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Human Health Risk Assessment for Petroleum Refining Industry of the Remaining Air Toxics after MACT I Emissions Reductions

A Thesis

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
requirements for the degree of

Master of Science
in
Environmental Engineering

By

Nadia Carolina Roa

B. S. UNEXPO, 2001

August, 2008

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LIST OF ABBREVIATIONS

ANPRM: Advance Notice of Proposed Rulemaking.

AERMOD: American Meteorological Society/Environmental Protection Agency Regulatory Model. Atmospheric dispersion modeling system used by HEM-3. Preferred EPA model for assessing pollutant concentrations from industrial facilities, based on Gaussian Dispersion model.

CAA: Clean Air Act.

EPA: Environmental Protection Agency.

HAP: Hazardous Air Pollutants.

HEM-3: Human Exposure Model, which performs three main operations: dispersion modeling, estimation of population exposure, and estimation of human health risks.

MACT Standard: Maximum Achievable Control Technology Standard.

MIR: Maximum Individual Risk corresponding to a person exposed to maximum concentrations near a facility for 70 years.

NAAQS: National Ambient Air Quality Standards.

NEI: National Emissions Inventory.

NESHAP: National Emission Standards for Hazardous Air Pollutants.

NPRM: Notice of Proposed Rulemaking.

OTAQ: EPA's Office of Transportation and Air Quality.

PB HAP: Persistent and Bio-accumulative Hazardous Air Pollutants.

PAH: Polycyclic Aromatic Hydrocarbon.

POM: Polycyclic Organic Matter.

RfC: Reference Concentration level used to compute hazard quotients.

RTR: Risk & Technology Review.

RRR: Residual Risk Rulemaking.

URE: Unit risk estimate used to compute cancer risks.

VOC: Volatile Organic Compound.

ABSTRACT

Inhalation risks on human health for hazardous air pollutants emitted from MACT I petroleum refining industry were determined using EPA HEM-3 Program.

Methodology included compiling vertical and fugitive emissions from 2002 National Emissions Inventory for sources inside two facilities in Louisiana, 'Motiva Norco' and 'Valero St. Charles' refineries.

Six cases were modeled applying EPA criteria, where cancer risks are 'low' if the probability is ≤ 1/1,000,000, and non-cancer risks are harmful when hazard quotient is > 1.

It was demonstrated that fugitive emissions have more impact on human health than the verticals because of their significant portion of the total refining emissions. HAPs can cause moderate adverse effects in humans living nearby refineries, as 113 people resulted in high risk of respiratory problems with Valero emissions, 4571 people resulted in 'moderate' risk of getting cancer with Motiva emissions, 2702 people with Valero emissions, and 11,282 people with both refineries' emissions.

KEYWORDS: MACT, HEM-3, HAPs, NEI, Petroleum Refining Industry, Cancer Risk, Non- Cancer Risk, URE, RfC, ANPRM, Organic Pollutants, Vertical Emissions, Fugitives Emissions, Risk Assessment.

INTRODUCTION

The Petroleum Refining Industry plays an important role as the main source of fuel in the world's economy, where the United States is the leading consumer. Oil dependence continues to dominate the world energy sector, and it could take decades before a new infrastructure for the production, transportation, and distribution of another energy supply is implemented worldwide.

High oil prices have not been the only reason for large investments in the petroleum refining industry. Environmental and safety regulatory changes have forced this sector to upgrade certain refinery processes for reducing environmental and human impacts associated with the use of petroleum products, and the operation of refineries.

Several alternatives related to the alteration of product compositions and the elimination of pollutant sources have been implemented in the U.S refineries based on 'Maximum Achievable Control Technology (MACT)' standards.

Additionally, Clean Air Act (CAA) of 1990 directs EPA to assess the remaining residual risk from each industry sector in human health after the application of MACT standard in 1990. EPA will have to promulgate more stringent standards if it is necessary to reduce cancer and non-cancer risks, considering costs, energy, safety, and other relevant factors.

The purpose of the present study is to assess the remaining human health risk of hazardous air pollutants from the refining industry sector after the application of MACT I in 1995. This study contains the development of HEM-3 models for air pollutant sources of two refineries in Louisiana State classified under MACT I. These two refineries are Motiva Enterprises, Norco and Valero, St Charles with oil processing capacities of 240 MBPD and 245 MBPD, respectively. Emissions from these refineries are considered together in this study as they are located in the same area, and affect the same nearby communities (Norco, Hahnville, New Sarpy, and Destrehan).

HEM-3 is an EPA program that performs dispersion modeling calculations, population exposure estimation, and human health risk estimation. The HEM-3 models are created using available source category emissions data from the 2002 National Emissions Inventory (NEI) database for the mentioned refineries. Such data compiled by

EPA was submitted to a careful review process, including facility-specific values. EPA made available this emission data to the general public, giving the refining stakeholders the chance for any correction or update through Advanced Notice of Proposed Rulemaking (ANPRM) on March 2007 prior to the development of the risk assessments.

Results of the HEM-3 models are examined to determine whether or not remaining risk is low enough. A low risk criterion includes a lifetime cancer risk of less than 1 in 1 million for the individual most exposed; and a chronic non-cancer risk of less than a target-organ-specific hazard index of 1.

The present report has been divided into five main sections, exploring different aspects related to petroleum refineries, risk assessment, and HEM-3 modeling.

.

OBJECTIVES

General Objective

Perform a human health risk assessment of the remaining Hazardous Air Pollutants (HAPs) emitted by the petroleum refining industries in the Norco area after MACT I emissions reductions.

Specific Objectives

- Compile available emissions data, verticals and fugitives, from the 2002 National Emissions Inventory (NEI) for the Petroleum Refinery source category MACT I, particularly for Motiva Enterprises, Norco and Valero, St. Charles facilities.
- Identify key Hazardous Air Pollutants (HAPs) and emission sources in the refining process units under MACT I regulation of the two refining facilities under consideration.
- Conduct a risk assessment of the key HAPs to evaluate remaining risks on humans using the EPA HEM-3 model from specific sources inside Motiva Enterprises, Norco and Valero, St. Charles refineries.
- Recommend the implementation of additional measures to address significant remaining risks for HAP in the refining industry.

LITERATURE REVIEW

Federal Legislation and Regulations

As defined in the EPA Petroleum Refinery Notebook (EPA 1995), the **Clean Air Act 'CAA' and its amendments of 1970** were designed to 'protect and enhance the nation's air resources so as to promote the public health and welfare and the productive capacity of the population.' The CAA consisted of six sections, known as Titles, which directed EPA to establish national standards. State and local governments are in charge of overseeing, managing, and enforcing the CAA requirements.

After the 1970 CAA, EPA established **National Ambient Air Quality Standards (NAAQSs)** to limit levels of 'criteria pollutants,' including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide.

Under CAA Title I, EPA established and enforced **National Emission Standards for Hazardous Air Pollutants (NESHAPs),** which uniformed national standards oriented towards controlling particular hazardous air pollutants (HAPs). These pollutants were defined as substances that did not have AAQSs but that might result in 'an increase in serious irreversible, or incapacitating, reversible illness' such as Beryllium, Mercury, Vinyl Chloride, Benzene or Asbestos (Cooper and Alley 2002).

The Title III of the CAAA (1990) included a list of 189 hazardous air pollutants, and required EPA to list source categories that emitted any of those HAPs, and publish a schedule for regulation of those source categories. EPA listed 174 categories and developed a schedule for the establishment of emission standards. The emission standards were developed for both new and existing sources based on '**Maximum Achievable Control Technology (MACT).**' The **MACT** is defined as 'the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors' (EPA 1995).

According to EPA Petroleum Refinery Notebook (EPA 1995), the development of the NESHAP regulations has taken place in two phases:

- In the first phase, EPA developed 96 Maximum Achievable Control Technology (MACT) standards between 1993 and 2004 for all new and existing sources covering 174 source categories. Here, EPA offered a six-year

extension of NESHAP requirements in exchange for an enforceable commitment to an early reduction of emissions by 90 percent.

- The second phase of the NESHAP regulations requires EPA assessing whether or not a remaining risk after the MACT standards have been implemented is acceptable, and if more stringent standards for a category source are necessary to protect public health with an ample margin of safety or to prevent adverse environmental effects.

According to EPA Petroleum Refinery Notebook (EPA 1995), the following NESHAPs apply for petroleum refineries (40 CFR Part 61):

- Subpart J, National Emission Standards for Equipment Leaks of Benzene.
- Subpart M, National Emission Standards for Asbestos (Demolition and Renovation).
- Subpart V, National Emission Standards for Equipment Leaks (Fugitive Emission Sources).
- Subpart Y, National Emission Standards for Benzene Emissions from Benzene Storage Tanks.
- Subpart BB, National Emission Standards for Benzene Emissions from Benzene Transfer Operations.
- Subpart FF, National Emission Standards for Benzene Waste Operations.
- Subpart E (National Emission Standards for Mercury) applies if the refinery has a wastewater treatment plant sludge incinerator.

Hazardous Air Pollutants (HAPs)

Hazardous Air Pollutants (HAPs), or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects, or adverse environmental effects (EPA, 2000).

People who are exposed to hazardous air pollutants at sufficient concentrations and for sufficient durations may increase their chances of getting cancer, damaging the immune system, as well as neurological, reproductive (e.g., reduced fertility) and developmental systems, or simply developing respiratory problems. Some air toxics may disturb hormonal or endocrine systems, because they can block the action of natural

hormones. Health effects associated with the endocrine system include reduced male fertility, birth defects, and breast cancer (EPA, 2000).

Examples of toxic air pollutants include benzene, found in gasoline; perchloroethylene, emitted from some dry cleaning facilities; and methylene chloride, used as a solvent by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds (EPA, 2000).

Scientists estimate that millions of tons of toxic pollutants released into the air each year comes from **manmade sources**, including both mobile sources (e.g., cars, buses, trucks) and stationary sources (e.g., factories, refineries, power plants); or from natural sources such as forest fires. Routine emissions from stationary sources constitute almost one-half of all manmade air toxics emissions (EPA, 2000).

EPA classifies **stationary sources** in these two types:

- **'Major' sources** are sources that emit 10 tons per year of any HAP, or 25 tons per year of a mixture of air toxics, e.g. chemical plants, steel mills, oil refineries, and hazardous waste incinerators. These sources may release air toxics from equipment leaks, stacks or vents.
- '**Area' sources** consist of smaller sources that emit less than 10 tons per year of a single HAP, or less than 25 tons per year of a mixture of air toxics; e.g. dry cleaners and gas stations.

Toxic pollutants can be carried by the wind, away from original sources, to other locations. Factors such as weather, the terrain (i.e., mountains, plains, valleys), and the chemical and physical properties of a pollutant determine how far it is transported, its concentration at various distances from the source, what kind of physical and chemical changes it undergoes, and whether it will degrade, remain airborne, or deposit to land or water (EPA, 2000).

Some pollutants remain airborne and contribute to air pollution problems far from the pollution source. Other pollutants released into the air can be deposited to land and water bodies through precipitation, or by settling directly out of the air onto land or water. Eventually, a large portion of those pollutants deposited near water bodies or small

tributaries will reach the water bodies via stormwater runoff or inflow from the tributary streams (EPA, 2000).

Some toxic air pollutants are of particular concern because they degrade very slowly or not at all, as in the case of metals such as mercury or lead. These persistent air toxics can remain in the environment for a long time (or forever, in the case of metals) and can be transported great distances (EPA, 2000).

Repeated cycles of transport, deposition, and evaporation can move toxic air pollutants very long distances. Persistent air toxics often reach the ground, evaporate back into the atmosphere, and are then transported further until they are deposited on the ground again.

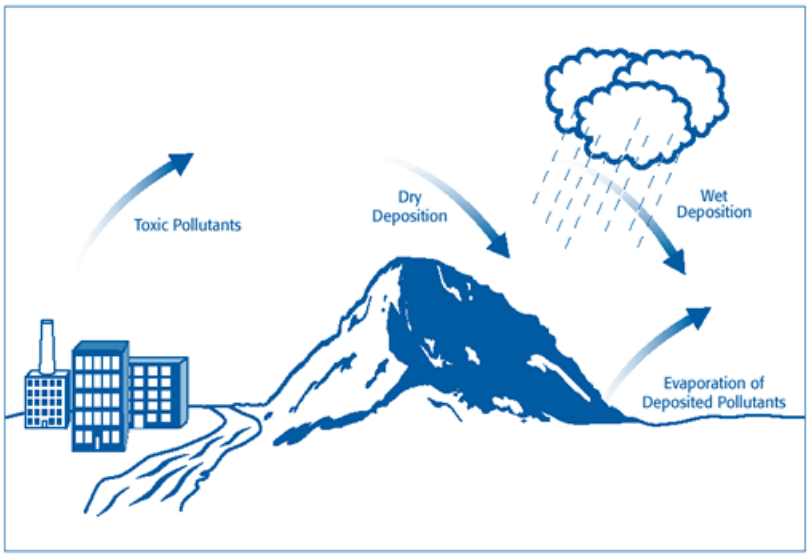

FIGURE 1. Toxic Air Pollutants Transport Mechanisms.
Source: www.epa.gov/air

People are exposed to toxic air pollutants in the following situations:

- Breathing contaminated air.
- Eating contaminated food products, such as fish, meat, milk, eggs, fruits and vegetables.
- Drinking contaminated water.
- Eating contaminated soil (young children).
- Touching contaminated soil, dust, or water.

Toxicology

Klaassen and Watkins III (2003) define ***Toxicology*** as 'the study of the adverse effects of chemicals on living organisms, including their cellular, biochemical, and molecular mechanisms of action, and assessing the probability of their occurrence'.

Toxic effects in a biological system are produced by a chemical agent if that agent reaches appropriate sites in the body at a concentration and time period sufficient to produce a toxic manifestation (Klaassen and Watkins III 2003).

Toxic response depends on the chemical and physical properties of the agent (e.g. agent toxicity), the exposure situation in which the agent is metabolized by the system, and the overall susceptibility of the biological system or subject (Klaassen and Watkins III 2003).

The major routes (or pathways) by which toxic agents gain access to the body are (Klaassen and Watkins III 2003):

- Gastrointestinal tract (ingestion),
- Lungs (inhalation),
- Skin (topical, percutaneous, or dermal),
- Other parenteral routes (other than intestinal canal).

Toxic agents generally produce the greatest effect and the most rapid response when they are introduced directly into the bloodstream (the intravenous route). A descending order of effectiveness for the other routes would be inhalation, intraperitoneal, subcutaneous, intramuscular, intradermal, oral, and dermal (Klaassen and Watkins III 2003).

The present study is focused on health cancer risks and non-cancer adverse health effects due to inhalation exposure.

Inhalation is defined in Wikipedia as the movement of air from the external environment, through the airways, into the alveoli during breathing. Inhalation begins with the contraction of the diaphragm, which results in negative pressure increase, generating airflow for the pressure difference between the atmosphere and alveolus. Air enters, inflating the lung through either the nose or the mouth into the throat and trachea before entering the alveoli.

Toxicants absorbed by the lungs are usually gases, vapors of volatile liquids, and aerosols. Once toxicants are absorbed, they cross body membranes and enter the bloodstream.

In the case of *absorption of gases,* some gas molecules are retained by the nose that acts as a "scrubber", and the other gas molecules diffuse from the alveolar space into the blood, dissolving until the equilibrium is reached. Then, the blood carries the dissolved gas molecules from the blood to the tissues (Klaassen and Watkins III 2003).

In contrast, the *absorption of aerosols or particles* depends on aerosol size and chemical solubility present in the aerosol. Particles 5 μm or larger are deposited in the nasopharyngeal region, and are removed by nose wiping, blowing, or sneezing. Particles 2-5 μm are deposited mainly in the tracheobronchiolar regions of the lungs, where they are cleared by retrograde movement of the mucus layer. Particles 1 μm and smaller penetrate to the alveolar sacs of the lungs, being absorbed into blood (Klaassen and Watkins III 2003).

For describing general human exposure situations, the following terms are used:

- **Acute,** resulting from a single incident or episode.
- **Subchronic,** occurring repeatedly over several weeks or months.
- **Chronic,** occurring repeatedly for many months or years.

Dose Response Relationship

The characteristics of exposure to toxic agents and the spectrum of their effects in the body come together in a correlative relationship referred to as the ***dose response relationship.*** This relationship between the degree of response of the biological system and the amount of toxicant administered assumes a consistent form (Klaassen and Watkins III 2003).

From a practical perspective, there are two types of dose-response relationships:

- The individual dose response relationship, which describes the response of an individual organism to varying doses of a chemical, where the measured effect is continuous over a range of doses.
- A quantal dose-response relationship, which characterizes the distribution of responses to different doses in a population of individual organisms.

Risk Assessment

Risk is defined as the probability of an adverse outcome (Klaassen and Watkins III 2003).

Cancer risks may be expressed either as individual risks or population risks. The distribution of individual exposures and risks within a given population can be provided as an estimate of the number of people exposed to various predicted levels of risk.

Individual and population cancer risks for carcinogenic HAPs can be calculated by multiplying the corresponding lifetime average exposure estimate by the appropriate **Unit Risk Estimate (URE)**. URE is an upper-bound estimate of the probability of contracting cancer over a 70-y period (the assumed human lifespan) for continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air (beyond any other factors).

Risk estimates are expressed as probabilities, e.g., a risk of developing cancer of 1 chance in 10,000 (or one person in 10,000, or $1x10^{-4}$).

Non-cancer health hazards are not expressed as a probability of an adverse occurrence as cancer risks. Instead, risks for non-cancer effects are expressed by comparing an estimated exposure to a reference level **(RfC)** as a ratio called **"hazard quotient" (HQ).**

Klaassen and Watkins III (2003) expose the Risk Assessment as follows:

Risk Assessment is the systematic scientific characterization of potential adverse health effects resulting from human exposures to hazardous agents or situations. Risk assessment requires qualitative information about the nature of the outcomes, as well as quantitative analysis of the exposures, host susceptibility factors, and the potential magnitude of the risk. Then, it is necessary to provide a description of the uncertainties in the estimates and conclusions.

Risk Characterization is the final product of the risk assessment process, in which the available information from the previous steps is integrated and an overall conclusion about risk is synthesized.

Risk Management refers to the process by which policy actions are chosen to control hazards identified in the risk assessment stage. Risk managers consider scientific

evidence and risk estimates along with statutory, engineering, economic, social, and political factors, in evaluating alternative options and choosing among those options.

Risk Communication is the challenging process of making information about risk assessment and management comprehensible to community groups, lawyers, local elected officials, judges, businesspeople, labor, and environmentalists.

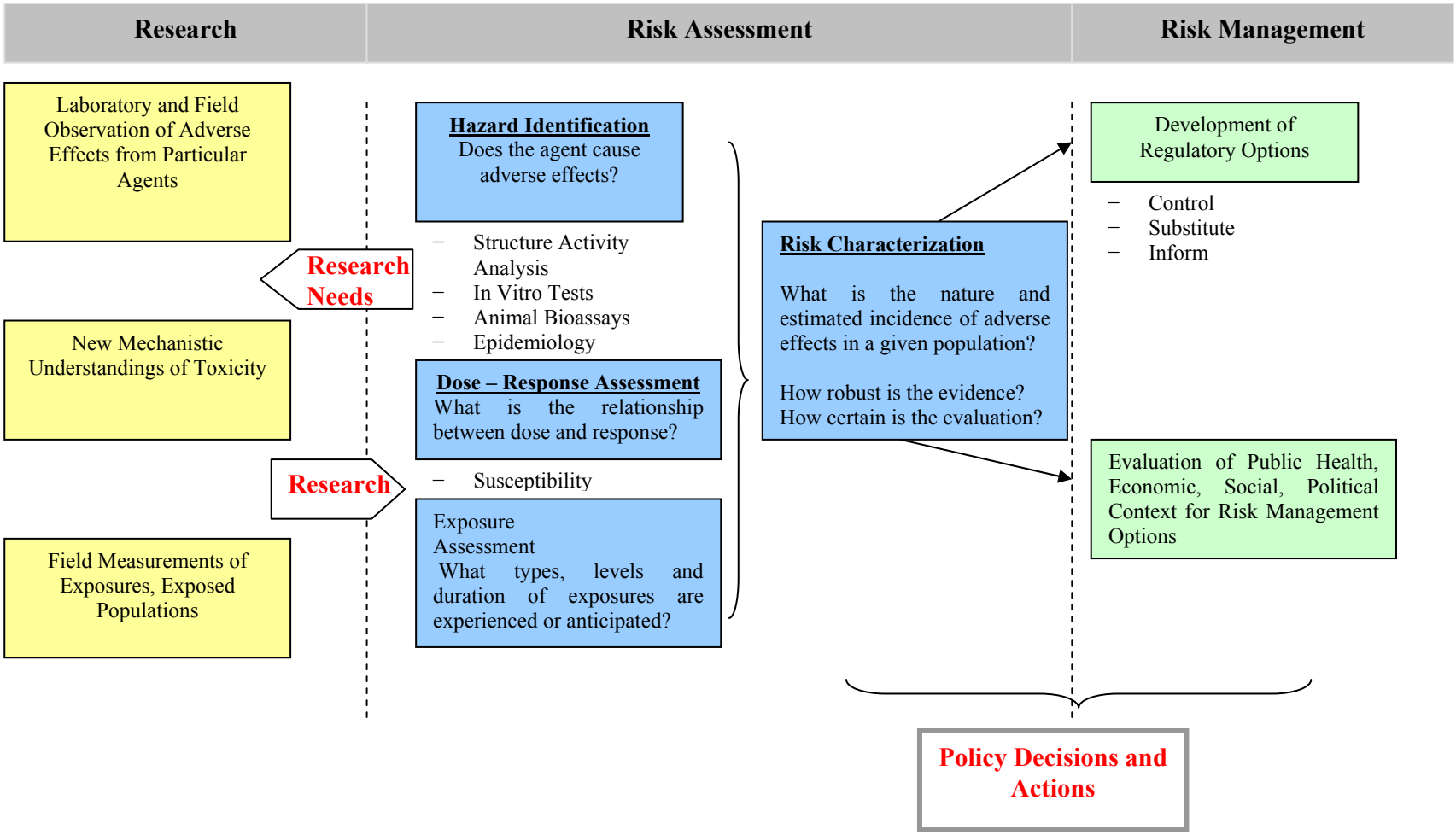

FIGURE 2. Risk Assessment / Risk Management Framework.
This framework shows the four key steps of risk assessment are: Hazard Identification, Dose - Response Assessment, Exposure Assessment, and Risk Characterization. It shows an interactive two-way process in which research needs from the risk assessment process drive new research and new research findings modify risk assessment outcomes.

Source: Klaassen and Watkins III (2003)

National Emission Inventory Database (NEI)

According to EPA Website (June, 2007), the EPA's Emission Inventory and Analysis Group normally prepares a national database of air emissions information with input from numerous states and local air agencies, from tribes, and from industry. This database contains information on stationary and mobile sources that emit criteria air pollutants and hazardous air pollutants (HAPs). The NEI database includes estimates of annual emissions, by source, for all 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. NEI databases for HAPs are available currently for years 1999 and 2002. A final version of the 2002 NEI was posted in February 2006. EPA updates these air toxics emissions inventories every 3 years. For this present study, the 2002 version was used.

The NEI database includes emission estimates for the 188 HAPs from stationary major and area sources, and mobile sources, as defined in the Clean Air Act (CAA). Data from the NEI are used for air dispersion modeling, regional strategy development, air toxics risk assessment, and tracking trends in emissions over time.

EPA compiles the NEI HAP emission estimates from five primary sources:

- State and local HAP inventories.
- Existing databases of EPA's MACT programs to reduce HAP emissions.
- Toxic Release Inventory (TRI) data.
- Estimated emissions by using mobile source methodology developed by EPA's Office of Transportation and Air Quality (OTAQ).
- Stationary non-point source emission estimates generated using emission factors and activity data.

EPA made available all information contained in the 2002 NEI database for public comments and review through an Advanced Notice of Proposed Rulemaking (ANPRM) last March 2007. Also, American Petroleum Institute and the National Petrochemicals and Refineries Association had collected and submitted up-to-date benzene emissions data for 23 refineries for the EPA's 2005 Refinery MACT I Residual Risk Survey. The industry and EPA considered this information to be the most accurate

benzene emissions data available for petroleum refineries. Thus, for these 23 refineries, EPA replaced all benzene emissions data in the NEI with these updated industry values.

The most common HAPs emitted from Petroleum Refineries are listed in the following Table 1.

TABLE 1. Key HAPs emitted from Petroleum Refineries

Carcinogenic HAP	POM71002,[a] benzene, naphthalene, 1,3-butadiene, chromium (VI) compounds, ethylene dichloride, POM72002,[a] tetrachloroethene, methyl tert-butyl ether, ethylene dibromide, ethylene oxide, epichlorohydrin, arsenic compounds, beryllium compounds, cadmium comounds, nickel compounds, carbon tetrachloride, arsenic as lead arsenate
Non-carcinogenic HAP	chlorine, 1,3-butadiene, benzene, naphthalene

a POM71002 is a POM subgroup that contains 16-PAH, PAH-total, and Polycyclic Organic Matter.
POM72002 is also a POM subgroup that contains 2-chloronaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(c)phenanthrene, benzo(e)pyrene, benzo(g,h,i)perylene, fluoranthene, fluorene, perylene, phenanthrene, and pyrene.

Source: EPA March, 2007. RTR - Phase II, ANPRM-Source Category Data Summary-Petroleum Refinery

Human Exposure Model

According to EPA (July, 2007), human exposure is defined as the contact between a target organism and a pollutant at the outer boundary of the organism. Exposure may be quantified as the amount of the pollutant available at the boundary of the receptor per specific time period. The principal goal of the human exposure modeling is to estimate the exposure as a function of both human factors and the pollutant concentrations in the contact media.

Currently, the models being used for estimating human exposure to hazardous air pollutants do not include multimedia exposures (e.g, APEX/TRIM, HAPEM4, HEM, and pNEM).

The Human Exposure Model (HEM) is used primarily for performing risk assessments for major point sources of air toxics. The HEM only addresses the *inhalation pathway of exposure*, and is designed to predict risks associated with emitted chemicals in the ambient air. The HEM provides ambient air concentrations, as surrogates for lifetime exposure, for use with unit risk estimates and inhalation reference concentrations to produce estimates of cancer risks and non-cancer hazards, respectively, for the modeled air toxics.

The HEM contains (1) Atmospheric dispersion models with included meteorological data, and (2) U.S. Bureau of 2000 Census population data at the Census block level. (EPA Jan, 2007)

Each emission source in HEM must be specifically located by latitude and longitude, and its release parameters must be described. These parameters include stack height, exit velocity, emission rate, etc.

HEM model estimates the magnitude and distribution of ambient air concentrations in the vicinity of each source, based on the inputs of the source parameters and the meteorological data. The model is generally used to estimate air concentrations within a radial distance of 50 kilometers (30.8 miles) from the source. Exposure estimates generated by HEM are the ambient air concentrations predicted by the model, in micrograms per cubic meter, without considering important exposure variables as duration, human activity patterns, residential occupancy period, etc.

From EPA (Jan, 2007), the HEM is available in two versions: **HEM-Screen** and **HEM-3**.

The **HEM-Screen** version can generate chronic cancer risk and hazard estimates for multiple facilities nationwide in one run. User-supplied data requirements are relatively low, and it is recommended for high screening level assessments involving a large number of facilities.

The **HEM-3** version generates chronic cancer risk, and chronic and acute hazard estimates for one facility at one time. This model uses the Industrial Source Complex Model (Short-term), Version 3 (ISCST3) or the AERMOD dispersion model. Data requirements are higher compared to HEM-Screen; however, the results are typically more refined.

HEM-3 includes a library of available health effects data for HAPs. For each pollutant, the library includes the unit risk factors for cancer, the reference concentrations for chronic non-cancer health effects, the reference concentrations for acute health effects, and the target organs affected by the chemical. These parameters have been taken from EPA's database of recommended dose-response factors for HAPs (Smith and Murphy, 2003).

Strengths and Limitations of HEM-3 (EPA Jan. 2007)

HEM-3's Strengths

- HEM-3 performs detailed and rigorous analyses of acute and chronic air pollution risks for populations located near industrial emission sources.
- HEM-3 simplifies the running of AERMOD or ISCST3 models without sacrificing their strengths, allowing the user to specify complex emission source configurations, including point sources for stacks, area and volume sources for fugitive emissions, and obliquely oriented area sources for roadways.
- HEM-3 identifies all Census blocks located near the industrial facility.
- HEM-3's user can specify receptor locations, e.g. houses, schools or monitors.
- HEM-3 can consider terrain impacts, building wake effects, pollutant deposition, and plume depletion.
- HEM-3 can analyze multiple pollutants concurrently, with the capability to include particulate and gaseous pollutants in the same model run.

HEM-3's Limitations

- Uncertainties subjected to the air pollutant dispersion models, AERMOD and ISCST3, used by HEM-3. Likewise, pollutant unit risk estimates and reference doses are subject to uncertainties.
- HEM-3 estimates pollutant concentrations and risks for a Census block internal point, defined by the Census Bureau. Values calculated for this internal point are not representative of the range of values over the entire block.
- HEM-3 does not consider the movement of people from their home Census blocks to other Census blocks as a result of commuting or other daily activities.
- HEM-3 calculates outdoor concentrations of air pollutants, without considering the reduction of outdoor pollution in indoor air.
- HEM-3 does not run successfully unless the input files are correctly formatted.

Petroleum Refining Industry

MACT I & II processes

According to EPA ANPRM (March 29, 2007), petroleum refinery was listed in two separate and distinct source categories in the MACT list as follows:

- **MACT II** - Petroleum Refineries - Catalytic Cracking (Fluid and Other) Units, Catalytic Reforming Units, and Sulfur Plant Units,
- **MACT I**-Petroleum Refineries - Other sources Not Distinctly Listed.

MACT I was promulgated on August 18, 1995 (60 FR 43244), while MACT II was promulgated on April 11, 2002 (67 FR 17761). EPA will assess the residual risk and make decisions on future regulations under section 112(f)(2) of the CAA independently.

The present study is focused on **MACT I, the "Petroleum Refineries, Other Sources Not Distinctly Listed"** source category. Residual risk for MACT II 'Petroleum Refineries - Catalytic Cracking (Fluid and Other) Units, Catalytic Reforming Units, and Sulfur Plant Units' is not being assessed.

According to EPA ANPRM (March 29, 2007), the petroleum refinery process units covered under MACT I include, but are not limited to: crude distillation, vacuum distillation, thermal cracking, hydroheating & hydrorefining, isomerization, polymerization, lube oil processing, and hydrogen production. Emissions originate from various process vents, storage vessels, wastewater streams, loading racks, marine tank vessel loading operations, and equipment leaks associated with refining facilities.

The primary HAPs expected to be emitted from MACT I petroleum refining sources include benzene, toluene, and ethyl benzene, but can also include acetaldehyde, formaldehyde, hexane, phenol, xylene, carbonyl sulfide, carbon disulfide, hydrogen chloride, chlorine and other HAPs (EPA ANPRM March 29, 2007).

For the Residual Risk Rulemaking process, EPA conducted a careful review of 175 refining facilities included in the 2002 NEI database, of which 124 are classified as major sources. The industry had collected and submitted up-to-date benzene emissions data for 23 refineries, which was considered to be the most accurate benzene emissions data available for petroleum refineries. EPA replaced all benzene emissions data in the NEI for these 23 refineries (EPA ANPRM March 29, 2007).

Petroleum Refining Process Description (EPA 1995)

Crude oils are made of a complex mixture of different hydrocarbons and impurities, such as sulfur, nitrogen, oxygen, salts and metals (nickel, iron, vanadium, copper, arsenic).

Petroleum refining is the physical, thermal and chemical separation of crude oil into its major distillation fractions, which are then processed through separation and conversion steps into finished petroleum products.

The primary products of this industry fall into three major categories:

- **Fuels:** Motor gasoline, diesel and distillate fuel oil, liquefied petroleum gas, jet fuel, residual fuel oil, kerosene, and coke;
- **Finished non-fuel products:** Solvents, lubricating oils, greases, petroleum wax, petroleum jelly, asphalt, and coke;
- **Chemical industry feed stocks:** Naphtha, ethane, propane, butane, ethylene, propylene, butylenes, butadiene, benzene, toluene, and xylene.

The complexity of a refinery depends upon the properties of the crude oil processed and the desired products. A sophisticated refinery has the ability to upgrade crude oil into high-value products. The description of the petroleum refining processes is comprehensive and complex, as shown in Figure 4. However, all refining complexes perform three basic steps: separation, conversion and treatment.

