92	581	111	497
Kern Oil & Refining Co., Bakersfield, CA	750	250	750	250	250	250	250	250
Lima Refining Co., Lima, OH	8,821	13,359	25,799	13,412	4,700	18,047	4,679	13,005
Lion Oil Co., El Dorado, AR	16,718	9,697	16,632	11,736	6,032	11,926	6,850	7,596
Marathon Ashland Petroleum LLC Illinois Refining Div, Robinson, IL	20,393	5,096	21,477	8,086	6,876	10,987	7,546	8,643
Marathon Petroleum Co. LLC - Michigan Refining Div, Detroit, MI	2,200	4,200	2,800	3,600	3,244	1,709	5,231	2,742
Marathon Petroleum Co. LLC Ohio Refining Div, Canton, OH	5,535	5,149	7,261	4,235	9,490	4,297	6,323	3,855
Marathon Petroleum Co. LLC Saint Paul Park Refiner, Saint Paul Park, MN	6,291	1,358	11,085	1,288	8,413	12,004	5,061	4,419
Marathon Petroleum Co. LLC, Texas City, TX	19,610	17,600	23,241	10,883	4,166	22,016	2,627	23,065
Marathon Petroleum Corp. Garyville, Garyville, LA	4,492	4,154	2,434	4,455	15,000	1,600	12,394	2,065
Montana Refining Co. Inc., Great Falls, MT	250	250	1,400	250	2	7,959	20	9,355
Motiva Enterprises LLC Norco Refinery, Norco, LA	8,700	5,200	8,626	9,129	4,167	11,680	5,855	7,186
Motiva Enterprises LLC, Port Arthur, TX	1,440	1,420	702	1,502	13,651	1,059	13,597	1,296
Murphy Oil USA Inc. Meraux Refinery, Meraux, LA	6,643	1,917	6,789	3,581	3,352	3,765	4,955	4,509
Murphy Oil USA Inc., Superior, WI	709	279	651	652	3,927	2,213	3,918	2,015
National Co-Op Refinery Assoc, McPherson, KS	16,600	8,400	13,540	10,220	6,466	2,803	4,352	2,654

Attachment A: U.S. Refinery Benzene Emissions (pounds/year)

Facility, City, State	2000		2001		2007		2008	
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack
Navajo Refining Co., Artesia, NM	15,508	3,020	6,995	3,020	11,723	983	18,634	1,052
Pasadena Refining System,Inc., Pasadena, TX	10,574	4,798	10,574	4,630	17,000	2,500	7,590	4,539
Placid Refining Co. LLC, Port Allen, LA	3,274	1,330	3,274	1,330	1,089	5,453	484	4,023
Premcor Refining Group Inc., Delaware City, DE	8,500	1,000	18,000	1,200	1,723	3,403	2,399	4,228
Shell Chemical Yabucoa Inc., Yabucoa, PR	2,856	528	1,109	205	10,868	811	9,107	1,192
Shell Oil Co. Deer Park Refining LP, Deer Park, TX	5,800	17,000	6,600	21,000	279	15,314	4,176	18,242
Shell Oil Products US - Martinez Refinery, Martinez, CA	560	1,400	590	2,600	580	1,400	400	1,100
Shell Oil Products US - Puget Sound Refinery, Anacortes, WA	1,010	1,920	1,700	2,200	820	910	590	1,200
Silver Eagle Refining Woods Cross, Woods Cross, UT	957	417	2,749	466	1,197	820	885	484
Sinclair Casper Refining Co., Casper, WY	3,343	973	6,300	1,100	3,270	4,065	594	1,463
Sinclair Tulsa Refining Co., Tulsa, OK	250	1,989	5,300	1,700	7,400	5,400	10,000	3,300
Sinclair Wyoming Refining Co., Sinclair, WY	8,694	3,546	10,000	7,000	25,000	3,500	25,000	2,900
Suncor Energy Commerce City Refinery, Commerce City, CO	1,401	1,457	1,635	1,357	157	926	88	694
Sunoco Inc. (R&M) Eagle Point Facility, Westville, NJ	11,563	11,966	11,514	13,614	10,187	6,505	2,349	5,037
Sunoco Inc., Oregon, OH	3,000	3,510	3,900	2,724	2,011	2,508	2,050	2,530
Sunoco, Inc. (R&M) - Marcus Hook Refinery, Marcus Hook, PA	1,700	7,300	1,600	10,218	7,754	13,253	26,932	19,024
Sunoco, Inc. (R&M) Philadelphia Refinery, Philadelphia, PA	34,576	4,975	21,613	4,974	20,625	8,187	65,600	32,160
Tesoro Alaska - Kenai Refinery, Kenai, AK	4,883	4,199	7,520	2,836	6,400	4,100	4,500	2,600
Tesoro Hawaii Refinery, Kapolei, HI	290	6,347	917	2,910	1,965	2,859	3,231	2,283
Tesoro Refining & Marketing Co. - Mandan Refinery, Mandan, ND	16,000	1,500	16,000	1,300	6,000	750	3,300	850
Tesoro Refining & Marketing Co., Anacortes, WA	5,100	11,240	5,125	10,971	3,814	6,188	6,917	2,265
Tesoro Refining & Marketing Co., Martinez, CA	1,100	6,200	1,600	6,700	980	4,800	1,300	4,700
Tesoro Refining & Marketing Co., Salt Lake City, UT	750	3,000	1,100	3,000	4,800	3,100	12,000	3,300
Total Petrochemicals USA Inc. - Port Arthur Refinery, Port Arthur, TX	15,801	17,885	11,325	19,032	10,040	5,151	11,181	4,871
Ultramar Inc. Wilmington Refinery, Wilmington, CA	240	440	170	470	217	470	316	424

