REFINED HAZARD

Carcinogenic Air Pollution from America's Oil Refineries

Petroleum refineries are the backbone of America's oil-based economy, providing the fuel we use for transportation, manufacturing and home heating, and often producing the "building block" chemicals used to make plastics and other important products used in the home and business. Refineries produce pollution as well as useful products, however, and that pollution can pose a serious risk of harm to human health. In this report, we use data from the U.S. Environmental Protection Agency's ("EPA's") Toxics Release Inventory ("TRI") to catalogue refinery air emissions of certain pollutants that are known or suspected to cause cancer. The TRI, established under the Emergency Planning and Community Right-to-Know Act of 1986 ("EPCRA"), is an EPA database that contains information on toxic chemical releases reported annually by certain covered industries, including petroleum refineries.

Our review examined releases that refineries report to TRI of so-called "OSHA carcinogens," as well as releases of selected individual chemicals that have been linked to cancer. The data demonstrate that while emissions of carcinogens have declined on an industry-wide basis between 1999 and 2004, there have been substantial increases at some facilities and at some companies over the same time period. Of particular interest, some facilities release a disproportionate share of pollution relative to their production – in other words, the biggest polluters are not always the largest refineries. Finally, the data suggest substantial differences in the level and quality of reporting by some refineries, which should prompt the EPA to investigate whether TRI releases are being accurately reported as required by law.

TRI data reveal amounts of certain chemicals (for the purposes of this report, carcinogens) that are released into the environment, and are therefore highly useful in evaluating chemical management practices and identifying areas of concern. However, it should be noted that TRI data do not reveal actual levels of public exposure to those chemicals. The ultimate determination of risk to human health and/or the environment depends upon a number of factors in addition to the amounts of toxic chemicals released, including the toxicity of the chemical, the fate of the chemical in the environment, and the amount and duration of human or other exposure to the chemical.

A discussion of the methodology used in compiling the information contained in this report follows the presentation of the results of our study. Appendix A sets forth a brief summary of our findings in a "numbers at a glance" format. Appendix B contains spreadsheets detailing total OSHA carcinogen releases for all U.S. refineries in 1999, 2003 and 2004. Appendix C contains tables with data on the refineries with the greatest releases of selected individual carcinogens in 1999, 2002 and 2004.

Results

I. The "OSHA Carcinogens"

"OSHA carcinogens" are TRI chemicals that are likely to be classified as carcinogens on material safety data sheets ("MSDS")[1] required by the Occupational Safety and Health Administration ("OSHA"). Designations of chemicals as carcinogenic or possibly carcinogenic in humans are made by expert consensus groups established by the U.S. National Toxicology Program ("NTP"), or by the International Agency for Research on Cancer ("IARC"), an agency of the World Health Organization. The TRI "OSHA carcinogens" emitted by refineries may include benzene, ethylbenzene, butadiene, polycyclic aromatic hydrocarbons ("PAHs"), naphthalene, formaldehyde, and metals such as nickel and lead.

Our study of the TRI data concerning releases of OSHA carcinogens by U.S. refineries in 1999, 2003, and 2004[2] revealed the following points:

- The ten refineries that released the greatest amount of OSHA carcinogens in 2004, in descending order with the highest emitter listed first, were **BP (Texas City, Texas), ExxonMobil (Baytown, Texas), Flint Hills (Corpus Christi, Texas) La Gloria (Tyler, Texas), Lyondell-Citgo (Houston, Texas), ExxonMobil (Baton Rouge, Louisiana), Valero (Corpus Christi, Texas), Sunoco (Philadelphia, Pennsylvania), Chalmette[3] (Chalmette, Louisiana), and Citgo (Lake Charles, Louisiana).** *See* Appendices A and B for specific data.

- Seven of these top ten carcinogen emitters reported increases in emissions of carcinogens between 1999 and 2004: BP (Texas City), ExxonMobil (Baytown), La Gloria (Tyler), Lyondell-Citgo (Houston), Valero (Corpus Christi), Sunoco (Philadelphia), and Chalmette (Chalmette). While some of these reported increases may be due to higher production or, as in the case of BP Texas City, may reflect a change in reporting methodology, they run counter to the industry trend of decreased carcinogen emissions reported over the five year period.

- BP Texas City was by far the largest single emitter of OSHA carcinogens in 2004, reporting a release of 2,084,113 pounds of "OSHA carcinogens," while the same

[1] MSDS are documents which provide workers and employers with information on the toxicity and safety hazards of chemicals, as well as recommendations for procedures needed to handle the chemicals safely and protect workers against the chemicals' harmful effects.

[2] Our study of eleven selected individual carcinogens, discussed below, focused on the years 1999, 2002 and 2004.

[3] The Chalmette Refinery is owned by ExxonMobil.

facility reported a release of 169,596 pounds in 2003. Over 94% of the reported carcinogen emissions from BP Texas City in 2004 came from stack (point source) releases of formaldehyde: 1,958,341 pounds. This enormous increase reportedly resulted from a change in BP's estimation methodology for the 2004 TRI report.[4] Because the BP Texas City increase in 2004 was so far in excess of any other reported increase in the refinery industry, that data was excluded from our analyses unless otherwise noted in this report. However, since formaldehyde is a known human carcinogen, a report of such high releases merits concern and raises questions regarding the accuracy of other refineries' reporting of formaldehyde industry-wide, as well as the accuracy of BP Texas City's formaldehyde reporting in years other than 2004. These questions are discussed below regarding formaldehyde as a "selected individual carcinogen."

- If BP Texas City is excluded from the analyses, industry-wide releases of carcinogens declined about 13% between 1999 and 2004, from 3,550,943 pounds to 3,090,521 pounds. These overall declines contrast, however, with significant increases reported by some companies (as well as individual facilities). **For example, ExxonMobil reported emitting more than 455,000 pounds of OSHA carcinogens from its 7 refineries in 2004, a 23% increase over 1999, and Sunoco reported over 211,000 pounds from its 5 refineries in 2004, for a 17% increase over the five year period.** Companies like Motiva, Chevron, and Conoco, on the other hand, reported significant decreases between 1999 and 2004.

- While the high releases at some refineries may reflect their large size, some facilities report releasing a disproportionate amount of pollution relative to their production capacity.[5] **For example, the La Gloria refinery in Tyler, Texas, was the fourth largest emitter of OSHA carcinogens in 2004, but at 55,000 barrels per day, it is ranked 95th in overall production capacity.** La Gloria's 2004 releases of benzene, a known human carcinogen, at 117,890 pounds, far exceeded those from refineries several times its size. Two small Kansas refineries, National Cooperative Refining Association ("NCRA") and Coffeyville Resources Refining and Marketing, were also notable for their disproportionately high releases of OSHA carcinogens. La Gloria and the Kansas refineries are discussed in greater detail in the "small refineries" section, below. **Even after BP Texas City is excluded from the top ten emitters, the remaining 9 refineries**

[4] *See, e.g.*, Dina Cappiello, *BP Plant Top U.S. Polluter*, Houston Chronicle, May 7, 2006, at A1, *available at* http://www.chron.com/CDA/archives/archive.mpl?id=2006_4112022.

[5] We used reports from the U.S. Energy Information Administration ("EIA"), an agency within the U.S. Department of Energy, for information on production capacity. Unless otherwise noted, all production capacity data in this report pertain to the year 2004, and were derived from the EIA's production report, "Capacity of Operable Petroleum Refineries by State as of January 1, 2005," *available at* http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/historical/2004/pdf/table_38.pdf.

account for nearly one third of the total carcinogens reported, but only 15% of total production capacity.

- Texas refineries release more carcinogens per barrel of oil processed than other leading refinery states. Just over half of the nation's refining capacity is located in three states: Texas, Louisiana, and California. **Excluding BP Texas City, Texas refineries accounted for about 24% of the nation's refining capacity in 2004, but reported 36% of carcinogens released.** (If the 2 million tons of carcinogens reported by BP Texas City is included in 2004, then the state's contribution to the emissions of such chemicals increases even more dramatically). Emissions of carcinogens from Louisiana refineries are roughly proportionate to that state's share of refining capacity – about fifteen percent of the U.S. total. California refineries account for 10% of U.S. capacity, but only 4% of total U.S. emissions of carcinogens from refineries. **In the aggregate, again excluding BP Texas City, Texas refineries emitted nearly five times the volume of carcinogens per barrel of oil processed as compared with California refineries in 2004.**

We have attached spreadsheets detailing total OSHA carcinogen releases for all U.S. refineries in 1999, 2003, and 2004 (Appendix B).

II. Selected Individual Carcinogens

The group of TRI "OSHA carcinogens" includes some well-known and frequently encountered air pollutants such as benzene and dioxin, as well as carcinogens which are less well-known and less frequently encountered. In order to gain an understanding of air emissions of some carcinogens that have been of particular concern in recent years, we selected 11 individual carcinogens and traced their reported releases by petroleum refineries in 1999, 2002 and 2004. The 11 carcinogens are: formaldehyde, tetrachloroethylene, benzene, naphthalene, ethylbenzene, dioxin, methyl tert-butyl ether ("MTBE"), 1,3-butadiene, styrene, polycyclic aromatic hydrocarbons ("PAHs" or "polycyclic aromatic compounds" ("PACs")), and benzo(G,H,I)perylene. Appendix C contains tables with data on the facilities with the greatest releases of these chemicals.

These carcinogens may be created and/or released in different ways. Some refineries have only one function: they process petroleum into fuel, most notably gasoline. Others produce fuels and also make chemicals, which the companies use in the production of fuels (such as the fuel additive MTBE). Some refineries actively produce chemicals, such as benzene or 1,3-butadiene, which are valuable feedstocks (starting chemicals) for important chemical production processes, and the refineries (or associated petrochemical plants) sell those chemicals to downstream users. Some carcinogens, such as benzene, formaldehyde, or 1,3-butadiene, can occur as unwanted side-products during combustion or production processes employed at petroleum refineries.

A. Benzene

Benzene is a known human carcinogen. It is an important feedstock used to make many chemicals, and it is produced largely at facilities that also refine petroleum into fuel. Benzene can also be released during production or combustion of petroleum-derived fuels.

In 2004, among U.S. petroleum refineries, the single largest source of releases of benzene was La Gloria, a small refinery located in Tyler, Texas. (*See* Appendix C.) While La Gloria does not actively "produce" benzene, and its #1 ranking was due to "fugitive" releases of benzene, the facility with the highest reported release of benzene through stacks – BP Texas City – *is* an active producer of benzene. In fact, with few exceptions, the refineries listed as "top 10" emitters of benzene (fugitive or stack releases) were either located with a benzene-producing facility or were benzene-producing facilities themselves. The fact that La Gloria's benzene emissions were "fugitive" rather than "stack" emissions, and that the facility does not actively produce benzene, may suggest the need to improve maintenance practices at the plant.

B. 1,3-butadiene

1,3-butadiene ("butadiene") is an important feedstock chemical used to make polymers including synthetic rubber. The IARC considers butadiene to be "probably carcinogenic" to humans.

In 2004, BP Texas City headed the list of refineries which reported releases of butadiene. Sunoco's refinery at Eagle Point, New Jersey, had the highest-ranked fugitive releases of butadiene. Neither facility is a "producer" of butadiene, so in both cases the chemical was occurring as a side-product during some process at the refinery.

C. Formaldehyde

As noted above, BP Texas City was far and away the largest single emitter of OSHA carcinogens in 2004, with over 94% of those emissions consisting of 1,958,341 pounds of formaldehyde. This enormous formaldehyde calculation reportedly resulted from a change in BP's estimation methodology for the 2004 TRI report. Since formaldehyde is a known human carcinogen, this report of high releases raises serious questions regarding the accuracy of formaldehyde reporting by refineries on an industry-wide basis.

First, are the estimates realistic for the Texas City refinery in 2004? The preliminary reports for 2005 suggest that BP has withdrawn the high estimates for formaldehyde releases at the Texas City plant. Did BP do that because they concluded that their estimates for 2004 were wrong, or rather because BP Texas City was the only refinery with such high estimates of formaldehyde emissions?

Second, are estimates of high formaldehyde releases from heaters applicable also to previous years at the BP Texas City Refinery? There were no reports filed with TRI for the 1999 or 2002 reporting years for formaldehyde releases at BP Texas City. Although TRI implementation includes permission for companies to revise reports at any time, as of January 2007, we have not identified revisions to the 1999 or 2002 reports to TRI for formaldehyde releases at BP Texas City.

Third, is release of high volumes of formaldehyde from heaters at refineries a problem unique to BP Texas City, or are other refineries also likely to have such releases? In 1999, 2002, and 2004, only five petroleum refineries reported formaldehyde releases to TRI. BP Texas City reported formaldehyde releases only in 2004. ExxonMobil reported formaldehyde releases from its Baytown, Texas refinery in all three reporting years, but the highest release reported for Baytown (the nation's largest petroleum refinery, with an annual capacity of 557,000 barrels per day ("bpd") as of 2004) was only 77,200 pounds (stack) in 2002.

D. Methyl tert-butyl ether (MTBE)

Methyl tert-butyl ether ("MTBE"), typically produced at refineries, is an additive that increases gasoline's octane content. In recent years, MTBE has been linked with environmental pollution, and the chemical has been shown to cause cancer in animals. Because of concerns regarding MTBE's contamination of water supplies, the chemical's use has been declining in recent years. However, MTBE was still being produced in 2004, and releases from refineries were reported.