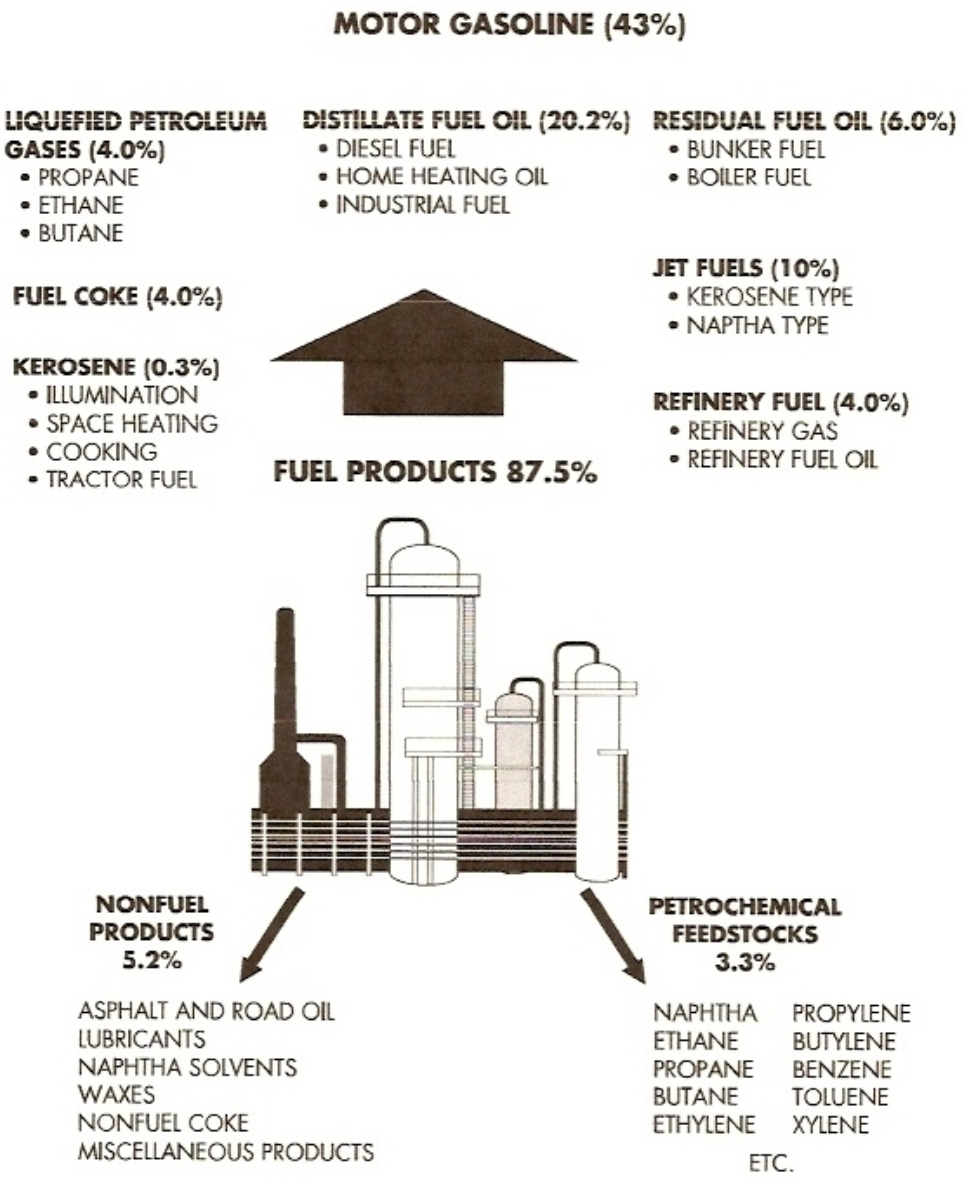

FIGURE 3. U.S. Refinery Products and Yields
Source: EPA 1995. EPA Sector Notebook 'Profile of the Petroleum Refining Industry'

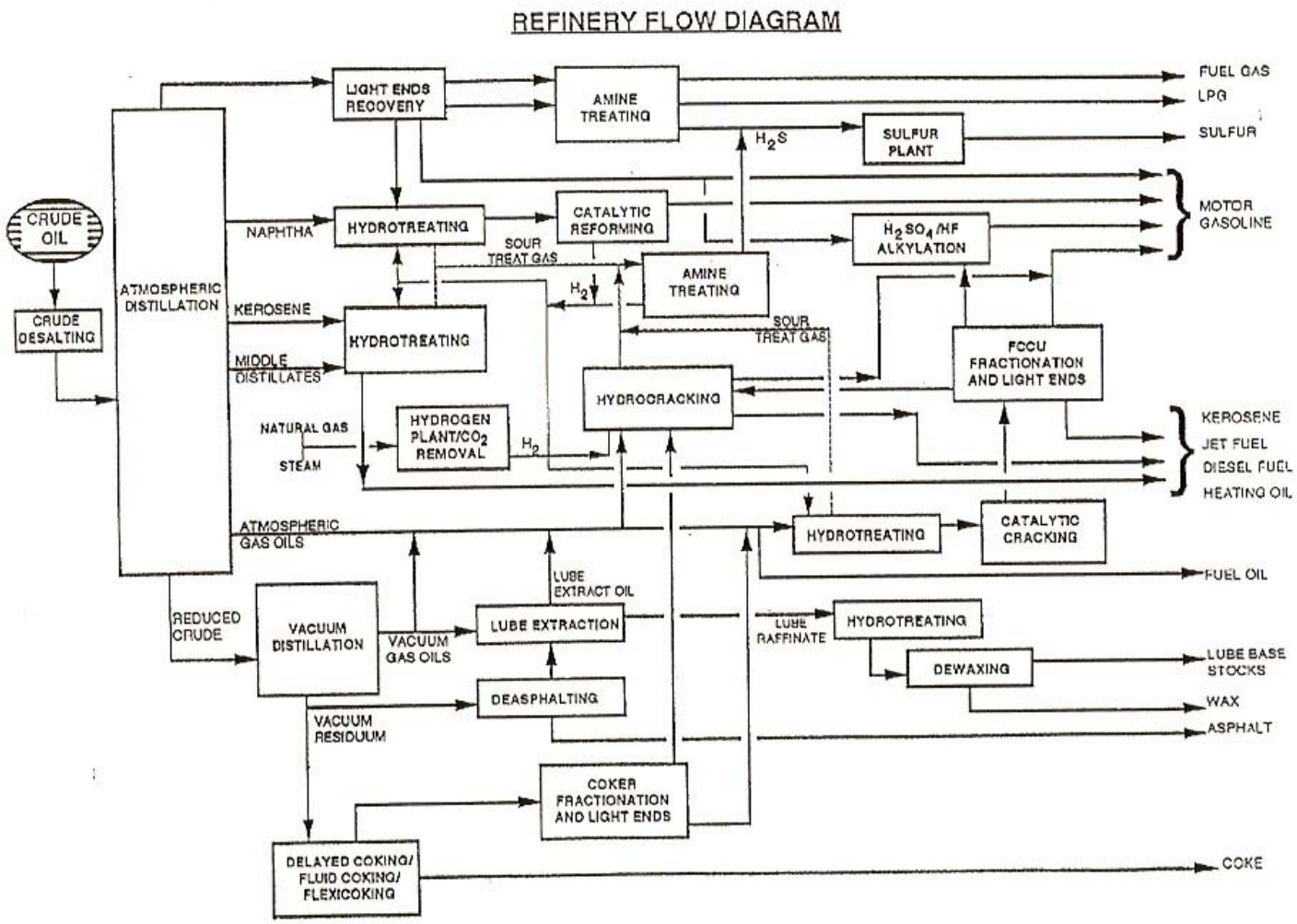

FIGURE 4. Typical Refinery Flow Diagram
Source: Haydel (2003). Petroleum Refinery Processing

Below is a brief description of the main processes in a refinery synthesized from Leghorn Learning Manual (Haydel 2003), and Refining Sector Notebook (EPA 1995).

Separation Processes

Desalting

Crude oil desalting involves the mixing of heated crude oil with water to dissolve the chloride salts, as well as to remove metals and suspended solids. The water is then separated by applying a high potential electric field across the settling vessel.

Atmospheric Distillation

The desalted crude oil is heated and fed into an atmospheric distillation column, where the crude is separated into its various fractions on trays. The lighter fractions are collected at the column top, and the heavier fractions are sent to a vacuum distillation unit.

Vacuum Distillation

Vacuum distillation separates heavy petroleum fractions at a very low pressure (0.2 to 0.7 psia). Fractions obtained from vacuum distillation include overhead gases (destined to Sweetening Fuel Gas), Light and Heavy Vacuum Gas Oil (destined to Hydrocraker and Catalytic Cracker) and Vacuum reduced crude (destined to Coker Unit).

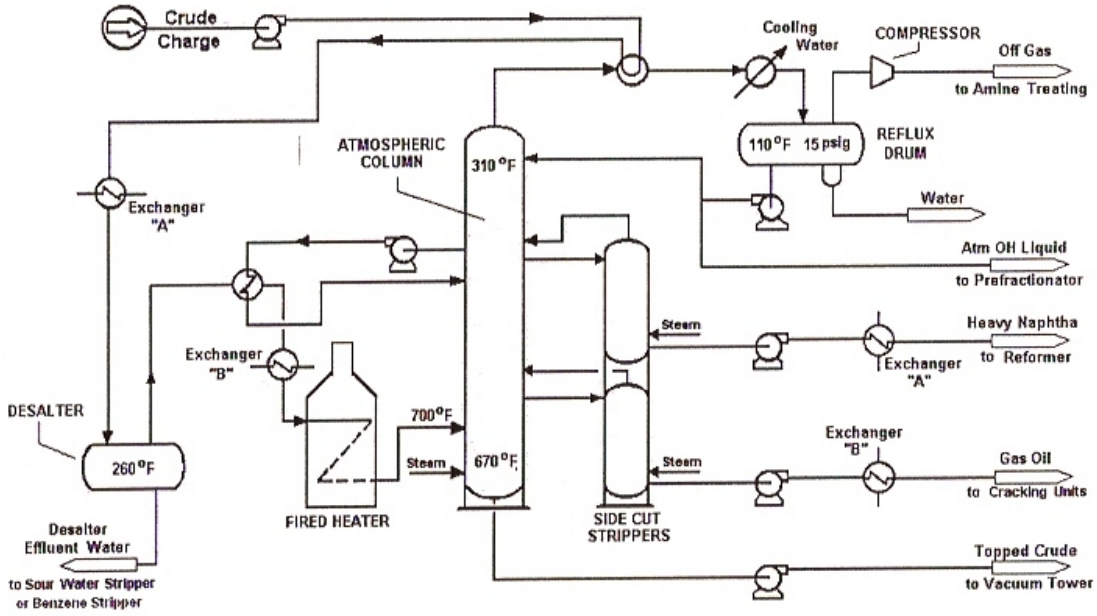

FIGURE 5. Desalting and Distillation Processes
Source: Haydel (2003). Petroleum Refinery Processing

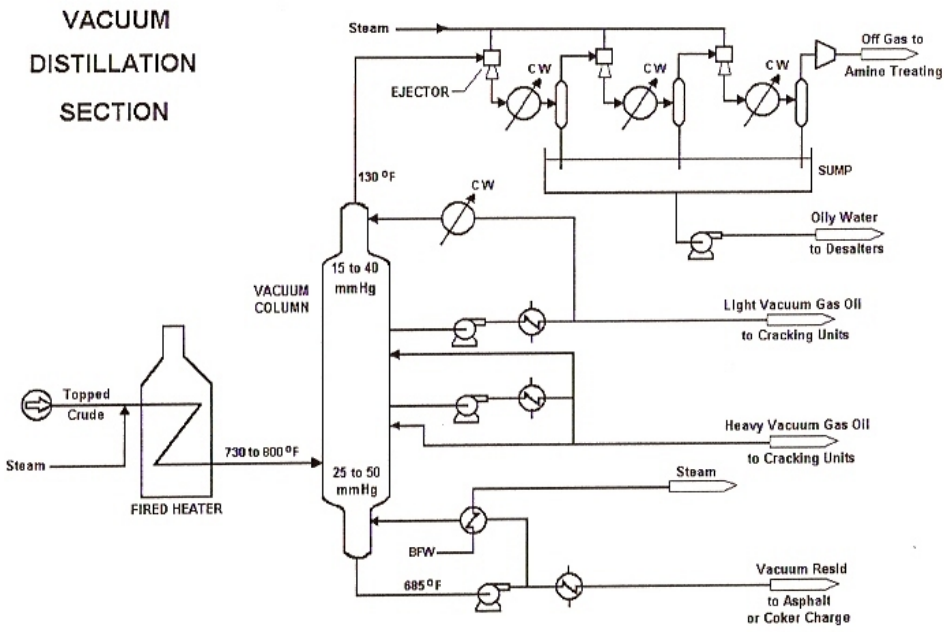

FIGURE 6. Vacuum Distillation
Source: Haydel (2003). Petroleum Refinery Processing

Conversion Processes

There are several chemical conversion processes to change one fraction into another by breaking large hydrocarbons into smaller pieces (cracking), combining smaller pieces to make larger ones (unification) or rearranging various pieces to make desired hydrocarbons (alteration).

Cracking

Cracking takes large hydrocarbons and breaks them into smaller ones.

- **Thermal cracking:** Uses heat and pressure to break large hydrocarbon molecules, such as Visbreaking and Coking Units.
- **Catalytic cracking:** Uses a catalyst as zeolite, aluminum hydrosilicate, bauxite and silica-alumina to speed up the cracking reaction.
- **Fluid catalytic cracking:** Uses a hot, fluid catalyst (1000 ºF) to crack heavy gas oil into diesel oils and gasoline.

- **Hydrocracking**: Similar to fluid catalytic cracking, but uses a different catalyst, with lower temperatures and higher pressure (1200 - 2000 psig), under the presence of hydrogen gas.

Unification

Unification processes consist of combining smaller hydrocarbons to make larger ones. The major unification process is called **Catalytic Reforming,** which uses catalytic reactions to process primarily low octane heavy straight run naphtha into high octane aromatics (including benzene), which are used in making chemicals and in blending gasoline. A by-product of this reaction is hydrogen gas.

Alteration

The structures of molecules in one fraction are rearranged to produce another.

- **Alkylation** joins an olefin and an isoparaffin compound using either a sulfuric acid or a hydrofluoric acid catalyst. The products are alkylates (high octane gasoline blending component), propane and butane.
- **Isomerization** is used to alter the arrangement of a molecule without adding or removing anything from the original molecule. So, paraffins (butane or pentane) are converted to isoparaffins with a much higher octane.

Treatment Processes

Refining fractions are treated to remove impurities such as organic compounds containing sulfur, nitrogen, oxygen, water, dissolved metals and inorganic salts.

- **Hydrotreating and hydroprocessing** are usually placed upstream of those processes in which sulfur and nitrogen could have adverse effects on the catalyst. The processes utilize catalysts in the presence of hydrogen under high pressure and temperature to react the feedstocks and impurities.

Supporting Processes

Other important refinery operations are not directly involved in the production of hydrocarbon fuels but serve in a supporting role. These include:

- Hydrogen Production

- Caustic Treating with sodium or potassium hydroxide to improve odor and color by removing organic acids.
- Amine Regeneration through H_2S stripping.
- Sour Water Stripping, removal of Hydrogen Sulfide (H_2S) and Ammonia (NH_3) contained in refinery sour water streams.
- Sulfur Recovery and Tail Gas Treating, 99.9 wt% removal of sulfur from acid gas streams from the Amine Regeneration Unit and the Sour Water Stripper. Also, ammonia is incinerated and any sulfur compounds is oxidized to SO_2 before venting to atmosphere. This elemental solid sulfur is sold as well.

Utilities Systems

The main utilities required in a refinery are:

- Fuel Gas System, which generally consists of collecting refinery gas and fuel gas distribution.
- Steam is produced for the refineries and used by process heat transfer and reboilers. Generally, three levels of steam are produced: superheated steam (> 600 psig), saturated medium pressure steam (150-175 psig) and saturated low pressure steam (50 psig).
- Boiler Feed Water (BFW) must be free of minerals and dissolved impurities for a steam generation system. This includes clarifying, filtering, softening and deaeration processes.
- Condensate Recovery collects and treats the recovered condensate for re-use in the Boiler Feed Water system.
- Cooling Water System generally is a closed loop that cools heated water by circulating the water through a tower with ambient air pushed with large fans. Make-up water is added to replace water lost through evaporation. The tower consists of a counterflow, a multi-cell structure with an at-grade basin, multiple pumps, chemical addition systems, filters and distribution piping.
- Instrument Air is dry air used for pneumatic instruments.
- Plant Air is used for maintenance operations and is not required to be dried.
- Inert Gas (or Nitrogen), is used for purging equipment and piping.

- Flare systems provide relief for hydrocarbons that must be vented to protect a vessel or piping system from rupturing due to overpressure. These systems include piping to collect the relief valve or vent valve discharges, knockout drums to remove condensed liquid, flare stack and flare tip.
- Slop Oil System collects offgrade material and/or equipment and piping flushes. Oil and water collected are separated and reprocessed separately.
- Flushing Oil System provides flushing oil to high-pour point hydrocarbons for piping, instruments and equipment.
- Waste Water Treatment. Refining wastewater includes process water as well as contaminated rainwater runoff, stripped sour water and benzene stripper effluent water. Treatment steps include: API separator, storage tanks, CPI separators, Air Flotation, Bio-oxidation ponds, Clarifiers, and Sand Filters.

METHODOLOGY

Pollutant Emission Source Sample

This research project is carried out at **Motiva Enterprises Norco Refinery, and Valero St. Charles Refinery** located in St. Charles Parish, Louisiana State.

Specifically, Motiva Norco is located at 15536 River Road, Norco, LA, 70079, and Valero St Charles at 14902 River Road, Norco, LA, 70079.

Both refineries are located on a site adjacent to the Mississippi River, about 20 miles west of New Orleans, Louisiana.

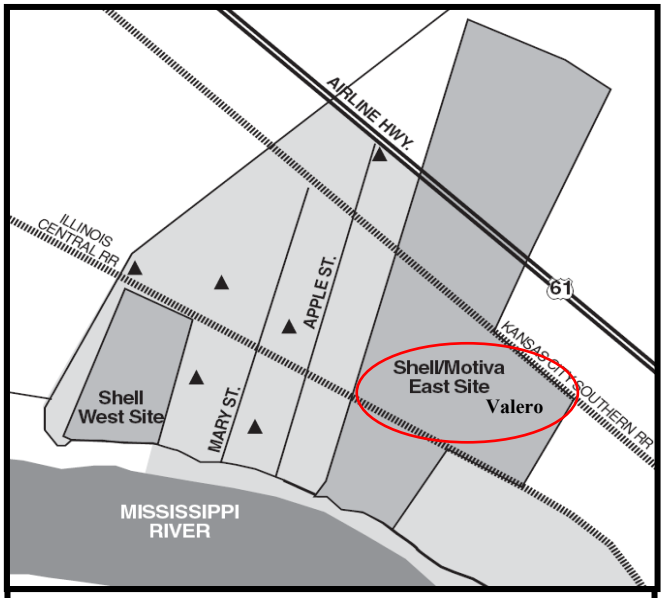

FIGURE 7. Location of Motiva & Valero.
Source: Motiva Norco Website

Motiva Norco refinery is designed to convert approximately 240,000 barrels per day of crude oil (75% of Louisiana sweet crudes and 25% of foreign crudes); and Valero St Charles has a capacity of 245,000 barrels per day of crude oil, with the ability of processing heavy and sour crude oils.

Norco town has grown up in the northwestern side of these two facilities, and its name corresponds to the acronym of New Orleans Refining Company, original owner of the Motiva Enterprises, Norco Refinery.

According to the 2000 United States Census Bureau, Norco has a population of 3,579 and a total area of 3.4 square miles (8.9 km²), of which, 3.0 square miles (7.7 km²) is land and 0.4 square miles (1.1 km²) (12.83%) is water.

Other nearby communities around **Motiva Enterprises - Norco, and Valero - St. Charles** sites are Destrehan, New Sarpy and Hahnville.

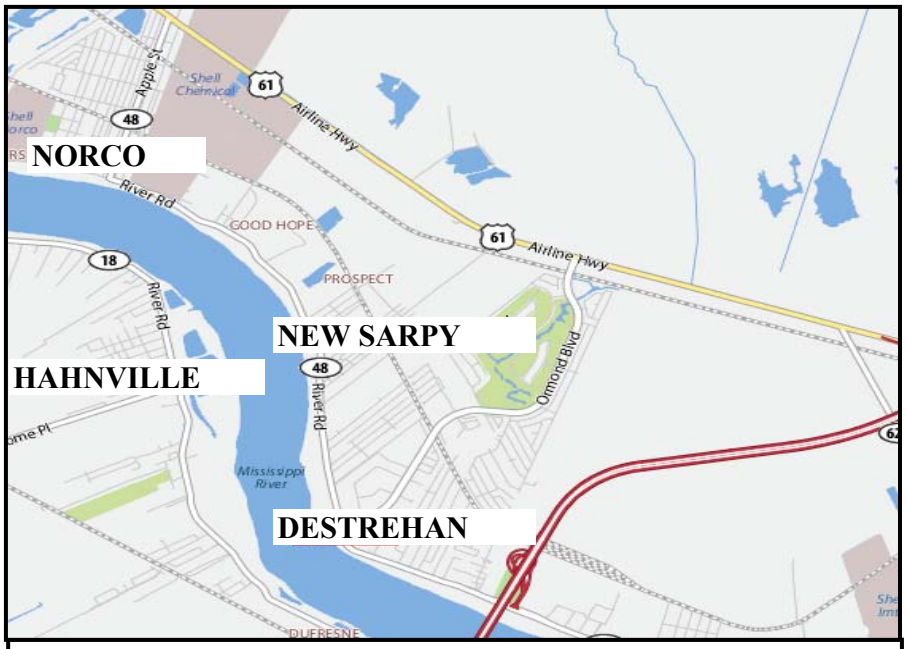

FIGURE 8. Nearby Communities around refineries in-study.
Source: Yahoo Maps Website

However, an outer radius for determining ambient impacts to be modeled was specified in the HEM-3 model as 50 kilometers (31.07 miles). Using Google Earth®, it was possible to visualize this circle around Motiva Enterprises, Norco and Valero, St. Charles facilities. Several other communities than those shown in Figure 8 are inside this 50-km radius, such as: Luling, Laplace, Kenner, Metairie, New Orleans, Chackbay, South Vacherie, Thibodaux, Boutte, Gramercy, Lutcher, and so on.

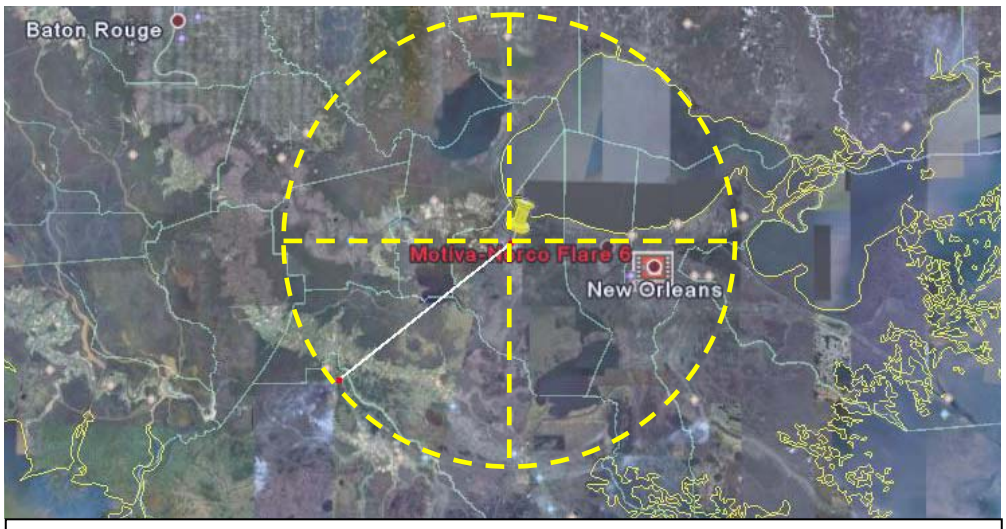

FIGURE 9. 50-KM Radius Reach for HEM-3 Model
Source: Google Earth Website.

Options used in HEM-3 Model

- **AERMOD** was selected as Air Pathway Dispersion Model to be used with HEM-3, instead of ISCST3, because AERMOD is state-of-the-art, and it is recommended by EPA for most industrial source modeling applications.
- **Terrain Elevation Option** was not selected in the HEM-3 model run, as the height of receptors around the Motiva Norco and Valero plant facilities does not exceed the height of any stack at the facility. The elevations (above sea level) of communities around mentioned refineries were checked using Google Earth ® program, and they are between 0 ft and 7 ft approximately; while the height of the considered emissions source points are between 10 ft and 263 ft based on 2002 NEI database. Flare stacks are 70-ft, 121-ft or 226-ft high, blowdown 263-ft high, cooling towers about 49-59-ft high, and wastewater separators 69-ft high.
- **Chronic health risks** were considered as the only human exposure situations, based on long-term average concentrations and assumed to occur repeatedly for many months or years. **Acute exposure situations**, resulting from single incidents or episodes, were not calculated as 2002 NEI database only includes annual emissions.
- **Rural Dispersion Environment** was selected for the HEM-3 model run. It determines the dispersion coefficients. According to HEM-3 User Guide, Page 19, 'Urban option should be used if the land use is classified as urban for more than 50% of the land within a 3-kilometer radius of the emission source, or the population density within 3 kilometer radius is greater than 750 people per square kilometer'. The communities located inside 3-km radius around Motiva and Valero refineries can be considered 'rural use' as population density is about 679 people/km^2 (See Table 2).

TABLE 2. Population of nearby communities to Motiva & Valero facilities

Community	**Population, people**
Norco	3,579
New Sarpy	1,568
Destrehan	11,260
Hahnville	2,792
Total Population	19,199
Area (Radius =3 km), km^2	28.27
Population density, people/km^2	679

Source: 2000 U.S. Census Bureau Website

- **Particulate matter deposition and plume depletion calculations** were not included in the HEM-3 Model. 2002 NEI database does not include particle size distribution, and scavenging coefficients are required to calculate removal of gaseous or particulate material from the pollution plume by contact with the ground surface, vegetation, or by rain action.
- **Building effects or downwash** were not considered in this study, as HEM-3 requires information related to the configuration of the nearby buildings to the stack source like building heights and widths. This information is confidential as nearby buildings are inside the facilities' boundaries. Building effects or downwash option tries to model the turbulent eddies formed in the downwind side of buildings when an air pollution plume flows over nearby buildings. It forces the plume from a stack source to go down to the ground much sooner than it would go if a building were not present. This effect is normally considered when the stack height is less than either 2.5 times the building height, or the sum of the building height and 1.5 times the building width.
- **Outside Radius & Overlap Distance:** As mentioned before, the maximum radius to be modeled was specified to be 50,000 meters. Also, a distance of 30 meters was considered between source and receptor for overlapping. Thus, if a receptor fell within 30 m, HEM-3 did not calculate risks based on the location of that receptor.

Input files for HEM-3 Model

Six HEM-3 models were developed, including vertical and fugitives emissions from point sources located in the two sites in the study, as shown in the following table.

TABLE 3. HEM-3 model cases

Cases	Facilities	MACT Category	Emissions Type
1	Motiva Enterprise LLC- Norco	I	Vertical
2	Motiva Enterprise LLC- Norco	I	Vertical & Fugitives
3	Valero - St. Charles	I	Vertical
4	Valero - St. Charles	I	Vertical & Fugitives
5	Motiva Enterprise LLC- Norco & Valero - St. Charles	I	Vertical
6	Motiva Enterprise LLC- Norco & Valero - St. Charles	I	Vertical & Fugitives

The two Emissions Input Files were prepared for each case:

- **Emission Location file,** which includes longitude and latitude coordinates for each source, source type, stack heights, stack diameters, exit velocities and temperatures.
- **HAP Emission file,** which lists all pollutants for each source with their respective emissions in ton/year. Fraction emitted as particulate matter was not included because it is not available in the 2002 NEI database.

Refers to Appendixes 2 and 3 for more details.

All required information was obtained from the 2002 NEI Database, with the following NEI ID numbers:

TABLE 4. NEI Site IDs for Motiva and Valero refineries.

STATE ABBREVIATION	COUNTY NAME	STATE COUNTY FIPS	STATE FACILITY IDENTIFIER	NEI SITE ID	FACILITY NAME
LA	St. Charles Parish	22089	0016	NEI6095	VALERO REFINING - NORCO (PREV. ORION REFINING CORP)
LA	St. Charles Parish	22089	0002	NEI33031	MOTIVA ENTERPRISES LLC/NORCO REFINERY

A summary of the existing vertical emission sources in the refineries in-study is presented in Table 5.

TABLE 5. Geographical Location of Vertical Emission Sources in study

Site	MACT category	Source ID	Longitude (decimal)	Latitude (decimal)	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Motiva	MACT I	Source 1	-90.400020	30.000650	P	37	1.7	7.27	807	Flare 1
Motiva	MACT I	Source 2	-90.402130	29.998890	P	37	1.7	7.27	807	Flare 2
Motiva	MACT I	Source 3	-90.405170	30.001660	P	37	1.7	7.27	807	Flare 3
Motiva	MACT I	Source 4	-90.405130	30.003460	P	37	1.7	7.27	807	Flare 4
Motiva	MACT I	Source 5	-90.398980	30.000630	P	80	0.5	0.34	374	Blowdown
Motiva	MACT I	Source 6	-90.399770	29.999420	P	69	1.1	6.10	807	Flare 5
Motiva	MACT I	Source 7	-90.402190	29.997180	P	69	4.4	6.10	807	Flare 6
Motiva	MACT I	Source 8	-90.401780	29.998190	P	18	5.7	12.37	308	Cooling Tower 1
Motiva	MACT I	Source 9	-90.401950	30.000280	P	15	10.3	10.35	316	Cooling Tower 2
Motiva	MACT I	Source 10	-90.406830	29.992830	P	20	3.6	20.00	389	Unknown
Valero	MACT I	Source 1	-90.372220	29.964920	P	21	3.7	6.49	750	Blowdown System w/ vapor recovery system with flaring

Calculations Performed by HEM-3

Total Cancer Risks and Hazard Indices

According to the HEM-3 User's Guide Section 4, this EPA software estimates **total cancer risks and hazard indices** for all Census block locations in the modeling domain. Then, HEM-3 estimates the Maximum Individual Risk and the Maximum Hazard Indices for populated and unpopulated receptors, as well as the contributions of individual chemicals and emission sources to cancer risks and hazard indices.

The following algorithms are used by HEM-3:

For cancer risk:

$CR_T = \sum_{i,j} CR_{i,j}$

$CR_{i,j} = DF_{i,j} \times CF \times \sum_k [E_{i,k} \times URE_k]$

For non-cancer hazard indices:

$HI_T = \sum_{i,j} HI_{i,j}$

$HI_{i,j} = DF_{i,j} \times CF \times \sum_k [E_{i,k} / RC_k]$

where:

CR_T = Total cancer risk at a given receptor (probability for one person)

$\sum_{i,j}$ = The sum over all sources i and pollutant types j (particulate or gas)

$CR_{i,j}$ = Cancer risk at the given receptor for source i and pollutant type j

$DF_{i,j}$= Dilution factor [$\mu g/m^3/(g/sec)$] at the given receptor for source i and pollutant j. Dilution factor can be defined as the predicted ambient impact from the given source and at the given receptor, divided by the emission rate from the given source.

CF = conversion factor, 0.02877 [(g/sec) / (ton/year)]

$\sum_k$ = sum over all pollutants k within pollutant group j (particulate or gas)

$E_{i,k}$ = emissions of pollutant k from source i

URE_k = cancer unit risk factor for pollutant k

HI_T = total organ-specific hazard index at a given receptor and for a given organ

$HI_{i,j}$ = organ-specific hazard index at a given receptor for source i and pollutant type j

RC_k = non-cancer health effect reference concentration for pollutant k

The above equations are equivalent to the following simpler equations:

$CR_T = \sum_{i,k} AC_{i,k} \times URE_k$

$HI_T = \sum_{i,k} AC_{i,k} / RC_k$

where:

$AC_{i,k}$ = ambient concentration ($\mu g/m^3$) for pollutant k at the given receptor.