Attachment A: U.S. Refinery Benzene Emissions (pounds/year)

Facility, City, State	2000		2001		2007		2008	
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack
United Refining Co., Warren, PA	2,200	3,400	2,030	1,500	2,470	3,679	2,680	3,671
US Oil & Refining Co., Tacoma, WA	1,667	454	1,165	1,201	991	700	1,220	1,070
Valero McKee, Sunray, TX***	1,260	6,420	340	6,088	3,002	1,344	2,611	4,728
Valero Refining - New Orleans LLC, New Sarpy, LA	265	6,598	10,783	6,553	1,300	4,000	1,200	3,200
Valero Refining - Texas LP Corpus Christi West Plant, Corpus Christi, TX	2,357	7,167	2,393	7,052	2,658	8,816	2,688	12,886
Valero Refining - Texas LP Houston Refinery, Houston, TX	1,170	11,697	1,165	12,414	6,296	6,824	4,271	3,944
Valero Refining - Texas LP, Texas City, TX	2,962	16,875	2,962	14,089	475	8,559	580	15,245
Valero Refining Co. - California Benicia Refinery, Benicia, CA	4,400	5,400	4,800	5,300	12,180	5,686	4,246	2,673
Valero Refining Co. - New Jersey, Paulsboro, NJ	5,921	2,919	6,561	2,865	3,336	7,516	2,699	11,341
Valero Refining Co. -Oklahoma Valero Ardmore Refinery, Ardmore, OK	6,460	27,280	27,772	18	1,460	2,939	1,558	2,718
Valero Refining Co. Tennessee LLC, Memphis, TN	3,147	3,244	3,575	2,771	3,120	3,744	2,524	4,362
Valero Refining Texas LP Corpus Christi East Plant, Corpus Christi, TX	40,021	11,028	34,945	11,102	19,331	19,230	8,916	19,053
Valero Three Rivers Refinery, Three Rivers, TX	7,327	8,162	7,331	7,097	12,360	20,606	23,502	14,397
Valero, Port Arthur, TX****	3,800	4,500	4,045	4,428	2,655	9,290	1,482	9,431
Western Refining Bloomfield Refinery, Bloomfield, NM	458	3,232	458	3,207	1,566	3,440	1,839	7,023
Western Refining Co. El Paso Refinery, El Paso, TX	6,300	2,250	2,150	3,450	4,733	4,555	5,700	3,100
Western Refining Southwest Inc. - Gallup Refinery, Jamestown, NM	2,544	7,451	2,629	7,435	3,798	7,652	5,540	12,737
Wynnewood Refining Co., Wynnewood, OK	4,600	8,200	2,100	8,400	3,500	3,700	2,600	3,300
Wyoming Refining Co., Newcastle, WY	250	750	750	750	39	342	129	803
Yorktown Refinery, Grafton, VA	560	2,600	1,882	1,702	909	1,535	1,021	1,722
TOTAL	**1,259,809**	**1,001,957**	**1,097,091**	**883,591**	**816,320**	**851,875**	**829,486**	**972,192**

Source: EPA, TRI Database. (Note: This list represents all U.S. refineries identified on EPA's TRI website, with the exception of several asphalt plants mislabeled as refineries, terminals and docks with separately reported emissions, plants that reported zero emissions for two years or more, and plants for which data was not available).

* Listed in TRI as "Wood River Refinery."

** Listed in TRI as "Borger Refinery."

*** Listed in TRI as "Diamond Shamrock Refining Co. LP."

**** Listed in TRI as "Premcor Refining Group."

ATTACHMENT B

U.S. Refinery Benzene Emissions Changes
From 2000/2001 to 2007/2008 in Ranked Order
(pounds)

Attachment B: U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)

Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
ConocoPhillips Wood River Refinery, Roxana, IL*	280,000	16,000	190,000	12,000	27,590	21,518	24,580	24,035	-400,277
Houston Refining LP, Houston, TX	51,113	53,428	57,527	37,614	63,827	14,158	24,187	9,283	-88,227
ExxonMobil Refining & Supply Baytown Refinery, Baytown, TX	7,642	54,239	9,809	42,385	4,300	21,700	4,300	23,900	-59,875
Coffeyville Resources Refining & Marketing, Coffeyville, KS	1,400	46,720	1,400	48,320	31,806	804	9,140	1,145	-54,945
Valero Refining Co. -Oklahoma Valero Ardmore Refinery, Ardmore, OK	6,460	27,280	27,772	18	1,460	2,939	1,558	2,718	-52,855
ExxonMobil Refining & Supply Baton Rouge Refinery, Baton Rouge, LA	24,334	13,190	19,423	28,173	11,000	7,800	8,800	5,000	-52,520
BP Cherry Point Refinery, Blaine, WA	41,000	2,200	17,000	3,000	3,100	3,900	2,940	3,680	-49,580
Chalmette Refining LLC, Chalmette, LA	46,000	6,000	48,000	8,000	19,400	19,200	12,600	16,500	-40,300
Total Petrochemicals USA Inc. - Port Arthur Refinery, Port Arthur, TX	15,801	17,885	11,325	19,032	10,040	5,151	11,181	4,871	-32,800
National Co-Op Refinery Assoc, McPherson, KS	16,600	8,400	13,540	10,220	6,466	2,803	4,352	2,654	-32,485
BP Products North America Whiting, Whiting, IN	12,000	42,000	9,500	4,300	1,253	9,500	19,000	6,500	-31,547
Catlettsburg Refining LLC, Catlettsburg, KY	25,068	12,460	25,341	5,365	7,671	11,944	7,588	9,849	-31,182
Valero Refining Texas LP Corpus Christi East Plant, Corpus Christi, TX	40,021	11,028	34,945	11,102	19,331	19,230	8,916	19,053	-30,566
Delek Refining Ltd., Tyler, TX	19,000	1,900	21,000	2,300	1,367	4,610	4,440	4,440	-29,343
Citgo Refining & Chemicals Co. LP East Plant, Corpus Christi, TX	19,266	15,064	19,949	15,234	8,418	8,618	16,608	7,610	-28,259
ConocoPhillips Co. - Bayway Refinery, Linden, NJ	23,000	9,000	3,100	5,900	2,200	4,600	3,700	4,000	-26,500
Alon USA - Big Spring Refinery, Big Spring, TX	18,037	12,780	9,370	21,334	811	16,462	2,837	15,391	-26,019
ConocoPhilllips Co. Borger Refinery, Borger, TX**	36,696	24,405	35,758	9,395	22,000	13,000	34,000	12,000	-25,254
Sunoco Inc. (R&M) Eagle Point Facility, Westville, NJ	11,563	11,966	11,514	13,614	10,187	6,505	2,349	5,037	-24,579
Tesoro Refining & Marketing Co. - Mandan Refinery, Mandan, ND	16,000	1,500	16,000	1,300	6,000	750	3,300	850	-23,900
ConocoPhillips Co. Sweeny Refinery Complex, Old Ocean, TX	5,510	39,693	6,633	27,872	12,000	9,300	26,000	9,200	-23,208
Lion Oil Co., El Dorado, AR	16,718	9,697	16,632	11,736	6,032	11,926	6,850	7,596	-22,379

Attachment B: U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)

Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
Marathon Ashland Petroleum LLC Illinois Refining Div, Robinson, IL	20,393	5,096	21,477	8,086	6,876	10,987	7,546	8,643	-21,000
Lima Refining Co., Lima, OH	8,821	13,359	25,799	13,412	4,700	18,047	4,679	13,005	-20,960
ExxonMobil Oil Beaumont Refinery, Beaumont, TX	12,000	6,200	12,000	11,000	3,700	5,700	3,700	7,202	-20,898
Marathon Petroleum Co. LLC, Texas City, TX	19,610	17,600	23,241	10,883	4,166	22,016	2,627	23,065	-19,460
Premcor Refining Group Inc., Delaware City, DE	8,500	1,000	18,000	1,200	1,723	3,403	2,399	4,228	-16,947
Hunt Southland Refining Co. - Sandersville, Heidelberg, MS	500	7,400	500	7,400	92	581	111	497	-14,519
Valero Refining - New Orleans LLC, New Sarpy, LA	265	6,598	10,783	6,553	1,300	4,000	1,200	3,200	-14,499
Tesoro Refining & Marketing Co., Anacortes, WA	5,100	11,240	5,125	10,971	3,814	6,188	6,917	2,265	-13,252
Flint Hills Resources LP, Clark Rd, Rosemount, MN	2,500	8,000	5,400	9,000	340	5,700	380	5,600	-12,880
Shell Oil Co. Deer Park Refining LP, Deer Park, TX	5,800	17,000	6,600	21,000	279	15,314	4,176	18,242	-12,389
Valero Refining - Texas LP, Texas City, TX	2,962	16,875	2,962	14,089	475	8,559	580	15,245	-12,029
Wynnewood Refining Co., Wynnewood, OK	4,600	8,200	2,100	8,400	3,500	3,700	2,600	3,300	-10,200
Flint Hills Resources LP - East Plant, Corpus Christi, TX	12,010	5,053	3,765	3,487	3,986	3,926	3,840	2,914	-9,649
ExxonMobil Billings Refinery, Billings, MT	3,100	6,500	1,300	6,200	970	3,000	1,800	2,200	-9,130
Chevron Products Co. Richmond Refinery, Richmond, CA	3,900	6,700	3,800	2,500	1,500	2,800	2,000	2,300	-8,300
Hunt Refining Co. A Corp., Tuscaloosa, AL	7,569	1,220	7,637	1,064	4,710	692	4,268	788	-7,032
Frontier El Dorado Refining Co., El Dorado, KS	16,000	15,000	11,000	14,000	7,182	19,347	11,637	11,259	-6,575
Countrymark Refinery, Mount Vernon, IN	3,572	771	1,930	465	392	269	398	241	-5,438
BP Products North America Inc. Toledo Refinery, Oregon, OH	4,800	8,300	4,900	6,400	6,900	2,700	5,600	3,800	-5,400
Valero Refining - Texas LP Houston Refinery, Houston, TX	1,170	11,697	1,165	12,414	6,296	6,824	4,271	3,944	-5,111
Chevron Products Co. - Hawaii Refinery, Kapolei, HI	5,970	2,840	1,343	3,393	3,500	1,000	3,700	1,100	-4,246
Sunoco Inc., Oregon, OH	3,000	3,510	3,900	2,724	2,011	2,508	2,050	2,530	-4,035
Suncor Energy Commerce City Refinery, Commerce City, CO	1,401	1,457	1,635	1,357	157	926	88	694	-3,985
Tesoro Refining & Marketing Co., Martinez, CA	1,100	6,200	1,600	6,700	980	4,800	1,300	4,700	-3,820