In 2004, The ExxonMobil refinery at Baton Rouge, Louisiana, a very large facility (capacity of 493,500 bpd; third-highest production capacity in 2004) headed the list of petroleum-refining facilities reporting releases of MTBE. The facility with the highest releases from stacks was the ExxonMobil refinery at Baytown, Texas. The Baytown refinery had the highest production capacity of any U.S. refinery at 557,000 bpd. Both of theses refineries are major producers of gasoline and other fuels, and would likely be using the MTBE they are producing in formulating gasoline.

E. Polycyclic aromatic hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbons ("PAHs" or "polycyclic aromatic compounds" ("PACs")) are chemicals made up of multiple benzene rings, the basic building blocks of organic chemicals. PAHs can form when materials (such as wood, tobacco, or gasoline) containing carbon and hydrogen (hydrocarbons) burn. They can also form during certain chemical production processes. There are many PAHs, some of which have been linked with the development of cancer in animals and, in some cases, in people. IARC considers some PAHs to be "probably carcinogenic" to people, and certain others to be "possibly carcinogenic." Typically, a mix of PAHs is released when hydrocarbons burn.

In 2004, Sunoco's Philadelphia, Pennsylvania refinery led the ranking for total releases of PAHs. That facility reported that all of its PAH emissions were fugitive

emissions and that none came from stacks. Although BP's Texas City refinery has been highly ranked for releases of carcinogens overall, in 2004 that refinery's stack releases of PAHs were below those of the tenth ranked facility, and the refinery's fugitive emissions ranked fifth, at only about ¼ the volume of the releases from top-ranked Sunoco in Philadelphia.

Our tables listing "top 10" emitters of the 11 individual carcinogens (Appendix C) include detailed information on the four chemicals discussed immediately above.

III. Certain small refineries emit large quantities of carcinogenic chemicals

In general, this report deals with releases of carcinogenic chemicals from medium-sized and large refineries. However, several small refineries, including several with production capacities well below 100,000 bpd, were relatively high on the lists of emitters of "OSHA carcinogens," and some small refineries were also included on our "top 10" lists of facilities for releases of selected individual carcinogens.[6]

In 2004, La Gloria in Tyler, Texas, with a production capacity of 55,000 bpd, had the ninth highest increase in total carcinogen releases when compared to emissions in 1999: 120,379 pounds in 2004 vs. 25,600 pounds in 1999. That increase was primarily due to La Gloria's high fugitive emissions of benzene in 2004 (over 110,000 pounds). In fact, the small La Gloria refinery was ranked #1 for total releases of benzene in 2004, far exceeding releases from refineries with production capacities several times that of La Gloria.

Other small refineries, including Somerset Refining in Kentucky, which had a production capacity of 5,500 bpd in 2004, have also appeared on our "top 10" lists of emitters of individual carcinogens.

EPA's "National Petroleum Refinery Initiative" is a program aimed at reducing air pollution emissions from refineries. While the nation's large refineries are generally participants in the Initiative, several smaller refineries, including La Gloria, have not been participating (as of March 2006).

Kansas Refineries

Kansas has three refineries: National Cooperative Refining Association ("NCRA") in McPherson, Coffeyville Resources in Coffeyville, and Frontier in El Dorado. All three refineries are small. As of 2004, NCRA had a production capacity of 81,200 bpd, Coffeyville had a production capacity of 112,000 bpd, and Frontier had a production capacity of 103,000 bpd. As of March 2006, Frontier was not participating at all in the EPA National Petroleum Refinery Initiative, while the other two refineries were participating in some, but not all, aspects of the Initiative.

[6] As noted above, all production data in this report pertain to the year 2004, unless otherwise noted.

In 2004, NCRA released a total of 60,062 pounds of OSHA carcinogens. In contrast, the nation's largest refinery, ExxonMobil's Baytown, Texas facility, had a production capacity of 557,000 bpd and a total carcinogen release of 173,730 pounds in 2004. Thus, in 2004, NCRA's total carcinogen releases were nearly 2 and ½ times higher per barrel of production capacity than ExxonMobil's Baytown facility.

All three of the Kansas refineries have appeared on our "top 10" lists for fugitive and/or stack emissions of individual chemicals in 2002 and 2004. NCRA and Coffeyville appear on "top 10" lists in 1999 as well.

In 2004, NCRA had the highest total releases of ethylbenzene, a potential carcinogen (#1 for fugitive releases and #2 for stack releases). NCRA's fugitive releases of ethylbenzene were only slightly higher than those of second-ranked Chalmette in Louisiana (18,776 pounds vs. 18,271 pounds), but Chalmette, with a production capacity of 187,200 bpd, had twice the production capacity of NCRA (81,200 bpd). Further, NCRA's stack releases of ethylbenzene (13,750 pounds) were over 85% those of Lyondell-Citgo in Houston, Texas, a facility with a production capacity approximately 3.5 times that of NCRA.

NCRA's total releases of ethylbenzene have exceeded 32,000 pounds in each of our three "selected individual chemical" study years – 1999, 2002 and 2004. The lack of improvement in estimated releases is of some concern, especially since the production capacity of the facility has been essentially static. NCRA is certainly a refinery releasing carcinogens in quantities disproportionate to the refinery's production capacity.

Methodology and Background

I. Toxics Release Inventory

The Toxics Release Inventory ("TRI"), established under the Emergency Planning and Community Right-to-Know Act of 1986 ("EPCRA") and expanded by the Pollution Prevention Act of 1990 ("PPA"), is an on-line publicly available EPA database that contains information on toxic chemical releases reported annually by certain covered industries, including petroleum refineries. Reporting is required for several dozen carcinogenic chemicals, some of which have been shown to cause cancer in people, and some of which cause cancer in animals and may be carcinogenic in people. Looking at releases of the group of chemicals that TRI refers to as "OSHA carcinogens" as a whole, a picture emerges of the extent to which certain petroleum refineries, as well as the refining industry as a whole, are releasing carcinogens.

We searched the TRI for data on air releases of carcinogenic chemicals in 1999, 2002, 2003 and 2004. Although TRI divides air emissions into "fugitive" and "stack" (or "point source") emissions, we also totaled the fugitive and stack data in order to consider "total air emissions" for our analyses. In addition, we focused on a few specific fugitive and/or stack releases from individual refineries which are of particular interest.

Further, this report analyzes carcinogenic air emissions in two distinct groupings. First, we consider emissions of "OSHA carcinogens," which are TRI chemicals that are likely to be classified as carcinogens under the requirements of the Occupational Safety and Health Administration ("OSHA"), and are listed in the on-line EPA document "Toxics Release Inventory (TRI) Basis of OSHA Carcinogens." This analysis focuses on 1999, 2003 and 2004. Although TRI is an EPA database, EPA's own carcinogenicity designations do not appear to be used for compiling the TRI "OSHA carcinogen" list. Second, we consider several individual chemicals, listed in the TRI, whose carcinogenic characteristics are well-known. This consideration of selected individual chemicals focuses on the years 1999, 2002 and 2004.

II. The TRI "OSHA carcinogen" list

Since OSHA has regulated very few chemicals as carcinogens, the great majority of the chemicals on the TRI "OSHA carcinogen" list are actually chemicals likely to be identified as carcinogenic or potentially carcinogenic on material safety data sheets ("MSDS"), which are forms intended to provide workers and emergency personnel with procedures for safely handling potentially hazardous substances. Designation of chemicals as carcinogenic or possibly carcinogenic in humans are made by expert consensus groups established by an agency of the U.S. Government (the National Toxicology Program ("NTP")), or by the International Agency for Research on Cancer ("IARC"), an agency of the World Health Organization, and are based on studies done by chemical companies according to standards set out in the OSHA "Hazard Communication Standard." In general, chemicals designated by the IARC in groups 1 (known to cause cancer in humans) or 2A-2B (potential/possible carcinogens) meet OSHA's criteria for listing on a material safety data sheet. Known or potential carcinogens listed by NTP also merit listing on material safety data sheets.

Dioxin was added to the TRI in 1999, so there were few reports for that chemical in the early reporting years. In the 2004 TRI, there were 63 reports from facilities in the petroleum refinery group, indicating that the facility released dioxin during the reporting year. Dioxin releases are reported in grams, while other releases included in the TRI are reported in pounds.

III. Fugitive versus stack (point source) emissions

TRI reports air releases as either "fugitive" or "stack" ("point source") emissions. Stack releases come from structures designed to release process wastes of various types, including combustion gasses, side-products or other contaminants of industrial processes. Fugitive emissions can occur from any non-stack source of releases at a facility, including storage tanks, broken pipes, or leaking flanges. Fugitive emissions offer insight into the state of maintenance and repair (or disrepair) at facilities, while stack emissions reflect the effectiveness (or lack thereof) of pollution control devices installed in or near a stack and the types of processes going on at a facility.

A. Fugitive Emissions

Petroleum refineries are sprawling industrial facilities, with pipes, storage containers, distilling/fractionation columns and related process machinery, and other equipment spread over several acres. When chemicals are released from any point in a refinery other than a stack, the release is a "fugitive emission."

Fugitive emissions often come from flanges, broken piping, leaking equipment used to store feedstock or chemicals (including products such as gasoline), or process upsets. The result of an upset can be as small as a minor leak due to an unforeseen change in pressure in piping, or as large as a catastrophic explosion.

Fugitive emissions can be especially hazardous for workers, and could be hazardous for community residents near the fenceline of a refinery. The unpredictability of fugitive emissions is what makes them especially worrisome. Also, unlike stacks, the myriad points at a refinery where process equipment could fail are unlikely to have emission control or monitoring devices.

The extent to which there are fugitive emissions at an industrial facility is directly related to maintenance of process equipment and housekeeping at the facility. If preventive maintenance is insufficient and housekeeping is poor, then the likelihood of fugitive emissions increases. Refineries tend to run at or close to their full production capacity, and shutting down part of a refinery for preventive maintenance is something that facility owners tend to avoid. Questions about adequacy of preventive maintenance and housekeeping have been raised after catastrophes such as the explosion and fire at the BP Texas City refinery in 2005 that killed fifteen people.

B. Stack Emissions

When people think of "stacks," they often think only of the very large smokestacks associated with power plants. However, industrial facilities often have process-related stacks which vent process waste products of various types. Stacks may have emission control devices within them, as well as pollutant monitoring devices that check for the presence of certain pollutants.

High releases from stacks, as opposed to fugitive emissions, can indicate something wrong with a pollution control device in the stack, or some process failure resulting in release through the stack of an unanticipated type or amount of pollutant. Releases from stacks are usually more predictable than fugitive emissions, but process upsets or equipment failure can cause releases through the stack whose nature or quantity can present serious problems.

IV. Data on production capacity for petroleum refineries

We used reports from the U.S. Energy Information Administration ("EIA"), an agency within the U.S. Department of Energy, for information on production capacity of petroleum refineries in the fifty United States and in the Virgin Islands and Puerto Rico. The "Capacity of Operable Petroleum Refineries by State as of January 1, 2005" was the set of capacity numbers we used for 2004.

We used the data collected by EIA for "operating" capacity for "atmospheric crude oil distillation" to determine production in barrels per day ("bpd") of crude petroleum.

V. Limitations on Data

A. Changes in facility ownership

Our study surveyed carcinogen releases from petroleum refineries during the period 1999-2004. During that period, there were numerous changes in ownership of refineries in our study group. In fact, there were purchases of facilities by companies that then sold the facilities again or changed their corporate names.

Although the fluidity of ownership of some of the refineries presented some difficulty in tracking ownership, we used EIA reports, information obtained on-line and other resources to do so.

B. EIA and TRI do not use identical names for individual refineries

EIA and TRI do not necessarily use the same names for facilities in the group of petroleum refineries covered in this report. This sometimes made it difficult to attribute production capacity to certain facilities for which we had data on carcinogen releases.

For example, three refineries in Corpus Christi, Texas, actually have two facilities each – an "east plant" and a "west plant." While TRI has reports filed for each facility separately (*e.g.*, "Valero Corpus Christi East plant" and "Valero Corpus Christi West plant"), EIA groups the plants together under one corporate name and city (*e.g.*, "Valero Corpus Christi").

When we had emission data for individual chemicals from, for example, one or both of the Valero Corpus Christi facilities, and we had only one production capacity estimate – for Valero Corpus Christi as a whole, if both facilities appeared on one set of our "top 10" lists (as, hypothetically, fugitive and stack emissions for benzene in 2002) – we counted capacity from Valero Corpus Christi only once to avoid over-counting.

In addition, EIA and TRI sometimes use different geographic descriptors for refineries, as in the case of a group of refineries in New Mexico where EIA consolidated two refineries owned by one company and used different town names for the refinery

locations than did TRI, which kept the facilities separate. We made every effort to detect and reconcile such discrepancies.

C. "Operating" versus "idle" production capacity

In some cases, EIA indicated zero ("0") "operating" production capacity for a facility for a reporting year. Although a "bpd" value was usually given for "idle" production capacity in those cases, we cannot tell how much crude oil the refinery was actually processing on any given day during the reporting year. Therefore, we noted that facility's production capacity as zero, although emissions from the facility were included in our analyses.

D. Carcinogens can be released from petroleum refineries in media other than air, the medium considered in this report

This report considered only air releases of carcinogens from petroleum refineries. Although air pollution associated with refineries, especially in terms of possible health hazards to people living near the refinery fence line, is of great importance, carcinogens can be released from refineries into water or onto land.