Population Exposures, Average Impacts and Total Risks

Using the predicted impact for Census blocks, HEM-3 estimates the **populations exposed** to various cancer risk levels and hazard index levels. This is done by adding up the populations for receptors that have predicted cancer risks or hazard indices above the given threshold.

The model also calculates the **average cancer risks**, **average hazard indices**, **and total cancer risks** for Census blocks located within various distances of the emission sources. The following equations are used:

$MCR_d = \sum_m [CR_m \times P_m] / \sum_m P_m$

$MHI_d = \sum_m [HI_m \times P_m] / \sum_m P_m$

$TCR_d = \sum_m [CR_m \times P_m] / LT$

where:

MCR_d = the population-weighted average cancer risk for the population located within distance 'd' of the center of the modeling domain,

$\sum_m$ = the sum over all Census blocks m within distance d

CR_m = the total lifetime cancer risk (from all modeled pollutants and emission sources) at Census block m

P_m = the population at Census block m

MHI_d = the population-weighted average hazard index (for a particular organ) for the population located within distance d

HI_m = the total hazard index for the given organ (from all modeled pollutants and emission sources) at Census block m

TCR_d = the estimated total annual cancer risk (cancers/year) to the population living within distance d

LT = the average lifetime used to develop the cancer unit risk factor, 70 years

Risk Characterization Criteria

Cancer Risk Criteria

For this study, the following EPA criteria are applied to determine whether or not a MACT standard in the refining industry is sufficiently protective of human health:

- A lifetime cancer risk greater than 1 in 1,000,000 is considered a trigger point, and requires more detailed analysis to determine additional reduction standards that provide "ampler margin of safety", considering cost, technical feasibility, and other factors.
- A lifetime cancer risk greater than 1 in 10,000 is considerably high, and does not provide an ample margin of safety. It would require EPA actions to reduce that risk.

Table 6 shows EPA's decision approach for conducting residual risk assessments (EPA Oct., 2007).

TABLE 6. EPA's Decision Making Process for Residual Cancer Risk

Maximum Individual Risk ≤ 1 in 1,000,000	1 in 1,000,000 < Maximum Individual Risk < 1 in 10,000	Maximum Individual Risk ≥ 1 in 10,000
Low Risk "Ample margin of safety" is met. No additional action is needed.	**Moderate Risk** Factors such as cost and technical feasibility are considered in determining whether additional actions are required.	**High Risk** Standard is generally not considered sufficiently protective of public health, and additional actions are needed to reduce risk.

Source: EPA Risk and Technology Review (RTR) Assessment Plan.

Non-Cancer Risk Criteria

Risks for non-cancer effects are expressed with the Hazard Quotient (HQ) ratio, which compares the exposure to a reference level (RfC).

- For a HAP, Hazard Quotient less than 1 (HQ≤1) are not likely to cause adverse health effects, which means exposures below the reference level.
- For a HAP, Hazard Quotient greater than 1 (HQ>1) indicates high potential for adverse health effects.

RESULTS AND DISCUSSION

As mentioned in the Methodology Chapter, the HEM-3 model was run for six scenarios including different types of emissions and different refining complexes. This chapter presents the analysis of 2002 NEI and HEM-3 output reports.

Site Pollutant Characterization

From 2002 EPA NEI, Motiva Enterprises Norco refinery reported 188 emissions point sources (10 verticals and 178 fugitives) with 23 different HAPs, and a total emissions of 62.155 tons/year. On the other hand, Valero St Charles refinery reported 16 emission point sources (1 vertical and 15 fugitives) with 15 different HAPs and a total of 23.86 tons/year. As mentioned in the Literature Section, these two refineries are inside the EPA classification of 'Major' stationary source for the volume of emitted HAPs.

Figures 9 and 10 show the breakdown of the HAPs emissions for each site. Results show the pollutants with major percentages to be aromatic hydrocarbons such as Toluene, Xylenes, Ethylbenzene, and Benzene; as well as n-Hexane and Methanol.

Motiva vertical emissions point sources consisted of six stack flares, two cooling water towers, one blowdown system, and one unknown source. Fugitive emissions sources included losses from cooling towers, seal system of floating roof tanks, compressor seals, sampling, purging, pipelines, valves, flanges, marine vessels, and wastewater treatment system (aerated and non-aerated impoundment, open trench, and oil/water separator); as well as breathing losses from fixed roof tanks.

The only vertical point source reported by Valero refinery was the blowdown system with vapor recovery and Flare. Under fugitive emissions, the following areas were included: Cooling towers, product storage tanks, pipelines, valves, flanges, marine vessels, process drains, and wastewater treatment system (oil/water separator).

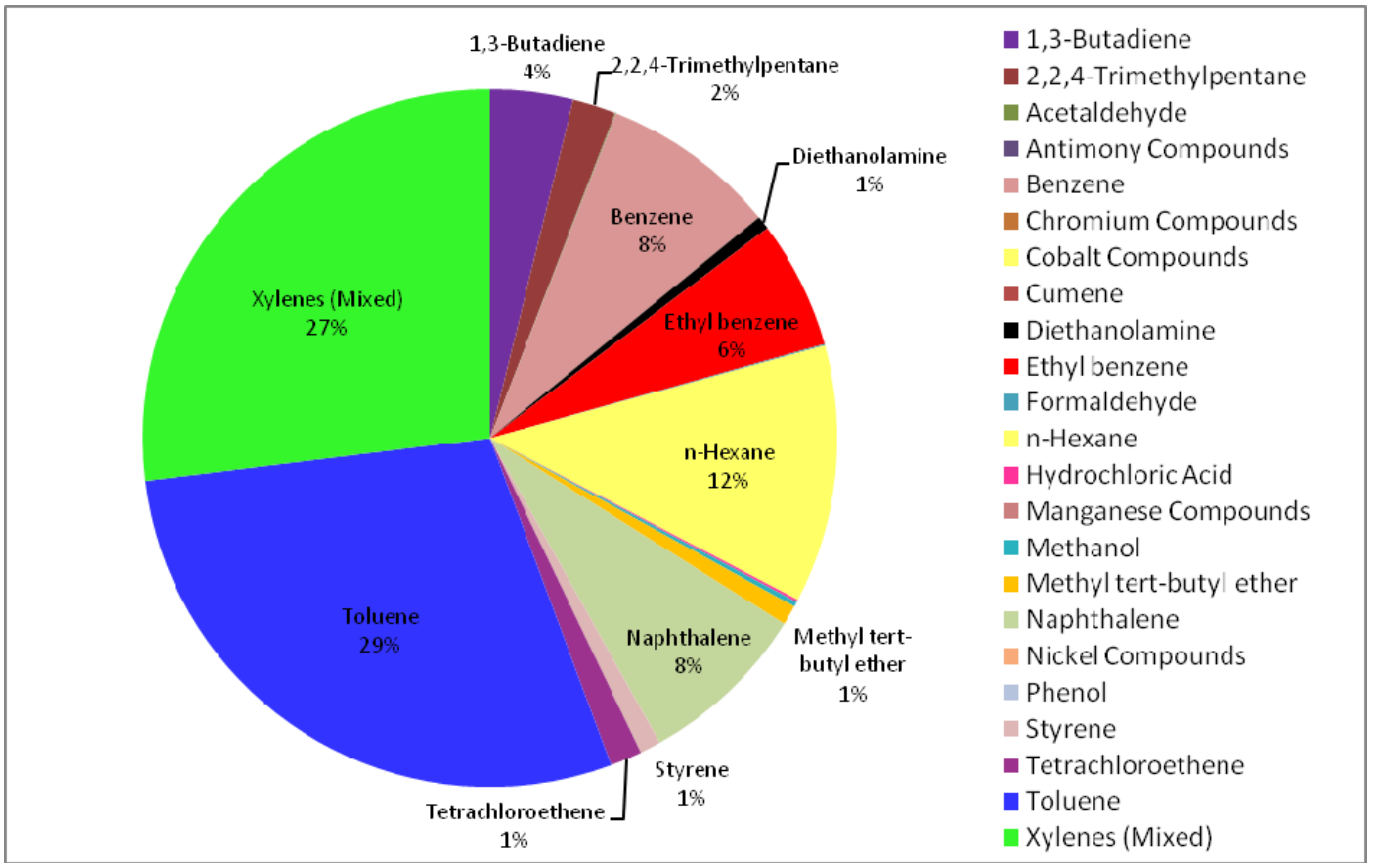

FIGURE 10. HAPs emitted by Motiva - Norco refinery in 2002

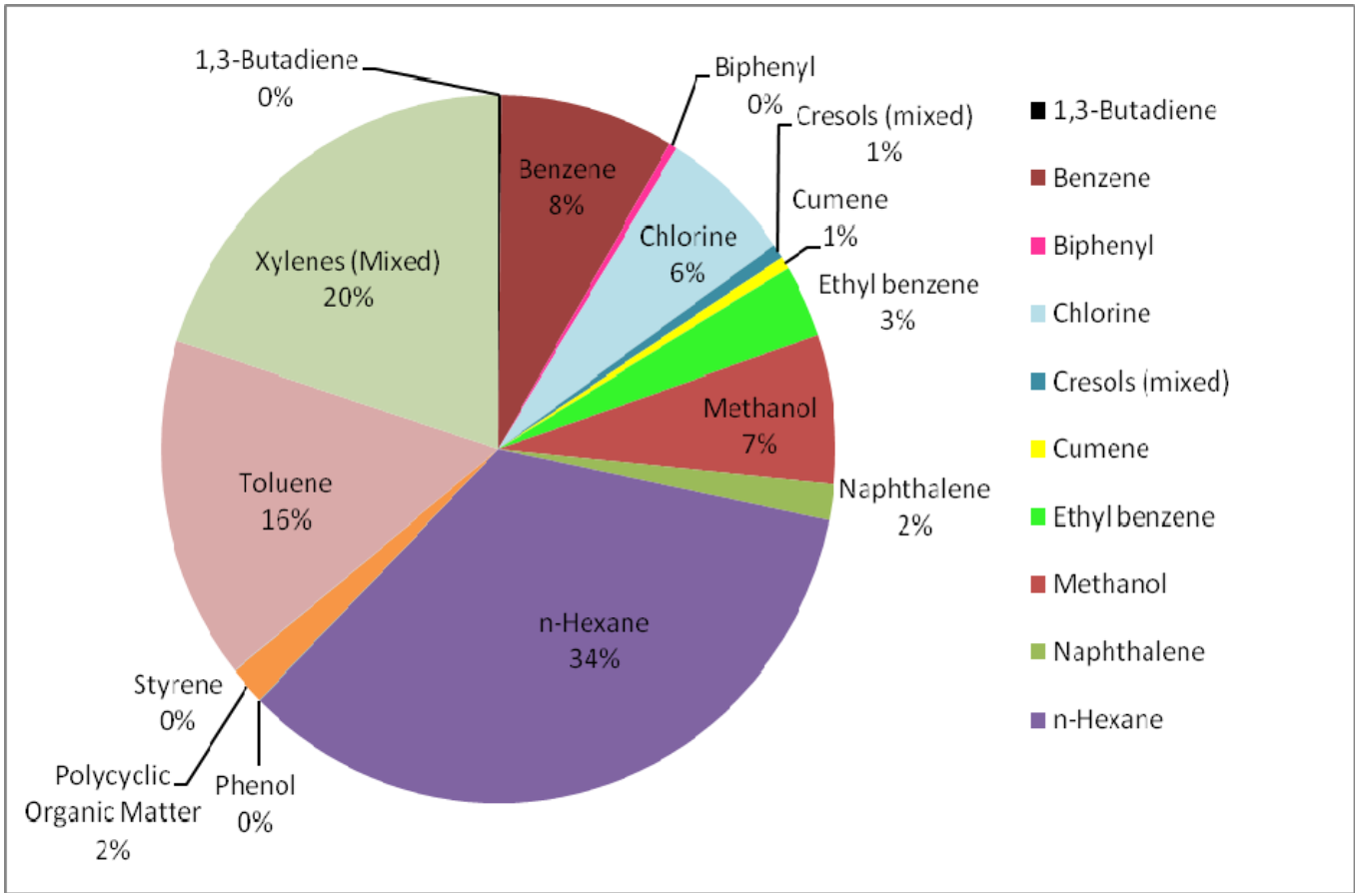

FIGURE 11. HAPs emitted by Valero- St Charles refinery in 2002

Emission Source Maps

HEM-3 generated the 'source maps' for each study run case, shown below, which displays the locations of the Maximum Individual Cancer Risk (MIR) and the Maximum Total Chronic Hazard Index for various target organs, predicting the impacts for all populated receptors in comparison to the locations of emission sources.

The maximum individual cancer risk sometimes occurs at a different location than the maximum hazard index for a given organ. Likewise, the location of the maximum hazard index for one organ could not be the same as the location for another organ.

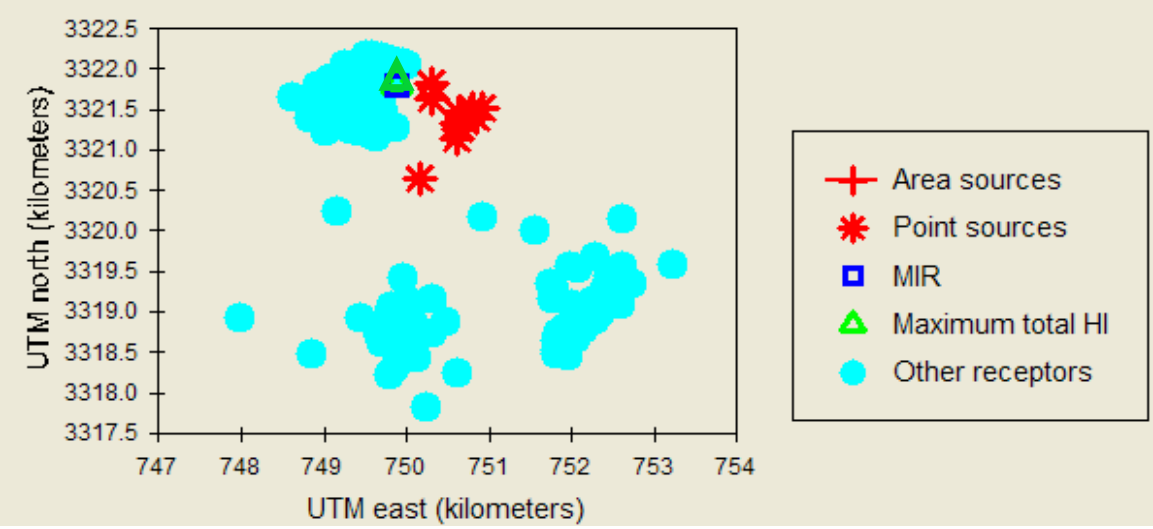

FIGURE 12. Map of Emission Sources and Nearby Receptors for Case #1 'Motiva Enterprise, Norco Refinery - Vertical Emissions- MACT I'

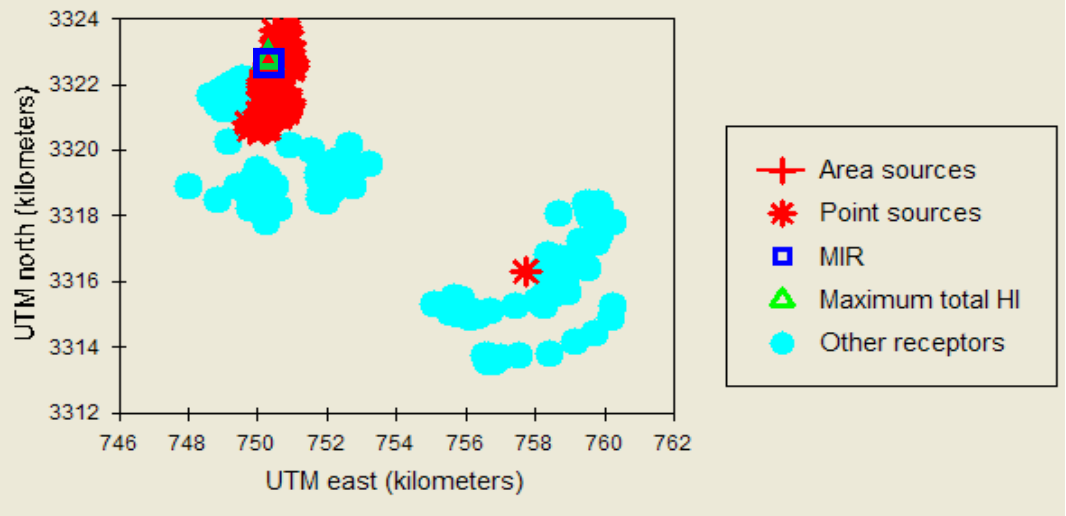

FIGURE 13. Map of Emissions Sources and Nearby Receptors for Case #2 'Motiva Enterprise, Norco Refinery - Vertical & Fugitive Emissions- MACT I'

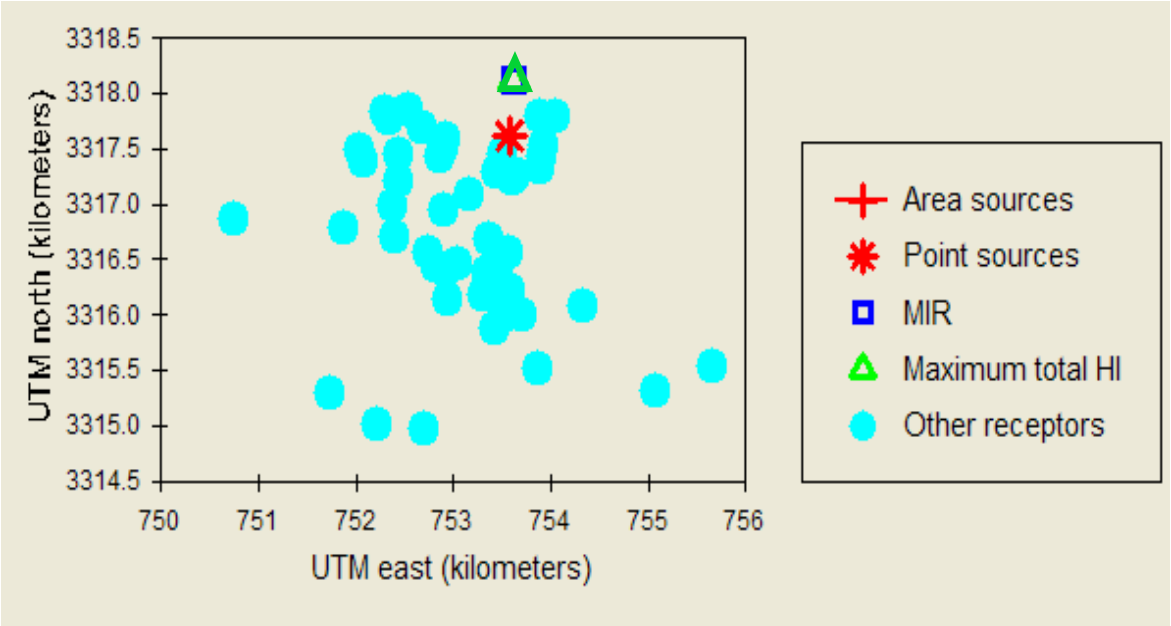

FIGURE 14. Map of Emissions Sources and Nearby Receptors for Case #3 'Valero, St. Charles Refinery - Vertical Emissions- MACT I'

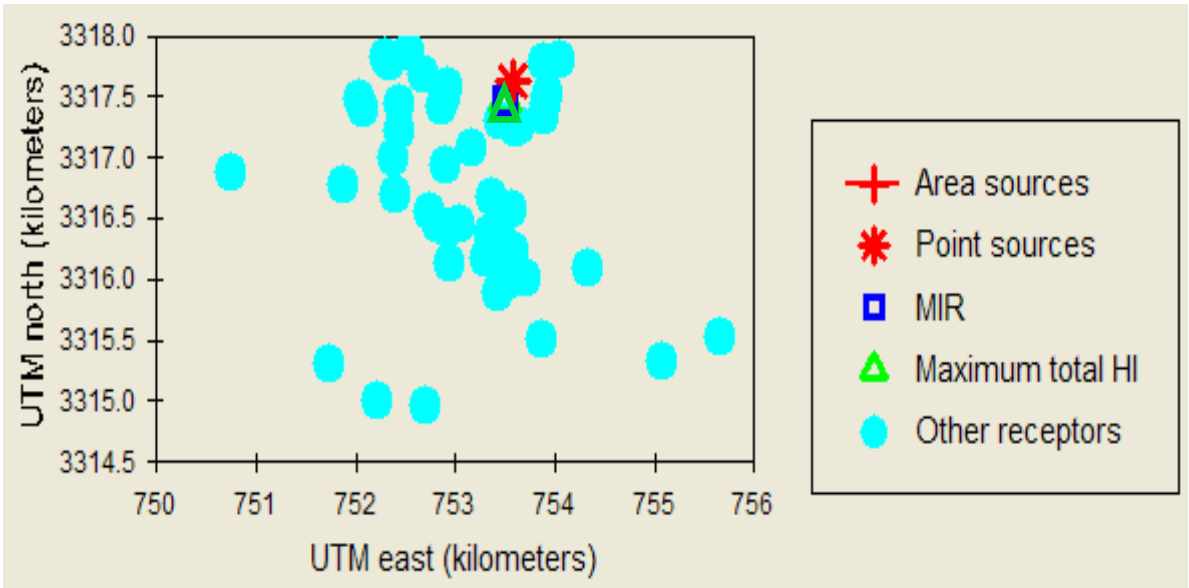

FIGURE 15. Map of Emissions Sources and Nearby Receptors for Case #4 'Valero, St. Charles Refinery - Vertical & Fugitive Emissions- MACT I'

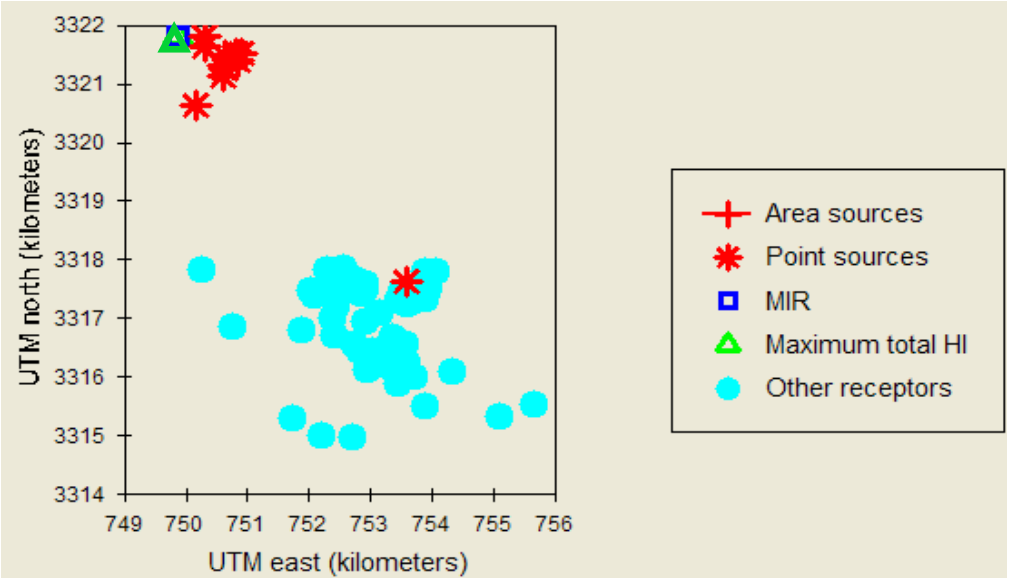

FIGURE 16. Map of Emissions Sources and Nearby Receptors for Case #5 'Motiva Enterprise, Norco Refinery & Valero, St. Charles Refinery-Vertical Emissions- MACT I'

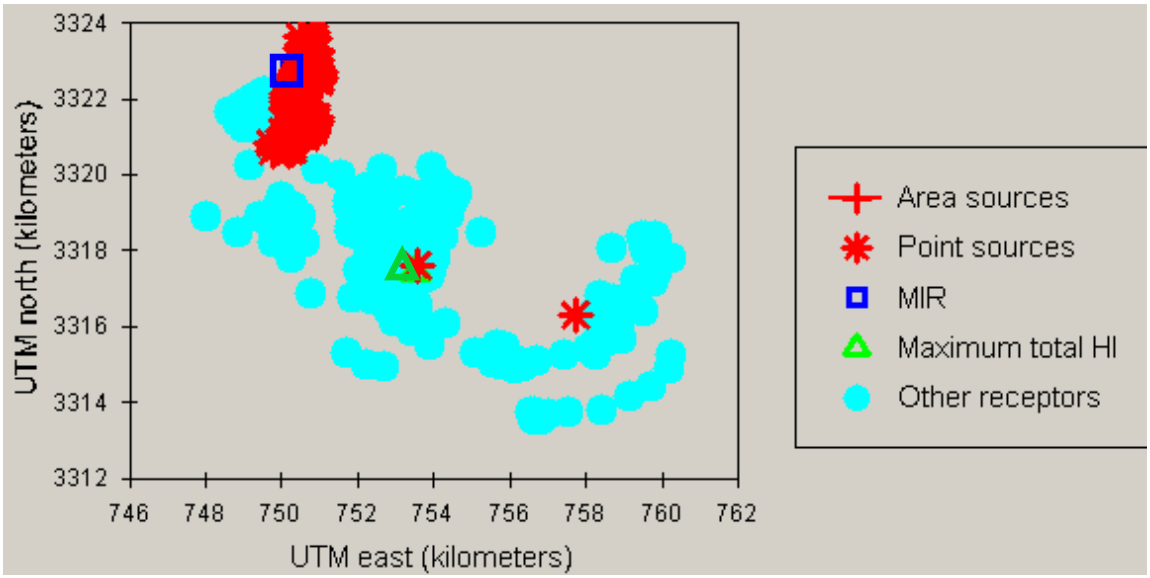

FIGURE 17. Map of Emissions Sources and Nearby Receptors for Case #6 'Motiva Enterprise, Norco Refinery & Valero, St. Charles Refinery - Vertical & Fugitive Emissions- MACT I'

HEM-3's Toxicity Table

The following table lists the unit risk estimates (URE) and reference doses (RfC) for each pollutant used in this study. Those values are the latest recommended by EPA, available in the EPA website (Smith and Murphy, 2003).

TABLE 7. Toxicity data & target organs associated with the chronic values

POLLUTANTS	Unit Risk Estimate, URE, (dimensionless)	Reference Concentration, RFC, (mg/m^3)	Target Organ
1,3-Butadiene	3.00E-05	2.00E-03	Reproductive
2,2,4-Trimethylpentane	0.00E+00	0.00E+00	-
Acetaldehyde	2.20E-06	9.00E-03	Respiratory
Antimony Compounds	0.00E+00	2.00E-04	Respiratory
Benzene	7.80E-06	3.00E-02	Immunological
Biphenyl	0.00E+00	0.00E+00	-
Chlorine	0.00E+00	2.00E-04	Respiratory
Chromium Compounds	1.20E-02	1.00E-04	Respiratory
Cobalt Compounds	0.00E+00	1.00E-04	Respiratory
Cresols (mixed)	0.00E+00	6.00E-01	Neurological, Whole body
Cumene	0.00E+00	4.00E-01	Kidney, Endocrine
Diethanolamine	0.00E+00	3.00E-03	Respiratory
Ethyl benzene	0.00E+00	1.00E+00	Developmental
Formaldehyde	5.50E-09	9.80E-03	Respiratory
Hexane	0.00E+00	0.00E+00	-
Hydrochloric Acid	0.00E+00	2.00E-02	Respiratory
Manganese Compounds	0.00E+00	5.00E-05	Neurological
Methanol	0.00E+00	4.00E+00	Developmental
Methyl Tert-Butyl Ether	2.60E-07	3.00E+00	Liver, Kidney, Ocular
Naphthalene	3.40E-05	3.00E-03	Respiratory
n-Hexane	0.00E+00	7.00E-01	Neurological, Respiratory
Nickel Compounds	1.20E-04	9.00E-05	Respiratory, Immunological
Phenol	0.00E+00	2.00E-01	Liver
Polycyclic Organic Matter	0.00E+00	0.00E+00	-
Styrene	0.00E+00	1.00E+00	Neurological
Tetrachloroethene	5.90E-06	2.70E-01	Neurological
Toluene	0.00E+00	5.00E+00	Respiratory, Neurological
Xylenes (Mixed)	0.00E+00	1.00E-01	Neurological

HEM-3's Cancer Risk Exposure

In this section, cancer risk exposure summary tables generated by the HEM-3 program are shown for risks between 1 in 1000 and 1 in 10,000,000. As mentioned before, 'moderate risk' level for cancer is considered for a value greater or equal than 1 in 1,000,000. 'High risk' is for a value greater or equal than 1 in 10,000.

TABLE 8. Cancer Risk, Case #1 'Motiva Norco - Vertical - MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	0
	Greater than or equal to 1 in 1,000,000	1.E-06	0
Low	Greater than or equal to 1 in 10,000,000	1.E-07	0

Total number of people with certain cancer risk level = 0 people.

TABLE 9. Cancer Risk, Case #2 'Motiva Norco - Vertical & Fugitive - MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	487
	Greater than or equal to 1 in 1,000,000	1.E-06	4571
Low	Greater than or equal to 1 in 10,000,000	1.E-07	74493

Total number of people in moderate cancer risk = 487 + 4571 = **5058 people**.
Total number of people in low cancer risk = 74493 people.

TABLE 10. Cancer Risk, Case #3 'Valero St Charles - Vertical - MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	0
	Greater than or equal to 1 in 1,000,000	1.E-06	0
Low	Greater than or equal to 1 in 10,000,000	1.E-07	0

Total number of people with certain cancer risk level = 0 people.

TABLE 11. Cancer Risk, Case #4 'Valero - Vertical & Fugitive - MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	0
	Greater than or equal to 1 in 1,000,000	1.E-06	2702
Low	Greater than or equal to 1 in 10,000,000	1.E-07	13305

Total number of people in moderate cancer risk = **2702 people**.
Total number of people in low cancer risk = 13305 people.

TABLE 12. Cancer Risk, Case #5 'Motiva & Valero - Vertical - MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	0
	Greater than or equal to 1 in 1,000,000	1.E-06	0
Low	Greater than or equal to 1 in 10,000,000	1.E-07	0

Total number of people with certain cancer risk level = 0 people.

TABLE 13. Cancer Risk, Case # 6 'Motiva- Valero -Vertical & Fugitive-MACT I'

Risk Level			Population
High	Greater than or equal to 1 in 1,000	1.E-03	0
	Greater than or equal to 1 in 10,000	1.E-04	0
Moderate	Greater than or equal to 1 in 20,000	5.E-05	0
	Greater than or equal to 1 in 100,000	1.E-05	487
	Greater than or equal to 1 in 1,000,000	1.E-06	11282
Low	Greater than or equal to 1 in 10,000,000	1.E-07	77356

Total number of people in moderate cancer risk = 487 + 11282 = **11769 people**.
Total number of people in low cancer risk = 77356 people.

It is important to point out that the study cases with moderate cancer exposure risks resulted to be those cases considering fugitive emissions, such as Cases #2, 4 and 6. Cancer risks associated with vertical emission point sources of MACT I process units resulted to be very low, indicating adequate protection of public health with an ample margin of safety.

The last case, #6, is the worst scenario as it includes vertical and fugitive emissions for both refineries in study.

Results from Cases #2, 4 and 6 were compiled in the Figures 16, 17 and 18 presented below.