Attachment B: U.S. Refinery Benzene Emissions Changes From 2000/2001 to 2007/2008 in Ranked Order (pounds)

Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
Shell Oil Products US - Puget Sound Refinery, Anacortes, WA	1,010	1,920	1,700	2,200	820	910	590	1,200	-3,310
Motiva Enterprises LLC Norco Refinery, Norco, LA	8,700	5,200	8,626	9,129	4,167	11,680	5,855	7,186	-2,767
Valero McKee, Sunray, TX***	1,260	6,420	340	6,088	3,002	1,344	2,611	4,728	-2,423
Murphy Oil USA Inc. Meraux Refinery, Meraux, LA	6,643	1,917	6,789	3,581	3,352	3,765	4,955	4,509	-2,349
Sinclair Casper Refining Co., Casper, WY	3,343	973	6,300	1,100	3,270	4,065	594	1,463	-2,324
Flint Hills Resources Alaska LLC, North Pole, AK	2,900	3,300	2,900	3,200	3,200	2,400	3,200	1,570	-1,930
Tesoro Alaska - Kenai Refinery, Kenai, AK	4,883	4,199	7,520	2,836	6,400	4,100	4,500	2,600	-1,838
Shell Oil Products US - Martinez Refinery, Martinez, CA	560	1,400	590	2,600	580	1,400	400	1,100	-1,670
Yorktown Refinery, Grafton, VA	560	2,600	1,882	1,702	909	1,535	1,021	1,722	-1,557
Silver Eagle Refining Woods Cross, Woods Cross, UT	957	417	2,749	466	1,197	820	885	484	-1,204
Wyoming Refining Co., Newcastle, WY	250	750	750	750	39	342	129	803	-1,187
Citgo Refining & Chemicals Co. LP - West Plant, Corpus Christi, TX	776	22	1,210	23	229	6	601	19	-1,176
Kern Oil & Refining Co., Bakersfield, CA	750	250	750	250	250	250	250	250	-1,000
Ergon West Virginia Inc., Newell, WV	1,150	974	950	796	383	1,553	53	1,023	-858
BP West Coast Products LLC Carson, Carson, CA	908	1,238	684	1,172	846	946	731	786	-693
US Oil & Refining Co., Tacoma, WA	1,667	454	1,165	1,201	991	700	1,220	1,070	-506
American Refining Group Inc., Bradford, PA	554	140	250	250	67	272	77	282	-497
Tesoro Hawaii Refinery, Kapolei, HI	290	6,347	917	2,910	1,965	2,859	3,231	2,283	-126
Chevron Products Co. Div Of Chevron USA Inc., El Segundo, CA	305	1,345	256	1,765	236	975	310	2,200	50
Ultramar Inc. Wilmington Refinery, Wilmington, CA	240	440	170	470	217	470	316	424	107
ConocoPhillips Santa Maria Facility- Refinery, Arroyo Grande, CA	160	225	180	230	190	270	200	250	115
Marathon Petroleum Co. LLC - Michigan Refining Div, Detroit, MI	2,200	4,200	2,800	3,600	3,244	1,709	5,231	2,742	126
Chs Inc. Laurel Refinery, Laurel, MT	2,200	1,500	2,600	1,400	2,200	1,700	2,200	2,000	400
ConocoPhillips Los Angeles Refinery Carson Plant, Carson, CA	63	387	68	165	90	490	110	480	487