Hurricanes Katrina and Rita illustrated the potential for the release of pollution from petroleum refineries through media other than air. For instance, the Murphy refinery in Meraux, Louisiana was flooded during Hurricane Katrina. Hazardous chemicals from the refinery were detected in neighboring areas, with both liquids and sludges being identified as means by which pollutants moved from the facility.

TRI data include releases through water and land, and such data could be used to gain further insight into the release of carcinogens from petroleum refineries.

Appendix A

Numbers at a Glance

Refinery Air Emissions of Carcinogens as Reported to U.S. EPA Toxic Release Inventory

NUMBERS AT A GLANCE

REFINERY AIR EMISSIONS OF CARCINOGENS
(AS REPORTED TO USEPA TOXIC RELEASE INVENTORY)

- **Top ten sources of air emissions of carcinogens in 2004:**

Refinery	Location	Pounds of Carcinogens per year
BP	**Texas City, TX**	**2,084,113**
ExxonMobil	**Baytown, TX**	**173,730**
Flint Hills	**Corpus Christi, TX**	**134,513**
La Gloria	**Tyler, TX**	**120,379**
Lyondell-Citgo	**Houston, TX**	**114,787**
ExxonMobil	**Baton Rouge, LA**	**103,168**
Valero	**Corpus Christi, TX**	**101,014**
Sunoco	**Philadelphia, PA**	**87,009**
Chalmette	**Chalmette, LA**	**86,506**
Citgo	**Lake Charles, LA**	**83,347**

- **BP Texas City was by far the largest refinery source of carcinogen emissions in 2004, due mostly to its reported release of nearly 2 million pounds of formaldehyde in that year. BP has claimed that the formaldehyde release resulted from a change in its emission calculations, raising questions as to whether other refineries are reporting accurately.**

- **Seven of the top ten carcinogen emitters in 2004 reported increases in emissions of carcinogens between 1999 and 2004: BP (Texas City, Texas), ExxonMobil (Baytown, Texas), La Gloria (Tyler, Texas), Lyondell-Citgo (Houston, Texas), Valero (Corpus Christi, Texas), Sunoco (Philadelphia, Pennsylvania), and Chalmette (Chalmette, Louisiana) (owned by ExxonMobil).**

- **Excluding BP Texas City, the top nine emitters account for nearly one third of carcinogens emitted by ALL U.S. refineries, but only 15% of the nation's refining capacity.**

- **Excluding BP Texas City, Texas refineries accounted for 36% of total refinery air emissions of carcinogens in 2004, with 24% of the nation's refining capacity. In the aggregate, again excluding BP Texas City, Texas refineries emitted nearly five times the volume of carcinogens per barrel of oil as did California refineries in 2004.**

- **La Gloria, a small refinery in Tyler, Texas, is the largest refinery source of air emissions of benzene, a known carcinogen.**

- **Sunoco's Philadelphia refinery is the largest single refinery source of polycyclic aromatic compounds, which include probable or suspected carcinogens.**

- **Increases and decreases from 1999 and 2004:**

    - **ExxonMobil reported emitting 455,000 pounds of carcinogens from its seven refineries in 2004, for a 23% increase since 1999, and Sunoco reported emitting over 211,000 pounds of carcinogens from its five refineries in 2004, for a 17% increase over the five year period.**

    - **Refinery emissions of carcinogens increased over the five year period in 8 states (California, Colorado, Michigan, Pennsylvania, Tennessee, Texas, Utah, and West Virginia), and declined in 23 states (Alabama, Alaska, Arkansas, Delaware, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Montana, Nevada, New Jersey, New Mexico, North Dakota, Ohio, Oklahoma, Virginia, Washington, Wisconsin, and Wyoming) plus Puerto Rico and the Virgin Islands.**

    - **Excluding BP Texas City, the refinery industry reported a 13% decrease in emissions of carcinogens between 1999 and 2004.**

Appendix B

OSHA Carcinogen Air Emissions (1999, 2003, and 2004)

OSHA Carcinogen Air Emissions (1999)

Row #	Facility	State	Zip	OSHA Carcinogen Fugitive Air Emissions	OSHA Carcinogen Stack Emissions	Total OSHA Carcinogen Air Emissions (lbs./year)
1	BP TEXAS CITY REFINERY	TX	'77590'	52,691	156,335	209,026
2	EXXONMOBIL REFINING & SUPPLY BAYTOWN REFINERY	TX	'77520'	51,151	101,395	152,546
3	PREMCOR REFINING GROUP INC	DE	'19706'	12,163	88,823	100,986
4	CONOCOPHILLIPS WOOD RIVER REFINERY	IL	'62084'	140,674	33,101	173,775
5	FLINT HILLS RESOURCES LP WEST PLANT	TX	'78410'	107,944	44,064	152,008
6	EXXONMOBIL REFINING & SUPPLY BATON ROUGE REFINERY	LA	'70805'	63,121	44,021	107,142
7	VALERO REFINING TEXAS LP CORPUS CHRISTI WEST PLANT	TX	'78407'	6,430	11,584	18,014
8	VALERO REFINING TEXAS L.P	TX	'77592'	21,026	15,698	36,724
9	TOTAL PETROCHEMICALS USA INC PORT ARTHUR REFINERY	TX	'77642'	39,442	13,540	52,982
10	CONOCOPHILLIPS CO SWEENY REFINERY COMPLEX	TX	'77463'	17,318	47,081	64,399
11	MOTIVA ENTERPRISES LLC NORCO REFINERY	LA	'70079'	89,920	30,014	119,934
12	VALERO REFINING TEXAS LP CORPUS CHRISTI EAST PLANT	TX	'78403'	52,618	14,384	67,002
13	CATLETTSBURG REFINING LLC	KY	'41129'	31,313	19,506	50,819
14	CHEVRON PRODUCTS CO PASCAGOULA REFINERY	MS	'39581'	79,502	21,571	101,073
15	LYONDELL-CITGO REFINING LP	TX	'77017'	51,282	52,207	103,489
16	CITGO PETROLEUM CORP	LA	'70669'	68,975	28,850	97,825
17	BP PRODUCTS NORTH AMERICA WHITING BUSINESS UNIT	IN	'46394'	15,463	7,447	22,910
18	CONOCOPHILLIPS CO	TX	'79008'	66,413	26,343	92,756
19	CHEVRON PRODUCTS CO. RICHMOND REFINERY	CA	'94801'	24,987	8,168	33,155
20	DEER PARK REFINING LP	TX	'77536'	25,477	39,275	64,752
21	CHALMETTE REFINING LLC	LA	'70043'	42,992	11,851	54,843
22	SUNOCO INC (R&M) EAGLE POINT FACILITY	NJ	'08093'	49,699	21,444	71,143
23	SUNOCO INC (R&M) PHILADELPHIA REFINERY	PA	'19145'	38,958	24,266	63,224
24	NATIONAL CO-OP REFINERY ASSOCIATION	KS	'67460'	32,870	29,990	62,860
25	HOVENSA LLC	VI	'00820'	17,829	38,255	56,084
26	CONOCOPHILLIPS LAKE CHARLES REFINERY	LA	'70669'	16,986	9,422	26,408
27	FLINT HILLS RESOURCES LP	MN	'55068'	26,630	18,432	45,062
28	CONOCOPHILLIPS CO BAYWAY REFINERY	NJ	'07036'	39,791	12,688	52,479
29	MARATHON ASHLAND PETROLEUM LLC ILLINOIS REFINING DIV	IL	'62454'	27,161	15,640	42,801
30	DIAMOND SHAMROCK REFINING CO. L.P.	TX	'79086'	17,460	13,480	30,940
31	ALON USA BIG SPRING REFINERY	TX	'79720'	35,156	7,647	42,803
32	FLINT HILLS RESOURCES LP EAST PLANT	TX	'78407'	7,259	6,863	14,122
33	COFFEYVILLE RESOURCES REFINING & MARKETING LLC	KS	'67337'	1,400	46,000	47,400
34	BP CHERRY POINT REFINERY	WA	'98230'	42,031	3,830	45,861
35	SUNOCO INC.	OH	'43616'	3,505	4,934	8,439
36	CONOCOPHILLIPS CO ALLIANCE REFINERY	LA	'70037'	14,470	23,721	38,191
37	TESORO PETROLEUM - MANDAN REFINERY	ND	'58554'	28,260	5,412	33,672
38	LION OIL CO	AR	'71730'	30,849	9,248	40,097
39	EXXONMOBIL OIL BEAUMONT REFINERY	TX	'77701'	19,765	11,927	31,692
40	NAVAJO REFINING CO	NM	'88210'	32,249	5,160	37,409
41	MARATHON ASHLAND PETROLEUM LLC	TX	'77590'	26,605	10,215	36,820
42	CHEVRON PRODUCTS CO. DIV OF CHEVRON USA INC.	CA	'90245'	957	1,512	2,469
43	CITGO REFINING & CHEMICALS CO LP EAST PLANT	TX	'78407'	22,038	14,750	36,788
44	BP PRODUCTS NORTH AMERICA INC TOLEDO REFINNERY	OH	'43616'	18,502	8,152	26,654
45	FRONTIER EL DORADO REFINING CO	KS	'67042'	20,011	16,252	36,263
46	TPI PETROLEUM INC	OK	'73401'	32,416	3,995	36,411
47	VALERO REFINING NEW ORLEANS LLC	LA	'70078'	4,216	31,387	35,603
48	CONOCOPHILLIPS PONCA CITY REFINERY	OK	'74601'	12,531	17,777	30,308
49	BP WEST COAST PRODUCTS LLC CARSON	CA	'90749'	1,867	4,022	5,889
50	SINCLAIR OIL CORP TULSA REFINERY	OK	'74107'	27,278	2,763	30,041
51	HOLLY REFINING & MARKETING CO WOODS CROSS	UT	'84087'	3,515	652	4,167
52	PREMCOR REFINING INC LIMA REFINERY	OH	'45804'	14,100	13,380	27,480
53	SAN JUAN REFINING CO	NM	'87413'	18,450	7,900	26,350
54	LA GLORIA OIL & GAS CO	TX	'75702'	23,200	2,400	25,600
55	VALERO THREE RIVERS REFINERY	TX	'78071'	15,200	9,908	25,108
56	VALERO REFINING TEXAS LP HOUSTON REFINERY	TX	'77012'	8,193	10,749	18,942
57	PREMCOR REFINING GROUP INC PORT ARTHUR REFINERY	TX	'77640'	6,600	17,200	23,800
58	TESORO REFINING & MARKETING CO	WA	'98221'	10,835	12,525	23,360
59	SUNOCO INC (R&M) TULSA REFINERY	OK	'74107'	14,360	8,005	22,365
60	GIANT REFINING CO	NM	'87347'	10,071	12,268	22,339
61	SINCLAIR OIL CORP CASPER REFINERY	WY	'82609'	20,109	671	20,780
62	SINCLAIR OIL CORP	WY	'82334'	18,835	3,765	22,600
63	MARATHON PETROLEUM CORP LLC	MN	'55071'	16,616	4,768	21,384
64	CONOCOPHILLIPS SAN FRANCISCO REFINERY	CA	'94572'	1,755	2,750	4,505
65	VALERO REFINING CO LOUISIANA	LA	'70750'	19,286	2,238	21,524
66	VALERO REFINING CO CALIFORNIA BENICIA REFINERY	CA	'94510'	4,601	11,842	16,443
67	MARATHON ASHLAND PETROLEUM OHIO REFINING DIV	OH	'44706'	15,380	5,212	20,592
68	SHELL CHEMICAL LP MOBILE SITE	AL	'36571'	17,341	3,386	20,727
69	TESORO REFINING & MARKETING CO	CA	'94553'	3,300	3,650	6,950
70	WESTERN REFINING CO. EL PASO REFINERY	TX	'79905'	14,600	4,360	18,960
71	TESORO ALASKA - KENAI REFINERY	AK	'99611'	17,314	2,655	19,969
72	EXXONMOBIL OIL CORP TORRANCE REFINERY	CA	'90509'	1,207	9,034	10,241
73	CONOCOPHILLIPS CO LA REFINERY WILMINGTON PLANT	CA	'90744'	2,169	8,355	10,524
74	CROWN CENTRAL PETROLEUM CORP	TX	'77506'	11,447	5,968	17,415
75	WYNNEWOOD REFINING CO	OK	'73098'	8,800	8,600	17,400

OSHA Carcinogen Air Emissions (1999)