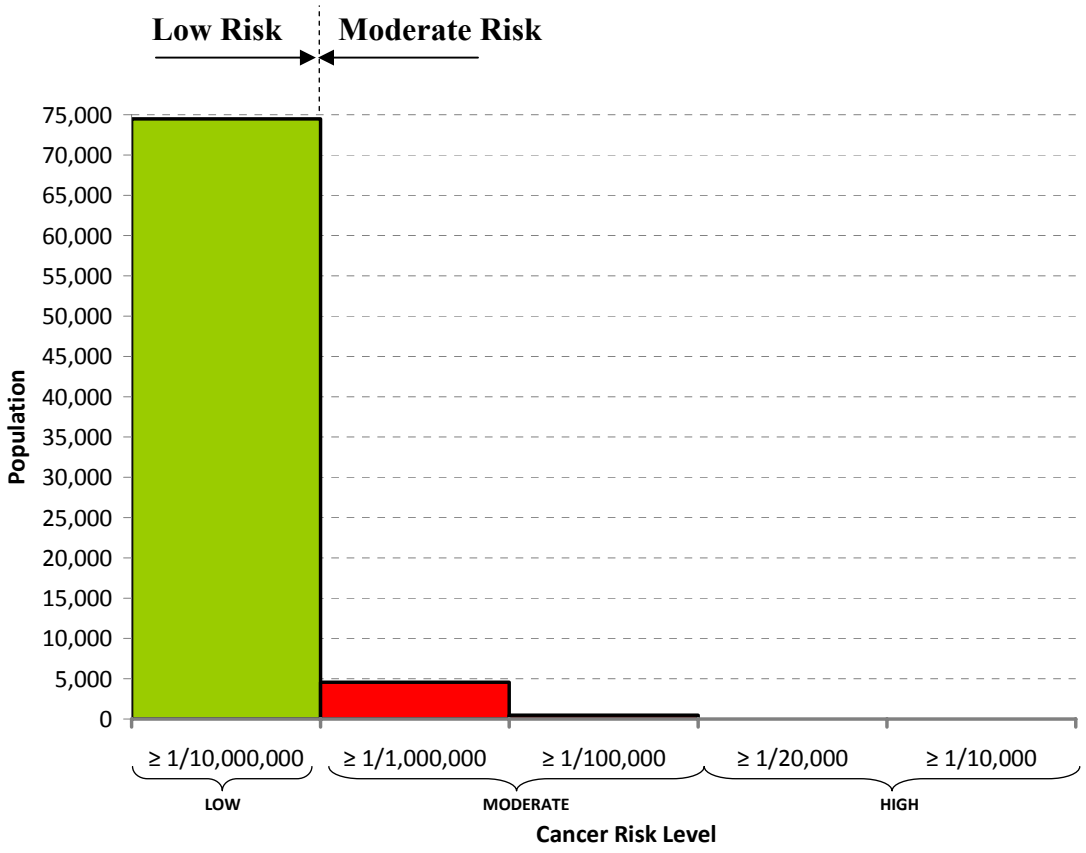

FIGURE 18. Cancer Risk Exposure, Case #2

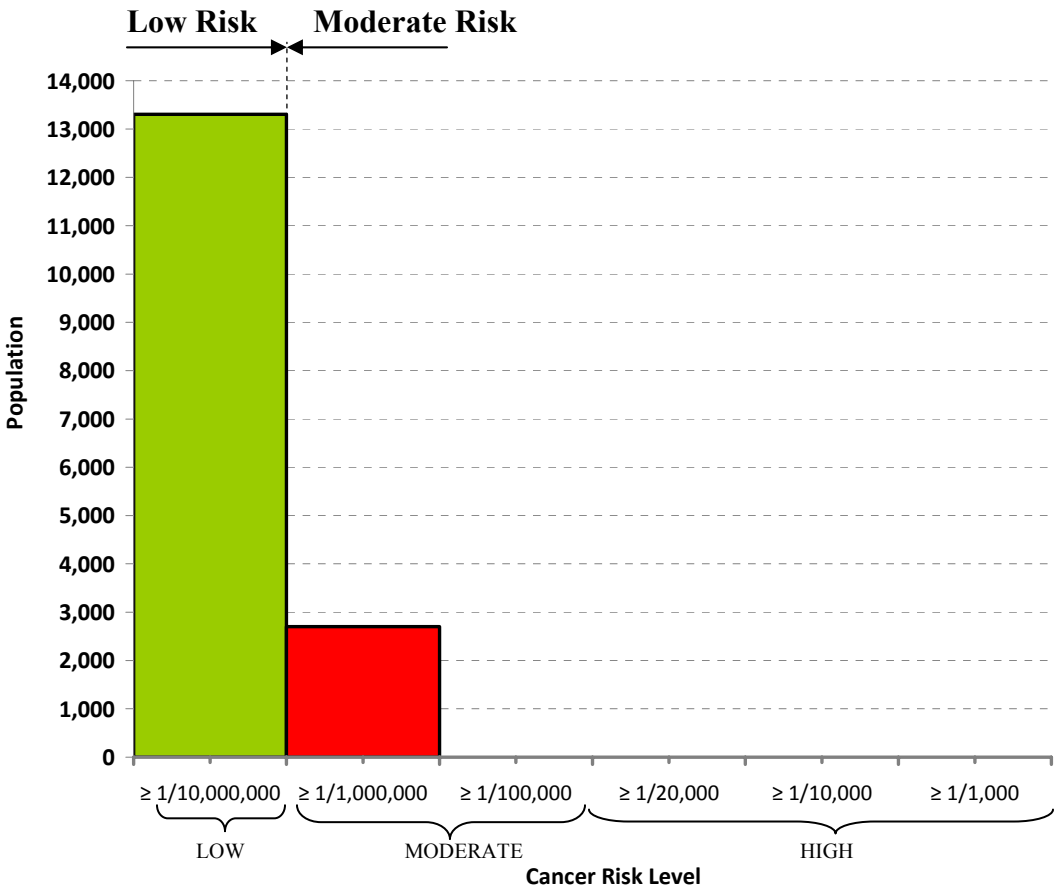

FIGURE 19. Cancer Risk Exposure, Case #4

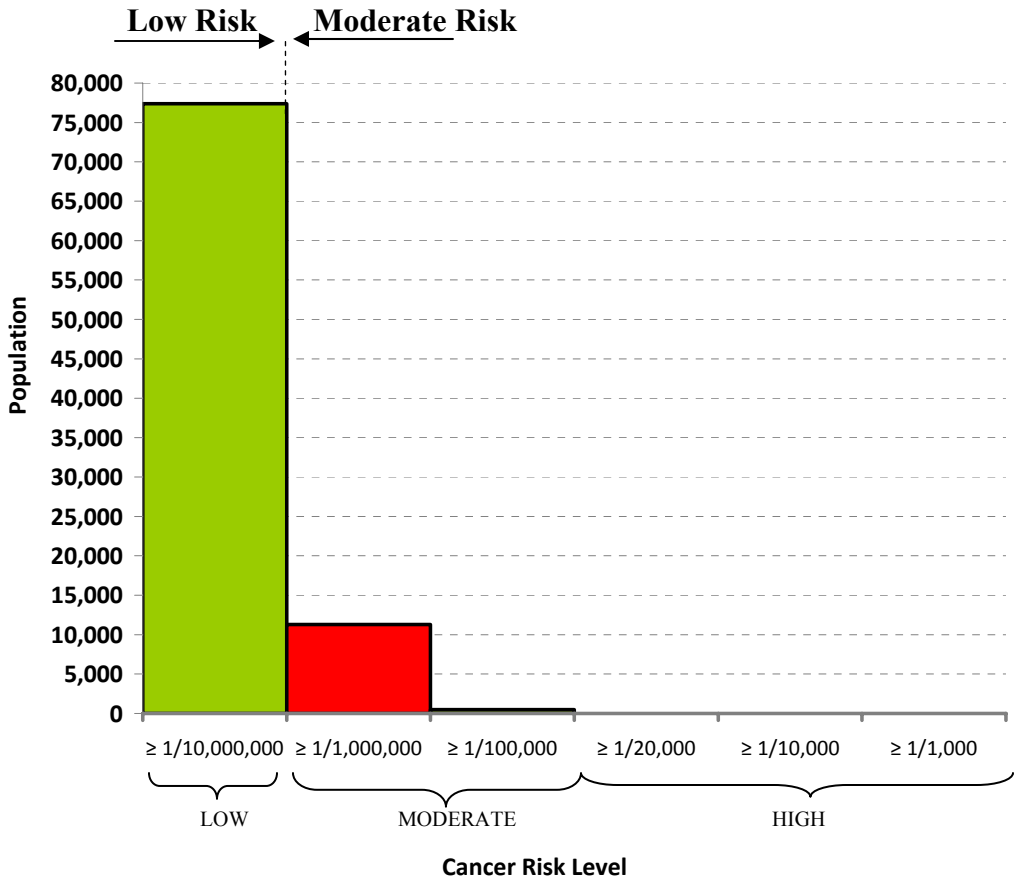

FIGURE 20. Cancer Risk Exposure, Case #6

HEM-3's Histograms

In this section, detailed data generated by the HEM-3 program in excel format created the histograms of the estimated numbers of people exposed to different levels of maximum individual cancer risk in a case by case basis.

The cancer histogram gives similar information than the cancer risk exposure output; however, the cancer histogram includes many more risk levels than the cancer risk exposure table (10 exposure bins for each factor of ten change in estimated cancer risk).

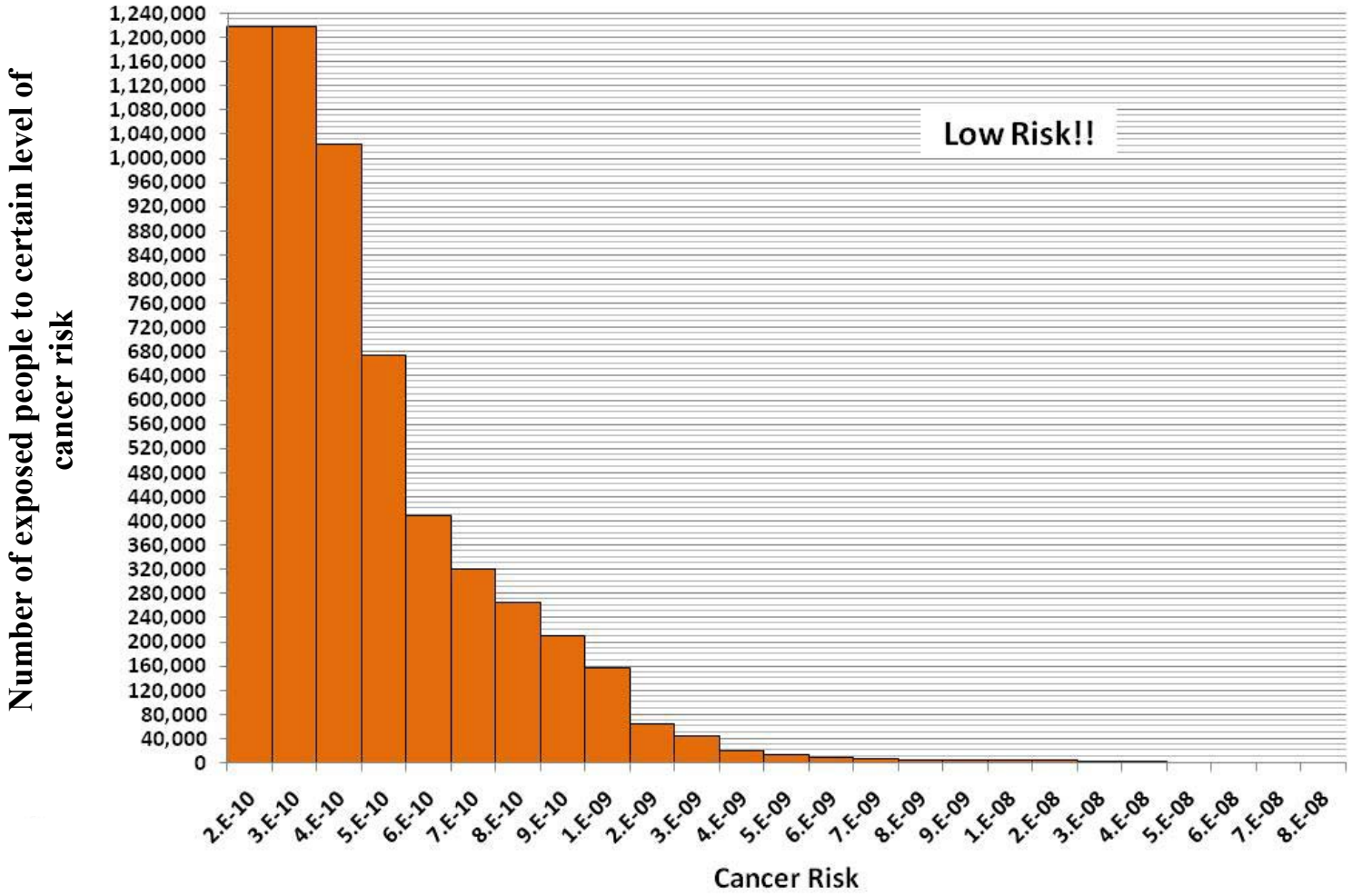

FIGURE 21. Histogram of Case #1

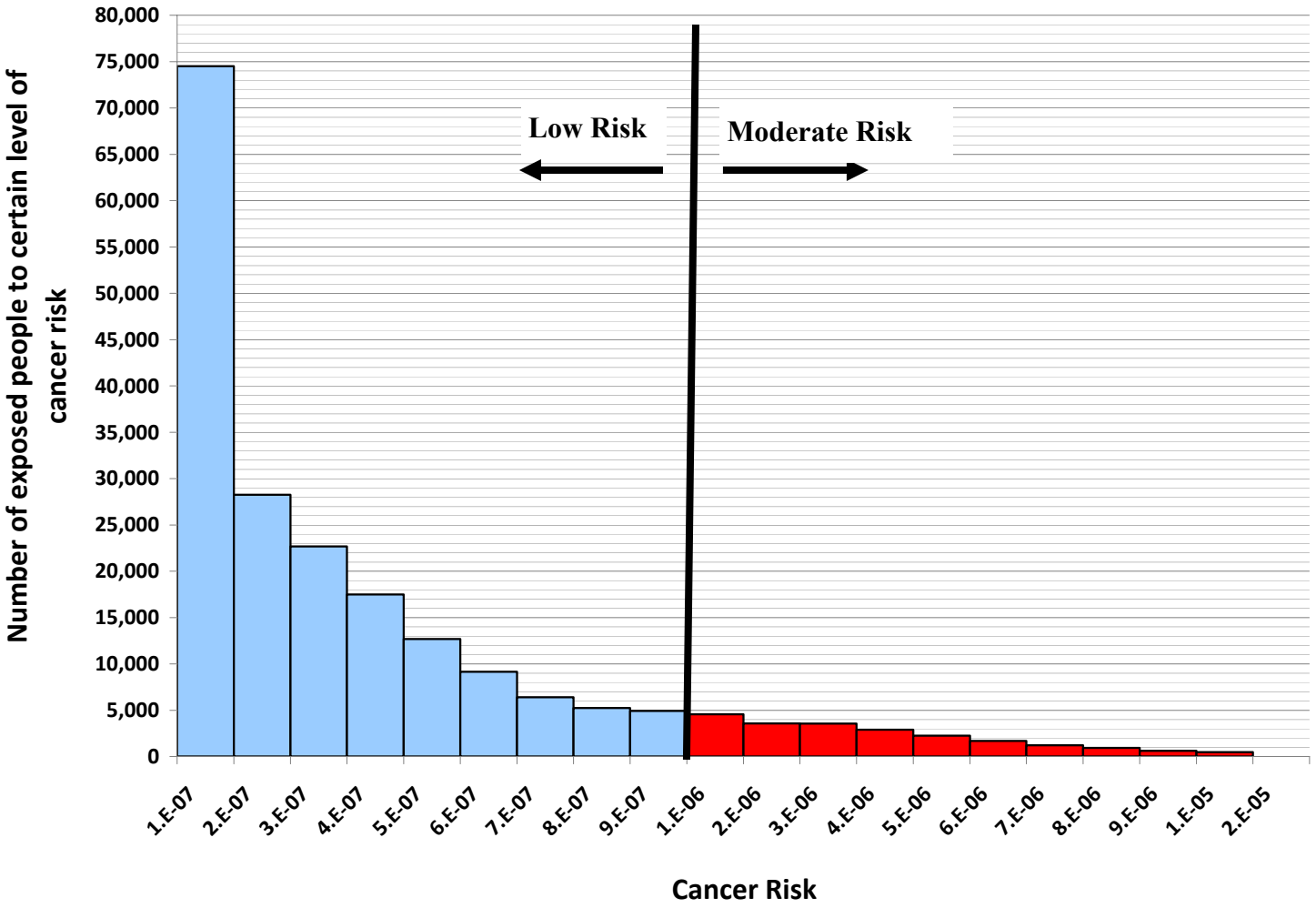

FIGURE 22. Histogram of Case #2

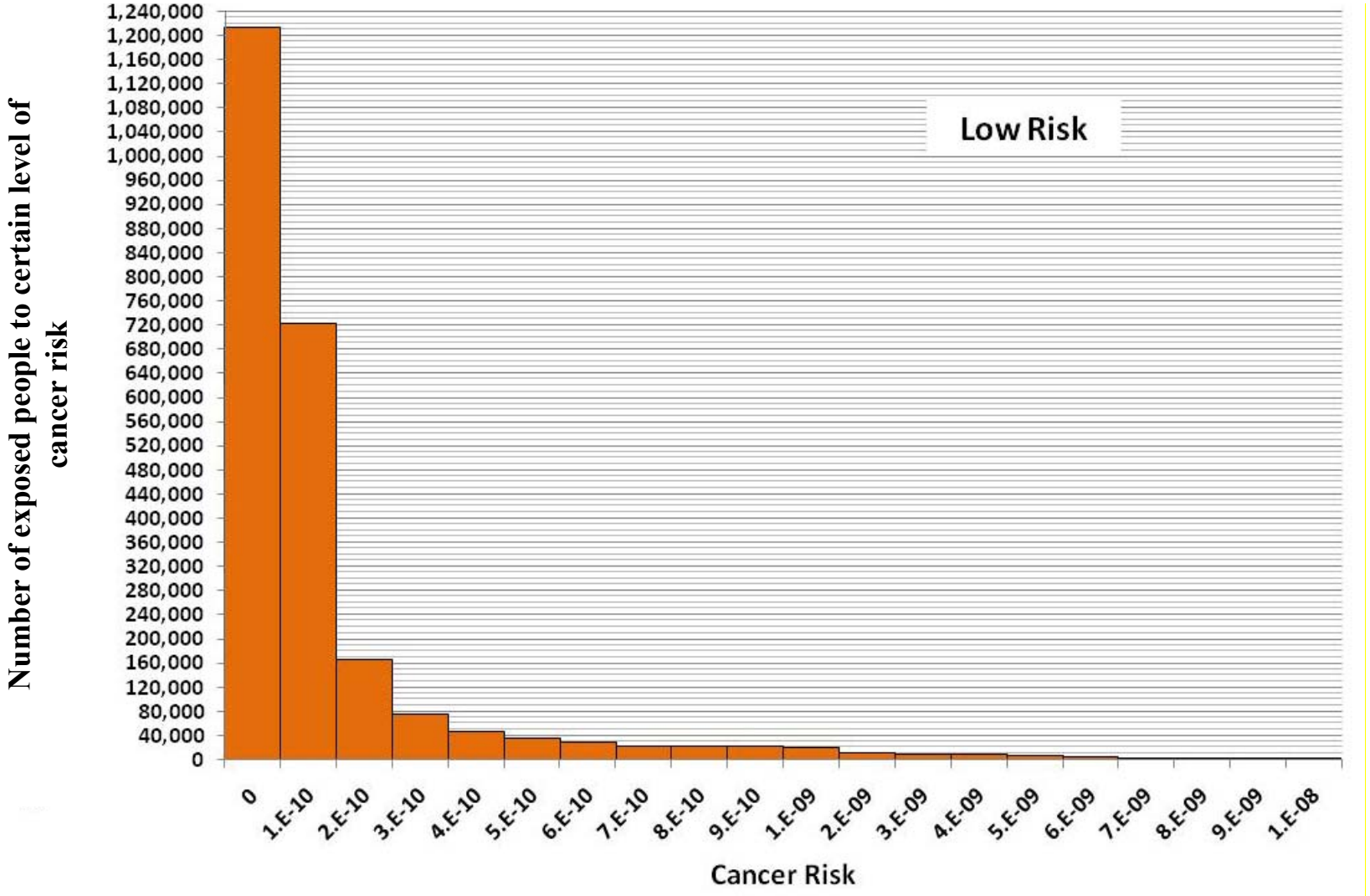

FIGURE 23. Histogram of Case #3

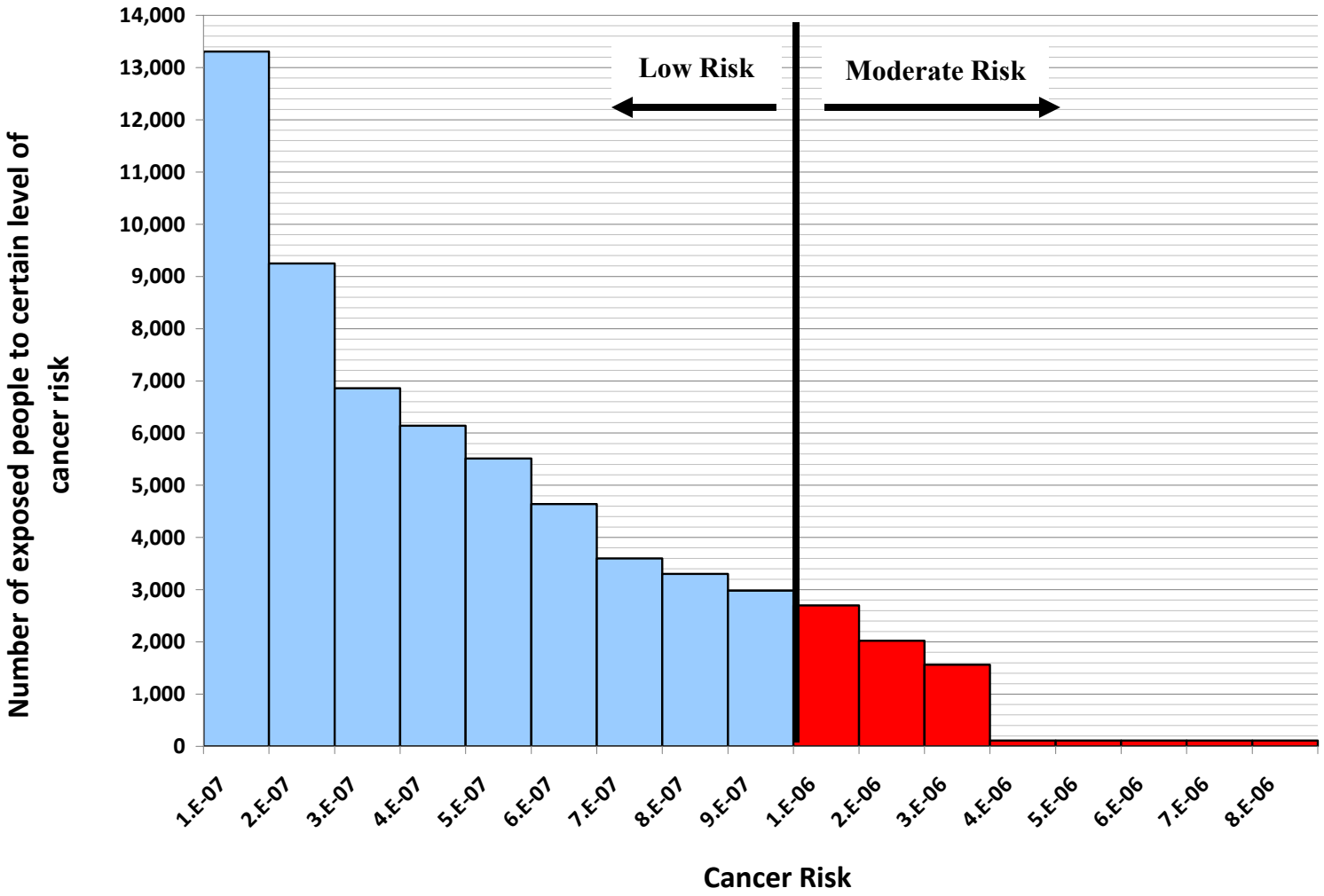

FIGURE 24. Histogram of Case #4

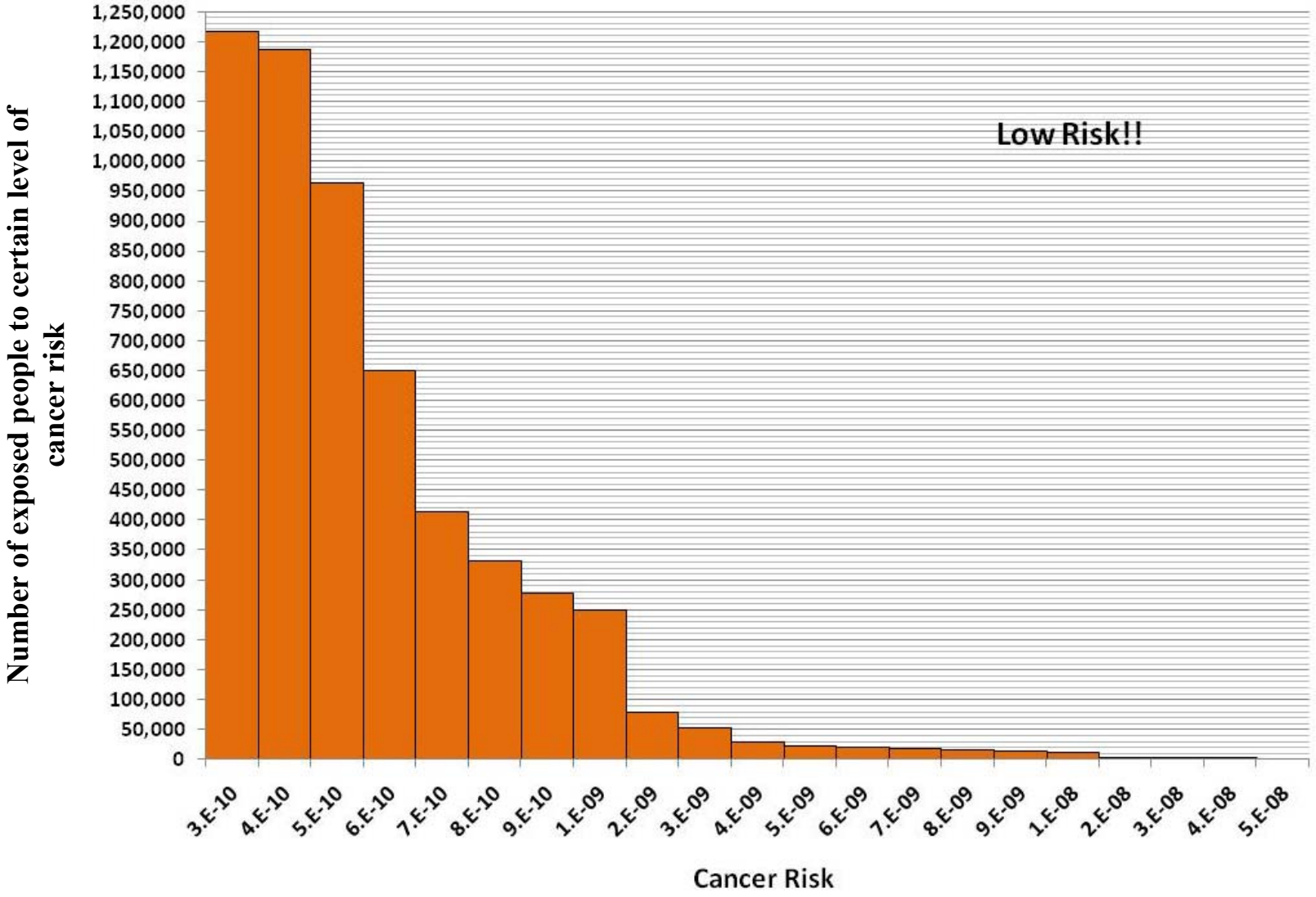

FIGURE 25. Histogram of Case #5

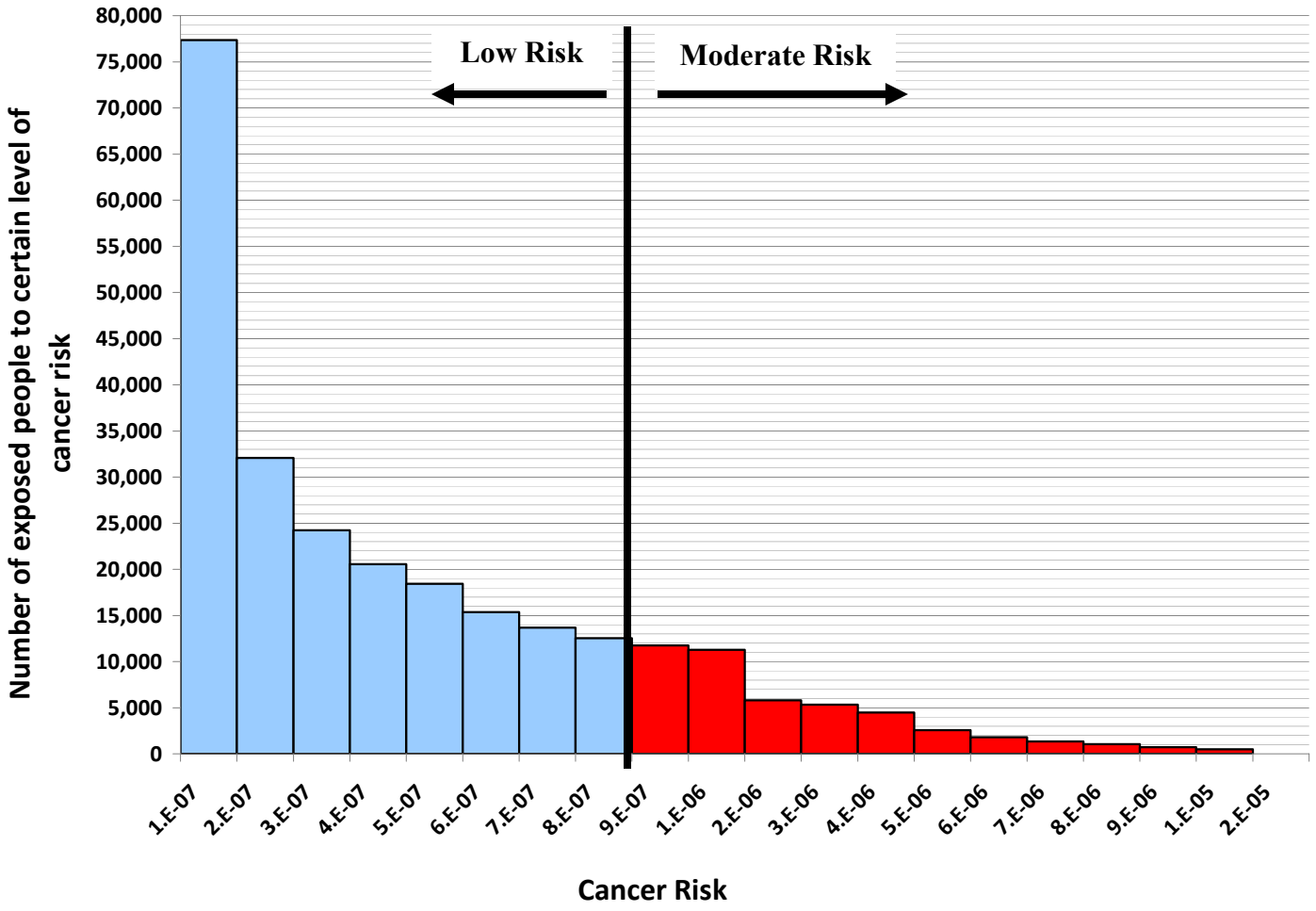

FIGURE 26. Histogram of Case #6

HEM-3's Non-Cancer Risk Exposure

Non-cancer health hazards were determined with chronic hazard indexes calculated with the HEM-3 model for the following categories: Respiratory, Liver, Neurological, Developmental, Reproductive, Kidney, Ocular, Endocrine, Hematological, Immunological, Skeletal, Spleen, Thyroid and Whole body. Such values were reported in excel format as follows:

TABLE 14. Hazard Index for Non-Cancer Risk, Case #1

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	0	0	0
Respiratory	0	0	0	0	0	0
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

TABLE 15. Hazard Index for Non-Cancer Risk, Case #2

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	0	0	60
Respiratory	0	0	0	0	0	0
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

TABLE 16. Hazard Index for Non-Cancer Risk, Case #3

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	0	0	0
Respiratory	0	0	0	0	0	0
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

TABLE 17. Hazard Index for Non-Cancer Risk, Case #4

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	**113**	1046	2469
Respiratory	0	0	0	**113**	970	2469
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

TABLE 18. Hazard Index for Non-Cancer Risk, Case #5

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	0	0	0
Respiratory	0	0	0	0	0	0
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

TABLE 19. Hazard Index for Non-Cancer Risk, Case #6

Level	Greater than or equal to 100	Greater than or equal to 50	Greater than or equal to 10	Greater than or equal to 1.0	Greater than or equal to 0.5	Greater than or equal to 0.2
Total hazard index - chronic	0	0	0	**113**	1046	2618
Respiratory	0	0	0	**113**	970	2469
Liver	0	0	0	0	0	0
Neurological	0	0	0	0	0	0
Developmental	0	0	0	0	0	0
Reproductive	0	0	0	0	0	0
Kidney	0	0	0	0	0	0
Ocular	0	0	0	0	0	0
Endocrine	0	0	0	0	0	0
Hematological	0	0	0	0	0	0
Immunological	0	0	0	0	0	0
Skeletal	0	0	0	0	0	0
Spleen	0	0	0	0	0	0
Thyroid	0	0	0	0	0	0
Whole body	0	0	0	0	0	0

Non-cancer health hazards generated by pollutant emissions from Motiva Enterprises, Norco refinery resulted to be insignificant. In contrast, 113 people resulted to be in high risk of getting respiratory problems around Valero, St Charles refinery.