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Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
Hovensa LLC, Christiansted, VI	5,684	18,480	4,192	19,364	4,647	19,220	4,816	19,538	501
Big West Of California Refinery, Bakersfield, CA	250	250	250	750	250	750	210	828	538
Chevron Products Co. - Salt Lake Refinery, Salt Lake City, UT	250	1,200	750	2,200	250	2,000	250	2,500	600
ConocoPhillips San Francisco Refinery, Rodeo, CA	750	1,000	1,800	1,000	2,000	700	1,900	660	710
Convent Refinery, Convent, LA	1,500	1,400	1,300	1,700	682	2,923	771	2,354	830
ConocoPhillips La Refinery Wilmington Plant, Wilmington, CA	61	412	73	378	290	600	320	570	856
Valero Refining Co. Tennessee LLC, Memphis, TN	3,147	3,244	3,575	2,771	3,120	3,744	2,524	4,362	1,013
Pasadena Refining System,Inc., Pasadena, TX	10,574	4,798	10,574	4,630	17,000	2,500	7,590	4,539	1,053
ConocoPhillips Co. - Trainer Refinery, Trainer, PA	1,730	1,192	1,477	1,382	1,452	2,030	1,769	1,998	1,468
Frontier Refining Inc., Cheyenne, WY	3,885	2,020	3,703	1,787	1,075	5,413	1,085	5,454	1,632
Hess Corp. - Port Reading Refinery, Port Reading, NJ	162	2,378	177	2,531	1,120	3,652	509	1,693	1,727
Big West Oil LLC, North Salt Lake, UT	4,796	0	4,762	0	5,686	0	5,642	0	1,770
Marathon Petroleum Co. LLC Ohio Refining Div, Canton, OH	5,535	5,149	7,261	4,235	9,490	4,297	6,323	3,855	1,785
Placid Refining Co. LLC, Port Allen, LA	3,274	1,330	3,274	1,330	1,089	5,453	484	4,023	1,841
ExxonMobil Oil Corp. Joliet Refinery, Channahon, IL	1,357	1,203	2,215	1,641	1,928	3,101	1,826	1,713	2,152
Alon Refining Krotz Springs Inc., Krotz Springs, LA*	4,163	1,297	2,392	1,644	2,819	2,989	2,659	3,909	2,880
United Refining Co., Warren, PA	2,200	3,400	2,030	1,500	2,470	3,679	2,680	3,671	3,370
Navajo Refining Co., Artesia, NM	15,508	3,020	6,995	3,020	11,723	983	18,634	1,052	3,849
Western Refining Co. El Paso Refinery, El Paso, TX	6,300	2,250	2,150	3,450	4,733	4,555	5,700	3,100	3,938
Age Refining Inc., San Antonio, TX	250	250	250	250	750	250	1,360	2,900	4,260
ExxonMobil Oil Corp. - Torrance Refinery, Torrance, CA	740	3,000	670	3,200	530	5,400	560	5,600	4,480
Valero Refining Co. - California Benicia Refinery, Benicia, CA	4,400	5,400	4,800	5,300	12,180	5,686	4,246	2,673	4,885
Chevron Products Co. Pascagoula Refinery, Pascagoula, MS	20,000	26,000	28,000	24,000	33,000	19,000	35,000	17,000	6,000
Valero, Port Arthur, TX****	3,800	4,500	4,045	4,428	2,655	9,290	1,482	9,431	6,085