76	CITGO REFINING & CHEMICALS CO LP WEST PLANT	TX	'78409'	1,341	61	1,402
77	PDV MIDWEST REFINING L.L.C. LEMONT REFINERY	IL	'60439'	2,350	9,355	11,705
78	SUNOCO INC (R&M) MARCUS HOOK REFINERY	PA	'19061'	2,918	12,900	15,818
79	CONOCOPHILLIPS CO BILLINGS REFINERY	MT	'59107'	13,890	2,325	16,215
80	VALERO REFINING CO NEW JERSEY	NJ	'08066'	8,817	6,430	15,247
81	MARATHON PETROLEUM CO LLC	LA	'70051'	10,083	4,973	15,056
82	HUNT REFINING CO A CORP	AL	'35401'	13,577	1,238	14,815
83	MARATHON ASHLAND PETROLEUM LLC	MI	'48217'	5,640	5,165	10,805
84	EXXONMOBIL BILLINGS REFINERY	MT	'59101'	1,225	8,105	9,330
85	SHELL OIL PRODUCTS US MARTINEZ REFINERY	CA	'94553'	2,516	6,453	8,969
86	CHEVRON PRODUCTS CO HAWAII REFINERY	HI	'96707'	9,500	2,855	12,355
87	MOTIVA ENTERPRISES LLC CONVENT REFINERY	LA	'70723'	5,031	2,621	7,652
88	HUNT SOUTHLAND REFINING CO SANDERSVILLE	MS	'39439'	12,180	0	12,180
89	PREMCOR REFINING GROUP INC MEMPHIS REFINERY	TN	'38109'	4,186	6,538	10,724
90	CALCASIEU REFINING CO	LA	'70605'	11,040	676	11,716
91	CALUMET SHREVEPORT LUBRICANTS & WAXES LLC	LA	'71109'	4,103	6,065	10,168
92	MURPHY OIL USA INC MERAUX REFINERY	LA	'70075'	7,972	1,670	9,642
93	FLINT HILLS RESOURCES ALASKA LLC	AK	'99705'	3,400	4,920	8,320
94	TESORO HAWAII REFINERY	HI	'96707'	293	7,501	7,794
95	COUNTRYMARK REFINERY	IN	'47620'	4,814	1,463	6,277
96	CHS INC. LAUREL REFINERY	MT	'59044'	5,300	1,665	6,965
97	SHELL CHEMICAL YABUCOA INC	PR	'00767'	6,053	768	6,821
98	CONOCOPHILLIPS CO. - TRAINER REFINERY	PA	'19061'	4,881	1,326	6,207
99	MOTIVA ENTERPRISES LLC PORT ARTHUR REFINERY	TX	'77640'	3,800	2,400	6,200
100	YORKTOWN REFINERY	VA	'23692'	1,501	4,528	6,029
101	CHEVRON PRODUCTS CO	NJ	'08861'	5,400	250	5,650
102	EXXONMOBIL OIL CORP JOLIET REFINERY	IL	'60410'	1,832	3,920	5,752
103	FRONTIER REFINING INC.	WY	'82007'	4,208	1,824	6,032
104	CHEVRON PRODUCTS CO SALT LAKE REFINERY	UT	'84116'	1,631	2,769	4,400
105	SHELL OIL PRODUCTS US LOS ANGELES REFINERY	CA	'90744'	751	2,560	3,311
106	BIG WEST OIL LLC	UT	'84054'	5,123	0	5,123
107	AMERADA HESS CORP PORT READING REFINERY	NJ	'07064'	119	1,776	1,895
108	PLACID REFINING CO LLC	LA	'70767'	3,751	1,238	4,989
109	TESORO REFINING & MARKETING CO	UT	'84103'	1,506	3,242	4,748
110	MONTANA REFINING CO	MT	'59404'	4,530	425	4,955
111	UNITED REFINING CO	PA	'16365'	1,750	2,550	4,300
112	SHELL OIL PRODUCTS US PUGET SOUND REFINERY	WA	'98221'	990	3,322	4,312
113	SUNCOR ENERGY COMMERCE CITY REFINERY	CO	'80022'	2,649	1,673	4,322
114	CONOCOPHILLIPS FERNDALE REFINERY	WA	'98248'	2,169	1,968	4,137
115	HUNT SOUTHLAND REFINING CO LUMBERTON	MS	'39455'	3,820	0	3,820
116	SOMERSET REFINERY INC	KY	'42501'	0	3,750	3,750
117	MURPHY OIL USA INC	WI	'54880'	3,315	318	3,633
118	U.S. OIL & REFINING CO.	WA	'98421'	2,626	404	3,030
119	COLORADO REFINING CO	CO	'80022'	1,707	1,034	2,741
120	WYOMING REFINING CO	WY	'82701'	750	1,250	2,000
121	SHELL BAKERSFIELD REFINERY	CA	'93308'	500	899	1,399
122	SILVER EAGLE REFINING-WOODS CROSS INC	UT	'84087'	241	1,483	1,724
123	KERN OIL & REFINING CO.	CA	'93307'	1,029	599	1,628
124	AGE REFINING INC	TX	'78223'	996	610	1,606
125	ERGON WEST VIRGINIA INC	WV	'26050'	734	772	1,506
126	AMERICAN REFINING GROUP INC	PA	'16701'	1,080	285	1,365
127	FORELAND REFINING CORP TONOPAH TERMINAL	NV	'89049'	1,026	273	1,299
128	ULTRAMAR INC. WILMINGTON REFINERY	CA	'90744'	112	851	963
129	CALUMET LUBRICANTS CO. L.P. CALUMET COTTON VALLEY	LA	'71018'	453	565	1,018
130	SHELL BAKERSFIELD REFINERY	CA	'93308'	250	5	255
131	EDGINGTON OIL CO	CA	'90805'	20	254	274
132	PETRO STAR VALDEZ REFINERY	AK	'99686'	250	250	500
133	CONOCOPHILLIPS SANTA MARIA FACILITY REFINERY	CA	'93420'	190	240	430
134	SHELL CHEMICAL LP ST ROSE FACILITY	LA	'70087'	250	103	353
135	SILVER EAGLE REFINING-EVANSTON	WY	'82930'	34	298	332
136	PETRO STAR INC	AK	'99705'	5	250	255
137	LUNDAY-THAGARD CO	CA	'90280'	48	84	132
	Total			**2,209,191**	**1,550,778**	**3,759,969**

OSHA Carcinogen Air Emissions (2003)

Row #	Facility	State	Zip	OSHA Carcinogen Fugitive Air Emissions	OSHA Carcinogen Stack Emissions	Total OSHA Carcinogen Air Emissions (lbs./year)
1	TOTAL PETROCHEMICALS USA INC PORT ARTHUR REFINERY	TX	'77642'	84,219	11,539	95,758
2	PREMCOR REFINING GROUP INC	DE	'19706'	11,209	8,149	19,359
3	BP TEXAS CITY REFINERY	TX	'77590'	54,626	119,970	174,596
4	EXXONMOBIL REFINING & SUPPLY BAYTOWN REFINERY	TX	'77520'	85,050	121,950	207,000
5	CHALMETTE REFINING LLC	LA	'70043'	73,007	101,214	174,221
6	CITGO PETROLEUM CORP	LA	'70669'	44,308	39,640	83,948
7	FLINT HILLS RESOURCES LP WEST PLANT	TX	'78410'	111,263	20,932	132,195
8	LYONDELL-CITGO REFINING LP	TX	'77017'	71,432	56,824	128,256
9	DIAMOND SHAMROCK REFINING CO. L.P.	TX	'79086'	3,510	5,282	8,792
10	TPI PETROLEUM INC	OK	'73401'	38,193	4,367	42,560
11	EXXONMOBIL REFINING & SUPPLY BATON ROUGE REFINERY	LA	'70805'	64,865	22,247	87,112
12	EXXONMOBIL OIL BEAUMONT REFINERY	TX	'77701'	23,414	32,798	56,212
13	CONOCOPHILLIPS CO	TX	'79008'	44,205	26,723	70,928
14	VALERO REFINING TEXAS LP CORPUS CHRISTI EAST PLANT	TX	'78403'	53,675	30,893	84,567
15	CHEVRON PRODUCTS CO PASCAGOULA REFINERY	MS	'39581'	48,431	29,395	77,827
16	VALERO THREE RIVERS REFINERY	TX	'78071'	42,191	18,416	60,607
17	CONOCOPHILLIPS WOOD RIVER REFINERY	IL	'62084'	34,888	24,708	59,596
18	NATIONAL CO-OP REFINERY ASSOCIATION	KS	'67460'	33,249	28,124	61,373
19	ALON USA BIG SPRING REFINERY	TX	'79720'	5,579	52,392	57,970
20	CONOCOPHILLIPS PONCA CITY REFINERY	OK	'74601'	9,000	34,486	43,486
21	MARATHON ASHLAND PETROLEUM LLC ILLINOIS REFINING DIV	IL	'62454'	16,443	31,684	48,127
22	CATLETTSBURG REFINING LLC	KY	'41129'	7,150	17,797	24,947
23	COFFEYVILLE RESOURCES REFINING & MARKETING LLC	KS	'67337'	1,283	54,002	55,285
24	CITGO REFINING & CHEMICALS CO LP EAST PLANT	TX	'78407'	31,848	19,855	51,703
25	PREMCOR REFINING GROUP INC PORT ARTHUR REFINERY	TX	'77640'	9,432	15,424	24,856
26	CONOCOPHILLIPS CO SWEENY REFINERY COMPLEX	TX	'77463'	9,293	28,047	37,340
27	HOVENSA LLC	VI	'00820'	11,063	27,475	38,538
28	VALERO REFINING CO CALIFORNIA BENICIA REFINERY	CA	'94510'	5,733	10,777	16,510
29	CHEVRON PRODUCTS CO. RICHMOND REFINERY	CA	'94801'	9,826	4,145	13,971
30	MARATHON ASHLAND PETROLEUM LLC	TX	'77590'	30,966	10,233	41,199
31	CONOCOPHILLIPS CO ALLIANCE REFINERY	LA	'70037'	10,127	30,045	40,172
32	FLINT HILLS RESOURCES LP	MN	'55068'	23,822	13,015	36,837
33	BP PRODUCTS NORTH AMERICA INC TOLEDO REFINNERY	OH	'43616'	15,566	10,298	25,864
34	EXXONMOBIL OIL CORP TORRANCE REFINERY	CA	'90509'	1,081	8,138	9,219
35	SUNOCO INC (R&M) EAGLE POINT FACILITY	NJ	'08093'	19,570	17,703	37,273
36	FRONTIER EL DORADO REFINING CO	KS	'67042'	16,720	20,800	37,520
37	NAVAJO REFINING CO	NM	'88210'	28,457	7,580	36,037
38	SUNOCO INC (R&M) MARCUS HOOK REFINERY	PA	'19061'	3,504	26,278	29,782
39	SHELL CHEMICAL YABUCOA INC	PR	'00767'	32,200	1,514	33,714
40	BP PRODUCTS NORTH AMERICA WHITING BUSINESS UNIT	IN	'46394'	5,260	11,148	16,408
41	PREMCOR REFINING INC LIMA REFINERY	OH	'45804'	18,426	14,810	33,236
42	MARATHON PETROLEUM CORP LLC	MN	'55071'	28,527	2,538	31,064
43	MARATHON PETROLEUM CO LLC	LA	'70051'	30,600	2,579	33,179
44	EXXONMOBIL BILLINGS REFINERY	MT	'59101'	4,015	8,628	12,643
45	DEER PARK REFINING LP	TX	'77536'	15,945	15,590	31,535
46	VALERO REFINING TEXAS L.P	TX	'77592'	13,243	12,325	25,568
47	LION OIL CO	AR	'71730'	9,120	22,173	31,293
48	MOTIVA ENTERPRISES LLC NORCO REFINERY	LA	'70079'	16,127	13,354	29,481
49	SHELL OIL PRODUCTS US LOS ANGELES REFINERY	CA	'90744'	2,948	2,889	5,836
50	TESORO REFINING & MARKETING CO	WA	'98221'	20,557	7,802	28,359
51	PREMCOR REFINING GROUP INC MEMPHIS REFINERY	TN	'38109'	5,565	4,680	10,245
52	VALERO REFINING TEXAS LP HOUSTON REFINERY	TX	'77012'	10,385	15,876	26,261
53	LA GLORIA OIL & GAS CO	TX	'75702'	23,500	2,480	25,980
54	BP WEST COAST PRODUCTS LLC CARSON	CA	'90749'	2,484	4,621	7,105
55	HOLLY REFINING & MARKETING CO WOODS CROSS	UT	'84087'	6,206	1,189	7,395
56	CONOCOPHILLIPS LAKE CHARLES REFINERY	LA	'70669'	9,998	7,905	17,903
57	SINCLAIR OIL CORP TULSA REFINERY	OK	'74107'	9,752	4,898	14,649
58	CONOCOPHILLIPS CO BAYWAY REFINERY	NJ	'07036'	8,921	7,254	16,175
59	HUNT REFINING CO A CORP	AL	'35401'	16,518	4,280	20,798
60	TESORO PETROLEUM - MANDAN REFINERY	ND	'58554'	9,820	2,854	12,674
61	PDV MIDWEST REFINING L.L.C. LEMONT REFINERY	IL	'60439'	3,228	11,862	15,090
62	SINCLAIR OIL CORP	WY	'82334'	9,919	9,294	19,213
63	TESORO REFINING & MARKETING CO	UT	'84103'	1,756	3,253	5,009
64	VALERO REFINING NEW ORLEANS LLC	LA	'70078'	3,535	4,227	7,762
65	VALERO REFINING TEXAS LP CORPUS CHRISTI WEST PLANT	TX	'78407'	5,995	9,799	15,794
66	CHEVRON PRODUCTS CO. DIV OF CHEVRON USA INC.	CA	'90245'	2,091	2,073	4,163
67	TESORO REFINING & MARKETING CO	CA	'94553'	2,729	8,866	11,595
68	EXXONMOBIL OIL CORP JOLIET REFINERY	IL	'60410'	11,043	4,863	15,906
69	MOTIVA ENTERPRISES LLC CONVENT REFINERY	LA	'70723'	3,617	3,485	7,102
70	AMERADA HESS CORP PORT READING REFINERY	NJ	'07064'	693	3,569	4,262
71	FLINT HILLS RESOURCES LP EAST PLANT	TX	'78407'	7,067	6,053	13,120
72	BP CHERRY POINT REFINERY	WA	'98230'	10,172	4,820	14,992
73	PLACID REFINING CO LLC	LA	'70767'	1,240	11,959	13,199
74	SHELL OIL PRODUCTS US MARTINEZ REFINERY	CA	'94553'	2,987	9,293	12,280
75	VALERO REFINING CO NEW JERSEY	NJ	'08066'	9,040	5,885	14,925
76	WYNNEWOOD REFINING CO	OK	'73098'	4,774	9,486	14,260
77	WESTERN REFINING CO. EL PASO REFINERY	TX	'79905'	8,465	5,590	14,055