EPA Analysis & Results

In general, EPA has determined that NEI-reported emissions for Petroleum Refineries have declined significantly when comparing databases from 1990 and 2002. This decline has been attributed to the numerous CAA regulations, plus MACT standard, applicable to this industry. The NEI data indicates that total air toxics emissions decreased by over 90,000 tons, or 91 percent, from 1990 to 2002. This exceeded the 59 percent reduction EPA anticipated when the MACT rule was developed (EPA, Oct, 2007)

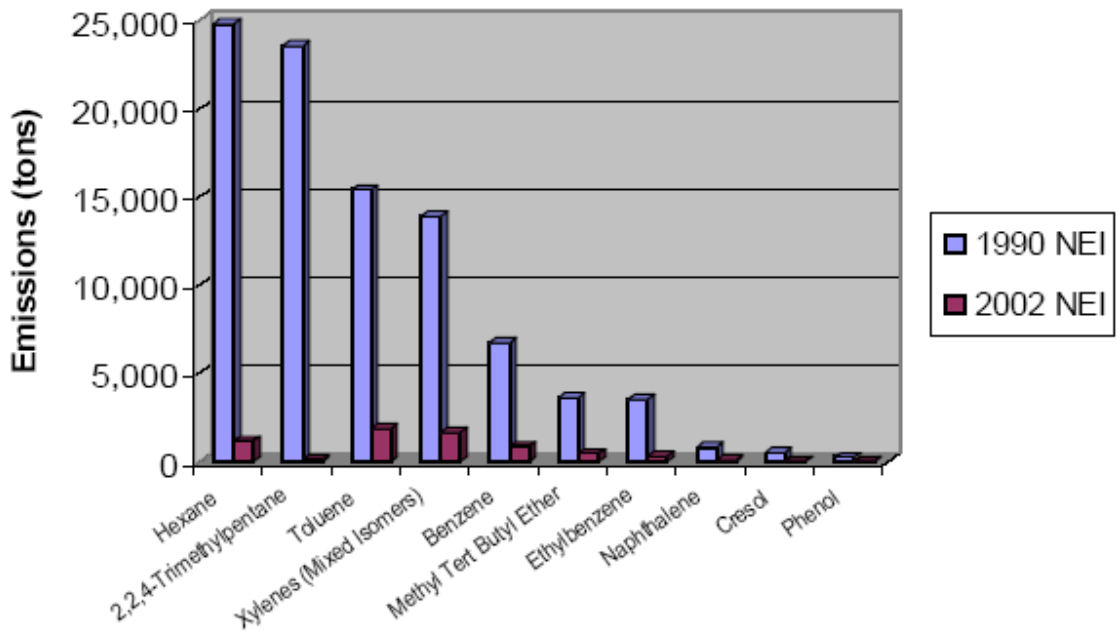

FIGURE 27. Emissions of Targeted Air Toxics for Petroleum Refinery MACT, 1990-2002.
Source: EPA Oct., 2007.

EPA analyzed in 2007 emissions from sources at petroleum refineries after implementation of the 1995 MACT standards and determined that the risks to human health and the environment are **low enough** that no further controls are warranted to protect human health. (EPA, Aug., 07).

Because the risks resulted acceptable, EPA is proposing, as **one option**, to retain the current level of the standard by not including any new requirements for these emissions sources. As **second option**, EPA is proposing to amend the standards to

provide additional health protection. This second option would add new requirements to the existing rule for certain storage vessels and wastewater treatment units.

Additionally under both options, EPA is proposing work practice standards for the detection and repair of leaks from refinery cooling towers.

On the EPA Notice Volume 72, # 170 (EPA, Sept. 2007), EPA describes in more details the proposals for regulatory amendments in the Petroleum Refining Sector MACT I:

- **Regulatory options for storage vessels with external floating roofs.** It would require the owner or operator of an existing external floating roof storage vessel to equip each slotted guide pole with a gasketed sliding cover or flexible fabric sleeve seal with a gasketed cover in order to close off the liquid surface from the atmosphere.
- **Regulatory options for an enhanced biodegradation unit (EBU).** It would add a specific performance standard and monitoring requirement for EBUs. Owners or operators will have to operate and maintain EBU at minimum treatment efficiency for benzene of 90 percent. An initial performance demonstration will have to be conducted in order to establish operating limits for the mixed liquor volatile suspended solids (MLVSS) concentration and the food-to-microorganism ratio. Weekly monitoring plans of the operating parameters will be required, and any exceedance will be recordable and reportable.
- **Leak detection and repair program plans for cooling towers** are being proposed as work practice standards which would require the owner or operator of a new or existing source to monitor for leaks in the cooling tower return lines from heat exchangers in organic HAP service, and repair any detected leak within a specified period of time.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrated through a risk assessment that hazardous air pollutants emitted from the petroleum refining industry under MACT I category could cause **moderate** adverse effects in human health. From the region selected, there is a moderate potential cancer risk for **11,769** people living around Motiva Enterprises, Norco and Valero, St Charles refineries, using EPA criterion of moderate risk when maximum individual risk is greater than 1 in 1,000,000. Also, **113** people living around Valero, St Charles refinery were found to be in high risk of getting respiratory problems.

'Moderate' cancer risks require that factors as cost and technical feasibility to be considered for taking additional actions. Results from this study support the application of EPA 2nd proposal, where new requirements to the existing rules need to be added for floating roof storage tanks, wastewater treatment units, and refinery cooling towers.

Additionally, the study demonstrated the importance of considering **multiple emission sources** in the same human exposure model for estimating health effects. Because facilities like refineries and chemical plants are often clustered together, neighboring communities are subject to cumulative upset emissions from the different plants.

HAPs emitted from petroleum refineries vary by facility and process operations, but they normally include a **variety of organic and inorganic compounds, as well as metals**. From the 2002 EPA NEI database, Motiva Norco refinery emitted 62.155 tons/year with mainly 29 % Toluene, 27% Xylenes, 12% n-Hexane, 8% Naphthalene, 8% Benzene, 6% Ethylbenzene and 4% 1, 3 - Butadiene. In the same year, Valero St Charles emitted 23.84 tons/year with 34% n-Hexane, 20% Xylenes, 16% Toluene, 8% Benzene, 7% Methanol, 6% Chlorine, 3% Ethylbenzene and 2% Naphthalene.

Emissions were mainly originated from various process vents and flares, cooling towers, storage vessels, wastewater streams, loading racks, marine tank vessel loading operations, and equipment leaks.

Benzene continues to be the **primary cancer risk driver** for the petroleum refining sector based on emitted volume and URE value, followed by 1,3-Butadiene and Naphthalene.

Likewise, the importance of **fugitive emissions** in the refining sector was proven. Fugitive emissions are one of the largest refining sources of hydrocarbon emissions, and future industry regulations must focus on them in order to address their significant cancer risks. More pollution prevention strategies could be applied in the refineries to control fugitive emissions more efficiently through feasible solutions, such as:

- More stringent leak detection and repair programs for valves, flanges, pump and compressor seals covering all refinery areas.
- Implementation of routine monitoring plans and repair plans for cooling water towers.

Cancer and non-cancer risks estimated with HEM-3 model are subjected to certain uncertainties related to the input data and taken assumptions, as follows:

- Emissions rates were taken from the 2002 EPA NEI database, which includes default values for unknown fields.
- 2000 population level in Norco area was considered constant during 70 years, which could underestimate the total number of people exposed.
- Population exposures were based on a lifetime of 70 years at the 2000 Census-identified place of residence, without considering any residence change during the entire life.
- All individuals living inside the 50-km radius around Motiva and Valero refineries were considered to be identical without making any difference of weight, age, and gender.

Some recommendations are:

- EPA needs to standardize the emissions reporting process from the petroleum refineries, in order to avoid ambiguous and inconsistent reports from one site to another, one unit process to another one.
- EPA needs to standardize fugitive emissions calculation methods for each process within the refining sector; preventing so the use of different calculation methodologies for equivalent process units from one refinery to another one (e.g. material balances, emission factors, manufacturer specifications or engineering judgments).

- Emissions from Valero St Charles refinery should be reported in the 2002 EPA NEI database with the exact and/or approximate location instead of one default location for all sources.
- Evaluate remaining risks resulting from emissions releases by MACT II category refineries.

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APPENDIX 1.

EPA 40 CFR PART 63

RISK AND TECHNOLOGY REVIEW, PHASE II, GROUP 2 ADVANCE NOTICE OF PROPOSED RULEMAKING [ANPRM]

[Source: Federal Register/Vol. 72, No. 60, March 29, 07/Proposed Rules]

submission that otherwise satisfies the provisions of the Clean Air Act. Therefore, the requirements of section 12(d) of the NTTA do not apply.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Carbon monoxide, Intergovernmental relations, Nitrogen dioxide, Ozone, Reporting and recordkeeping requirements.

Dated: March 22, 2007.

Bharat Mathur,

Acting Regional Administrator, Region 5.

[FR Doc. E7–5809 Filed 3–28–07; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 63

[EPA–HQ–OAR–2006–0859; FRL–8293–4]

RIN 2060–AN85

Risk and Technology Review, Phase II, Group 2

AGENCY: Environmental Protection Agency (EPA).

ACTION: Advance notice of proposed rulemaking (ANPRM).

SUMMARY: This ANPRM asks for public comment on hazardous air pollutant emissions and other model input data that EPA intends to use to assess residual risk from selected industrial major source categories, as required by the Clean Air Act. Specifically, the data are comprised of hazardous air pollutant emission estimates and emission release parameters for 22 industrial source categories subject to 12 national emission standards for hazardous air pollutants for hazardous air pollutants with compliance dates of 2002 and earlier. The source of this information is the February 2006 version of the 2002 National Emissions Inventory, updated with some facility-specific data collected by EPA. We are seeking comment on the emissions and source data found at the Risk and Technology Review Web site and we are providing the opportunity for the public to submit technical corrections and updates. Following review of comments received, we will update the data, as appropriate, and assess risk for these source categories. We will use these risk estimates and our evaluation of the availability, cost, and feasibility of emissions reduction options to determine the ample margin of safety for residual risk and to fulfill our obligations to conduct a technology review. We currently anticipate using the results of these risk estimates along with review of control technology as the basis for our decisions on whether to propose additional standards to address residual risk for each source category. There will be opportunity for oral and written comment on any additional standards when we publish our Notice of Proposed Rulemaking (NPRM). We anticipate proposing the results of this risk and technology review for these 22 source categories by fall 2007.

DATES: Comments must be received on or before May 29, 2007.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2006–0859 by one of the following methods:

- *http://www.regulations.gov.* Follow the online instructions for submitting comments.
- *E-mail: a-and-r-docket@epamail.epa.gov.*
- *Fax:* (202) 566–1741.
- *Mail:* U.S. Postal Service, send comments to: Air and Radiation Docket (6102T), Docket ID No. EPA–HQ–OAR–2006–0859, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW., Washington, DC 20460. Please include a total of two copies.
- *Hand Delivery:* In person or by Courier, deliver comments to: Air and Radiation Docket (6102T), EPA West, Room 3334, 1301 Constitution Ave., NW., Washington, DC 20004. Such deliveries are accepted only during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2006–0859. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be confidential business information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through www.regulations.gov or e-mail. The *http://www.regulations.gov* Web site is an ''anonymous access'' system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *http://www.regulations.gov,* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, i.e., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the Air and Radiation Docket, EPA West, Room 3334, 1301 Constitution Avenue, NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air and Radiation Docket is (202) 566–1742.

Note: The EPA Docket Center suffered damage due to flooding during the last week of June 2006. The Docket Center is continuing to operate. However, during the cleanup, there will be temporary changes to Docket Center telephone numbers, addresses, and hours of operation for people who wish to make hand deliveries or visit the Public Reading Room to view documents. Consult EPA's **Federal Register** notice at 71 FR 38147 (July 5, 2006) or the EPA Web site at *http://www.epa.gov/epahome/dockets.htm* for current information on docket operations, locations, and telephone numbers. The Docket Center's mailing address for U.S. mail and the procedure for submitting comments to *http://www.regulations.gov* are not affected by the flooding and will remain the same.

FOR FURTHER INFORMATION CONTACT: For general information about this ANPRM, contact Ms. Paula Hirtz, Office and Air Quality Planning and Standards, Sector Policies and Programs Division, Coatings and Chemicals Group (E143–01), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; *telephone number:* (919) 541–2618; *fax number:* (919) 541–0246; and *e-mail address: hirtz.paula@epa.gov.*

For information specific to the National Emissions Inventory (NEI), contact Ms. Anne Pope, Air Quality and Assessment Division (Office and Air Quality Planning and Standards), Mail Code C339–02, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711; *telephone number:* (919) 541–5373; *fax number:* (919) 541–0684; and *e-mail address: pope.anne@epa.gov.*

SUPPLEMENTARY INFORMATION:

Regulated Entities. Entities potentially affected by this action include facilities containing any one or more of the 22 major source categories subject to the 12 national emission standards for hazardous air pollutants (NESHAP) (or commonly referred to maximum achievable control technology (MACT) standards) listed in Table 1. This action does not affect area sources, as these NESHAP do not apply to area sources. Industries regulated by these MACT are classified by the North American Industry Classification System (NAICS) codes shown in Table 1. In addition, a classification system of MACT codes has been developed and is used in the 2002 NEI to identify processes included in each MACT source category. The MACT codes for the 22 source categories addressed in this notice are also displayed in Table 1.

TABLE 1.—MACT STANDARDS, SOURCE CATEGORIES, AND CORRESPONDING NAICS AND MACT CODES ADDRESSED BY THIS ANPRM

MACT standard/source category name	NAICS codes	MACT code
Mineral Wool Production	327993	409
Aerospace Manufacturing and Rework Facilities	336411	0701
Marine Tank Vessel Loading Operations	4883	0603
Natural Gas Transmission and Storage	486210	0504
Oil and Natural Gas Production	211	0501
Petroleum Refineries	32411	0503
Pharmaceuticals Production	3254	1201
Group I Polymers and Resins:		
Epichlorohydrin Elastomers Production	325212	1311
Hypalon(™) Production	325212	1315
Nitrile Butadiene Rubber Production	325212	1321
Polybutadiene Rubber Production	325212	1325
Styrene-Butadiene Rubber and Latex Production	325212	1339
Group IV Polymers and Resins:		
Acrylic-Butadiene-Styrene Production	325211	1302
Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene Production	325211	1317
Methyl Methacrylate-Butadiene-Styrene Production	325211	1318
Nitrile Resins Production	325211	1342
Polyethylene Terephthalate Production	325211	1328
Polystyrene Production	325211	1331
Styrene-Acrylonitrile Production	325211	1338
Primary Aluminum Reduction Plants	331312	0201
Printing and Publishing Industry	32311	0714
Shipbuilding and Ship Repair Operations	336611	0715

Submitting Comments/CBI. When submitting comments, remember to identify this ANPRM by docket number and other identifying information (subject heading, **Federal Register** date, and page number). Also, make sure to submit your comments by the comment period deadline identified. As described further in section VII of this ANPRM, specific data change suggestions need to be accompanied by supporting documentation that includes a description of any assumptions used and any technical information and/or data that you used.

Do not submit CBI to EPA through *www.regulations.gov* or e-mail. Instead, send or deliver information identified as CBI only to the following address: Mr. Roberto Morales, OAQPS Document Control Officer (C404–02), U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711, Attention Docket ID No. EPA–HQ–OAR–2006–0859. Clearly mark the part or all of the information that you claim to be CBI. For CBI information on a disk or CD–ROM that you mail to Mr. Morales, mark the outside of the disk or CD–ROM as CBI and then identify electronically within the disk or CD–ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. If you submit a CD–ROM or disc that does not contain CBI, mark the outside of the disk or CD–ROM clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket and EPA's electronic public docket without prior notice.

If you have any questions about CBI or the procedures for claiming CBI, please consult the person identified in the **FOR FURTHER INFORMATION CONTACT** section. Information marked as CBI will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

Worldwide Web (WWW). In addition to being available in the docket, an electronic copy of today's notice is also available on the World Wide Web through the Technology Transfer Network (TTN). Following signature by the EPA Administrator, a copy of today's notice will be posted on the TTN's policy and guidance page for newly proposed or promulgated NESHAP at *http://www.epa.gov/ttn/oarpg.* The TTN provides information and technology exchange in various areas of air pollution control.

As discussed in more detail in section VI of this ANPRM, additional information is available on the Risk and Technology Review Phase II Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* This information includes source category descriptions and detailed emissions and other data that will be used as model inputs.

Outline. The information presented in this preamble is organized as follows:

I. Background
II. What approach is EPA taking for the Risk and Technology Review?
A. What is the approach we are taking to address residual risk for the Group 2 source categories?
B. What data were compiled and reviewed?
C. What are the steps planned before proposing NESHAP to address residual risk?
D. How will we develop proposed NESHAP to address residual risk?
E. When will the NESHAP be proposed and promulgated?
III. What is the purpose of this ANPRM?
IV. What data are in the ANPRM data sets for each source category?
V. What are we specifically seeking comment on?
VI. How may I access the data for a specific source category?
VII. How do I submit suggested data corrections?
VIII. What additional steps are expected after EPA reviews the comments received?

I. Background

Section 112 of the Clean Air Act (CAA) establishes a two-stage regulatory process to address emissions of hazardous air pollutants (HAP) from stationary sources. In the first stage, after EPA has identified categories of sources emitting one or more of the HAP listed in CAA section 112(b), section 112(d) of the CAA calls for promulgation of technology-based emission standards for those sources. For ''major sources'' that emit or have the potential to emit 10 tons per year or more of any single HAP or 25 tons per year or more of any combination of HAP, these technology-based standards must reflect the maximum reductions of HAP achievable (after considering cost, energy requirements, and non-air health and environmental impacts). These technology based standards are commonly referred to as MACT standards. Between 1993 and 2004, EPA published 96 MACT standards (or NESHAP) covering 174 source categories. In this first stage, the focus was on ensuring reductions through available technologies. CAA Section 112(d)(6) requires EPA to review these emission standards and to revise them ''as necessary (taking into account developments in practices, processes, and control technologies)'' no less frequently than every 8 years.

The second stage in standard-setting focuses on reducing any remaining ''residual'' risk according to CAA section 112(f). This provision requires, first, that EPA prepare a Report to Congress discussing (among other things) methods of calculating risk posed (or potentially posed) by sources after implementation of the MACT standards, the public health significance of those risks, the means and costs of controlling them, actual health effects to persons in proximity of emitting sources, and recommendations as to legislation regarding such remaining risk. EPA prepared and submitted this report (Residual Risk Report to Congress, EPA–453/R–99–001) in March 1999. Congress did not act in response to the report, thereby triggering EPA's obligation under CAA section 112(f)(2) to analyze and address residual risk.

Section 112(f)(2) of the CAA then directs EPA to assess the risk remaining (residual risk) after the application of the MACT standards and promulgate more stringent standards for a category or subcategory of sources subject to MACT standards if promulgation of such standards is necessary to protect public health with an ample margin of safety or to prevent (taking into consideration various factors) adverse environmental effects. The standards to be promulgated under this subsection must ''provide an ample margin of safety to protect public health in accordance with this section (as in effect before the date of enactment of the CAA Amendments of 1990), unless the Administrator determines that a more stringent standard is necessary to prevent, taking into consideration costs, energy, safety, and other relevant factors, an adverse environmental impact.'' Section 112(f)(2) of the CAA expressly preserves our use of a two-step process for developing standards to address any residual risk and our interpretation of ''ample margin of safety'' developed in the ''National Emission Standards for Hazardous Air Pollutants: Benzene Emissions from Maleic Anhydride Plants, Ethylbenzene/Styrene Plants, Benzene Storage Vessels, Benzene Equipment Leaks, and Coke By-Product Recovery Plants'' (Benzene NESHAP) (54 FR 38044, September 14, 1989).

To date, EPA has conducted CAA 112(d)(6) technology reviews and promulgated residual risk standards for eight (Halogenated Solvents will be promulgated in April 2007) individual NESHAP and their associated source categories. In an effort to streamline this process for the remaining source categories, EPA plans to address residual risk and perform a technology review for several source categories in one combined effort. While the standard review and development process will be streamlined, each source category will be assessed independently and decisions on the level of any standards will be made individually for each source category. The first set of MACT source categories for which this streamlined process will be undertaken includes the 50 source categories listed in Table 2, all of which have MACT compliance dates of 2002 and earlier. (Except for the Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills source category, which has a compliance date of January 2004, these facilities are believed to be in compliance with MACT as of 2002, so the NEI reflects their post-MACT compliance emissions.) This action is referred to as Phase II of the Risk and Technology Review (RTR) process (where the first eight individual NESHAP comprise Phase I). Other MACT standards will be reviewed in the future. While the initial phases of data compilation and EPA internal review processes have been completed for each of the 50 source categories included in RTR Phase II, the source categories have been divided into smaller groups to ease the burden on public commenters and EPA's review of public comments and the rulemaking processes. Table 2 shows the source categories EPA anticipates including in each group of the RTR Phase II.

TABLE 2.—SOURCE CATEGORIES AND CORRESPONDING NAICS AND MACT CODES INCLUDED IN RISK AND TECHNOLOGY REVIEW PHASE II

RTR Phase II group	Source category name	NAICS codes	MACT code
1	Acetal Resins Production	325211	1301
	Hydrogen Fluoride Production	325120	1409
	Group I Polymers and Resins:		
	Butyl Rubber Production	325212	1307
	Ethylene-Propylene Rubber Production	325212	1313
	Polysulfide Rubber Production	325212	1332
	Neoprene Production	325212	1320
	Group II Polymers and Resins:		

TABLE 2.—SOURCE CATEGORIES AND CORRESPONDING NAICS AND MACT CODES INCLUDED IN RISK AND TECHNOLOGY REVIEW PHASE II—Continued

RTR Phase II group	Source category name	NAICS codes	MACT code
	Epoxy Resins Production	325211	1312
	Non-Nylon Polyamides Production	325211	1322
2	Mineral Wool Production	327993	409
	Aerospace Manufacturing and Rework	336411	701
	Marine Tank Vessel Loading	4883	603
	Natural Gas Transmission & Storage	486210	504
	Oil and Natural Gas Production	211	501
	Petroleum Refineries	32411	503
	Pharmaceuticals Production	3254	1201
	Group I Polymers and Resins:		
	Epichlorohydrin Elastomers Production	325212	1311
	Hypalon(™) Production	325212	1315
	Nitrile Butadiene Rubber Production	325212	1321
	Polybutadiene Rubber Production	325212	1325
	Styrene-Butadiene Rubber and Latex Production	325212	1339
	Group IV Polymers and Resins:		
	Acrylic-Butadiene-Styrene Production	325211	1302
2	Group IV Polymers and Resins:		
	Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene Production	325211	1317
	Methyl Methacrylate-Butadiene-Styrene Production	325211	1318
	Nitrile Resins Production	325211	1342
	Polyethylene Terephthalate Production	325211	1328
	Polystyrene Production	325211	1331
	Styrene-Acrylonitrile Production	325211	1338
	Primary Aluminum Reduction Plants	331312	201
	Printing and Publishing Industry	32311	714
	Shipbuilding and Ship Repair	336611	715
Other	Acrylic/Modacrylic Fibers	325222	1001
	Chromium Electroplating:		
	Chromic Acid Anodizing	332813	1607
	Decorative Chromium Electroplating	332813	1610
	Hard Chromium Electroplating	332813	1615
	Ferroalloys Production	331112	304
	Flexible Polyurethane Foam	326150	1314
Other	Kraft, Sulfite, Semi-chemical, Soda Pulping Processes and Mechanical, Secondary Fiber, and Non-wood Pulping Processes and Papermaking Systems:		
	Pulp and Paper Production	3221	1626–1
	Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills:		
	Pulp and Paper Production	3221	1626–2
	Off-site Waste and Recovery	562	806
	Phosphate Fertilizer Production	325312	1410
	Phosphoric Acid Manufacturing	325312	1411
	Polycarbonates Production	325199	1326
	Polyether Polyols Production	325199	1625
	Portland Cement Manufacturing	3273	410
	Primary Lead Smelting	331419	204
	Publicly Owned Treatment Works	221320	803
	Secondary Aluminum Production	331314	202
	Secondary Lead Smelting	331492	205
	Steel Pickling-HCl Process	331111	310
	Wood Furniture Manufacturing	337122	716
	Wool Fiberglass Manufacturing	327993	412

This ANPRM addresses only the 22 source categories included in Group 2. As initial analyses for each source category included in Group 1 of the RTR Phase II indicate that estimated health risks to the individual most exposed to emissions from a facility in the source category meet levels the Agency considers to be without appreciable health risk and it is improbable that these source categories emit pollutants that would cause adverse environmental effects, we plan to publish a Notice of Proposed Rulemaking (NPRM) in the **Federal Register** for the 8 source categories in Group 1 without previously issuing an ANPRM. The remaining source categories were split into two groups. Group 2 is generally comprised of source categories with earlier deadlines, fewer multipathway concerns, and categories that the Agency believes will require fewer resources to complete. The source categories in the other group generally have later deadlines and more multipathway concerns. Additional notices will be published addressing the other source categories in the future.

II. What approach is EPA taking for the Risk and Technology Review?

A. What is the approach we are taking to address residual risk for the Group 2 source categories?

We plan to follow the same general process in revising NESHAP to address residual risk for each of Group 2 source categories listed in the table above. *This*

general approach includes the following primary steps:

1. Compile and review (and update with facility-specific data collected by EPA in some cases) readily available source category emissions data from the 2002 NEI.

2. For each group of source categories, conduct preliminary evaluations to identify key HAP and data anomalies.

3. Make emissions and other modeling input data, along with a list of the identified key HAP and data anomalies, available for public comment through an ANPRM.

4. Reconcile and update emissions and other modeling input data, based on comments received, and conduct a risk assessment for each category.

5. Develop and propose CAA section 112(f)(2) residual risk and CAA section 112(d)(6) technology review standard(s) as appropriate.

6. Address comments from the proposal(s) and promulgate CAA section 112(f)(2) residual risk and CAA 112(d)(6) technology standard(s), where necessary.

An independent scientific peer consultation is currently underway to review the approach for assessing residual risk for the source categories included in the RTR Phase II. This peer consultation will be conducted by a panel of EPA's Science Advisory Board, and will focus on: (1) The source of emissions and other modeling data and the approach for refining this data, (2) the analytical approach for quantifying and characterizing human and environmental exposures and risks, and (3) the types of results that will be generated and the format for the characterization of assessment results.

The process outlined above for the 22 source categories included in Group 2 of the RTR Phase II is described in more detail in the following discussion.

B. What data were compiled and reviewed?

In the first step of this process, we used the 2002 NEI Final Version 1 (made publicly available on February 26, 2006) as a starting point and compiled emissions information for each source category and performed an internal engineering review of these data (referred to hereafter as ''initial NEI data''). The primary data attributes evaluated in this review included: (1) Facility representation in each source category (i.e., we ensured that source categories accurately included facilities making the products characteristic of the source categories), and (2) appropriateness of facility emissions, in both the inclusion of the appropriate HAP, and in the magnitude of those HAP emissions. In cases where better data were known to exist for a particular source category, that information was integrated into the data set for that source category. These reviewed and integrated data sets for each source category are referred to hereafter as the ''ANPRM data sets.''

C. What are the steps planned before proposing NESHAP to address residual risk?

In this ANPRM, we are seeking public review and comment on the emissions and other model input data included in the ANPRM data sets for the source categories included in Group 2 of the RTR Phase II. These source categories are listed in Table 1. We will evaluate the comments and data corrections received in response to this ANPRM and update the data for the source categories in Group 2, as appropriate. In accordance with the methodologies described in the Residual Risk Report to Congress, we will then use the revised model input data sets for these source categories (referred to as the notice of proposed rulemaking, or NPRM, data sets) in an analysis of the inhalation risks. The Human Exposure Model (Community and Sector HEM–3 version 1.1.0) will be used to perform this modeling. The HEM–3 model performs three main operations: dispersion modeling, estimation of population exposure, and estimation of human health risks. The dispersion model used by HEM–3 is AERMOD, which is one of EPA's preferred models for assessing pollutant concentrations from industrial facilities.[1] We will also perform a screening assessment of potential adverse environmental effects using these updated data.

We will also evaluate the NPRM data sets for each of the 22 source categories for potential non-inhalation human health risks, specifically through the presence of emissions of any persistent and bioaccumulative (PB) HAP, all of which are listed in Table 3 below.[2] For source categories that also carry a potential for non-inhalation human health risks, in addition to analyses to estimate risks from inhalation of emissions, we will also estimate risks using refined models capable of addressing multi-pathway exposures (i.e., exposures due to ingestion or dermal exposures). The models selected for this exercise (primarily, we will use the EPA's Total Risk Integrated Modeling system, or TRIM, a refined multi-pathway pollutant fate and transport model) will also be used to produce estimates of pollutant concentrations in the surrounding environment, which will be used in the quantitative assessment of environmental risks from these chemicals. The 22 source categories are not expected to have multi-pathway issues.

TABLE 3.—PERSISTENT AND BIOACCUMULATIVE HAZARDOUS AIR POLLUTANTS (PB HAP)

Cadmium compounds	Chlordane	Chlorinated dibenzodioxins and furans
DDE	Heptachlor	Hexachlorocyclohexane (all isomers)
Hexachlorobenzene	Lead compounds	Mercury compounds
Methoxychlor	Polychlorinated biphenyls.	Polycyclic Organic Matter (POM)
Toxaphene	Trifluralin	

D. How will we develop proposed NESHAP to address residual risk?

We will provide a more detailed discussion of the residual risk methodology in the Group 2 NPRM. Therefore, after the risk assessments for Group 2 are complete, the results will be examined to determine whether any source category meets certain criteria where the Agency considers the risk to not be a problem (''low risk''). The ''low risk'' criteria we intend to consider include: Lifetime cancer risk to the individual most exposed is less than 1-in-1 million, chronic non-cancer risk to

[1] Environmental Protection Agency. Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions (70 FR 68218, November 9, 2005).

[2] Environmental Protection Agency. Air Toxics Risk Assessment Reference Library, Volume I. EPA–453K–04–001A. *http://www.epa.gov/ttn/fera/risk_atra_vol1.html.*

the individual most exposed is less than a target-organ-specific hazard index of 1, air concentrations estimated for acute exposures scenarios are less than health-protective reference levels, and there is no potential for significant and widespread adverse environmental effect.

For Group 2 source categories in which all facilities meet these ''low risk'' criteria, EPA will not propose further regulation under CAA section 112(f). For source categories that are not determined to be low risk, a two-step standard development process will be applied, consistent with CAA section 112(f) and with our previously articulated approach for developing NESHAP pursuant to CAA section 112(f). This approach was described in the final NESHAP addressing residual risk for coke ovens (58 FR 57898, October 27, 1993).

In the first step of this approach, modeled source category risks will be evaluated to determine if they are ''acceptable.'' The term ''acceptable,'' in reference to residual risks is not specifically defined in the CAA, but CAA section 112(f)(2) refers positively to the interpretation of this term in the Benzene NESHAP (54 FR 38044, September 14, 1989).

The preamble to the Benzene NESHAP (54 FR 38044, September 14, 1989) stated that a lifetime maximum individual excess cancer risk of approximately 100-in-1 million ''should ordinarily be the upper-end of the range of acceptability.'' However, this is not a rigid line of acceptability, and other factors will be considered, such as the number of people exposed at various risk levels, the overall incidence of cancer and other serious health effects, assumptions and uncertainties associated with the risk analysis (including the 70 year exposure assumption), and the weight of evidence for human health effects.

In the second step of this standard development process, we will develop risk-reduction regulatory alternatives and decide upon the level of the standard for each source category, considering the requirements necessary to provide an ample margin of safety to protect human health, as required by CAA section 112(f)(2). To develop the regulatory alternatives, we will conduct various analyses, including an assessment of the impacts of each regulatory alternative. The impacts will include HAP emission reductions, other environmental impacts, costs, economics, small business impacts, reduction in maximum risks to individuals most exposed, reductions in chronic and acute risks to populations at various risk levels, and reductions in cancer incidence. We will assess these alternatives, decide upon the level of the standard, and publish a NPRM in the **Federal Register** to propose any regulatory changes for the individual standards codified in 40 CFR part 63 for each source category.