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Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
Western Refining Bloomfield Refinery, Bloomfield, NM	458	3,232	458	3,207	1,566	3,440	1,839	7,023	6,513
Valero Refining Co. - New Jersey, Paulsboro, NJ	5,921	2,919	6,561	2,865	3,336	7,516	2,699	11,341	6,626
ConocoPhillips Lake Charles Refinery, Westlake, LA	4,810	6,362	4,774	9,085	8,673	5,979	10,117	7,308	7,046
ConocoPhillips Co. Billings Refinery, Billings, MT	3,100	2,100	2,300	2,400	6,700	2,200	6,300	2,100	7,400
Valero Refining - Texas LP Corpus Christi West Plant, Corpus Christi, TX	2,357	7,167	2,393	7,052	2,658	8,816	2,688	12,886	8,079
Holly Refining & Marketing Co. Woods Cross Refinery, Woods Cross, UT	6,400	1,700	6,500	2,100	12,100	3,900	8,700	1,300	9,300
Western Refining Southwest Inc. - Gallup Refinery, Jamestown, NM	2,544	7,451	2,629	7,435	3,798	7,652	5,540	12,737	9,668
Murphy Oil USA Inc., Superior, WI	709	279	651	652	3,927	2,213	3,918	2,015	9,782
Marathon Petroleum Co. LLC Saint Paul Park Refiner, Saint Paul Park, MN	6,291	1,358	11,085	1,288	8,413	12,004	5,061	4,419	9,875
ConocoPhillips Ferndale Refinery, Ferndale, WA	610	1,400	571	1,438	4,900	2,200	5,388	2,387	10,856
Montana Refining Co. Inc., Great Falls, MT	250	250	1,400	250	2	7,959	20	9,355	15,186
Tesoro Refining & Marketing Co., Salt Lake City, UT	750	3,000	1,100	3,000	4,800	3,100	12,000	3,300	15,350
Marathon Petroleum Corp. Garyville, Garyville, LA	4,492	4,154	2,434	4,455	15,000	1,600	12,394	2,065	15,524
Sinclair Tulsa Refining Co., Tulsa, OK	250	1,989	5,300	1,700	7,400	5,400	10,000	3,300	16,861
Flint Hills Resources LP - West Plant, Corpus Christi, TX	28,813	20,634	31,621	14,863	38,479	22,503	33,189	18,798	17,038
Shell Chemical Yabucoa Inc., Yabucoa, PR	2,856	528	1,109	205	10,868	811	9,107	1,192	17,280
Calcasieu Refining Co., Lake Charles, LA	2,379	250	1,544	157	496	17,174	553	8,864	22,757
Motiva Enterprises LLC, Port Arthur, TX	1,440	1,420	702	1,502	13,651	1,059	13,597	1,296	24,539
Sinclair Wyoming Refining Co., Sinclair, WY	8,694	3,546	10,000	7,000	25,000	3,500	25,000	2,900	27,160
ConocoPhillips Ponca City Refinery, Ponca City, OK	17,892	8,935	3,072	25,840	29,250	5,451	34,250	18,998	32,209
Valero Three Rivers Refinery, Three Rivers, TX	7,327	8,162	7,331	7,097	12,360	20,606	23,502	14,397	40,948
Sunoco, Inc. (R&M) - Marcus Hook Refinery, Marcus Hook, PA	1,700	7,300	1,600	10,218	7,754	13,253	26,932	19,024	46,145

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Facility, City, State	2000		2001		2007		2008		Change from 2000/2001 to 2007/2008 (pounds)
	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	Fugitive	Stack	
Sunoco, Inc. (R&M) Philadelphia Refinery, Philadelphia, PA	34,576	4,975	21,613	4,974	20,625	8,187	65,600	32,160	60,434
BP Products North America Inc. Texas City Refinery, Texas City, TX	57,000	110,000	4,800	71,000	40,000	110,000	19,000	150,000	76,200
Citgo Petroleum Corp., Westlake, LA	27,673	28,404	33,182	32,521	28,172	53,172	27,391	142,157	129,112
TOTAL	**1,259,809**	**1,001,957**	**1,097,091**	**883,591**	**814,520**	**851,875**	**829,486**	**972,192**	

Source: EPA, TRI Database. (Note: This list represents all U.S. refineries identified on EPA's TRI website, with the exception of several asphalt plants mislabeled as refineries, terminals and docks with separately reported emissions, plants that reported zero emissions for two years or more, and plants for which data was not available).

* Listed in TRI as "Wood River Refinery."

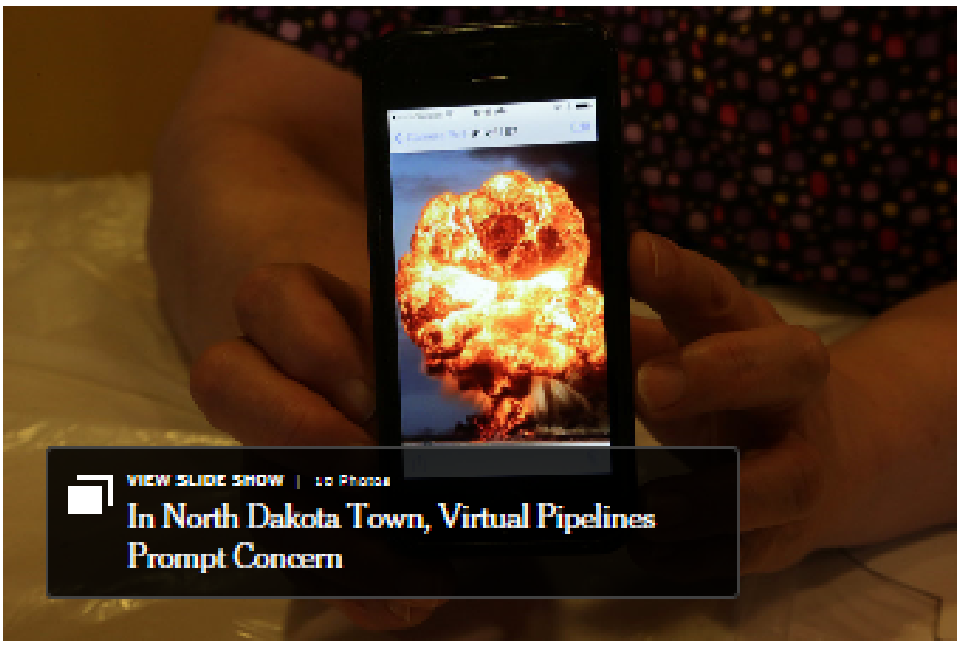
** Listed in TRI as "Borger Refinery."