OSHA Carcinogen Air Emissions (2003)

78	TESORO ALASKA - KENAI REFINERY	AK	'99611'	9,367	2,707	12,073
79	GIANT REFINING CO	NM	'87347'	4,022	7,991	12,013
80	MARATHON ASHLAND PETROLEUM OHIO REFINING DIV	OH	'44706'	5,897	3,917	9,814
81	SUNOCO INC (R&M) TULSA REFINERY	OK	'74107'	7,240	4,400	11,640
82	MURPHY OIL USA INC MERAUX REFINERY	LA	'70075'	8,629	2,131	10,760
83	SHELL CHEMICAL LP MOBILE SITE	AL	'36571'	3,838	2,681	6,519
84	CALUMET SHREVEPORT LUBRICANTS & WAXES LLC	LA	'71109'	6,870	4,600	11,470
85	CALUMET LUBRICANTS CO. L.P. CALUMET COTTON VALLEY	LA	'71018'	416	10,735	11,151
86	CONOCOPHILLIPS SAN FRANCISCO REFINERY	CA	'94572'	2,478	3,771	6,249
87	SUNOCO INC.	OH	'43616'	4,698	5,035	9,733
88	CHEVRON PRODUCTS CO SALT LAKE REFINERY	UT	'84116'	1,500	6,803	8,303
89	CHS INC. LAUREL REFINERY	MT	'59044'	6,766	2,302	9,068
90	COLORADO REFINING CO	CO	'80022'	5,978	3,087	9,065
91	ERGON WEST VIRGINIA INC	WV	'26050'	957	2,048	3,004
92	FLINT HILLS RESOURCES ALASKA LLC	AK	'99705'	4,305	3,745	8,050
93	CROWN CENTRAL PETROLEUM CORP	TX	'77506'	4,334	4,100	8,434
94	CONOCOPHILLIPS CO. - TRAINER REFINERY	PA	'19061'	2,835	5,194	8,028
95	HUNT SOUTHLAND REFINING CO SANDERSVILLE	MS	'39439'	400	5,240	5,640
96	YORKTOWN REFINERY	VA	'23692'	4,310	2,450	6,760
97	MOTIVA ENTERPRISES LLC PORT ARTHUR REFINERY	TX	'77640'	2,874	2,943	5,817
98	VALERO REFINING CO LOUISIANA	LA	'70750'	4,847	2,734	7,581
99	CONOCOPHILLIPS FERNDALE REFINERY	WA	'98248'	3,753	3,666	7,418
100	CHEVRON PRODUCTS CO HAWAII REFINERY	HI	'96707'	3,199	3,477	6,675
101	CHEVRON PRODUCTS CO	NJ	'08861'	5,886	607	6,493
102	SUNOCO INC (R&M) PHILADELPHIA REFINERY	PA	'19145'	3,125	3,276	6,401
103	SOMERSET REFINERY INC	KY	'42501'	15	6,355	6,370
104	FRONTIER REFINING INC.	WY	'82007'	4,167	1,961	6,128
105	MARATHON ASHLAND PETROLEUM LLC	MI	'48217'	4,640	1,207	5,847
106	TESORO HAWAII REFINERY	HI	'96707'	1,974	3,906	5,880
107	CITGO REFINING & CHEMICALS CO LP WEST PLANT	TX	'78409'	5,814	50	5,864
108	BIG WEST OIL LLC	UT	'84054'	5,283	3	5,286
109	SHELL BAKERSFIELD REFINERY	CA	'93308'	501	4,922	5,423
110	UNITED REFINING CO	PA	'16365'	1,530	3,200	4,730
111	SHELL OIL PRODUCTS US PUGET SOUND REFINERY	WA	'98221'	2,203	2,104	4,307
112	CONOCOPHILLIPS CO LA REFINERY WILMINGTON PLANT	CA	'90744'	2,244	2,159	4,403
113	CONOCOPHILLIPS CO BILLINGS REFINERY	MT	'59107'	2,501	2,602	5,103
114	SAN JUAN REFINING CO	NM	'87413'	780	3,655	4,435
115	SILVER EAGLE REFINING-WOODS CROSS INC	UT	'84087'	3,769	612	4,382
116	CALCASIEU REFINING CO	LA	'70605'	3,500	188	3,688
117	COUNTRYMARK REFINERY	IN	'47620'	2,263	925	3,188
118	SINCLAIR OIL CORP CASPER REFINERY	WY	'82609'	2,591	1,076	3,667
119	MURPHY OIL USA INC	WI	'54880'	1,206	639	1,845
120	PARAMOUNT PETROLEUM CORP	CA	'90723'	1,335	1,019	2,354
121	MONTANA REFINING CO	MT	'59404'	2,941	174	3,115
122	U.S. OIL & REFINING CO.	WA	'98421'	2,103	793	2,896
123	HUNT SOUTHLAND REFINING CO LUMBERTON	MS	'39455'	200	2,180	2,380
124	SHELL CHEMICAL LP ST ROSE FACILITY	LA	'70087'	1,580	305	1,885
125	AMERICAN REFINING GROUP INC	PA	'16701'	732	284	1,016
126	KERN OIL & REFINING CO.	CA	'93307'	1,000	500	1,500
127	SUNCOR ENERGY COMMERCE CITY REFINERY	CO	'80022'	161	1,200	1,361
128	ULTRAMAR INC. WILMINGTON REFINERY	CA	'90744'	437	802	1,239
129	WYOMING REFINING CO	WY	'82701'	215	1,117	1,331
130	CONOCOPHILLIPS SANTA MARIA FACILITY REFINERY	CA	'93420'	380	560	940
131	SILVER EAGLE REFINING-EVANSTON	WY	'82930'	573	425	998
132	AGE REFINING INC	TX	'78223'	500	250	750
133	EDGINGTON OIL CO	CA	'90805'	506	26	532
134	PETRO STAR VALDEZ REFINERY	AK	'99686'	250	250	500
135	LUNDAY-THAGARD CO	CA	'90280'	191	13	204
136	SHELL BAKERSFIELD REFINERY	CA	'93308'	6	5	11
137	TRIGEANT, LTD.	TX	'78409'	19	6	25
138	SAN JOAQUIN REFINING CO INC	CA	'93308'	7	18	25
139	FORELAND REFINING CORP- EAGLE SPRINGS REFINERY	NV	'89301'	-	-	0
140	PETRO STAR INC	AK	'99705'	5	5	10
141	CALUMET LUBRICANTS CO LP	LA	'71067'	4	0	4
142	ERGON REFINING INC	MS	'39183'	-	-	0
	Total			**1,743,310**	**1,574,242**	**3,317,552**

OSHA Carcinogen Air Emissions (2004)

State	Refinery	Barrels per Day Crude Oil Distillation	OSHA Carcinogen Fugitive Air Emissions	OSHA Carcinogen Point Source Air Emissions	Total OSHA Carcinogen Emissions (Gross Pounds / year)
Alabama	Hunt Refining Co. -Tuscaloosa	33,500	8,414	4,786	13,200
	Shell Chem LP-Saraland	80,000	3,341	2,104	5,445
Alaska	Flint Hills Resources Alaska LLC-North Pole	210,000	4,454	4,006	8,460
	Petro Star Inc-North Pole	17,000	5	250	255
	Petro Star Inc-Valdez	48,000	250	250	500
	Tesoro Petroleum Corp-Kenai	72,000	9,129	2,660	11,789
Arkansas	Lion Oil Co-El Dorado	70,000	11,072	21,034	32,106
California	BP West Coast Products LLC-Los Angeles	260,000	2,418	4,147	6,565
	Chevron USA Inc.-El Segundo	260,000	3,632	26,059	29,691
	Chevron USA Inc.-Richmond	242,901	8,461	3,646	12,107
	Conoco Phillips-Arroyo Grande	41,800	1	155	156
	Conoco Phillps-Rodeo	73,200	7	16	23
	Conoco Phillips-Wilmington	139,000	1,580	2,079	3,659
	Edgington Oil Co Inc.-Long Beach	14,000	476	28	504
	Exxon Mobil Refining & Supply Co-Torrance	149,500	1,194	8,725	9,919
	Kern Oil & Refining Co-Bakersfield	25,000	1,000	500	1,500
	Lunday Thagard Co-South Gate	8,500	103	13	116
	Paramount Petroleum Corp-Paramount	50,000	1,295	1,151	2,446
	San Joaquin Refining Co Inc-Bakersfield	14,300	8	19	27
	Shell Oil Products US-Bakersfield	66,000	638	1,020	1,658
	Shell Oil Products US-Martinez	152,700	2,473	10,994	13,467
	Shell Oil Products US-Wilmington	98,500	1,498	4,021	5,519
	Tesoro Refining & Marketing Co-Martinez	166,000	1,590	9,652	11,242
	Ultramar Inc.-Wilmington	80,887	517	740	1,257
	Valero Refining Co California-Benicia	144,000	4,977	8,880	13,857
Colorado	Colorado Refining Co.-Commerce City	27,000	5,472	4,632	10,104
	Suncor Energy USA Inc - Commerce City	60,000	96	520	616
Delaware	Premcor Refining Group Inc-Delaware City	175,000	6,981	5,032	12,013
Hawaii	Chevron USA Inc.-Honolulu	54,000	3,853	1,834	5,687
	Tesoro Hawaii Corp-Ewa Beach	93,500	2,821	3,127	5,948
Illinois	Conoco Phillips-Wood River	306,000	39,202	27,531	66,733
	Exxon Mobil Refining & Supply Co-Joliet	238,000	16,021	5,272	21,293
	Marathon Ashland Petroleum LLC-Robinson	192,000	13,915	33,803	47,718
	PDV Midwest Refining LLC-Lemont (Chicago)	160,000	2,554	12,293	14,847
Indiana	BP Products North America Inc-Whiting	410,000	6,009	9,876	15,885
	Countrymark Cooperative Inc-Mount Vernon	23,000	2,266	920	3,186
Kansas	Coffeyville Resources Refining & Mkg-Coffeyville	112,000	15,327	5,879	21,206
	Frontier Refining & Martketing Inc-El Dorado	103,000	12,696	17,749	30,445
	NCRA-McPherson	81,200	33,249	26,813	60,062
Kentuky	Marathon Ashland Petroleum LLC - Catlettsburg	222,000	28,550	14,401	42,951
	Somerset Refinery Inc-Somerset	5,500	556	6,366	6,922
Louisiana	Calcasieu Refining Co-Lake Charles	30,000	3,571	188	3,759
	Calumet Lubricants Co LP-Cotton Valley	13,020	417	10,600	11,017
	Calumet Lubricants Co LP-Princeton	8,300	4	-	4
	Calumet Shreveport LLC - Shreveport	35,000	6,830	1,270	8,100
	Chalmette Refining LLC - Chalmette	187,200	43,495	43,011	86,506
	Citgo Petroleum Corp - Lake Charles	324,300	43,276	40,071	83,347
	Conoco Phillips-Belle Chasse	247,000	30,465	35,385	65,850
	Conoco Phillips-Westlake	239,400	28,598	23,740	52,338
	Exxon Mobil Refining & Supply Co.-Baton Rouge	493,500	80,973	22,195	103,168
	Marathon Ashland Petroleum LLC-Garyville	245,000	21,511	2,409	23,920
	Motiva Enterprises LLC-Convent	235,000	1,470	3,488	4,958
	Motiva Enterprises LLC-Norco	226,500	15,177	8,329	23,506
	Murphy Oil USA Inc-Meraux	120,000	7,754	5,978	13,732
	Placid Refining Co-Port Allen	48,500	1,240	12,548	13,788
	Shell Chem LP-Saint Rose	55,000	5,105	527	5,632
	Valero Refining Co Louisiana-Krotz Springs	80,000	6,290	1,333	7,623
	Valero Saint Charles Refinery-Norco	185,003	4,202	4,181	8,383
Michigan	Marathon Ashland Petroleum LLC-Detroit	74,000	28,464	1,113	29,577
Minnesota	Flint Hills Resources LP-Saint Paul	265,000	5,470	10,372	15,842
	Marathon Ashland Petroleum LLC-Saint Paul Park	70,000	22,956	2,672	25,628
Mississippi	Chevron USA Inc-Pascagoula	325,000	38,479	24,906	63,385
	Ergon Refining Inc.-Vicksburg	23,000	-	-	-
	Hunt Southland Refining Co-Lumberton	5,800	413	118	531
	Hunt Southland Refining Co-Sandersville	11,000	819	438	1,257
Montana	Cenex Harvest States Coop-Laurel	55,000	7,659	2,487	10,146

OSHA Carcinogen Air Emissions (2004)