As we undertake these rulemaking proposals, we will also consider developments in pollution control in each source category and the costs of potentially stricter standards reflecting those developments, to fulfill the requirements of CAA section 112(d)(6). Where there have been developments in practices, processes, and control technologies, we will consider relevant factors, such as costs, potential emissions reductions, and health and environmental risk in a determination of what, if any, further controls are necessary. Where appropriate, we will develop regulatory alternatives, assess the impacts of those alternatives, and decide upon the level of the standard(s). We plan to propose any CAA section 112(d)(6) regulatory changes for the individual standards codified in 40 CFR part 63 for each source category in the same **Federal Register** notice proposing action addressing residual risk.

E. When will the NESHAP be proposed and promulgated?

Our current goal is to propose the decisions resulting from both CAA section 112(f) (residual risk) and CAA section 112(d)(6) (technology review) efforts, including the proposal of any standards for each of the 21 source categories in Group 2, in the Fall of 2007. Proposal of any standards for the petroleum refineries source category will occur by the court-ordered deadline of August 22, 2007. In addition to proposing any new residual risk or technology-based standards, we will announce any decisions not to promulgate residual risk standards for ''low risk'' source categories or source categories for which the current standards protect public health with an ample margin of safety and any decisions not to promulgate additional technology-based standards.

After the close of the comment period on the proposed standard(s), we will review and perform any analyses and data gathering necessary to address the comments, prepare responses, and make changes to the proposed standards, as necessary. We anticipate the final standards will be published in the **Federal Register** in the summer of 2008.

III. What is the purpose of this ANPRM?

The primary purpose of today's ANPRM is to request public comments on the emissions and other model input data included in the ANPRM data sets for the 22 source categories included in Group 2 of the RTR Phase II. These data are provided in an updatable form on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* We provide detail in section VII below on how to submit updates and corrections to this information. Following review of comments received, we will update the data as appropriate, and model to generate estimates of residual risk that we will use as the basis for our proposed decisions on whether to develop standards to address residual risk for each source category.

Section V lists the general items for which we are seeking comment for all source categories. In addition, we note information unique to each source category for which we are requesting technical corrections or updates in the source category specific sections within section IV of this ANPRM. We note that emissions data cannot be withheld from disclosure as CBI pursuant to section 1905 of title 18 of the United States Code. EPA's policy regarding the categories of information that it considers to be ''emissions data'' is set forth in a **Federal Register** notice dated February 14, 1991 (56 FR 7042). A copy of that notice has been placed in the docket.

IV. What data are in the ANPRM data sets for each source category?

As mentioned in Section II of this ANPRM, the 2002 NEI is the primary data source used in creating the ANPRM data sets for each source category. The data extracted from the NEI for inclusion in the ANPRM data sets included general facility information, such as company name, plant name, and facility identification codes; emissions data, including speciated HAP emissions data; emissions release characteristics, including stack height, stack diameter, and the emissions stream exit temperature and velocity; and location information, including the latitude/longitude coordinates of emissions release locations. For more information on the 2002 NEI, please visit our 2002 NEI Web page at *http://www.epa.gov/ttn/chief/net/2002inventory.html.*

For the most part, the emissions values in the ANPRM data set represent actual emission levels. Where actual emissions data is not already included,

we request that commenters provide such data.

Due to the high uncertainty of the dioxin/furan emissions information submitted during the inventory development process, dioxin/furan emissions were not included in the 2002 NEI, and no emissions of these compounds are included in the ANPRM data sets. As we update the ANPRM data set, we will include dioxin/furan emissions, based on the best information available to EPA at that time. These data may include information EPA has gathered on dioxin and dioxin-like compounds. The EPA National Center for Environmental Assessment Web site, *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=159286*, contains links to these data.

In creating the ANPRM data sets for each source category, we started with the February 2006 version of the 2002 NEI. We first conducted a detailed review of the facilities that were included in the NEI and added or removed facilities to make the data as representative of the overall source category as possible. We then reviewed emissions, release characteristics, and other model input data.

We began by retrieving all records in the 2002 NEI based solely on MACT source category designations, which are fields in the NEI that identify the MACT source category that applies to each emission point. This MACT source category is assigned by a variety of methods. In some cases, the State or local agency that provided the data to EPA identified the MACT category. Since State and local agencies are aware of the regulations that apply to facilities, we have high confidence in MACT category designations provided by a State or local agency. In other cases, EPA staff responsible for developing the MACT standards provided input to populate the MACT source category code fields. As these individuals have knowledge of the source category for which they are accessing and using the NEI data, the confidence in these designations is also high. Most of the MACT source category code designations, however, are assigned based on Standard Industrial Classification (SIC), NAICS, or Source Classification Code (SCC) defaults. There is often considerable uncertainty associated with these designations.

One of the first things we reviewed in the NEI data was the list of facilities included for each source category. For some source categories, we are reasonably confident that we know the names of the facilities and their exact locations. In these cases, we compared the ''known'' lists of facilities to the facilities in the NEI. We removed the MACT source category designation for facilities not on the known list. If facilities on the known lists were not in the data for the source categories, we searched the NEI for these facilities. Quite often, they were in the 2002 NEI, but had different, and presumably incorrect, MACT source category designations. These facilities were added to the data set for the category and the MACT source category codes were re-designated accordingly.

For large facilities with multiple processes that represent multiple MACT source categories, it was not always straightforward to separate the processes by source category. In these cases, we used a variety of approaches to separate the processes and emission points into source categories. Examples of the criteria used to separate processes and emissions into source categories include SCC, SIC codes, and pollutants emitted. Situations where such source category separation decisions were made are highlighted in the source-category discussions later in this section and detailed in the files available for download on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* We are asking specifically for comment on how we separated processes and emission points by source category at these large integrated facilities.

For categories with large numbers of facilities for which we do not have complete lists of known facilities, we conducted more general evaluations of the facilities in the data sets. These evaluations included examining the company names, SIC, NAICS, and SCC, and adding or removing facilities based on these criteria.

We will be evaluating residual risk for all facilities and emission sources that are in the 22 source categories included in Group 2 of the RTR Phase II. In some instances, the ANPRM data sets may include emission points that are part of the source category but are not subject to the MACT standard for that source category. Emissions from these sources will be considered in our future regulatory decisions. In addition, the ANPRM data sets, for most source categories, include all major and area sources (facilities) in the 2002 NEI that have processes related to the specific source category.

After finalizing the facility lists for each source category, we conducted a general review of the emissions and other data included in the ANPRM data sets to identify data anomalies that could affect the risk estimates. With a few exceptions, we did not change the data or include additional data. For the following source categories, the 2002 NEI was supplemented with additional data provided by industry to create the ANPRM data sets:

- Petroleum Refineries
- Shipbuilding and Ship Repair
- Source categories regulated by the Group I Polymers and Resins MACT:
  - Epichlorohydrin Elastomers Production
  - Hypalon™ Production
  - Nitrile Butadiene Rubber Production
  - Polybutadiene Rubber Production
  - Styrene-Butadiene Rubber and Latex Production

The addition of these data, as well as other data changes made, are described in the source-category specific sections below. We note that because these changes are included in the ANPRM data sets, these data sets do not exactly match the February 2006 version of the 2002 NEI data available on our NEI Web site—*http://www.epa.gov/ttn/chief/net/2002inventory.html.* When comments are received via this ANPRM and incorporated into the source category-specific ANPRM data sets, these revisions will then also be incorporated into the 2002 NEI and made publicly available through the NEI Web site in Final Version 2.1.

Following are sections discussing the data for individual source categories. These discussions provide an overview of the source category, a brief summary of the ANPRM data sets, and a mention of the types of major anomalies associated with the data. Summary reports for each of the source categories, which contain considerable detail on the information summarized below, including the carcinogenic HAP and HAP with adverse health effects other than cancer, are available on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* We especially encourage you to review the specific anomalies raised in these reports and to provide data to help reduce these anomalies.

1. Mineral Wool Production

The mineral wool production source category includes facilities that produce mineral wool, which is a fibrous, glassy substance made from natural rock (such as basalt), blast furnace slag, or other similar materials and consisting of silicate fibers. In the mineral wool manufacturing process, rock and/or blast furnace slag and other raw materials (e.g., gravel) are melted in a furnace (cupola) using coke as fuel. The molten material is then formed into fiber. Mineral wool is manufactured as either a ''bonded'' product that

incorporates a binder to increase structural rigidity or a less rigid ''nonbonded'' product. Emission sources from mineral wool manufacturing facilities include the cupola furnace where the mineral charge is melted; a blow chamber, in which air or a binder is drawn over the fibers, forming them into a screen; a curing oven that bonds the fibers (for bonded products); and a cooling oven. The primary HAP expected to be emitted during the mineral wool manufacturing process are metals, including antimony, arsenic, beryllium, cadmium, chromium, manganese, nickel, lead, and selenium that are emitted from the cupola, and gaseous HAP, including formaldehyde, carbonyl sulfide, and phenol, that result from the vaporization of the binder.

The ANPRM data set for this source category includes information for 12 facilities, 11 of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the mineral wool source category, this data set represents between 75 and 90 percent of the industry. The HAP emitted in largest quantities from these facilities is carbonyl sulfide, which accounts for over 84 percent of the total HAP emissions by mass from the data set. Formaldehyde, triethylamine, and phenol are also emitted in large quantities. Several PB HAP are reported in the data set for the mineral wool manufacturing source category, including lead, cadmium, and mercury compounds.

The major anomalies associated with the data set for this source category include the HAP emitted and the speciation of chromium and mercury emissions. Some HAP expected (e.g., lead, manganese, cadmium, chromium, nickel, etc.) are not included for all the facilities in the data set, and some that are not expected (e.g., benzene and triethylamine) are reported from a few facilities.

2. Aerospace Manufacturing and Rework Facilities

The aerospace manufacturing and rework source category includes all facilities that manufacture aerospace vehicles and/or vehicle components and all facilities that rework or repair these items. An aerospace vehicle or component is any fabricated, processed, or assembled set of parts or complete unit of any aircraft including, but not limited to, airplanes, helicopters, missiles, rockets, and space vehicles. Organic and inorganic HAP emissions in aerospace facilities originate from cleaning, primer application, topcoat application, paint stripping, chemical milling maskant application, and waste handling and storage. The HAP expected to be emitted by aerospace facilities include chromium, cadmium, methylene chloride, toluene, xylene, ethylene glycol, and glycol ethers. For emissions reported generically as ''chromium'' or ''chromium and compounds,'' emissions are speciated for this source category as 75 percent ''chromium (III) compounds'' and 25 percent ''chromium (VI) compounds.'' This speciation is based on source category-specific information provided by the aerospace industry. (Typically, a 66 percent ''chromium (III) compounds'' and 34 percent ''chromium (VI) compounds'' is used as a default speciation profile based on the approach adopted by the 1996 National-Scale Air Toxics Assessment, or NATA.) We encourage commenters to review this assumption and provide site-specific chromium (VI) and chromium (III) data where possible.

The ANPRM data set for the Aerospace Manufacturing and Rework source category includes information for 301 facilities, 169 of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the aerospace source category, the ANPRM data set includes data for about 10 percent of the industry. Methyl chloroform, tetrachloroethylene, toluene, trichloroethylene, and methylene chloride account for approximately 80 percent of the mass of HAP emitted across the 301 facilities in the ANPRM dataset.

The major anomalies associated with the data set for this source category include the number of facilities in the source category, the HAP emitted, and the speciation of chromium. Some HAP expected to be reported (chromium, nickel, and hexamethylene diisocyanate) are not included for all the facilities in the data set.

3. Marine Tank Vessel Loading Operations

Marine tank vessel loading operations are facilities that load and unload liquid commodities in bulk, such as crude oil, gasoline and other fuels, and some chemicals and solvent mixtures. The cargo is pumped from the terminal's large, above-ground storage tanks through a network of pipes and into a storage compartment (tank) on the vessel. Most marine tank vessel loading operations are associated with petroleum refineries, synthetic organic chemical manufacturers, or are independent terminals. The major HAP emission points for marine vessel loading operations include open tank hatches and overhead vent systems. Other possible emission points are hatch covers or domes, pressure-vacuum relief valves, seals, and vents. Emissions may also occur during ballasting (i.e., the process of drawing ballast as water into a cargo hold). The primary HAP expected to be emitted from marine vessel loading operations depend on the material being loaded, but are generally expected to be benzene, hexane, toluene, xylene compounds, ethyl benzene, and cumene.

The ANPRM data set for the marine tank vessel loading operations source category includes information for 126 facilities, all of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in this source category, the ANPRM data set includes data for more than were expected to be subject to the MACT (which was estimated to be 40 at time of the MACT promulgation) and less than the estimated number of existing facilities based on Army Corps of Engineers estimates (700). In the ANPRM data set, the HAP emitted in largest quantities from these 126 sources are hexane, methanol, toluene, xylene compounds, and benzene, which collectively accounts for nearly 75 percent of the total HAP emitted.

The major anomalies associated with the data set for this source category include the number of facilities in the source category and the emission release parameters (of which nearly all are NEI default values).

4. Natural Gas Transmission and Storage

The natural gas transmission and storage source category comprises the pipelines, facilities, and equipment used to transport and store natural gas products (hydrocarbon liquids and gases). Pipeline transport of natural gas products is covered by this category to either the point of custody transfer for the oil and natural gas production source category or the point of delivery to the local distribution company or final end user of the natural gas if no local distribution company is present. Emissions of HAP from the natural gas transmission and storage category come from glycol dehydration unit reboiler vents, other process vents, storage vessels with flash emissions, pipeline pigging and storage of pipeline pigging wastes, combustion sources, and equipment leaks. The major HAP expected to be emitted by the natural gas transmission and storage source category are hexane, toluene, benzene, mixed xylenes, formaldehyde, and glycol ethers.

Our previous estimates identified seven natural gas transmission and storage facilities that were major sources. The ANPRM data set for the natural gas transmission and storage source category includes information for 123 facilities, 78 of which are classified as major sources in the NEI. In the ANPRM data set, the HAP emitted in largest quantities from natural gas transmission and storage facilities are hexane, toluene, benzene, and mixed xylenes and these emissions collectively account for over 75 percent of the total HAP emissions from this source category.

One major anomaly associated with the data set for this source category is the number of facilities identified in the ANPRM data set compared to the number of facilities previously identified for this source category (i.e., there appear to be more facilities identified as natural gas transmission and storage facilities in the ANPRM data set than previously identified).

5. Oil and Natural Gas Production

The Oil and Natural Gas Production source category includes facilities involved in the recovery and treatment of hydrocarbon liquids and gases from oil and natural gas production wells. Components of these facilities include glycol dehydration units, condensate tank batteries, and other tanks and equipment present at natural gas processing plants. The primary HAP emissions from oil and natural gas production facilities occur via the glycol dehydration reboiler vents, other process vents, storage vessels, and equipment leaks. The major HAP expected to be emitted by the oil and natural gas production source category are xylenes, toluene, hexane, and ethyl benzene.

The ANPRM data set for the oil and natural gas production source category includes information for 2,824 facilities, of which 909 facilities are classified as major sources in the NEI. Our previous estimates identified 440 major sources and 2,200 area sources. In the ANPRM data set, the HAP emitted in the greatest amounts are carbonyl sulfide, hexane, toluene, benzene, and xylenes formaldehyde, ethyl benzene, ethylene glycol, and methanol. These HAP collectively account for over 99 percent of the total HAP emissions for this source category. There are twelve PB HAP reported in the data set for the Oil and Natural Gas Production source category, including polycyclic aromatic hydrocarbons (PAH), lead, dibenzofuran, and cadmium.

For reported emissions of POM chemicals, emissions are grouped into one of seven POM categories—POM 71002 (16–PAH, PAH total, POM); POM 72002 (2–Chloronaphthalene, 2–Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Benzo(c)phenanthrene, Benzo[e]Pyrene, Benzo[g,h,i,]Perylene, Fluoranthene, Fluorene, Perylene, Phenanthrene, Pyrene); POM 73002 (7,12–Dimethylbenz[a]Anthracene); POM 74002 (3–Methylcholanthrene); POM 75002 (5–Methylchrysene, Benzo[a]Pyrene, Dibenzo[a,h]Anthracene); POM 76002 (B[j]Fluoranthen, Benz[a]Anthracene, Benzo[b]Fluoranthene, Benzo[k]Fluoranthene, Indeno[1,2,3-c,d]Pyrene); and POM 77002 (Chrysene). We encourage commenters to provide data on the individual chemical(s) that make up the POM.

The major anomalies associated with the data set for this source category include the number of facilities in the source category, the specific HAP emitted by individual facilities, and default plant coordinates. The ANPRM data set contains over 2,800 facilities and this number is more than expected. The ANPRM data set also contains emissions of some HAP that are expected to be emitted from all facilities in the category (e.g., xylenes, hexane, toluene, and ethyl benzene), but are only emitted from a small percentage of facilities. Conversely, the HAP with the largest quantity of emissions in the ANPRM data set, carbonyl sulfide, is not expected to be emitted from facilities in this source category. In addition, a significant percentage (40 percent) of the coordinates in the ANPRM data set are default coordinates.

6. Petroleum Refineries

Petroleum refineries are facilities engaged in refining and producing products made from crude oil or unfinished petroleum derivatives. EPA listed two separate Petroleum Refinery source categories, both of which include any facility engaged in producing gasoline, naphtha, kerosene, jet fuels, distillate fuel oils, residual fuel oils, lubricants, or other products from crude oil or unfinished petroleum derivatives. The Petroleum Refineries—Catalytic Cracking (Fluid and Other) Units, Catalytic Reforming Units, and Sulfur Plant Units source category includes the following process units: catalytic cracking (fluid and other) units, catalytic reforming units, and sulfur plant units (MACT II). The second source category, Petroleum Refineries—Other Sources Not Distinctly Listed, includes the process units not listed in the first category including, but not limited to, thermal cracking, vacuum distillation, crude distillation, hydrotreating, hydrorefining, isomerization, polymerization, lube oil processing, and hydrogen production (MACT I).

Because the MACT standard for the ''Other Sources Not Distinctly Listed'' source category (40 CFR part 63, subpart UU) was promulgated first (60 FR 43244, August 18, 1995), it is commonly referred to as Petroleum Refineries MACT I. Only the units in the ''Other Sources Not Distinctly Listed'' category, and regulated by the MACT 1 standards, are being addressed in RTR Phase II. These units include emissions sources classified under SIC 2911 located at petroleum refineries, including: petroleum refinery process units, storage vessels, transfer racks, wastewater streams, and equipment leaks. The units and emissions associated with catalytic cracking, catalytic reforming, and sulfur plants, which are all regulated by MACT 2 standards, will be investigated in future RTR efforts.

The specific HAP emitted by petroleum refineries varies by facility and process operations but can include a variety of organic and inorganic compounds and metals. Emissions originate from various process vents, storage vessels, wastewater streams, loading racks, marine tank vessel loading operations, and equipment leaks associated with refining facilities. Process vents, wastewater streams, and storage vessels generally emit organic HAP. The primary HAP expected to be emitted from the MACT 1 petroleum refining sources include benzene, toluene, and ethyl benzene, but can also include acetaldehyde, formaldehyde, hexane, phenol, xylene, carbonyl sulfide, carbon disulfide, hydrogen chloride, chlorine and other HAP.

The ANPRM dataset for this source category contains 175 refineries, of which 124 are classified as major sources. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date benzene emissions data for 23 refineries. The industry and EPA consider these data to be the most accurate benzene emissions data available for petroleum refineries. For these 23 refineries, EPA replaced all benzene emissions data in the NEI with these updated industry data. The emissions of other HAP that were in the NEI for these 23 refineries were not removed. For the purpose of these analyses, the ANPRM data set for these 23 facilities was kept separate from the ANPRM data set for the remaining 152 refineries.

Organic chemicals account for the majority of the total mass of HAP emitted by petroleum refinery sources, with toluene, hexane, mixed and individual isomers of xylenes, benzene, methanol, methyl tert-butyl ether, and ethyl benzene accounting for about 90 percent of the HAP mass emitted across the both data sets. Of the 152 refineries for which industry did not supply benzene emissions data, benzene emissions were reported for 137 refineries. A range of PB HAP emissions are reported in the ANPRM datasets, including various PAH and several metals (including lead and lead compounds, cadmium and cadmium compounds, mercury and mercury compounds).

For reported emissions of POM chemicals, emissions are grouped into one of seven POM categories. We encourage commenters to provide the individual chemical(s) that make up the POM.

The major anomalies associated with the data sets for this source category include specific HAP emitted by individual facilities, along with release characteristics and coordinates for those refineries for which industry did not provide updated data. The data sets contain emissions of several metal HAP, which are expected to be more likely to be emitted from MACT 2 sources, not MACT 1. Also, it appears that the benzene emissions for the 23 facilities for which the industry supplied new data are significantly higher than the benzene emissions in the NEI for the other refineries.

Nearly all of the emissions release parameters (71 percent of stack height, 96 percent of stack diameter, 97 percent of emissions exit temperature, and 97 percent of emissions exit velocity values) for the refineries for which no new data were provided are default values in the NEI and the ANPRM data set. Finally, a significant percentage (40 percent) of the coordinates in the data set for which new data were not provided are defaulted, some based on county or zip code centroids.

7. Pharmaceutical Manufacturing

The pharmaceutical manufacturing process consists of chemical production operations that produce drugs and medication. These operations include chemical synthesis (deriving a drug's active ingredient) and chemical formulation (producing a drug in its final form). During pharmaceutical manufacturing operations, HAP emissions can occur from breathing and withdrawal losses from chemical storage tanks, venting of process vessels, leaks from piping and equipment used to transfer HAP compounds (equipment leaks), and volatilization of HAP from wastewater streams. While a wide variety of HAP can be emitted from pharmaceutical manufacturing processes, expected HAP include methylene chloride, methanol, N,N-dimethylformamide, toluene and hydrochloric acid. When the NESHAP for this category was finalized in 1998, EPA estimated that there were approximately 101 pharmaceutical manufacturing operations subject to the MACT regulations.

The ANPRM data set for pharmaceutical manufacturing includes 222 facilities, 107 of which are classified as major sources in the NEI. The HAP emitted in largest quantities from these sources are methanol, methylene chloride, and toluene. Emissions of these three HAP account for over 80 percent of the mass of all HAP emitted across all 222 facilities. PB HAP emissions in the ANPRM data set for the Pharmaceutical Manufacturing source category include lead, mercury, and cadmium compounds as well as a range of PAH.

For reported emissions of POM chemicals, emissions are grouped into of one of seven POM categories. We encourage commenters to provide the individual chemical(s) that make up the POM.

For emissions reported generically as ''chromium'' or ''chromium and compounds,'' emissions are speciated for this source category as 66 percent ''chromium (III) compounds'' and 34 percent ''chromium (VI) compounds.'' We encourage commenters to review this assumption and provide specific chromium (VI) and chromium (III) data where possible.

The major anomalies associated with the data set for this source category are related to the HAP emitted. While methylene chloride, NN-dimethylformamide, toluene, and hydrochloric acid are expected to be emitted by facilities in this source category, these emissions were not reported for many of the facilities. Also, HAP not expected to be emitted from this source category (e.g., ethylene oxide, p-dioxane, naphthalene, ethylene dichloride, arsenic, hydrazine, POM, and chromium (IV) compounds) are reported for eight or fewer facilities.

8. Epichlorohydrin Elastomers Production

Epichlorohydrin elastomers are widely used in the automotive industry. The main epichlorohydrin elastomers are polyepichlorohydrin, epi-ethylene oxide (EO) copolymer, epi-allyl glycidyl ether (AGE) copolymer, and epi-EO–AGE terpolymer. Sources of HAP emissions for the Epichlorohydrin Elastomer source category include raw material storage vessels, front-end process vents, back-end process operations, wastewater operations, and equipment leaks. The majority of the emissions come from equipment leaks. The process ''front-end'' includes pre-polymerization, reaction, stripping, and material recovery operations; and the process ''back-end'' includes all operations after stripping (predominately drying and finishing). The primary HAP emitted during production are epichlorohydrin and toluene.

The ANPRM data set for the Epichlorohydrin source category includes information for one facility, which is classified as a major source in the NEI. Our previous estimate of the number of facilities in the Epichlorohydrin source category was also one, therefore we believe the ANPRM data set includes data for the entire industry. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date emissions and emissions release characteristic data for this facility. The industry and EPA consider these data to be the most accurate emissions and emissions release characteristic data available for the epichlorohydrin elastomers production processes at this facility. EPA replaced all epichlorohydrin elastomers production emissions and emissions release characteristic data in the NEI with the updated industry data for this facility. In the ANPRM data set, toluene is emitted in the greatest quantity and accounts for about 99 percent of the total emissions.

9. Hypalon™ Production

Hypalon™, or chlorosulfonated polyethylene, is a synthetic rubber produced by reacting polyethylene with chloric and sulfur dioxide, transforming the thermoplastic polyethylene into a vulcanized elastomer. The reaction is conducted in a solvent reaction medium containing carbon tetrachloride. Sources of HAP emissions include raw material storage vessels, front-end process vents, back-end process operations, and equipment leaks. The majority of the emissions come from front-end process vents. The process ''front-end'' includes pre-polymerization, reaction, stripping, and material recovery operations; and the process ''back-end'' includes all operations after stripping (predominately drying and finishing). The primary HAP emitted during production are carbon tetrachloride and chloroform.

The ANPRM data set for the Hypalon™ resins source category includes information for one facility, which is classified as a major source in the NEI. Our previous estimate of the number of facilities in the Hypalon™ source category was also one, therefore we believe the ANPRM data set includes data for the entire industry. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date emissions and emissions release characteristic data for this facility. The industry and EPA consider these data to be the most accurate emissions and emissions release characteristic data available for the Hypalon™ production processes at this facility. EPA replaced all Hypalon™ production emissions and emissions release characteristic data in the NEI with the updated industry data for this facility.

In the ANPRM data set, carbon tetrachloride and chloroform are emitted in the greatest amounts and account for nearly all of the emissions.

10. Nitrile Butadiene Rubber Production

Nitrile butadiene rubber is a copolymer of 1,3-butadiene and acrylonitrile, and the Nitrile Butadiene Rubber Production source category includes any facility that polymerizes 1,3-butadiene and acrylonitrile. Depending on its specific composition, nitrile butadiene rubber can be resistant to oil and chemicals, a property that facilitates its use in disposable gloves, hoses, seals, and a variety of automotive applications. The drying and finishing steps that make up the back-end processes are significant sources of HAP emissions. Other sources of HAP emissions include raw material storage vessels, front-end process vents, wastewater operations, and equipment leaks. The primary HAP emitted during production are acrylonitrile, 1,3-butadiene, and styrene.

The ANPRM data set for the Nitrile Butadiene Rubber Production source category includes five facilities, two of which are classified as major sources. Based on our previous estimates of the number of facilities in the source category, the ANPRM data set includes data for the entire industry. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date emissions and emissions release characteristic data for three of these five facilities. The industry and EPA consider these data to be the most accurate emissions and emissions release characteristic data available for the nitrile butadiene rubber production processes at these facilities. For these three facilities, EPA replaced all nitrile butadiene rubber production emissions and emissions release characteristic data in the NEI with these updated industry data.

In the ANPRM data set, styrene, 1,3-butadiene, and acrylonitrile are emitted in the largest quantities, accounting for 42 percent, 21 percent, and 33 percent of the total source category emissions, respectively.

A major anomaly associated with the data set for this source category is that one HAP expected to be reported by each facility (1,3-butadiene) is not included in the data for all the facilities.

11. Polybutadiene Rubber Production

Polybutadiene rubber is a homopolymer of 1,3-butadiene, and the Polybutadiene Rubber Production source category includes any facility that polymerizes 1,3-butadiene. Most of the polybutadiene rubber manufactured in the United States is used in the production of tires in the construction of the tread and sidewalls. Sources of HAP emissions include raw material storage vessels, front-end process vents, back-end process operations, wastewater operations, and equipment leaks. The majority of the emissions come from back-end process operations, which are predominately drying and finishing. The primary HAP emitted during production include hexane, 1,3-butadiene, styrene, and toluene.

The ANPRM data set for the Polybutadiene Rubber Production source category includes information for five facilities, each of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Polybutadiene Rubber Production source category, the ANPRM data set includes data for the entire industry. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date emissions and emissions release characteristic data for each of these five facilities. The industry and EPA consider these data to be the most accurate emissions and emissions release characteristic data available for the polybutadiene rubber production processes at these facilities. For these five facilities, EPA replaced all polybutadiene rubber production emissions and emissions release characteristic data in the NEI with these updated industry data.

In the ANPRM data set, hexane and toluene are emitted in the greatest amounts and account for about 74 and 19 percent of the total emissions, respectively.

12. Styrene-Butadiene Rubber and Latex Production

The Styrene-Butadiene Rubber and Latex Production source category includes any facility that manufactures copolymers consisting of styrene and butadiene monomer units. This source category is divided into three subcategories due to technical process and HAP emission differences: (1) The production of styrene-butadiene rubber by emulsion, (2) the production of styrene-butadiene rubber by solution, and (3) the production of latex. Styrene-butadiene rubber is coagulated and dried, while latex is not. For both styrene-butadiene rubber processes, the monomers used are styrene and butadiene; either process can be conducted as a batch or a continuous process. Sources of HAP emissions for the emulsion subcategory include raw material storage vessels, front-end process vents, back-end process operations, wastewater operations, and equipment leaks. Most of the emissions come from back-end process operations, which are predominately drying and finishing. The primary HAP emitted by emulsion styrene-butadiene rubber production are styrene and 1–3,butadiene. Sources of HAP emissions for the solution subcategory include raw material storage vessels, front-end process vents, back-end process operations, wastewater operations, and equipment leaks. Most of the emissions come from back-end process operations. The primary HAP emitted by production of solution styrene butadiene rubber are hexane, butadiene, styrene, and toluene. Sources of HAP emissions from the latex production subcategory include raw material storage vessels, front-end process vents, wastewater operations, and equipment leaks. The primary HAP emitted are styrene and butadiene.

The ANPRM data set for the Styrene-Butadiene Rubber and Latex Production source category includes information for 15 facilities, seven of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Styrene-Butadiene Rubber and Latex Production source category, the ANPRM data set includes data for the entire industry. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date emissions and emissions release characteristic data for eight of these 15 facilities. The industry and EPA consider these data to be the most accurate emissions and emissions release characteristic data available for the styrene butadiene rubber and latex

production processes at these facilities. For these eight facilities, EPA replaced all styrene butadiene rubber and latex production emissions and emissions release characteristic data in the NEI with these updated industry data.

In the ANPRM data set, styrene and 1,3-butadiene are emitted in the greatest amounts and account for about 88 and 8 percent of the total emissions, respectively.

13. Acrylonitrile-Butadiene-Styrene Production

Acrylonitrile-butadiene-styrene resins consist of a terpolymer of acrylonitrile, butadiene, and styrene and can be synthesized by emulsion, suspension, and continuous mass polymerization. The majority of acrylonitrile-butadiene-styrene resin production is by batch emulsion. The primary HAP emissions during the acrylonitrile-butadiene-styrene production process occur via equipment leaks and process vents. Other emission points include storage vessels, wastewater operations, and heat exchange systems. Typical products made from acrylonitrile-butadiene-styrene resins are piping, refrigerator door liners and food compartments, automotive components, telephones, luggage and cases, toys, mobile homes, and margarine tubs. The major HAP expected to be emitted by the Acrylonitrile-Butadiene-Styrene Production source category are acrylonitrile, butadiene, and styrene.

The ANPRM data set for the Acrylonitrile-Butadiene-Styrene Production source category includes information for seven facilities, six of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Acrylonitrile-Butadiene-Styrene Production source category, the ANPRM data set includes data for about half of the industry. In the ANPRM data set, styrene and acrylonitrile are emitted in the greatest amounts and account for about 65 percent of the total emissions.

The major anomalies associated with the data set for this source category include the number of facilities in the source category (i.e., only about half of the facilities in the category appear to be included in the inventory) and the specific HAP emitted by individual facilities. Some HAP expected to be reported (styrene and 1,3-butadiene) are not included for all the plants in the data set and other unexpected HAP (e.g., ethylene dichloride and ethylene oxide) are reported to be emitted by at least one facility.

14. Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene Resin Production

Methyl methacrylate-acrylonitrile-butadiene-styrene is an acrylic graft copolymer. Chemically, graft copolymers are prepared by attaching a polymer as a branch to the chain of another polymer of a different composition. Typical products made from methyl methacrylate-acrylonitrile-butadiene-styrene resins are piping, refrigerator door liners and food compartments, automotive components, telephones, luggage and cases, toys, mobile homes, and margarine tubs. Major HAP expected to be emitted by the Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene source category are acrylonitrile, butadiene, and styrene.

The ANPRM data set for the Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene source category includes information for one facility, which is classified as a major source in the NEI. Based on our previous estimates of the number of facilities in the Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene source category, the ANPRM data set includes data for the whole industry. In the ANPRM data set, the six HAP reported to be emitted include styrene, acrylonitrile, 1,3-butadiene, methyl methacrylate, cumene, and ethyl benzene. Styrene accounts for almost 83 percent of the mass emitted.

One major anomaly associated with the data set for this source category is that nearly all of the emissions points are reported to be fugitive sources, but the data includes only NEI default ''virtual stack'' emissions parameters for these sources.

15. Methyl Methacrylate-Butadiene-Styrene Production

Methyl methacrylate-butadiene-styrene polymers are prepared by grafting methyl methacrylate and styrene onto a styrene-butadiene rubber in an emulsion process. The product is a two-phase polymer used as an impact modifier for rigid polyvinyl chloride products. These products are used for applications in packaging, building, and construction. Emission points for methyl methacrylate-butadiene-styrene resin production include process vents, equipment leaks, storage vessels, and wastewater operations. Major HAP expected to be emitted by the Methyl Methacrylate-Butadiene-Styrene Production source category include butadiene, styrene, acrylonitrile, and methyl methacrylate.

The ANPRM data set for the Methyl Methacrylate-Butadiene-Styrene Resin Production source category includes information for three facilities, each of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Methyl Methacrylate-Butadiene-Styrene Production source category, the ANPRM data set includes data for each facility in the industry. In the ANPRM data set, toluene, methyl methacrylate, styrene, and 1,3-butadiene account for nearly all of the emissions.

The major anomalies associated with the data set for this source category include the HAP emitted. Some HAP are emitted by one facility and possibly should be emitted by the other facilities in the source category. In addition, nearly all of the emission release parameters are NEI default values.

16. Nitrile Resins Production

Nitrile resins are synthesized through the polymerization of acrylonitrile, methyl acrylate, and butadiene latex using an emulsion process. Nitrile resin products are commonly used in packaging applications (e.g., food packaging). Emissions points for nitrile resin manufacturing processes are process vents and equipment leaks. Emissions from storage tanks, such as those used to store acrylonitrile, are also possible. The major HAP expected to be emitted by the nitrile resins production source category is acrylonitrile.

The ANPRM data set for the Nitrile Resins source category includes information for one facility, which is classified as a major source in the NEI. Based on our previous estimates of the number of facilities in the Nitrile Resins source category, the ANPRM data set includes data for the whole industry. Acrylonitrile is the HAP emitted in the largest quantity, accounting for over 55 percent of the total HAP mass emitted.

One major anomaly associated with the data set for this source category is that 100 percent of the emission release parameters are NEI default values.

17. Polyethylene Terephthalate Production

Three different types of resins are made by sources covered by the Polyethylene Terephthalate Production source category: Solid-state resins (polyethylene terephthalate bottle grade resins); polyester film; and engineering resins. They are all thermoplastic linear condensation polymers based on dimethyl terephthalate or terephthalic acid. Polyethylene terephthalate melt-phase polymer is used in the production of all three of these resins. Polyethylene terephthalate production can occur via either a batch or continuous process. The most common use of polyethylene terephthalate solid-state resins is in soft drink bottles, and some industrial fiber-

graded polyester (e.g., for tire cord) is also produced from polyethylene terephthalate solid-state resins. The most common uses of polyethylene terephthalate film are photographic film and magnetic media. Polyethylene terephthalate is used extensively in the manufacture of synthetic fibers (i.e., polyester fibers), which compose the largest segment of the synthetic fiber industry. The most common uses of polyester fibers are apparel, home furnishings, carpets, fiberfill, and other industrial processes. Emissions sources present at polyethylene terephthalate production processes include raw material storage tanks, mix tanks, prepolymerization and polymerization reaction vents and process tanks, cooling towers, and methanol recovery systems. Major HAP emissions expected from the Polyethylene Terephthalate Production source category are ethylene glycol, methanol, acetaldehyde, and dioxane.

The ANPRM data set for the Polyethylene Terephthalate source category includes information for 22 facilities, 21 of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Polyethylene Terephthalate Production source category, the ANPRM data set includes data for about two-thirds of the facilities in the industry. In the ANPRM data set, volatile organic HAP dominate the total mass emissions, with methanol, ethylene glycol, acetaldehyde, methylene chloride, and mixed xylenes accounting for over three-fourths of the total emissions.

The major anomalies associated with the data set for this source category include the number of facilities in the source category and the HAP emitted. Some HAP expected to be reported (methanol, acetaldehyde, and dioxane) are not included for all the plants in the data set.

18. Polystyrene Production

Polystyrene resins are those produced by the polymerization of styrene monomer. This type of resin can be produced by three methods: (1) Suspension polymerization (operated in batch mode); (2) mass (operated in a continuous mode); and (3) emulsion process (operated in a continuous mode). The mass and suspension methods are the most commercially significant, whereas use of the emulsion process has decreased significantly since the mid-1940s. The uses for polystyrene resin include packaging and one-time use, expandable polystyrene beads, electronics, resellers and compounding, consumer and institutional products, and furniture, building, or construction uses. A wide variety of consumer and construction products are made from polystyrene resins, including disposable dinnerware, shower doors, light diffusers, soap dishes, insulation board, food containers, drain pipes, audio and video tape, picnic coolers, loose fill packaging, and tubing. The major HAP expected to be emitted by the polystyrene source category is styrene.

The ANPRM data set for the polystyrene resins source category includes information for 23 facilities, 14 of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Polystyrene Production source category, the ANPRM data set is missing data for 5 facilities in the industry. In the ANPRM data set, styrene is emitted in the greatest amounts and accounts for about 65 percent of the total emissions.

The major anomalies associated with the data set for this source category include facility representation of the source category and the HAP emitted. Some unexpected HAP, including tetrachloroethylene, naphthalene, ethyl chloride, and several metals, are reported to be emitted by some facilities.

19. Styrene-Acrylonitrile Production

Styrene-acrylonitrile resins are copolymers of styrene and acrylonitrile. Styrene-acrylonitrile resins may be synthesized by emulsion, suspension, and continuous mass polymerization; however, the majority of production is by batch emulsion. Typical uses include automobile instrument panels and interior trim and housewares. Emission points along the styrene-acrylonitrile resin production process include equipment leaks, process vents, storage vessels, and wastewater operations. Major HAP expected to be emitted by the Styrene-Acrylonitrile Production source category are acrylonitrile and styrene.

The ANPRM data set for the Styrene-Acrylonitrile Production source category includes information for three facilities, all of which are classified as major sources in the NEI. Based on our previous estimates of the number of facilities in the Styrene-Acrylonitrile Production source category, the ANPRM data set is missing data for 3 facilities in the industry. Many facilities that produce acrylonitrile-butadiene-styrene resins also produce styrene-acrylonitrile, because much of the styrene-acrylonitrile resins that are produced are used as feedstock in the production of acrylonitrile-butadiene-styrene. Therefore, for two of these plant sites, we could not distinguish whether certain emissions units belonged to the Acrylonitrile-Butadiene-Styrene or the Styrene-Acrylonitrile Production source categories. For these two plant sites, the emissions units in question were assigned to the Acrylonitrile-Butadiene-Styrene Production source category and no emissions units were assigned to the Styrene-Acrylonitrile Production source category. For the third plant site, EPA assigned the Styrene-Acrylonitrile Production MACT code to all the processes that emitted styrene or acrylonitrile and included these units in the ANPRM data set for the Styrene-Acrylonitrile Production source category. For this facility, styrene is the HAP emitted in the largest quantity accounting for over 55 percent of total HAP mass emitted. Ethyl benzene, 1,3-butadiene, and toluene are also reported in relatively large quantities and collectively account for about 35 percent of the total emissions.

The major anomalies associated with the data set for this source category include the number of facilities in the source category, the use of county centroid locations as default emissions release locations, and the use of NEI default values for 100 percent of the emissions release parameters. In addition, one HAP (acrylonitrile) is expected to be emitted in larger quantities than reported in the NEI.

20. Primary Aluminum Reduction Plants

Primary aluminum plants produce aluminum metal from alumina ore through the electrolytic reduction of aluminum oxide (alumina) by direct current voltage in an electrolyte (called ''cryolite'') of sodium aluminum fluoride. All primary aluminum facilities have potlines that produce aluminum metal, and also have a paste production operation. In addition, some facilities have anode bake furnaces that are used in the production of aluminum anodes. Potlines are categorized based primarily on differences in the process operation, equipment, and the applicability of control devices. HAP expected to be emitted by primary aluminum production sources include hydrogen fluoride and POM, including PAH (e.g., anthracene, benzo(a) pyrene, and naphthalene) that are part of the POM HAP category.

The ANPRM data set for the primary aluminum reduction source category includes information for 20 primary aluminum facilities. Of these 20 facilities, 19 are classified as major sources in the NEI. Based on our previous estimates of the number of primary aluminum reduction facilities,

this includes over 85 percent of the industry. Although a wide range of compounds are reported as emissions from these facilities in the ANPRM data set, carbonyl sulfide, hydrogen fluoride, and hydrochloric acid make up over 96 percent of the total emissions by mass. Hydrogen fluoride is the most common HAP reported as an emission (reported for 18 facilities); carbonyl sulfide and hydrochloric acid are reported as emissions by 11 and 7 facilities, respectively. A wide variety of PB HAP are reported, including numerous PAH and the metals lead, cadmium, and mercury and their associated compounds. For reported emissions of POM chemicals, emissions are grouped into one of seven POM categories. We encourage commenters to provide the individual chemical(s) that make up the POM.

The major anomalies associated with the data set for this source category include the specific HAP emitted by individual facilities and the speciation of POM. Certain HAP (e.g., chlorine, hydrogen chloride, POM) are not included for all the facilities in the data set.

21. Printing and Publishing

The printing and publishing source category includes facilities that use lithography, rotogravure, and other methods to print a variety of substrates, including paper, plastic, metal foil, wood, vinyl, metal, and glass. The MACT standards focused on those facilities that perform publication rotogravure printing, product and package rotogravure printing, and wide-web flexographic printing. Publication rotogravure printing refers to printing using a rotogravure press of various paper products, including catalogs, magazines, direct mail advertisements, display advertisements, miscellaneous brochures and other advertisements, newspaper sections and inserts, periodicals, and telephone directories. Product and packaging rotogravure printing entails the production, on a rotogravure press, of any printed substrate not otherwise defined as publication rotogravure printing. This includes (but is not limited to) folding cartons, flexible packaging, labels and wrappers, gift wraps, wall and floor coverings, upholstery, decorative laminates, and tissue products. Wide-web flexographic printing is a technique for printing substrates of 18 inches or wider in which the applied pattern is raised above the printing plate and the image carrier is made of rubber or other elastomeric materials. The wide-web flexographic presses are used to print flexible and rigid packaging; newspapers, magazines, and directories; paper towels, tissues, and similar products; and printed vinyl shower curtains and wallpaper. Research and laboratory facilities are not subject to the provisions of the MACT standards unless they are collocated with production lines. The NESHAP applies to HAP present in the inks, ink extenders, solvents, coatings, varnishes, primers, adhesives, and other materials applied with rotogravure and flexographic plates.

The primary HAP expected to be emitted from printing and publishing operations are toluene, xylene, ethylbenzene, methanol, methyl isobutyl ketone, ethylene glycol, and certain glycol ethers.

At the time of MACT promulgation in 1995, EPA estimated that there were approximately 200 publication rotogravure, product and packaging rotogravure, and wide-web flexographic printing facilities nationwide that would be subject to these MACT regulations.

The ANPRM dataset for the printing and publishing source category contains 463 facilities, of which 216 are classified as major sources in the NEI. The HAP emitted in largest quantities from these sources are toluene, glycol ethers, methyl isobutyl ketone, and xylene (mixture of o-, m-, and p-isomers). Emissions from these HAP account for nearly 94 percent of the mass emitted across all 463 facilities. POM is the only PB HAP reported in the ANPRM data set for this source category.

For reported emissions of POM chemicals, emissions are grouped into one of seven POM categories. We encourage commenters to provide the individual chemical(s) that make up the POM.

The major anomalies associated with the data set for this source category are related to the HAP emitted. Emissions of several HAP, including trichloroethylene, tetrachloroethylene, p-dioxane, benzene, and naphthalene, are reported to be emitted by a small percentage of sources in this category. These HAP may be emitted from other on-site processes. We are requesting data on these HAP emissions.

22. Shipbuilding and Ship Repair

The shipbuilding and ship repair industry consists of establishments that build, repair, repaint, convert, and alter ships. In general, activities and processes involved in ship repair and new ship construction are relatively similar. Operations include fabrication of basic components from raw materials, welding components and parts together, painting and repainting, overhauls, ship conversions, and other alterations. Nearly all shipyards that construct new ships also perform major ship repairs. Marine coatings used on offshore oil and gas well drilling and production platforms are not included in this source category.

Emissions of HAP from shipbuilding and ship repair facilities result from painting, cleaning solvents, welding, metal forming and cutting, and abrasive blasting performed during ship repair and shipbuilding operations. HAP expected to be emitted include a range of organic compounds used as solvents, including toluene, xylene, ethylbenzene, methanol, methyl isobutyl ketone, ethylene glycol, and glycol ethers. In addition to the organic HAP, relatively small amounts of inorganic HAP such as chromium, hexavalent chromium, manganese, nickel, and lead are expected to be emitted from painting, welding, metal forming and cutting, and abrasive blasting performed during ship repair and shipbuilding operations.

At the time of NESHAP promulgation in 1995, EPA estimated that there were approximately 437 facilities of varying capabilities involved in the construction and repair of ships in the United States; approximately 35 of these facilities qualified as major sources of HAP emissions.

The ANPRM data set for the shipbuilding and ship repair source category contains 88 facilities, of which 71 facilities are classified as major sources. In conjunction with previous efforts for this source category, the industry had collected and submitted up-to-date welding and blasting emissions data for 13 facilities. The industry and EPA consider these data to be the accurate welding and blasting emissions data for these facilities. For 12 of these 13 facilities, the 2002 NEI did not include any emissions from these welding and blasting processes. The newly collected data was added to the ANPRM data set for these facilities. The data was not added for the 13th facility, which did have detailed state-submitted welding and blasting emissions data already included in the NEI. As no welding and blasting emissions data were available for the other facilities in the source category, no data was added to the ANPRM data set for these facilities. The HAP emitted in largest quantities in total from these sources are xylenes and ethylbenzene. Total emissions from these two HAP account for 63 percent of the mass emitted across all 88 facilities. PB HAP emissions reported in the ANPRM data set for the shipbuilding and ship repair

source category include cadmium, lead compounds, POM, and mercury.

For emissions reported generically as ''chromium'' or ''chromium and compounds,'' emissions are speciated for this source category as 66 percent ''chromium (III) compounds'' and 34 percent ''chromium (VI) compounds.'' We encourage commenters to review this assumption and provide specific chromium (VI) and chromium (III) data where possible.

For reported emissions of POM chemicals, emissions are grouped into one of seven POM categories. We encourage commenters to provide the individual chemical(s) that make up the POM.

The major anomalies associated with the data set for this source category are related to the HAP emitted. Some metal HAP expected to be reported from welding, blasting, and other metalworking processes are not included for all the facilities in the data set. We have been working with the industry to improve these anomalies, and will continue these efforts. However, we also welcome additional data on these emissions.

V. What are we specifically seeking comment on?

The primary purpose of this ANPRM is to solicit comments on the source-category specific data included in the ANPRM data sets. Therefore, we are asking you to carefully review the facility-specific data available for download on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html* and provide corrections to these data. These data include information for each emissions release point at each facility in each of the 22 source categories included in Group 2 of the RTR Phase II. For large integrated facilities with multiple processes representing multiple source categories, it is often difficult to clearly distinguish the source category to which each emission point belongs. For this reason, the data available for download include not only the data for each facility in the specific source category, but also the data for each entire facility.

In addition to the ANPRM data sets for each source category, we are providing a downloadable file which describes each source category and summarizes the major data anomalies. These files are being made available to focus the review of emissions data on the emission points and pollutants which are expected to contribute the most to significant inhalation exposures and health risks. More information on how to download the data and how to submit data corrections is provided in Sections VI and VII of this ANPRM, respectively.

In reviewing the data, we are requesting both general comments about how well the data represent the source categories and more specific comments regarding the emission-point specific information included in the ANPRM data set for each facility in the 22 source categories. We also ask that you examine situations in which we made changes or additions to the NEI data and provide comments and data that will help us improve or clarify the information in order to minimize any anomalies. We are particularly interested in the following information regarding source category representation in the data:

- Names and addresses for any facilities with processes which should be, but are not included in the data set for a specific source category.
  - If known, whether data for these facilities are included in the NEI.
- Facilities whose data should not be included in the data set for a specific source category—please provide a brief description of the facilities and an explanation of why they do not belong in the data set for that source category.
- Facilities in the data set for a source category that are not major sources for HAP—please provide documentation verifying the area source status.

We would also like comment on the facility-specific and emission-point specific data, as well as our assumptions about certain data characteristics. As discussed further below, the areas in which further information and/or correction or clarification is requested, include the following:

- Facility location and identification.
  - Facility name.
  - Facility address.
  - Facility category code (i.e., major or area source).
- Emission point data
  - SCC and MACT codes
  - Emissions (tons per year (TPY)) of each HAP.
  - Emission release point type (i.e., fugitive, vertical, horizontal, gooseneck, vertical with raincap, or downward facing vent).
  - Emissions release characteristics: stack height and diameter, exit gas temperature, velocity, and flow rate.
  - Emission point latitude and longitude coordinates.
- Data characteristics.
  - Acute emissions factors.
  - Speciation of metal HAP and POM.
  - HAP emissions performance level (e.g., actual, allowable, maximum).

At the facility level, we are asking for input on the name and address of the facility, whether the facility is a major or area source for HAP, and facility identification codes. The facility name should include at least the company name and may also include facility identification information, such as ''Plant A'' or ''Ohio River Works.'' The address should include the street address of the plant location, as well as the city, county, State, and zip code for that location. We are also requesting verification of the area/major source status of each facility.

For each individual emission point, we are asking for comments on the SCC and MACT code to which each emission point is assigned, the HAP emitted, the mass of emissions reported for each HAP, and the release characteristics. For large facilities with multiple processes representing more than one source category, we ask that you pay particular attention to the MACT and SCC codes, so that emission points and emissions are assigned to the appropriate source category. We also ask that you provide comments on all HAP emitted from a process, even if you know the emission levels are very low. The high toxicity of some HAP means that even emission levels one might otherwise consider insignificant (in terms of mass) can have a significant risk impact. This is particularly true for PB HAP. These compounds have high toxicities and may be emitted by some of the source categories being reviewed. It is critical that we obtain the most accurate, speciated emission estimates possible to be used in the multi-pathway assessments that will be conducted prior to proposal of regulatory actions.

If you consider the data in the ANPRM data sets unrepresentative of the emissions from a facility, explain why these data are not representative and submit better data where available. When submitting emissions data, we ask that you provide documentation of the basis for the revised values. We will need appropriate documentation to support any suggested changes. Data corrections are discussed more in section VII.

In addition to the emissions data, we also request comments and revisions on the release characteristics for individual emission points. First, you should check the emission release point type description. Most of the emission points in the NEI are either classified as vertical or fugitive, although the options also include horizontal, goose neck, vertical with rain cap, and downward facing vent. Then you should check the release parameters, which include stack height, exit gas temperature, stack diameter, exit gas velocity, and exit gas flow rate. Quite often the NEI contains default release parameters, so providing

actual parameters will improve the quality of the data and the modeling results.

Emission point location is a parameter that can have a significant effect on the modeling results. Ideally, we would like a specific set of coordinates for every emission point. In many instances, a single set of coordinates is used for all emission points at a facility. In these situations, we request information on emission-point specific coordinates. If such detailed coordinates are already in the ANPRM data sets, we would like you to review them carefully and provide any updates or corrections needed.

To model fugitive sources, the release parameters used include the height, length, width, and angle of the area where the fugitive emissions sources are located, along with the temperature. The NEI contains fields for these parameters, but they are rarely populated. Instead, the NEI contains a set of default vertical stack parameters for fugitive sources, which have been designed to provide the same dispersion as a low-lying point source with minimal plume rise. These are a temperature of 72° Fahrenheit, a diameter of 0.003 feet, a velocity of 0.0003 feet per second, and a flow rate of 0 cubic feet per second. We request comment on the use of these release characteristics to effectively model fugitive emission sources as pseudo-point sources.

We are also requesting comments concerning certain data characteristics. This includes the speciation of several metal HAP, including mercury and chromium, and polycyclic organic material. These HAP were separated into their various forms, such as hexavalent and trivalent chromium, within NEI using the procedures established by the National Air Toxics Assessment. We are requesting comment on whether the speciation factors used are appropriate and ask that any suggested alternative approaches be accompanied by documentation supporting that alternative.

Also, to screen for potentially-significant short-term exposures, maximum short-term (one-hour) emission rates will be developed by multiplying the average annual hourly emission rates by ten. We would like comments on whether this factor represents a reasonable approximation for each emission point in order to estimate acute exposures and risks. If you believe that any particular emission point does not represent a reasonable approximation, please provide your rationale and a suggestion for a more appropriate ratio. This will assist us in our assessment of short-term impacts and risks.

As noted in section IV, the emissions values in the ANPRM data set generally represent actual emission levels. Where actual emissions data is not already included, we request that commenters provide such data.

In addition to comments on the data included in the data sets for each source category, we will accept other comments related to this ANPRM. As described in section VII of this ANPRM, all comments and supporting data must be submitted to the docket for this action.

VI. How may I access the data for a specific source category?

Source category descriptions and the ANPRM data sets are available on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* Information is available to be downloaded from this Web page for each source category in two separate files. One file contains a description of the source category, and a separate file includes the detailed ANPRM data set for the source category. These files must be downloaded from the Web site to be viewed.

The file containing the source category description is available in an Adobe® PDF format (this file format is viewable with Adobe® Reader, which may be downloaded at *http://www.adobe.com/products/acrobat/readermain.html*) and contains the following information:

- A description of the processes and major products
- The estimated number of facilities in the source category.
- A summary of emission points types and HAP emissions from the source category.
- A summary of the anomalies associated with the data for that source category.

The ANPRM data set for each source category is included in a separate file, which must be downloaded from the RTR Web *page—http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* These are Microsoft® Access files, which require Microsoft® Access to be viewed (if you do not have Microsoft® Access, contact Anne Pope by telephone ((919) 541–5373) or by e-mail (*pope.anne@epa.gov*) for other data viewing options). Each file contains the following information from the NEI for each facility in the source category:

Facility data	Emissions data
EPA Region	Pollutant Code
Tribal Code	Pollutant Code Description
Tribe Name	Emissions (TPY)
State Abbreviation	MACT Code
County Name	MACT Flag
State County FIPS	SCC Code
NEI Site ID	SCC Code Description
Facility Name	Emission Unit ID
Location Address	Process ID
City Name	Emission Release Point ID
State Name	Emission Release Point Type
Zip Code	Stack Default Flag
Facility Registry	Stack Height
Facility Registry Identifier	
State Facility Identifier	Exit Gas Temperature
SIC Code	Stack Diameter
SIC Code Description	Exit Gas Velocity
NAICS Code	Exit Gas Flow Rate
Facility Category Code	Longitude
Facility Category	Latitude
	Location Default Flag
	Data Source Code
	Data Source Description
	HAP Emissions Performance Level

Facility data	Emissions data
	Start Date End Date

More information on these NEI data fields can be found in the NEI documentation at *http://www.epa.gov/ttn/chief/net/2002inventory.html#documentation.*

VII. How do I submit suggested data corrections?

The source category-specific ANPRM data sets are available for download on the RTR Web page at *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html.* To suggest revisions to this information, we request that you complete the following steps:

1. Download the Microsoft® Access file containing the ANPRM data set for a source category.

2. Within this downloaded file, enter suggested revisions in the data fields appropriate for that information. The data fields that may be revised include the following:

Facility data	Emissions data
REVISED Tribal Code REVISED County Name REVISED Facility Name REVISED Location Address REVISED City Name REVISED State Name REVISED Zip Code REVISED Facility Registry REVISED State Facility REVISED Facility Category	REVISED Emissions (TPY) REVISED MACT Code REVISED SCC Code REVISED Emission Release Point REVISED Stack Height REVISED Exit Gas Temperature REVISED Stack Diameter REVISED Exit Gas Velocity REVISED Exit Gas Flow Rate REVISED Longitude REVISED Latitude REVISED HAP Emissions

3. Fill in the following commenter information fields for each suggested revision:

- Commenter Name.
- Commenter E-Mail Address.
- Commenter Phone Number.
- Revision Comments.

4. Gather documentation for any suggested emissions revisions (e.g., performance test reports, material balance calculations, etc.).

5. Send the entire downloaded file with suggested revisions in Microsoft® Access format and all accompanying documentation to the docket for this ANPRM (through one of the methods described in the **ADDRESSES** section of this ANPRM). To help speed review of the revisions, it would also be helpful to submit the suggestions to EPA directly at *RTR@epa.gov.*

6. If you are providing comments on a facility with multiple source categories, you need only submit one file for that facility, which should contain all suggested changes for all source categories at that facility.

We strongly urge that all data revision comments be submitted in the form of updated Microsoft® Access files, which are provided on the *http://www.epa.gov/ttn/atw/rrisk/rtrpg.html* Web page. Data in the form of written descriptions or other electronic file formats will be difficult for EPA to translate into the necessary format in a timely manner. Additionally, placing the burden on EPA to interpret data submitted in other formats increases the possibility of misinterpretation or errors.

VIII. What additional steps are expected after EPA reviews the comments received?

Once EPA receives comments on the Group 2 emissions and emissions release data, we plan to revise the ANPRM data sets based upon public comment and supporting documentation, model with the new data, and proceed with proposing and promulgating residual risk and technology review standards as appropriate. More detail of this process is provided in sections C, D, and E of section II of this ANPRM.

List of Subjects in 40 CFR Part 63

Environmental protection, Air pollution control, Hazardous substances.

Dated: March 23, 2007.

Stephen L. Johnson,

Administrator.

[FR Doc. E7–5805 Filed 3–28–07; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List the Siskiyou Mountains Salamander and Scott Bar Salamander as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 90-day petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 90-day finding on a petition to list the Siskiyou Mountains salamander (*Plethodon stormi*) and Scott Bar salamander (*Plethodon asupak*) as threatened or endangered, under the Endangered Species Act of 1973, as amended (Act). We find that the petition presents substantial scientific or commercial information indicating that listing these species may be warranted. Therefore, with the publication of this notice, we are initiating status reviews of these species, and we will issue a 12-month finding to determine if the petitioned action is warranted. To ensure that the status review of the Siskiyou Mountains and Scott Bar salamanders is comprehensive, we are soliciting scientific and commercial data

APPENDIX 2.

EMISSION RATES PER POLLUTANT FOR EACH SOURCE.

[Source: 2002 EPA NEI]

APPENDIX 2. Emission rates for each pollutant in tons/year for each source.

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Vertical Emissions)	SAMPLE1	Ethyl benzene	0.00050
	SAMPLE1	Toluene	0.00400
	SAMPLE1	n-Hexane	0.11750
	SAMPLE1	Xylenes (Mixed)	0.00900
	SAMPLE1	Formaldehyde	0.00600
	SAMPLE1	Acetaldehyde	0.00400
	SAMPLE2	n-Hexane	0.66450
	SAMPLE2	Formaldehyde	0.01200
	SAMPLE2	Acetaldehyde	0.00800
	SAMPLE3	n-Hexane	0.02300
	SAMPLE3	Formaldehyde	0.00250
	SAMPLE3	Acetaldehyde	0.00150
	SAMPLE4	1,3-Butadiene	0.38700
	SAMPLE4	n-Hexane	0.00800
	SAMPLE4	Formaldehyde	0.02050
	SAMPLE4	Acetaldehyde	0.01400
	SAMPLE5	1,3-Butadiene	0.00250
	SAMPLE6	Benzene	0.01600
	SAMPLE7	Benzene	0.00600
	SAMPLE8	Benzene	0.26000
	SAMPLE9	Benzene	0.01000
	SAMPLE10	Benzene	0.06000
Motiva Norco (Fugitive Emissions)	SAMPLE11	Ethyl benzene	0.02050
	SAMPLE11	Toluene	0.25000
	SAMPLE11	n-Hexane	0.60000
	SAMPLE11	Xylenes (Mixed)	0.15950
	SAMPLE11	Benzene	0.17500
	SAMPLE11	Naphthalene	0.04200
	SAMPLE12	Toluene	0.00050
	SAMPLE12	Naphthalene	0.00300
	SAMPLE13	Benzene	0.01000
	SAMPLE14	Benzene	0.04600
	SAMPLE15	Benzene	0.00400
	SAMPLE16	Benzene	0.01036
	SAMPLE17	Benzene	0.01424
	SAMPLE18	Benzene	0.00645
	SAMPLE19	Benzene	0.01000
	SAMPLE20	Benzene	0.00567
	SAMPLE21	Benzene	0.04219
	SAMPLE22	Benzene	0.01238
	SAMPLE23	Benzene	0.00552
	SAMPLE24	Benzene	0.00070

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPLE25	Benzene	0.01000
	SAMPLE26	Benzene	0.01000
	SAMPLE27	Benzene	0.00056
	SAMPLE28	Benzene	1.91997
	SAMPLE29	Benzene	0.21330
	SAMPLE30	Benzene	0.00227
	SAMPLE31	Benzene	0.01957
	SAMPLE32	Benzene	0.08912
	SAMPLE33	Benzene	0.04538
	SAMPLE34	Benzene	0.03157
	SAMPLE35	Benzene	0.01666
	SAMPLE36	Benzene	0.00143
	SAMPLE37	Benzene	0.13136
	SAMPLE38	Benzene	0.00084
	SAMPLE39	Benzene	0.10993
	SAMPLE40	Benzene	0.01000
	SAMPLE41	Benzene	0.01000
	SAMPLE42	Benzene	0.01000
	SAMPLE43	Benzene	0.01000
	SAMPLE44	Benzene	0.01000
	SAMPLE45	Benzene	0.01000
	SAMPLE46	Benzene	0.01000
	SAMPLE47	Benzene	0.02226
	SAMPLE48	Benzene	0.03498
	SAMPLE49	Benzene	0.02265
	SAMPLE50	Benzene	0.03063
	SAMPLE51	Benzene	0.01140
	SAMPLE52	Benzene	0.00820
	SAMPLE53	Benzene	0.00148
	SAMPLE54	Benzene	0.01718
	SAMPLE55	Benzene	0.04342
	SAMPLE56	Benzene	0.16389
	SAMPLE57	Benzene	0.01371
	SAMPLE58	Benzene	0.00635
	SAMPLE59	Benzene	0.18438
	SAMPLE60	Benzene	0.00644
	SAMPLE61	Benzene	0.04000
	SAMPLE62	Benzene	0.00748
	SAMPLE63	Benzene	0.01476
	SAMPLE64	Benzene	0.01072
	SAMPLE65	Benzene	0.04342

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPLE66	Benzene	0.00719
	SAMPLE67	Benzene	0.00047
	SAMPLE68	Benzene	0.00052
	SAMPLE69	Benzene	0.00033
	SAMPLE70	Benzene	0.00130
	SAMPLE71	Benzene	0.00005
	SAMPLE72	Benzene	0.00006
	SAMPLE73	Benzene	0.41207
	SAMPLE74	Benzene	0.11000
	SAMPLE75	Benzene	0.00235
	SAMPLE76	Benzene	0.00469
	SAMPLE77	Benzene	0.07913
	SAMPLE78	Benzene	0.00007
	SAMPLE79	Benzene	0.00008
	SAMPLE80	Benzene	0.03920
	SAMPLE81	Benzene	0.12000
	SAMPLE82	Benzene	0.02000
	SAMPLE83	Benzene	0.02000
	SAMPLE84	Benzene	0.00168
	SAMPLE85	Benzene	0.10327
	SAMPLE86	Benzene	0.00390
	SAMPLE87	Benzene	0.00004
	SAMPLE88	Benzene	0.00012
	SAMPLE89	Benzene	0.00006
	SAMPLE90	Benzene	0.00006
	SAMPLE91	Benzene	0.00006
	SAMPLE92	Benzene	0.00002
	SAMPLE93	Benzene	0.00003
	SAMPLE94	Benzene	0.09000
	SAMPLE95	Benzene	0.00168
	SAMPLE96	Benzene	0.00006
	SAMPLE97	Benzene	0.00046
	SAMPLE98	Benzene	0.00262
	SAMPLE99	Benzene	0.00262
	SAMPL100	Benzene	0.00036
	SAMPL101	Benzene	0.00003
	SAMPL102	Ethyl benzene	0.01250
	SAMPL102	1,3-Butadiene	0.00450
	SAMPL102	Toluene	0.07050
	SAMPL102	n-Hexane	0.00300
	SAMPL102	Diethanolamine	0.03850