*** Listed in TRI as "Diamond Shamrock Refining Co. LP."

**** Listed in TRI as "Premcor Refining Group."

Accidents Surge as Oil Industry Takes the Train

By CLIFFORD KRAUSS and JAD MOUAWAD JAN. 25, 2014



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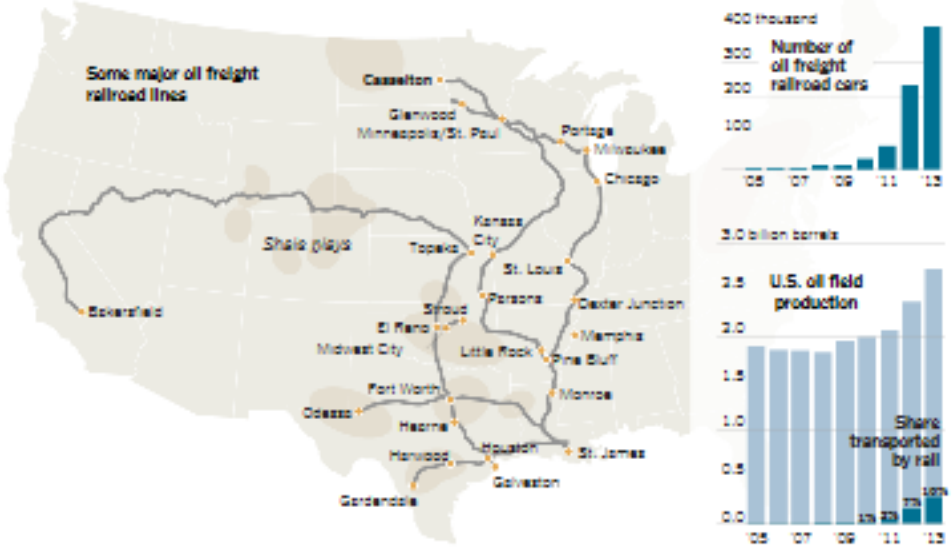
CASSELTON, N.D. — Kerry's Kitchen is where Casselton residents gather for gossip and comfort food, especially the caramel rolls baked fresh every morning. But a fiery rail accident last month only a half mile down the tracks, which prompted residents to evacuate the town, has shattered this calm, along with people's confidence in the crude-oil convoys that rumble past Kerry's seven times a day.

What was first seen as a stopgap measure in the absence of pipelines has become a fixture in the nation's energy landscape — about 200 "virtual pipelines" that snake in endless processions across the horizon daily. It can take more than five minutes for a single oil train, made up of about 100 tank cars, to pass by Kerry's, giving this bedroom community 20 miles west of Fargo a front-row seat to the growing practice of using trains to carry oil.

"I feel a little on edge — actually very edgy — every time one of those trains passes," said Kerry Radermacher, who owns the coffee shop. "Most people think we should slow the production, and the trains, down."

Moving More Oil Over Rails

As domestic oil production has increased rapidly in recent years, more and more of it is being transported by rail because of the lack of pipeline capacity. The trains often travel through populated areas, leading to concerns among residents over the hazards they can pose, including spills and fires.



Source: Union Pacific; Energy Information Administration; Association of American Railroads

Casselton is near the center of the great oil and gas boom unleashed these last few years. And it has seen up close how trains have increasingly been used to transport the oil from the new fields of Colorado, Wyoming and North Dakota, in part as a result of delays in the approval of the Keystone XL pipeline. About 400,000 carloads of crude oil traveled by rail last year to the nation's refineries, up from 9,500 in 2008, according to the Association of American Railroads.

But a series of recent accidents — including one in Quebec last July that killed 47 people and another in Alabama last November — have prompted many to question these shipments and have increased the pressure on regulators to take an urgent look at the safety of the oil shipments.

In the race for profits and energy independence, critics say producers took shortcuts to get the oil to market as quickly as possible without weighing the hazards of train shipments. Today about two-thirds of the production in North Dakota's Bakken shale oil field rides on rails because of a shortage of pipelines. And more than 10 percent of the nation's total oil production is shipped by rail. Since March there have been no fewer than 10 large crude spills in the United States and Canada because of rail accidents. The number of gallons spilled in the United States last year, federal records show, far outpaced the total amount spilled by railroads from 1975 to 2012.

Railroad executives, meeting with the transportation secretary and federal regulators recently, pledged to look for ways to make oil convoys safer — including slowing down the trains or rerouting them from heavily populated areas. (Trains go up to roughly 35 miles an hour through towns and at higher speeds outside populated areas.) They also agreed to speed up a review of tougher standards for the train cars used for oil. And last Thursday, safety officials urged regulators to quickly improve industry standards.