	Conoco Phillips-Billings	58,000	2,203	2,572	4,775
	Exxon Mobil Refining & Supply Co-Billings	60,000	2,924	6,524	9,448
	Montana Refining Co-Great Falls	8,200	2,941	174	3,115
Nevada	Foreland Refining Corp-Eagle Springs	1,707	255	500	755
New Jersey	Amerada Hess Corp-Port Reading	-	1,146	3,574	4,720
	Chevron USA Inc-Perth Amboy	80,000	2,513	654	3,167
	Conoco Phillips-Linden	230,000	5,640	6,568	12,208
	Sunoco Inc-Westville	145,000	19,806	13,522	33,328
	Valero Refining Co New Jersey-Paulsboro	160,000	7,871	5,046	12,917
New Mexico	Navajo Refining Co-Artesia	75,000	37,172	6,833	44,005
	Giant Industries Inc - Bloomfield	16,800	784	3,668	4,452
	Giant Refining Co - Gallup	20,800	3,135	7,724	10,859
North Dakota	Tesoro West Coast-Mandan	58,000	10,639	3,280	13,919
Ohio	BP Products North America Inc-Toledo	160,000	19,738	10,157	29,895
	Marathon Ashland Petroleum LLC-Canton	73,000	9,828	3,554	13,382
	Premcor Refining Group Inc-Lima	158,400	15,623	6,174	21,797
	Sunoco Inc-Toledo	160,000	9,357	5,119	14,476
Oklahoma	Conoco Phillips-Ponca City	194,000	13,253	33,385	46,638
	Sinclair Oil Corp-Tulsa	70,300	11,650	5,433	17,083
	Sunoco Inc-Tulsa	85,000	10,810	4,550	15,360
	TPI Petroleum Inc-Ardmore	83,161	7,282	15,270	22,552
	Wynnewood Refining Co-Wynnewood	52,500	4,521	11,317	15,838
Pennsylvania	American Refining Group Inc-Bradford	10,000	764	478	1,242
	Conoco Phillips-Trainer	185,000	4,109	5,284	9,393
	Sunoco Inc-Marcus Hook	175,000	44,002	17,095	61,097
	Sunoco Inc (R & M)-Philadelphia	335,000	77,640	9,369	87,009
	United Refining Co-Warren	65,000	3,290	4,597	7,887
Tennessee	Premcor Refining Group Inc-Memphis	180,000	5,655	5,315	10,970
Texas	Age Refining Inc-San Antonio	10,308	250	250	500
	Alon USA LP-Big Spring	61,000	3,985	20,362	24,347
	BP Products North America Inc-Texas City	437,000	53,627	2,030,486	2,084,113
	Citgo Refining & Chemical Inc-Corpus Christi	156,000	45,289	16,469	61,758
	Conoco Phillips-Borger	146,000	40,417	6,666	47,083
	Conoco Phillips-Sweeny	229,000	10,015	28,360	38,375
	Crown Central Petroleum Corp-Pasadena	100,000	3,142	13,705	16,847
	Deer Park Refining LTD Partnership-Deer Park	333,700	590	25,639	26,229
	Exxon Mobil Refining & Supply Co-Baytown	557,000	29,485	144,245	173,730
	Exxon Mobil Refining & Supply Co-Beaumont	348,500	36,593	15,155	51,748
	Flint Hills Resources LP-Corpus Christi	288,126	105,059	29,454	134,513
	La Gloria Oil & Gas Co-Tyler	55,000	117,890	2,489	120,379
	Lyondell Citgo Refining Co LTD-Houston	270,200	70,991	43,796	114,787
	Marathon Ashland Petroleum LLC-Texas City	72,000	30,472	12,855	43,327
	Motiva Enterprises LLC-Port Arthur	285,000	11,332	2,298	13,630
	Premcor Refining Group Inc-Port Arthur	255,000	5,171	19,891	25,062
	Total Petrochemicals Inc-Port Arthur	233,500	14,177	36,169	50,346
	Trigeant LTD-Corpus Christi	-	10	5	15
	Valero Energy Corp - Sunray	158,327	3,284	6,495	9,779
	Valero Energy Corporation-Three Rivers	90,000	16,928	25,609	42,537
	Valero Refining Co Texas-Corpus Christi	142,000	51,892	49,122	101,014
	Valero Refining Co Texas-Houston	83,000	1,546	8,804	10,350
	Valero Refining Co Texas-Texas City	209,950	14,367	17,185	31,552
	Western Refining Company LP-El Paso	107,000	2,300	7,365	9,665
Utah	Big West Oil Co-North Salt Lake	29,400	5,276	2	5,278
	Chevron USA Inc-Salt Lake City	45,000	1,002	14,052	15,054
	Holly Corp Refining & Marketing-Woods Cross	10,250	6,976	1,615	8,591
	Silver Eagle Refining - Woods Cross	10,250	3,986	768	4,754
	Tesoro West Coast-Salt Lake City	58,000	1,507	3,568	5,075
Virginia	Giant Yorktown Refining - Yorktown	58,600	1,592	2,639	4,231
Washington	BP West Coast Productions LLC-Ferndale (Cherry Point)	225,000	6,775	4,571	11,346
	Conoco Phillips-Ferndale	96,000	3,749	3,269	7,018
	Shell Oil Products US-Anacortes	145,000	1,943	2,083	4,026
	Tesoro West Coast-Anacortes	115,000	21,070	7,287	28,357
	US Oil & Refining Co-Tacoma	35,150	2,195	910	3,105
West Virginia	Ergon West Virginia Inc-Newell (Congo)	19,400	1,189	1,061	2,250
Wisconsin	Murphy Oil USA Inc-Superior	33,000	1,985	797	2,782
Wyoming	Frontier Refining & Martketing Inc-Cheyenne	46,000	2,285	3,524	5,809
	Little America Refining Co - Evansville (Casper)	24,500	2,588	1,781	4,369
	Silver Eagle Refining-Evanston	3,000	690	401	1,091
	Sinclair Oil Corp-Sinclair	66,000	14,086	3,265	17,351

OSHA Carcinogen Air Emissions (2004)

	Wyoming Refining Co-Newcastle	12,500	307	1,130	1,437
CONTINENTAL U.S. TOTAL		17,006,290	1,736,889	3,358,889	5,095,778
Puerto Rico	Shell Chem Yabucoa Inc-Yabucoa	67,500	38,901	2,126	41,027
Virgin Islands	Hovensa LLC-Kingshill (St. Croix)	495,000	10,886	26,943	37,829
U.S. TOTAL		**17,568,790**	**1,786,676**	**3,387,958**	**5,174,634**

Appendix C

Selected Individual Carcinogen Air Emissions (1999, 2002, and 2004)

Selected Individual Carcinogen Air Emissions (1999)

Facility	Release, lbs	Capacity, bpd
1. FORMALDEHYDE		
5 reports		
Fugitive Emissions 1/5 = 0		
Stack Emissions 2/5 = 0		
FUGITIVE EMISSIONS		
Hunt Southland, Sandersville MS	3432	11000
Hunt Southland, Lumberton MS	800	5800
Motiva, Delaware City DE	12	157000
STACK EMISSIONS		
Motiva, Delaware City DE	83000	157000
Exxon Mobil, Baytown TX	64342	505000
Exxon Mobil, Baton Rouge LA	14833	483000
2. BENZNE		
176 reports		
FUGITIVE EMISSIONS		
Equilon, Wood River IL	110000	288300
Koch, Corpus Christi West TX	70203	297000CC
Phillips 66, Borger TX	44012	125000
Chevron, Pascagoula MS	42000	295000
(Inland or Phillips 66?), Woods Cross UT	40009	?
Citgo, Lake Charles LA	37870	317000
Lyondell-Citgo, Houston TX	37263	262650
Coastal Eagle Point, NJ	36949	143000
Arco, Cherry Point WA	34000	222720
Fina (?) Port Arthur TX	28201	178500
STACK EMISSIONS		
BP, Texas City TX	100000	437000
Lyondell-Citgo, Houston TX	49000	262650
Coop Refining, Coffeyville KS	44200	112000
Phillips 66, Sweeny TX	40334	205000
Koch, Corpus Christi West TX	37034	297000CC
Exxon Mobil, Baytown TX	30591	505000
Valero New Orleans, New Sarpy LA	30423	?

Phillips 66, Borger TX	24405	125000
Equilon, Wood River IL	20000	288300
Citgo Westlake LA	19973	317000

3. NAPTHALENE

119 reports

FUGITIVE EMISSIONS

Exxon Mobil, Baton Rouge LA	20475	483000
Koch, MN	8000	260000
Citgo, Lake Charles LA	7821	317000
Chalmette, LA	7800	190080
Motiva, Norco LA	7600	225000
DiamondShamrock, Sunray McKee TX	7160	145900
Equilon Wood River IL	5400	288300
Conoco, Westlake LA	4900	240000
Sunoco, Philadelphia PA	4814	330000
BP, Texas City TX	4700	437000

STACK EMISSIONS

BP, Texas City TX	27000	437000
Motiva, Port Arthur TX	5700	238000
Conoco, Ponca City OK	5577	174000
Marathon Catlettsburg KY	2816	222000
Valero Paulsboro NJ	2600	155000
Koch, MN	2500	260000
Conoco, Westlake LA	2400	240000
Exxon Mobil, Beaumont TX	2200	348400
Cooperative Refining, McPherson KS	1900	77400
Motiva, Norco LA	1700	225000

4. ETHYLBENZEN

165 reports

FUGITIVE EMISSIONS

Equilon, Wood River IL	240000	288300
Chevron, Pascagoula MS	230000	295000
Koch, Corpus Christi West TX	22278	297000CC
Phillips 66, Borger TX	21369	125000
Exxon Mobil, Baton Rouge LA	19466	483000
PDV, Lemont IL	18991	164700
Cooperative Refining, McPherson KS	18000	77400
Tosco, Linden NJ	15000	250000
Fina, Big Spring TX	14796	58500

Navajo, Artesia NM	14269	58000

STACK EMISSIONS

Hovensa, VI	17540	430000
Cooperative Refining, McPherson KS	14000	77400
Phillips, PR	12985	0
Equilon, Wood River IL	9100	288300
Chalmette, LA	6900	190080
PDV, Lemont IL	6887	164700
DiamondShamrock, Sunray McKee TX	6580	145900
Koch, Corpus Christi West TX	6197	297000CC
Deer Park, TX	6100	274200
Koch, MN	6000	260000

5. STYRENE

20 reports
FUGITIVE EMISSIONS 5/20 = 0
STACK EMISSIONS 5/20 = 0

FUGITIVE EMISSIONS

Marathon, MN	1658	70000
Pennzoil?, Rouseville PA	1000	12800
Equilon, Wood River IL	970	288300
Motiva, Norco LA	520	225000
Exxon Mobil, Baton Rouge LA	306	483000
Koch, Corpus Christi West TX	301	297000CC
Conoco, Westlake LA	250	240000
Marathon, Catlettsburg KY	67	222000
Valero, Texas City TX	64	152000
Motiva, Delaware City DE	33	157000

STACK EMISSIONS

Exxon Mobil, Baytown TX	562	505000
Paramount Chevron?, Seattle WA	429	0?
Marathon, Catlettsburg KY	358	222000
Valero, Texas City TX	313	152000
Motiva, Norco LA	88	225000
Marathon, MN	78	70000
Pennzoil?, Rouseville PA	76	12800
Paramount Chevron?, Portland OR	47	0?
Exxon Mobil, Baton Rouge LA	37	483000
Motiva, Delaware City DE	21	157000

6. 1,3-BUTADIENE

86 reports

FUGITIVE EMISSIONS		
Motiva, Norco LA	59000	225000
Coastal Eagle Point, NJ	8827	143000
Deer Park, TX	6200	274200
Phillips 66, Sweeny TX	3112	205000
Exxon Mobil, Beaumont TX	2100	348400
Valero, Texas City TX	1998	152000
Chevron, HI	1280	54000
Phillips 66, Borger TX	1032	125000
Motiva, Delaware City DE	1000(tie)	157000
Marathon, MI	1000(tie)	74000

STACK EMISSIONS		
BP, Texas City TX	18000	437000
Exxon Mobil, Baton Rouge LA	16036	483000
Deer Park, TX	15000	274200
Motiva, Norco LA	6400	225000
Tosco, Wilmington CA	5973	130500
Phillips 66, Sweeny TX	4047	205000
Sunoco. Marcus Hook PA	3400	175000
Valero, Benicia CA	1600	?
Exxon Mobil, Baytown TX	1280	505000
Hovensa, VI	1209	430000

7. TETRACHLOROETHYLENE (PERC)

63 reports
FUGITIVE EMISSIONS 22/63 = 0
STACK EMISSIONS 47/63 = 0

FUGITIVE EMISSIONS		
Chevron, Pascagoula MS	10000	295000
Chevron, Richmond CA	5700	225000
Marathon, MN	4282	70000
TPI, Ardmore OK	4236	76989
Koch, MN	4200	260000
Tesoro, Anacortes WA	3500	107500
Marathon, Robinson IL	3129	192000
BP, Mandan ND	2900	58000
Tosco, Linden NJ	2200	250000

Conoco, Billings MT	1900	51500

8. BENZO(G,H,I)PERYLENE

1 report
FUGITIVE EMISSIONS 1/1 = 0

STACK EMISSIONS

Exxon Mobil, Joliet IL	0.21	240000

9. METHYL TERT-BUTYL ETHER ("MTBE")

75 reports

FUGITIVE EMISSIONS

(?) Martinez CA	300000	?
Chevron, Richmond CA	93000	225000
Deer Park, TX	45000	274200
Equilon Martinez CA	33000	156200
Exxon Mobil, Baton Rouge LA	31490	483000
DiamondShamrock, Sunray McKee TX	28280	145900
Coastal Eagle Point, NJ	24660	143000
Motiva, Norco LA	23000	225000
BP, VA	20000	59500
Crown Central, Pasadena TX	17024	100000

STACK EMISSIONS

Valero, Corpus Christi West TX	122709	36000CC
Tosco, Linden NJ	120000	250000
Exxon Mobil, Baytown TX	112277	505000
Koch, Corpus Christi West TX	62020	297000CC
Exxon Mobil, Baton Rouge LA	41680	483000
Hovensa, VI	41422	430000
Chevron, Richmond CA	39000	225000
Motiva, Delaware City DE	38000	157000
Coastal Eagle Point, NJ	32166	143000
Phillips 66, Sweeny TX	30537	205000

10. POLYCYCLIC AROMATIC HYDROCARBONS ("PAHs" or POLYCYCLIC AROMATIC COMPOUNDS ("PACs"))

64 reports
FUGITIVE EMISSIONS 31/64 = 0
STACK EMISSIONS 24/64 = 0

FUGITIVE EMISSIONS

Valero, Texas City TX	12546	152000
Motiva, Norco LA	4100	225000
Calcasieu, LA	3560	15300
Valero, Krotz Springs LA	3454	78000
Lion, AR	1415	54000
Marathon, OH	751	73000
Conoco, MT	680	51500
Exxon Mobil, Torrance CA	510	149000
BP, Texas City TX	500	437000
Valero, Houston TX	487	72500

STACK EMISSIONS

BP, Texas City TX	7200	437000
BP, Whiting IN	1700	410000
Exxon Mobil, Baytown TX	1049	505000
BP, Belle Chasse LA	935	250000
Valero, Houston TX	840	72500
Sunoco, (Oregon?) Toledo? OH	750	134000
BP, Mandan ND	370	58000
Exxon Mobil, Torrance CA	350	149000
Calcasieu, LA	330	15300
Suncor (?), Commerce CO	318	?

Notes on 1999 "top 10" lists

Where EIA and TRI facility name/location were not the same, the EIA identification was used.

Corpus Christi, TX facilities- TRI identifies releases from both the east and west plants belonging to Valero, Koch and Citgo. EIA, however, gives production capacity for the corporate entity and the city location without allocating production capacity to individual plants. We reported the TRI data for each plant, and then reported the EIA production capacity for the facility as a whole. Therefore, if a release appears for the west plant of Valero in Corpus Christi, the report will identify the TRI release (as, 45 lbs) and will then list the production capacity for Valero's Corpus Christi facilities as a whole: 484 bpd; a CC is placed next to the production capacity to identify the data on production capacity for the Corpus Christi refineries.

There are no reports on dioxin because dioxin was not on TRI in 1999.

Relative to the number of reports in 2002 and 2004, there are few reports on PAHs and only one for perylene. That is likely because reporting on those chemicals had just started during the 1999 reporting period.

When production capacity or refinery identification was not clear, a ? was used to indicate uncertainty. Some of the refineries tracked through our study period from 1999-2004 had undergone multiple changes of ownership and/or owners' names; refinery owners were particularly difficult to identify for the 1999 survey, precisely because of the complexity of some of the subsequent ownership and/or name changes.

Selected Individual Carcinogen Air Emissions (2002)

Facility	release, lbs	capacity, bpd
1. FORMALDEHYDE		
5 reports		
FUGITIVE EMISSIONS 4/5 = 0		
STACK EMISSIONS 1/5 = 0		
FUGITIVE EMISSIONS		
Exxon Mobil, Baton Rouge LA	7	491500
STACK EMISSIONS		
Exxon Mobil, Baytown TX	77200	523000
Exxon Mobil, Beaumont TX	16000	348500
Exxon Mobil, Baton Rouge LA	10764	491500
Chalmette LA	1500	182500
2. BENZNE		
161 reports		
FUGITIVE EMISSIONS		
Lyondell-Citgo , Houston TX	89665	270200
Chalmette LA	87000	182500
Flint Hills, Corpus Christi W TX	67308	259980CC
Citgo ,Westlake LA	34597	324200
Valero, Corpus Christi E	34500	134000CC
Phillips 66, Wood River IL	34000	288300
Phillips 66, Borger TX	33160	143800
Chevron, Pascagoula MS	31000	325000
Citgo, Corpus Christi E TX	26640	156000CC
Marathon, Texas City TX	23026	72000
STACK EMISSIONS		
BP, Texas City TX	96000	437000
Exxon Mobil, Baytown TX	62000	523000
Lyondell-Citgo, Houston TX	58962	270200
Coffeyville (Farmland), KS	51020	112000
Atofina, Port Arthur TX	41966	175068
Chalmette LA	34000	182500
Exxon Mobil, Baton Rouge LA	30532	491500
Conoco, Ponca City OK	27228	194000

Citgo, Westlake LA	26712	324300

3. NAPTHALENE

117 reports

FUGITIVE EMISSIONS		
Marathon, Robinson IL	22181	192000
Exxon Mobil, Baton Rouge LA	11857	491500
Chalmette LA	11000	182500
BP, Texas City TX	6600	437000
Navajo, Lovington NM	4900	58000A+L
Navajo, Artesia NM	4888	58000A+L
Sunoco, Philadelphia PA	4644	330000
Valero, Houston TX	4032	83000
Exxon Mobil, Beaumont TX	3800	348500
Chevron, Pascagoula MS	3300	325000

STACK EMISSIONS		
Motiva, Norco LA	7400	219700
Exxon Mobil, Baton Rouge LA	6886	491500
Marathon, Catlettsburg KY	6000	222000
Sunoco, Marcus Hook PA	5769	175000
Premcor, Port Arthur TX	5169	255000
Exxon Mobil, Baytown TX	2900	523000
Somerset, KY	2033	5500
Conoco ,Westlake LA	2002	252000
NCRA, KS	1876	81200

4. ETHYLBENZEN

158 reports

FUGITIVE EMISSIONS		
Chalmette, LA	28000	182500
Marathon, Robinson IL	25200	192000
Exxon Mobil, Baton Rouge LA	21019	491500
Flint Hills West, Corpus Christi TX	18402	259980CC
NCRA, KS	18078	81200
Citgo, Westlake LA	17064	324300
Lyondell-Citgo, Houston TX	14863	270200
BP, Texas City TX	14000	437000
Sunoco, Philadelphia PA	13224	330000
Chevron, Pascagoula MS	13000	325000

STACK EMISSIONS

Lyondell-Citgo, Houston TX	38432	270200
Phillips 66, Wood River IL	15000	288300
NCRA, KS	14802	81200
Exxon Mobil, Beaumont TX	11000	348500
Hovensa, VI	10013	345000
Exxon Mobil, Baytown TX	9500	523000
Motiva, Norco LA	8300	219700
Conoco, Ponca City OK	7205	194000
Shell, Martinez CA	6800	63000

5. STYRENE

22 reports

FUGITIVE EMISSIONS

Exxon Mobil, Baton Rouge LA	1619	491500
Phillips 66, Wood River IL	750	288300
Exxon Mobil, Beaumont TX	280	348500
Marathon, Catlettsburg KY	250	222000
Conoco, Westlake LA	113	252000
Shell, Anacortes WA	39	140800
Motiva, Norco LA	23	219700
Premcor, Port Arthur TX	13	255000
Phillips 66, Wilmington CA	11	136600

STACK EMISSIONS

Exxon Mobil, Baytown TX	2600	523000
Motiva, Norco LA	2300	219700
Marathon, Catlettsburg KY	1200	222000
Exxon Mobil, Beaumont TX	500	348500
Lyondell-Citgo, Houston TX	250 (tie)	270200
Phillips-66, Wood River IL	250 (tie)	288300
Phillips 66, Wilmington CA	27	136600
Conoco, Ponca City OK	26	194000
Shell. Anacortes WA	25	140800
Premcor, Port Arthur TX	19	175000

6. 1,3-BUTADIENE

91 reports

FUGITIVE EMISSIONS

Coastal, Eagle Point NJ	3992	142287
Motiva, Norco LA	3700	219700
Exxon Mobil, Beaumont TX	1900	348500

Chevron, HI	1055		54000
Marathon, MN	910		70000
Citgo, Westlake LA	806		324300
Chevron, Pascagoula MS	800		325000
Lyondell-Citgo. Houston TX	750		270200
Motiva , Delaware City DE	660		175000
Chalmette, LA	470		182500

STACK EMISSIONS

Exxon Mobil, Baton Rouge LA	23808		491500
BP, Texas City TX	18000		437000
Deer Park, TX	11453		333700
Phillips 66, Wilmington CA	6400		136600
Motiva, Norco LA	2300		219700
Exxon Mobil, Baytown TX	1730		523000
Lion, AR	1383		63000
Valero, Texas City TX		1347	215000
Hovensa, VI	1110		345000
Conoco, Ponca City OK	986		194000

7. TETRACHLOROETHYLENE (PERC)

64 reports
FUGITIVE EMISSIONS 17/64 = 0
STACK EMISSIONS 45/64 = 0

FUGITIVE EMISSIONS

Marathon, MN	7297	70000
Tesoro, Anacortes WA	6308	115000
Flint Hills, MN	4200	265000
Chevron, Richmond CA	3300	225000
Marathon, Robinson IL	3129	192000
Marathon, Garyville LA	2517	232000
Chevron, Pascagoula MS	2500	325000
Valero, Corpus Christi West TX	1886	134000CC
Lion, AR	1810	63000
Motiva, Norco LA	1700	219700

STACK EMISSIONS

Marathon, Robinson IL	17303	192000
Valero, Benicia CA	1700	144000
Conoco, Westlake LA	1044	252000
Lion, AR	605	63000
Phillips 66, Wood River IL	250(tie)	288300
Countrymark, IN	250(tie)	23000
Exxon Mobil, Joliet IL	134	238000

NCRA, KS	63	81200
Valero, Corpus Christi West TX	38	134000CC
Phillips 66, Linden NJ	24	250000

8. BENZO(G,H,I)PERYLENE

119 reports

FUGITIVE EMISSIONS

BP, Texas City TX	240	437000
Williams, AK	193	197928
Sinclair, Sinclair WY	153	62000?
Lion, AR	56	63000
Conoco, Ponca City OK	37	194000
Phillips 66, Borger TX	30	143800
BP, Toledo OH	23	157000
DiamondShamrock, Three Rivers TX	18	90000
Sinclair (Little America), Casper WY	16	24500?
Conoco, Westlake LA	13(tie)	252000
Marathon, MN	13(tie)	70000

STACK EMISSIONS

Conoco, Ponca City OK	105	194000
DiamondShamrock, Sunray McKee TX	46	155000
Lion, AR	42	63000
Marathon, Robinson IL	38	192000
Atofina, Port Arthur TX	32	175068
Marathon, MN	30.2	70000
Somerset, KY	25	5500
Suncor, Commerce City CO	22.9	?
Flint Hills, MN	21.7	265000
Phillips 66, Ferndale WA	12.1	92000

9. METHYL TERT-BUTYL ETHER ("MTBE")

62 reports

FUGITIVE EMISSIONS

Chevron, Richmond CA	35000	225000
Giant, Yorktown VA	28123	58600
Shell, Martinez CA	22000	159250
Marathon, Catlettsburg KY	17000	222000
Exxon Mobil, Baton Rouge LA	13341	491500
Exxon Mobil, Beaumont TX	11000	348500
Valero, Corpus Christi West TX	10408	134000CC
Valero, Benicia CA	10300	144000

Citgo, Westlake LA	9881	324300
Flint Hills, Corpus Christi West TX	7805	259980CC

STACK EMISSIONS

Deer Park, TX	145098	333700
Exxon Mobil, Baytown TX	140000	523000
Valero, Corpus Christi West TX	81803	134000CC
Motiva, Norco LA	69000	219700
Phillips 66, Linden NJ	51000	250000
Amerada Hess, Port Reading NJ	45440	0
Chevron, El Segundo CA	43615	260000
Exxon Mobil, Baton Rouge LA	33213	491500
Valero, Paulsboro NJ	30000	160000
Exxon Mobil, Torrance CA	29000(tie)	149000
BP, Carson CA	29000(tie)	260000

10. DIOXIN (measured in grams)

64 reports
FUGITIVE EMISSIONS 59/64 = 0
STACK EMISSIONS 7/64 = 0

FUGITIVE EMISSIONS

BP, Whiting IN	0.5	410000
BP, Toledo OH	0.18	157000
Exxon Mobil, Joliet IL	0.101	238000
Tesoro, Mandan ND	0.1	58000

STACK EMISSIONS

Giant, Yorktown VA	2.82	58600
Phillips 66, Arroyo Grande CA	2.6	41800
Exxon Mobil, Beaumont TX	2.31	348500
Phillips 66, Trainer PA	1.937	180000
Motiva, Delaware City DE	1.8	175000
Valero, Corpus Christi West TX	1.159	134000CC
Citgo, Westlake LA	0.848	324300
Premcor, Lima OH	0.8	161500
Marathon, Robinson IL	0.77	192000
Flint Hills, Corpus Christi West TX	0.766	259980CC

11. POLYCYCLIC AROMATIC HYDROCARBONS ("PAHs" or POLYCYCLIC AROMATIC COMPOUNDS ("PACs"))

147 reports

FUGITIVE EMISSIONS		
Valero, Texas City TX	21724	215000
Marathon, MN	1982	70000
Williams, AK	1934	197928
BP, Texas City TX	1700	437000
Lion, AR	1190	63000
Valero New Orleans LA	1130	?
Phillips 66, Borger TX	834	143800
Valero, Krotz Spring LA	667	78000
Sinclair, Sinclair WY	568	62000?
Cenex Harvest States, MT	496	55000

STACK EMISSIONS		
Valero, Texas City TX	10103	215000
Lyondell-Citgo, Houston TX	6255	270200
BP, Texas City TX	5900	437000
Exxon Mobil, Baytown TX	3100	523000
DiamondShamrock, Sunray McKee TX	3032	155000
Valero, Houston TX	2071	83000
Exxon Mobil, Baton Rouge LA	1976	491500
Phillips 66, Ferndale WA	1891	92000
Hovensa, VI	1851	345000
BP, Whiting IN	1800	410000

Notes on 2002 "top 10" lists

Where EIA and TRI facility name/location were not the same, the EIA identification was used.