"This is an industry that has developed overnight, and they have been playing catch-up with the infrastructure," said Deborah A. P. Hersman, the chairwoman of the National Transportation Safety Board, which is investigating the Casselton accident. "A lot of what we've seen could have been a lot worse."

But given the fragmented nature of the business — different companies produce the oil, own the rail cars, and run the railroads — there is no firm consensus on what to do. And few analysts expect new regulations this year.

"There was no political pressure to address this issue in the past, but there clearly is now," said Brigham A. McCown, a former administrator of the Pipeline and Hazardous Materials Safety Administration. "Producers need to understand that rail-car safety can become an impediment to production."

The stakes are high. In five years, domestic oil production has jumped by 50 percent, to reach 7.5 million barrels a day last year.

But with little pipeline infrastructure, energy producers had to scramble for new ways to get their oil to refiners. Rail was the answer.

"The reality is that this came out of nowhere," said Anthony B. Hatch, a rail transport consultant. "Rail has gone from near-obsolescence to being critical to oil supplies. It's as if the buggy-whips were back in style."

Far more toxic products are shipped on trains. But those products, like chlorine, are transported in pressurized vessels designed to survive an accident. Crude oil, on the other hand, is shipped in a type of tank car that entered service in 1964 and that has been traditionally used for nonflammable hazardous liquids like liquid fertilizers.

Safety officials have warned for more than two decades that these cars were unsuited to carry flammable cargo: their shell can puncture and tears up too easily in a crash.

In 2009, a train carrying ethanol derailed and exploded, killing one person in Cherry Valley, Ill. The National Transportation Safety Board said the inadequate design of the tank cars made them "subject to damage and catastrophic loss of hazardous materials."

After that accident, railroads and car owners agreed in 2011 to beef up new cars with better protections and thicker steel. But they resisted improving safety features on the existing fleet because of cost. They also argued that thousands of new cars were being ordered anyway, so it would be just a matter of time before the fleet was replaced.

But analysts said that time has run out; railroads and car owners can no longer ignore the liabilities associated with oil trains, which could reach $1 billion in the Quebec accident.

"Quebec shocked the industry," Mr. Hatch said, adding that while rail safety has improved over all, "the consequences of any accident are rising."

Last November, the Association of American Railroads said it would support requiring that the 92,000 tank cars used to transport flammable liquids, including crude oil, be retrofitted with better safety features or "aggressively phased out."

Still, other groups have resisted. The Railway Supply Institute, which represents freight car owners, told regulators three weeks before the Casselton accident that existing cars "already provide substantial protection in the event of a derailment" and suggested minor modifications to be phased in over 10 years.

While the safety record of railroads has improved in recent years, the surge in oil transportation has meant a spike in spill rates. From 1975 to 2012, federal records show, railroads spilled 800,000 gallons of crude oil. Last year alone, they spilled more than 1.15 million gallons, according to the Pipeline and Hazardous Materials Safety Administration. And that figure does not include the Casselton spill, estimated at about 400,000 gallons.

The accidents have also created a sense of weariness among elected officials and even staunch oil backers.

North Dakota Gov. Jack Dalrymple, a Republican, insisted that the first priority was improving tank cars. "These exploding tank cars are obviously very powerful and very dangerous," he said.

The accidents have brought another problem to light. Crude oil produced in the Bakken appears to be a lot more volatile than other grades of oil, something that could explain why the oil trains have had huge explosions.

Here too, the warnings came too late.

Federal regulators started analyzing samples from a few Bakken wells last year to test their flammability. In an alert issued on Jan. 2, P.H.M.S.A. said the crude posed a "significant fire risk" in an accident.

The Federal Railroad Administration also pointed to rising numbers of oil cars that showed a "form of severe corrosion" on the inside of the tanks, covers and valves.

After the recent meeting with regulators, the American Petroleum Institute pledged it would share its own test data about the oil, which they have said is proprietary.

While the tank cars themselves have not caused any accident, they failed to contain their cargo. That happened on the outskirts of Casselton when a 106-car oil train crashed into a soybean train that derailed on a parallel track.

In a preliminary report, the N.T.S.B. said 18 of the 20 oil tank cars that derailed were punctured. Much of the oil spilled was incinerated by the explosions, and some soaked into nearby corn fields.

Aside from evacuating nearby farms, there was little the fire department could do but watch the train burn.

Tim McLean, Casselton's fire chief, pictured what the town would look like if an oil train derailed. The large propane supply tank would explode "like a bomb" and incinerate two multifamily houses next to it. Five blocks to the west are a lumber yard and two gasoline stations. Oil might accumulate in storm sewers and possibly spread a fire underground.

"There's virtually no way we could protect these buildings," he said as he passed the barber shops, drugstore and pizza parlor, all occupying sturdy brick buildings more than a century old. "It would be too hot."

The terror of what might have happened hit many here immediately.

Adrian Kieffer, the assistant fire chief, rushed to the accident and spent nearly 12 hours there, finishing at 3 a.m. "When I got home that night, my wife said let's sell our home and move," he said.