Corpus Christi, TX facilities- TRI identifies releases from both the east and west plants belonging to Valero, Flint Hills and Citgo. EIA, however, gives production capacity for the corporate entity and the city location without allocating production capacity to individual plants. We reported the TRI data for each plant, and then reported the EIA production capacity for the facility as a whole. Therefore, if a release appears for the west plant of Valero in Corpus Christi, the report will identify the TRI release (as, 45 lbs) and will then list the production capacity for Valero's Corpus Christi facilities as a whole: 484 bpd; a CC is placed next to the production capacity to identify the data on production capacity for the Corpus Christi refineries.

Where we had doubts about proper assignment of data on production capacity, a ? was placed next to the capacity data (or next to an empty space if we could not determine those data).

The EIA reported an active production capacity of 0 for the Amerada Hess facility in Port Reading, NJ. We have reported the production capacity for that facility as 0.

The Navajo plants in New Mexico had inconsistent town locators as between EIA and TRI; we made a "best effort" to allocate production capacity to those facilities, which are marked with A+L next to the production capacity.

Selected Individual Carcinogen Air Emissions (2004)

Facility	Release, lbs	capacity, bpd
1. FORMALDEHYDE		
5 reports		
FUGITIVE EMISSIONS		
Chevron, El Segundo CA	122	260000
STACK EMISSIONS		
BP, Texas City TX	1958341	437000
Exxon Mobil, Baytown TX	69000	557000
Chevron, El Segundo CA	24525	260000
Chalmette, LA	3112	187500
2. BENZNE		
142 reports		
FUGITIVE EMISSIONS		
La Gloria, TX	110000	55000
Flint Hill, Corpus Christi West TX	63563	288126CC
Lyondell-Citgo, TX	58779	270000
Sunoco, Philadelphia PA	43616	335000
Exxon Mobil, Baton Rouge LA	41213	493500
Valero, Corpus Christi East TX	39697	142000CC
BP, Texas City TX	39530	437000
Sunoco, Marcus Hook PA	35044	175000
Citgo, Corpus Christi East TX	32863	150000CC
Conoco, Borger TX	28007	146000
STACK EMISSIONS		
BP, Texas City TX	40819	437000
Total, Port Arthur TX	32321	233500
Valero, Corpus Christi East TX	31054	142000CC
Conoco, Belle Chasse LA	30300	247000
Exxon Mobil, Baytown TX	30150	557000
Citgo, Lake Charles LA	28284	324300
Lyondell-Citgo, TX	27736	270200
Chalmette, LA	26204	187200
Conoco, Sweeny TX	25488	229000

Valero, Three Rivers TX	25235	90000

3. NAPTHALENE

131 reports

FUGITIVE EMISSIONS		
Shell, Yabucoa PR	16000	67500
Exxon Mobil, Baton Rouge LA	9333	493500
Conoco, Westlake LA	8878	239400
Sunoco, Philadelphia PA	7669	335000
Citgo, Lake Charles LA	6306	324300
Exxon Mobil, Beaumont TX	5800	348500
Motiva, Norco LA	5666	226500
Valero, Texas City TX	4301	209950
BP, Texas City TX	4185	437000
Chalmette, LA	4094	187200

STACK EMISSIONS		
BP, Texas City TX	25361	437000
Exxon Mobil, Baytown TX	13750	557000
Exxon Mobil, Baton Rouge LA	7438	493500
BP, Whiting Indiana	6900	410000
Premcor, Port Arthur	6857	255000
Marathon, Catlettsburg KY	5800	222000
Motiva, Norco LA	2588	226500
Chalmette, LA	2370	187200
Somerset, KY	2057	5500
Marathon, Texas City	1971	72000

4. ETHYLBENZEN

155 reports

FUGITIVE EMISSIONS		
NCRA, KS	18776	81200
Chalmette, LA	18271	187200
Exxon Mobil, Baton Rouge LA	17284	493500
Navajo, Artesia NM	15483	75000
Flint Hills, Corpus Christi West TX	14576	288126CC
Citgo, Lake Charles LA	12314	324300
Lyondell-Citgo, Houston TX	12212	270200
Exxon Mobil, Beaumont TX	12000	348500
Conoco, Borger TX	11038	146000
Motiva, Port Arthur TX	9782	285000

STACK EMISSIONS

Lyondell-Citgo, TX	16060	270200
NCRA, KS	13750	81200
Exxon Mobil, Baytown TX	13425	557000
Deer Park, TX	11000	333700
Chalmette, LA	9697	187200
Shell, Martinez CA	8200	152700
Citgo, Lake Charles LA	7905	324300
Conoco, Ponca City OK	7545	194000
Exxon Mobil, Beaumont TX	7000	348500
Hovensa, VI	6971	495000

5. STYRENE

23 reports
FUGITIVE EMISSIONS 3/23 = 0
STACK EMISSIONS 6/23 = 0

FUGITIVE EMISSIONS

BP, OH	1800	160000
Exxon Mobil, Baton Rouge LA	1680	493500
Conoco, Wood River IL	1270	306000
Exxon Mobil, Beaumont TX	770	348500
Marathon, Catlettsburg KY	750	222000
Shell, Anacortes WA	120	145000
Motiva, Norco LA	70	226500
Exxon Mobil, Baytown TX	50	557000
Premcor, Port Arthur	37	255000

STACK EMISSIONS

Exxon Mobil, Baytown TX	8150	557000
Marathon, Catlettsburg KY	1100	222000
Exxon Mobil, Torrance CA	660	149500
Exxon Mobil, Beaumont TX	320	348500
Shell, Anacortes WA	85	145000
Conoco, Wood River IL	60	306000
Conoco, Ponca City OK	54	194000

6. 1,3-BUTADIENE

93 reports

FUGITIVE EMISSIONS

Sunoco, Westville NJ	4259	145000
BP, Whiting IN	3600	410000
Exxon Mobil, Beaumont TX	3200	348500

Citgo, Corpus Christi East TX	1968	156000CC
Citgo, Corpus Christi West TX	1554	156000CC
Premcor, TN	1500	180000
Sunoco, Philadelphia PA	1101	335000
Chevron, HI	1060	54000
Marathon, MI	900	74000
Marathon, MN	832	70000

STACK EMISSIONS

BP, Texas City TX	18476	437000
Premcor, Port Arthur TX	1800	255000
Hovensa, VI	1413	495000
Lion, AR	1215	70000
Deer Park, TX	1200	333700
Tesoro, Martinez CA	1100	166000
Conoco, Wilmington CA	970	139000
Marathon, MN	863	70000
Valero, Texas City TX	829	209950
Exxon Mobil, Baton Rouge LA	823	493500

7. TETRACHLOROETHYLENE (PERC)

77 reports
FUGITIVE EMISSIONS 19/77 = 0
STACK EMISSIONS 45/77 = 0

FUGITIVE EMISSIONS

Tesoro, Anacortes WA	6309	115000
Marathon, MN	4859	70000
Marathon, Garyville LA	2985	245000
Chevron, Pascagoula MS	2800	325000
Chevron, Richmond CA	2700	242901
Conoco, Wood River IL	2225	306000
Marathon, Canton OH	2017	78000
Motiva, Norco LA	1944	226000
Valero, Corpus Christi West TX	1888	142000CC
Cenex Harvest States MT	1760	55000

STACK EMISSIONS

Marathon, Robinson IL	18450	192000
Valero, Benicia CA	1700	144000
Countrymark, IN	250	23000
Sinclair, Tulsa OK	250	70300
Exxon Mobil, Joliet IL	190	238000
NCRA, KS	144	81200
Conoco, Wood River IL	108	306000

Conoco, Rodeo CA	100	73200
Valero, Corpus Christi West TX	50	142000CC
Frontier, KS	27	103000

8. BENZO(G,H,I)PERYLENE

129 reports
FUGITIVE EMISSIONS 84/129 = 0
STACK EMISSIONS 51/129 = 0

FUGITIVE EMISSIONS

Conoco, Westlake LA	437	239400
BP, Texas City TX	240	437000
TPI, Ardmore OK	136	83161
Conoco, Ponca City OK	34	194000
Conoco, Borger TX	27	146000
Marathon, MN	12	70000
Marathon, MI	10	74000
Sinclair, Casper WY	8.5	245000
Amerada Hess, NJ	7	0
Conoco, Ferndale WA	7	96000

STACK EMISSIONS

Conoco, Ponca City OK	157	194000
Hunt, Tuscaloosa AL	42	33500
Marathon, Robinson IL	40	192000
Marathon, MN	34	70000
Conoco, Ferndale WA	32	96000
Somerset, KY	26	5500
Lion, AR	25	70000
Conoco, Westlake LA	11	239400
Valero, Krotz Spring LA	7	80000
Valero, Three Rivers TX	6	90000

9. METHYL TERT-BUTYL ETHER ("MTBE")

42 reports

FUGITIVE EMISSIONS

Exxon Mobil, Baton Rouge LA	28764	493500
Exxon Mobil, Beaumont TX	24000	348500
Giant, VA	22680	58600
Valero, Corpus Christi West TX	11695	142000CC
Sunoco, Marcus Hook PA	8300	175000
Sunoco, Westville NJ	7524	145000
Citgo, Lake Charles LA	6490	324300

Citgo, Corpus Christi East TX	6203	156000CC
Conoco, Linden NJ	5900	230000
Premcor, Delaware City	5606	175000

STACK EMISSIONS

Exxon Mobil, Baytown TX	108000	557000
Valero, Corpus Christi West TX	69641	142000CC
Deer Park, TX	47000	333700
Exxon Mobil, Baton Rouge LA	35627	493500
Citgo, Corpus Christi East TX	35227	156000CC
Motiva, Norco LA	34766	226500
Amerada Hess, Pt. Reading NJ	34184	0
BP, Texas City TX	31567	437000
Hovensa, VI	30826	495000
Valero, Paulsboro NJ	29090	160000

10. DIOXIN (measured in grams)

63 reports
FUGITIVE EMISSIONS 51/63 = 0
STACK EMISSIONS 7/63 = 0

FUGITIVE EMISSIONS

Giant, VA	2.99	58600
BP, Whiting IN	1.04	410000
BP, Toledo OH	0.16	160000
Motiva, Port Arthur TX	0.1	285000
Tesoro, Mandan ND	0.09	58000

STACK EMISSIONS

Conoco, Trainer PA	2.33	185000
Exxon Mobil, Beaumont TX	2.29	348500
Marathon, Catlettsburg KY	1.4	222000
Valero, Corpus Christi West TX	1.12	142000CC
Premcor, Delaware City DE	1.12	175000
Marathon, Robinson IL	0.86	192000
Flint Hills, Corpus Christi West TX	0.75	288126CC
Premcor, Lima OH	0.72	158400
Citgo, Lake Charles LA	0.70	324300
Exxon Mobil, Joliet IL	0.59	238000

11. POLYCYCLIC AROMATIC HYDROCARBONS ("PAHs" or POLYCYCLIC AROMATIC COMPOUNDS ("PACs"))

152 reports
FUGITIVE EMISSIONS 63/152 = 0
STACK EMISSIONS 34/152 = 0

FUGITIVE EMISSIONS		
Sunoco, Philadelphia PA	6101	335000
Conoco, Westlake LA	4798	239400
Valero, Texas City TX	4046	209950
Marathon, MI	3334	74000
BP, Texas City TX	1400	437000
Marathon, MN	1362	70000
Murphy,LA	1254	120000
Conoco, Borger TX	1100	146000
Total, Port Arthur TX	839	233500
Cenex Harvest States, MT	519	55000

STACK EMISSIONS		
Hunt, Tuscaloosa AL	3184	33500
Exxon Mobil, Baytown TX	2590	557000
Hovensa, VI	1690	495000
Valero, Houston TX	1505	83000
Conoco, Trainer PA	1320	185000
Conoco, Ponca City OK	862	194000
Valero, Texas City TX	861	209950
Sunoco, OH	797	160000
Citgo,Lake Charles LA	558	324300
Lion, AR	546	70000

Notes on 2004 "top 10" lists

Where EIA and TRI facility name/location were not the same, the EIA identification was used.

Corpus Christi, TX facilities- TRI identifies releases from both the east and west plants belonging to Valero, Flint Hills and Citgo. EIA, however, gives production capacity for the corporate entity and the city location without allocating production capacity to individual plants. We reported the TRI data for each plant, and then reported the EIA production capacity for the facility as a whole. Therefore, if a release appears for the west plant of Valero in Corpus Christi, the report will identify the TRI release (as, 45 lbs) and will then list the production capacity for Valero's Corpus Christi facilities as a whole: 484 bpd; a CC is placed next to the production capacity to identify the data on production capacity for the Corpus Christi refineries.

The EIA reported an active production capacity of 0 for the Amerada Hess facility in Port Reading, NJ. We have reported the production capacity for that facility as 0.