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL102	Xylenes (Mixed)	0.14200
	SAMPL102	Naphthalene	0.27150
	SAMPL103	Manganese Compounds	0.00050
	SAMPL103	Nickel Compounds	0.00550
	SAMPL103	Antimony Compounds	0.00550
	SAMPL103	Chromium Compounds	0.00150
	SAMPL103	Cobalt Compounds	0.00100
	SAMPL104	2,2,4-Trimethylpentane	0.18650
	SAMPL105	Ethyl benzene	0.04900
	SAMPL105	Toluene	0.98700
	SAMPL105	Xylenes (Mixed)	1.40700
	SAMPL105	Naphthalene	0.09650
	SAMPL106	Methyl tert-butyl ether	0.02950
	SAMPL106	Methanol	0.02100
	SAMPL107	Ethyl benzene	0.08100
	SAMPL107	Toluene	0.06500
	SAMPL107	Xylenes (Mixed)	0.08100
	SAMPL107	Naphthalene	0.51000
	SAMPL108	Toluene	0.00150
	SAMPL108	Hexane	0.00050
	SAMPL108	Diethanolamine	0.05150
	SAMPL108	Xylenes (Mixed)	0.00400
	SAMPL108	Naphthalene	0.00200
	SAMPL109	Methyl Tert-Butyl Ether	0.10300
	SAMPL109	Methanol	0.10650
	SAMPL110	Ethyl benzene	0.00500
	SAMPL110	Toluene	0.03400
	SAMPL110	Xylenes (Mixed)	0.07900
	SAMPL110	Naphthalene	0.03050
	SAMPL111	Ethyl benzene	0.01500
	SAMPL111	Toluene	0.03800
	SAMPL111	Hexane	0.14150
	SAMPL111	Xylenes (Mixed)	0.04600
	SAMPL111	Naphthalene	0.07400
	SAMPL112	Ethyl benzene	0.00100
	SAMPL112	Xylenes (Mixed)	0.00100
	SAMPL113	Ethyl benzene	0.00100
	SAMPL113	Xylenes (Mixed)	0.00100
	SAMPL114	Ethyl benzene	0.04600
	SAMPL114	Toluene	0.27500
	SAMPL114	Xylenes (Mixed)	0.16000

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL114	Naphthalene	0.00100
	SAMPL115	1,3-Butadiene	0.00100
	SAMPL116	1,3-Butadiene	0.00100
	SAMPL117	Ethyl benzene	0.01000
	SAMPL117	Toluene	0.05700
	SAMPL117	Xylenes (Mixed)	0.03300
	SAMPL118	Ethyl benzene	0.00100
	SAMPL119	Ethyl benzene	0.01800
	SAMPL119	Toluene	0.36200
	SAMPL119	Xylenes (Mixed)	0.24700
	SAMPL119	Naphthalene	0.00250
	SAMPL120	Ethyl benzene	0.03700
	SAMPL120	Toluene	0.73700
	SAMPL120	Xylenes (Mixed)	0.50250
	SAMPL120	Naphthalene	0.00500
	SAMPL121	Ethyl benzene	0.02450
	SAMPL121	Toluene	0.49000
	SAMPL121	Xylenes (Mixed)	0.33350
	SAMPL121	Naphthalene	0.00300
	SAMPL122	Ethyl benzene	0.01100
	SAMPL122	Toluene	0.22200
	SAMPL122	Xylenes (Mixed)	0.15100
	SAMPL122	Naphthalene	0.00150
	SAMPL123	Ethyl benzene	0.02150
	SAMPL123	Toluene	0.42850
	SAMPL123	Xylenes (Mixed)	0.29200
	SAMPL123	Naphthalene	0.00300
	SAMPL124	Ethyl benzene	0.00050
	SAMPL124	Xylenes (Mixed)	0.00150
	SAMPL124	Naphthalene	0.00700
	SAMPL125	Ethyl benzene	0.00950
	SAMPL125	Toluene	0.19400
	SAMPL125	Xylenes (Mixed)	0.13200
	SAMPL125	Naphthalene	0.00150
	SAMPL126	Ethyl benzene	0.07250
	SAMPL126	Toluene	1.44900
	SAMPL126	Xylenes (Mixed)	0.98700
	SAMPL126	Naphthalene	0.00950
	SAMPL127	Xylenes (Mixed)	0.00050
	SAMPL127	Naphthalene	0.00200
	SAMPL128	Ethyl benzene	0.04000

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL128	Toluene	0.79600
	SAMPL128	Xylenes (Mixed)	0.54250
	SAMPL128	Naphthalene	0.00500
	SAMPL129	Ethyl benzene	0.00950
	SAMPL129	Toluene	0.18900
	SAMPL129	Xylenes (Mixed)	0.12850
	SAMPL129	Naphthalene	0.00100
	SAMPL130	Ethyl benzene	0.01700
	SAMPL130	Toluene	0.34450
	SAMPL130	Xylenes (Mixed)	0.23450
	SAMPL130	Naphthalene	0.00250
	SAMPL131	Ethyl benzene	0.00200
	SAMPL131	Toluene	0.00050
	SAMPL131	Xylenes (Mixed)	0.00800
	SAMPL131	Naphthalene	0.02500
	SAMPL132	Ethyl benzene	0.38150
	SAMPL132	Styrene	0.00900
	SAMPL132	1,3-Butadiene	1.99350
	SAMPL132	Toluene	1.51550
	SAMPL132	Hexane	0.57650
	SAMPL132	Diethanolamine	0.00050
	SAMPL132	Xylenes (Mixed)	0.91750
	SAMPL132	Methyl Tert-Butyl Ether	0.43650
	SAMPL132	2,2,4-Trimethylpentane	0.28450
	SAMPL132	Methanol	0.01600
	SAMPL132	Naphthalene	0.11850
	SAMPL133	Ethyl benzene	0.12050
	SAMPL133	1,3-Butadiene	0.00050
	SAMPL133	Toluene	0.35400
	SAMPL133	Hexane	0.23300
	SAMPL133	Diethanolamine	0.07850
	SAMPL133	Tetrachloroethene	0.11650
	SAMPL133	Xylenes (Mixed)	0.50550
	SAMPL133	Naphthalene	0.08250
	SAMPL134	Ethyl benzene	0.05200
	SAMPL134	Toluene	0.14350
	SAMPL134	Hexane	0.08750
	SAMPL134	Tetrachloroethene	0.79650
	SAMPL134	Xylenes (Mixed)	0.20600
	SAMPL134	Naphthalene	0.42900
	SAMPL135	1,3-Butadiene	0.00150

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL135	Toluene	0.00100
	SAMPL135	Hexane	0.04500
	SAMPL135	Diethanolamine	0.01150
	SAMPL135	Xylenes (Mixed)	0.00150
	SAMPL135	2,2,4-Trimethylpentane	0.29050
	SAMPL135	Hydrochloric Acid	0.07150
	SAMPL135	Naphthalene	0.00050
	SAMPL136	Ethyl benzene	0.00750
	SAMPL136	1,3-Butadiene	0.00250
	SAMPL136	Toluene	0.01000
	SAMPL136	Hexane	0.00800
	SAMPL136	Diethanolamine	0.00050
	SAMPL136	Xylenes (Mixed)	0.01650
	SAMPL136	Naphthalene	0.02400
	SAMPL137	Ethyl benzene	0.00750
	SAMPL137	Styrene	0.00050
	SAMPL137	1,3-Butadiene	0.00200
	SAMPL137	Toluene	0.06050
	SAMPL137	Hexane	0.22900
	SAMPL137	Diethanolamine	0.03750
	SAMPL137	Xylenes (Mixed)	0.11850
	SAMPL137	Naphthalene	0.06150
	SAMPL137	Cumene	0.00150
	SAMPL138	Ethyl benzene	0.01000
	SAMPL138	Toluene	0.09500
	SAMPL138	Hexane	0.10300
	SAMPL138	Diethanolamine	0.07150
	SAMPL138	Xylenes (Mixed)	0.11450
	SAMPL138	Naphthalene	0.05650
	SAMPL139	Ethyl benzene	0.08300
	SAMPL139	Toluene	0.13750
	SAMPL139	Hexane	0.61000
	SAMPL139	Diethanolamine	0.04150
	SAMPL139	Xylenes (Mixed)	0.12600
	SAMPL139	2,2,4-Trimethylpentane	0.00050
	SAMPL139	Naphthalene	0.01900
	SAMPL140	Ethyl benzene	0.05050
	SAMPL140	Toluene	0.06900
	SAMPL140	Hexane	0.19800
	SAMPL140	Xylenes (Mixed)	0.09100
	SAMPL140	Naphthalene	0.36900

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL141	Ethyl benzene	0.00150
	SAMPL141	Toluene	0.01000
	SAMPL141	Hexane	0.00150
	SAMPL141	Diethanolamine	0.05800
	SAMPL141	Xylenes (Mixed)	0.02350
	SAMPL141	Naphthalene	0.00850
	SAMPL142	Ethyl benzene	0.00050
	SAMPL142	1,3-Butadiene	0.00450
	SAMPL142	Toluene	0.00050
	SAMPL142	Xylenes (Mixed)	0.00050
	SAMPL142	Naphthalene	0.00050
	SAMPL143	Ethyl benzene	0.02600
	SAMPL143	Toluene	0.17850
	SAMPL143	Xylenes (Mixed)	0.41900
	SAMPL143	Naphthalene	0.15200
	SAMPL144	Ethyl benzene	0.02050
	SAMPL144	Toluene	0.14200
	SAMPL144	Xylenes (Mixed)	0.33350
	SAMPL144	Naphthalene	0.12100
	SAMPL145	Naphthalene	0.09800
	SAMPL146	Ethyl benzene	0.00050
	SAMPL146	Naphthalene	0.00050
	SAMPL147	Ethyl benzene	0.00050
	SAMPL147	Naphthalene	0.00050
	SAMPL148	Ethyl benzene	0.16600
	SAMPL148	Toluene	0.38450
	SAMPL148	Hexane	0.12100
	SAMPL148	Xylenes (Mixed)	0.34950
	SAMPL148	Naphthalene	0.00450
	SAMPL149	Ethyl benzene	0.00100
	SAMPL149	Toluene	0.00050
	SAMPL149	Xylenes (Mixed)	0.00100
	SAMPL149	Naphthalene	0.00250
	SAMPL150	Ethyl benzene	0.16900
	SAMPL150	Toluene	0.39200
	SAMPL150	Hexane	0.12350
	SAMPL150	Xylenes (Mixed)	0.35600
	SAMPL150	Naphthalene	0.00450
	SAMPL151	Ethyl benzene	0.13850
	SAMPL151	Toluene	0.32150
	SAMPL151	Hexane	0.10150

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL151	Xylenes (Mixed)	0.29200
	SAMPL151	Naphthalene	0.00400
	SAMPL152	Ethyl benzene	0.12800
	SAMPL152	Toluene	0.29650
	SAMPL152	Hexane	0.09350
	SAMPL152	Xylenes (Mixed)	0.26950
	SAMPL152	Naphthalene	0.00350
	SAMPL153	Ethyl benzene	0.12650
	SAMPL153	Toluene	0.29350
	SAMPL153	Hexane	0.09250
	SAMPL153	Xylenes (Mixed)	0.26650
	SAMPL153	Naphthalene	0.00350
	SAMPL154	Ethyl benzene	0.27950
	SAMPL154	Styrene	0.22950
	SAMPL154	Toluene	1.43350
	SAMPL154	Hexane	0.33350
	SAMPL154	Xylenes (Mixed)	1.15850
	SAMPL154	Naphthalene	0.04600
	SAMPL155	Toluene	0.32650
	SAMPL155	Hexane	0.09450
	SAMPL155	Xylenes (Mixed)	0.47550
	SAMPL155	Naphthalene	0.01500
	SAMPL156	2,2,4-Trimethylpentane	0.49050
	SAMPL157	Ethyl benzene	0.44400
	SAMPL157	Styrene	0.36500
	SAMPL157	Toluene	2.27750
	SAMPL157	Hexane	0.52950
	SAMPL157	Xylenes (Mixed)	1.84050
	SAMPL157	Naphthalene	0.07350
	SAMPL158	Toluene	0.33700
	SAMPL158	Hexane	0.09750
	SAMPL158	Xylenes (Mixed)	0.49000
	SAMPL158	Naphthalene	0.01550
	SAMPL159	Ethyl benzene	0.00300
	SAMPL159	Toluene	0.04250
	SAMPL159	Hexane	0.00350
	SAMPL159	Xylenes (Mixed)	0.02200
	SAMPL160	Ethyl benzene	0.05100
	SAMPL160	Toluene	0.11800
	SAMPL160	Hexane	0.03750
	SAMPL160	Xylenes (Mixed)	0.10750

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL160	Naphthalene	0.00150
	SAMPL161	Ethyl benzene	0.00550
	SAMPL161	Toluene	0.00400
	SAMPL161	Hexane	1.67150
	SAMPL161	Xylenes (Mixed)	0.00550
	SAMPL161	Naphthalene	0.00850
	SAMPL162	Ethyl benzene	0.34350
	SAMPL162	Toluene	0.79550
	SAMPL162	Hexane	0.25100
	SAMPL162	Xylenes (Mixed)	0.72300
	SAMPL162	Naphthalene	0.00950
	SAMPL163	Ethyl benzene	0.00100
	SAMPL163	Naphthalene	0.00100
	SAMPL164	Ethyl benzene	0.00050
	SAMPL164	Naphthalene	0.00100
	SAMPL165	Naphthalene	0.03500
	SAMPL166	Ethyl benzene	0.38150
	SAMPL166	Toluene	0.33600
	SAMPL166	Xylenes (Mixed)	0.38150
	SAMPL166	Naphthalene	0.32050
	SAMPL167	Naphthalene	0.01100
	SAMPL168	Naphthalene	0.01100
	SAMPL169	Tetrachloroethene	0.00600
	SAMPL170	Naphthalene	0.00100
	SAMPL171	Phenol	0.00350
	SAMPL172	Ethyl benzene	0.03800
	SAMPL172	Toluene	0.26150
	SAMPL172	Xylenes (Mixed)	0.61350
	SAMPL172	Naphthalene	0.22250
	SAMPL173	Ethyl benzene	0.00400
	SAMPL173	Toluene	0.02800
	SAMPL173	Xylenes (Mixed)	0.06500
	SAMPL173	Naphthalene	0.02350
	SAMPL174	Ethyl benzene	0.00400
	SAMPL174	Toluene	0.02800
	SAMPL174	Xylenes (Mixed)	0.06500
	SAMPL174	Naphthalene	0.02350
	SAMPL175	Ethyl benzene	0.00400
	SAMPL175	Toluene	0.02800
	SAMPL175	Xylenes (Mixed)	0.06500
	SAMPL175	Naphthalene	0.02350

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL176	Toluene	0.00050
	SAMPL176	Naphthalene	0.00400
	SAMPL177	Ethyl benzene	0.00150
	SAMPL177	Toluene	0.01100
	SAMPL177	Xylenes (Mixed)	0.02600
	SAMPL177	Naphthalene	0.00950
	SAMPL178	Ethyl benzene	0.00650
	SAMPL178	Toluene	0.04500
	SAMPL178	Xylenes (Mixed)	0.10550
	SAMPL178	Naphthalene	0.03850
	SAMPL179	Ethyl benzene	0.00150
	SAMPL179	Toluene	0.01150
	SAMPL179	Xylenes (Mixed)	0.02650
	SAMPL179	Naphthalene	0.00950
	SAMPL180	Ethyl benzene	0.00100
	SAMPL180	Toluene	0.00700
	SAMPL180	Xylenes (Mixed)	0.01700
	SAMPL180	Naphthalene	0.00600
	SAMPL181	Ethyl benzene	0.00550
	SAMPL181	Toluene	0.03850
	SAMPL181	Xylenes (Mixed)	0.09050
	SAMPL181	Naphthalene	0.03300
	SAMPL182	Ethyl benzene	0.00550
	SAMPL182	Toluene	0.03850
	SAMPL182	Xylenes (Mixed)	0.09050
	SAMPL182	Naphthalene	0.03300
	SAMPL183	Toluene	0.00500
	SAMPL183	Xylenes (Mixed)	0.00350
	SAMPL183	2,2,4-Trimethylpentane	0.00050
	SAMPL183	Naphthalene	0.02450
	SAMPL184	Toluene	0.13850
	SAMPL184	Xylenes (Mixed)	0.06950
	SAMPL184	Naphthalene	0.69350
	SAMPL185	Ethyl benzene	0.01500
	SAMPL185	Toluene	0.05200
	SAMPL185	Hexane	0.06350
	SAMPL185	Xylenes (Mixed)	0.08450
	SAMPL185	Naphthalene	0.02900
	SAMPL186	Naphthalene	0.54250
	SAMPL187	Ethyl benzene	0.09500
	SAMPL187	Toluene	0.09500

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Motiva Norco (Fugitive Emissions) Cont.	SAMPL187	Hexane	0.14650
	SAMPL187	Xylenes (Mixed)	0.13050
	SAMPL187	Naphthalene	0.00800
	SAMPL188	Toluene	0.00050
	SAMPL188	Formaldehyde	0.00100
	SAMPL188	Acetaldehyde	0.00050
Valero St. Charles (Vertical Emissions)	SAMPL189	Ethyl benzene	0.18400
	SAMPL189	Styrene	0.00600
	SAMPL189	Toluene	0.87300
	SAMPL189	n-Hexane	0.34600
	SAMPL189	Xylenes (Mixed)	0.77050
	SAMPL189	Benzene	0.16600
	SAMPL189	Naphthalene	0.05750
	SAMPL189	Cumene	0.02300
Valero St. Charles (Fugitive Emissions)	SAMPL190	Ethyl benzene	0.03300
	SAMPL190	n-Hexane	0.31850
	SAMPL190	Cresols (mixed)	0.02400
	SAMPL190	Xylenes (mixed)	0.20400
	SAMPL190	Polycyclic Organic Matter	0.02400
	SAMPL190	Benzene	0.07850
Valero St. Charles (Fugitive Emissions) - Cont.	SAMPL190	Naphthalene	0.03500
	SAMPL190	Biphenyl	0.00750
	SAMPL190	Cumene	0.00800
	SAMPL191	Ethyl benzene	0.00750
	SAMPL191	Toluene	0.03100
	SAMPL191	n-Hexane	0.07200
	SAMPL191	Cresols (mixed)	0.00550
	SAMPL191	Xylenes (mixed)	0.04650
	SAMPL191	Polycyclic Organic Matter	0.00550
	SAMPL191	Benzene	0.01800
	SAMPL191	Chlorine	0.44850
	SAMPL191	Naphthalene	0.00800
	SAMPL191	Biphenyl	0.00150
	SAMPL191	Cumene	0.00200
	SAMPL192	Ethyl benzene	0.00700
	SAMPL192	Toluene	0.03000
	SAMPL192	n-Hexane	0.07000
	SAMPL192	Cresols (mixed)	0.00550
	SAMPL192	Xylenes (mixed)	0.04500
	SAMPL192	Polycyclic Organic Matter	0.00550
	SAMPL192	Benzene	0.01750

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Valero St. Charles (Fugitive Emissions) - Cont.	SAMPL192	Chlorine	0.43400
	SAMPL192	Naphthalene	0.00750
	SAMPL192	Biphenyl	0.00150
	SAMPL192	Cumene	0.00150
	SAMPL193	Ethyl benzene	0.00800
	SAMPL193	Toluene	0.03400
	SAMPL193	n-Hexane	0.07900
	SAMPL193	Cresols (mixed)	0.00600
	SAMPL193	Xylenes (mixed)	0.05050
	SAMPL193	Polycyclic Organic Matter	0.00600
	SAMPL193	Benzene	0.01950
	SAMPL193	Chlorine	0.49200
	SAMPL193	Naphthalene	0.00850
	SAMPL193	Biphenyl	0.01950
	SAMPL193	Cumene	0.00200
	SAMPL194	Ethyl benzene	0.16350
	SAMPL194	Styrene	0.00150
	SAMPL194	1,3-Butadiene	0.01500
	SAMPL194	Toluene	0.38800
	SAMPL194	Phenol	0.00050
	SAMPL194	n-Hexane	0.22500
	SAMPL194	Cresols (mixed)	0.00150
	SAMPL194	Xylenes (mixed)	0.26500
	SAMPL194	Polycyclic Organic Matter	0.26200
	SAMPL194	Benzene	0.11600
	SAMPL194	Naphthalene	0.03000
	SAMPL194	Biphenyl	0.00550
	SAMPL194	Cumene	0.01050
	SAMPL195	Ethyl benzene	0.00050
	SAMPL195	Toluene	0.00300
	SAMPL195	n-Hexane	0.00650
	SAMPL195	Cresols (mixed)	0.00050
	SAMPL195	Xylenes (mixed)	0.00450
	SAMPL195	Polycyclic Organic Matter	0.00050
	SAMPL195	Benzene	0.00150
	SAMPL195	Naphthalene	0.00100
	SAMPL196	Ethyl benzene	0.00050
	SAMPL196	Toluene	0.00300
	SAMPL196	n-Hexane	0.00650
	SAMPL196	Cresols (mixed)	0.00050
	SAMPL196	Xylenes (mixed)	0.00450

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Valero St. Charles (Fugitive Emissions) - Cont.	SAMPL196	Polycyclic Organic Matter	0.00050
	SAMPL196	Naphthalene	0.00100
	SAMPL197	Ethyl benzene	0.01050
	SAMPL197	Toluene	0.03050
	SAMPL197	n-Hexane	0.00950
	SAMPL197	Xylenes (mixed)	0.05350
	SAMPL197	Benzene	0.01050
	SAMPL197	Naphthalene	0.04700
	SAMPL197	Biphenyl	0.01300
	SAMPL197	Cumene	0.00100
	SAMPL198	Ethyl benzene	0.00050
	SAMPL198	Toluene	0.00300
	SAMPL198	n-Hexane	0.00650
	SAMPL198	Cresols (mixed)	0.00050
	SAMPL198	Xylenes (mixed)	0.00450
	SAMPL198	Polycyclic Organic Matter	0.00050
	SAMPL198	Benzene	0.00150
	SAMPL198	Chlorine	0.14500
	SAMPL198	Naphthalene	0.00100
	SAMPL199	Ethyl benzene	0.14750
	SAMPL199	Toluene	0.61600
	SAMPL199	Phenol	0.00550
	SAMPL199	n-Hexane	1.43700
	SAMPL199	Cresols (mixed)	0.10800
	SAMPL199	Xylenes (mixed)	0.92100
	SAMPL199	Polycyclic Organic Matter	0.10800
	SAMPL199	Benzene	0.35500
	SAMPL199	Naphthalene	0.15800
	SAMPL199	Biphenyl	0.03400
	SAMPL199	Cumene	0.03500
	SAMPL200	Ethyl benzene	0.00250
	SAMPL200	Toluene	0.00700
	SAMPL200	n-Hexane	1.84100
	SAMPL200	Xylenes (mixed)	0.49600
	SAMPL200	Benzene	0.19850
	SAMPL201	Ethyl benzene	0.00100
	SAMPL201	Toluene	0.00350
	SAMPL201	n-Hexane	0.89300
	SAMPL201	Xylenes (mixed)	0.00950
	SAMPL201	Benzene	0.09900
	SAMPL202	Toluene	0.00050

APPENDIX 2. Continuation

Refinery	Source ID	Pollutant	Emissions (tons/year)
Valero St. Charles (Fugitive Emissions) - Cont.	SAMPL202	Xylenes (mixed)	0.00150
	SAMPL202	Benzene	0.01100
	SAMPL203	Ethyl benzene	0.22600
	SAMPL203	Toluene	1.64050
	SAMPL203	Phenol	0.00150
	SAMPL203	n-Hexane	1.99200
	SAMPL203	Cresols (mixed)	0.00550
	SAMPL203	Xylenes (mixed)	1.90500
	SAMPL203	Methanol	1.61750
	SAMPL203	Benzene	0.70250
	SAMPL203	Naphthalene	0.03700
	SAMPL203	Biphenyl	0.00800
	SAMPL203	Cumene	0.05350
	SAMPL204	Ethyl benzene	0.00600
	SAMPL204	1,3-Butadiene	0.01950
	SAMPL204	Toluene	0.06950
	SAMPL204	n-Hexane	0.87600
	SAMPL204	Xylenes (mixed)	0.00850
	SAMPL204	Benzene	0.19400

APPENDIX 3.

LOCATIONS OF EMISSION SOURCES

[Source: 2002 EPA NEI]

APPENDIX 3. Locations of Emission Sources.

Refinery	Source ID	Location type (U=UTM, L=lat/lon)	Longitude (decimal) [use center for point sources]	Latitude (decimal) [use center for point sources]	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Motiva Norco (Vertical Emissions)	SAMPLE1	L	-90.400020	30.000650	P	37	1.7	7.27	807	Flare 1
	SAMPLE2	L	-90.402130	29.998890	P	37	1.7	7.27	807	Flare 2
	SAMPLE3	L	-90.405170	30.001660	P	37	1.7	7.27	807	Flare 3
	SAMPLE4	L	-90.405130	30.003460	P	37	1.7	7.27	807	Flare 4
	SAMPLE5	L	-90.398980	30.000630	P	80	0.5	0.34	374	Blowdown
	SAMPLE6	L	-90.399770	29.999420	P	69	1.1	6.10	807	Flare 5
	SAMPLE7	L	-90.402190	29.997180	P	69	4.4	6.10	807	Flare 6
	SAMPLE8	L	-90.401780	29.998190	P	18	5.7	12.37	308	Cooling Tower 1
	SAMPLE9	L	-90.401950	30.000280	P	15	10.3	10.35	316	Cooling Tower 2
	SAMPLE10	L	-90.406830	29.992830	P	20	3.6	20.00	389	
Motiva Norco (Fugitive Emissions)	SAMPLE11	L	-90.329720	29.952220	P	3	0.0	0.00	295	
	SAMPLE12	L	-90.410560	29.993650	P	3	0.0	0.00	295	Marine Vessels
	SAMPLE13	L	-90.406830	29.992830	P	3	0.0	0.00	295	Marine Vessels
	SAMPLE14	L	-90.399480	29.998890	P	3	0.0	0.00	295	Wastewater Treatment Oil/Water Separator
	SAMPLE15	L	-90.402000	29.997000	P	3	0.0	0.00	295	Wastewater Treatment Oil/Water Separator
	SAMPLE16	L	-90.399890	29.997420	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE17	L	-90.399390	29.998720	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE18	L	-90.400860	29.999030	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE19	L	-90.401920	29.998330	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE20	L	-90.400720	29.999530	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE21	L	-90.404340	29.998250	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE22	L	-90.401170	29.998060	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE23	L	-90.406640	30.002580	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE24	L	-90.403470	30.002700	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPLE25	L	-90.399170	30.019330	P	3	0.0	0.00	295	Wastewater System: Non-aerated Impoundment
	SAMPLE26	L	-90.402050	30.018030	P	3	0.0	0.00	295	Wastewater System: Lift Station
	SAMPLE27	L	-90.406560	30.003690	P	3	0.0	0.00	295	
	SAMPLE28	L	-90.401970	30.011720	P	3	0.0	0.00	295	
	SAMPLE29	L	-90.404340	29.998250	P	3	0.0	0.00	295	
	SAMPLE30	L	-90.400330	29.997800	P	3	0.0	0.00	295	
	SAMPLE31	L	-90.400860	29.999030	P	3	0.0	0.00	295	
	SAMPLE32	L	-90.401170	29.998060	P	3	0.0	0.00	295	
	SAMPLE33	L	-90.401640	29.996610	P	3	0.0	0.00	295	
	SAMPLE34	L	-90.399890	29.997420	P	3	0.0	0.00	295	
	SAMPLE35	L	-90.400720	29.999530	P	3	0.0	0.00	295	
	SAMPLE36	L	-90.406650	30.002590	P	3	0.0	0.00	295	
	SAMPLE37	L	-90.403000	30.001000	P	3	0.0	0.00	295	
	SAMPLE38	L	-90.403810	29.998160	P	3	0.0	0.00	295	
	SAMPLE39	L	-90.404250	29.999500	P	3	0.0	0.00	295	
	SAMPLE40	L	-90.398610	30.009500	P	3	0.0	0.00	295	
	SAMPLE41	L	-90.398110	30.008920	P	3	0.0	0.00	295	
	SAMPLE42	L	-90.397530	30.010060	P	3	0.0	0.00	295	
	SAMPLE43	L	-90.399170	30.010440	P	3	0.0	0.00	295	
	SAMPLE44	L	-90.398860	30.011390	P	3	0.0	0.00	295	
	SAMPLE45	L	-90.397390	30.011060	P	3	0.0	0.00	295	
	SAMPLE46	L	-90.398530	30.012440	P	3	0.0	0.00	295	
	SAMPLE47	L	-90.403110	30.008720	P	3	0.0	0.00	295	
	SAMPLE48	L	-90.402830	30.009580	P	3	0.0	0.00	295	
	SAMPLE49	L	-90.402190	30.007800	P	3	0.0	0.00	295	
	SAMPLE50	L	-90.400950	30.008000	P	3	0.0	0.00	295	

APPENDIX 3. Continuation

Refinery	Source ID	Location type (U=UTM, L=lat/lon)	Longitude (decimal) [use center for point sources]	Latitude (decimal) [use center for point sources]	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Motiva Norco (Fugitive Emissions) Cont.	SAMPLE51	L	-90.403660	30.007220	P	3	0.0	0.00	295	
	SAMPLE52	L	-90.402580	30.006940	P	3	0.0	0.00	295	
	SAMPLE53	L	-90.402860	30.006110	P	3	0.0	0.00	295	
	SAMPLE54	L	-90.403420	30.008000	P	3	0.0	0.00	295	
	SAMPLE55	L	-90.404890	30.005020	P	3	0.0	0.00	295	
	SAMPLE56	L	-90.403470	30.012310	P	3	0.0	0.00	295	
	SAMPLE57	L	-90.400670	30.011830	P	3	0.0	0.00	295	
	SAMPLE58	L	-90.401410	30.012830	P	3	0.0	0.00	295	
	SAMPLE59	L	-90.402280	30.013060	P	3	0.0	0.00	295	
	SAMPLE60	L	-90.403660	30.009170	P	3	0.0	0.00	295	
	SAMPLE61	L	-90.403470	30.004300	P	3	0.0	0.00	295	
	SAMPLE62	L	-90.400610	30.015330	P	3	0.0	0.00	295	
	SAMPLE63	L	-90.401470	30.015530	P	3	0.0	0.00	295	
	SAMPLE64	L	-90.399860	30.011640	P	3	0.0	0.00	295	
	SAMPLE65	L	-90.404750	30.005970	P	3	0.0	0.00	295	
	SAMPLE66	L	-90.404030	30.005530	P	3	0.0	0.00	295	
	SAMPLE67	L	-90.402470	29.995900	P	3	0.0	0.00	295	
	SAMPLE68	L	-90.408470	29.997360	P	3	0.0	0.00	295	
	SAMPLE69	L	-90.403690	29.998140	P	3	0.0	0.00	295	
	SAMPLE70	L	-90.405360	30.001720	P	3	0.0	0.00	295	
	SAMPLE71	L	-90.404890	29.996080	P	3	0.0	0.00	295	
	SAMPLE72	L	-90.403780	29.996580	P	3	0.0	0.00	295	
	SAMPLE73	L	-90.400890	30.002580	P	3	0.0	0.00	295	
	SAMPLE74	L	-90.401280	30.003310	P	3	0.0	0.00	295	
	SAMPLE75	L	-90.401660	30.006780	P	3	0.0	0.00	295	
	SAMPLE76	L	-90.402080	30.005830	P	3	0.0	0.00	295	
	SAMPLE77	L	-90.400110	30.013330	P	3	0.0	0.00	295	
	SAMPLE78	L	-90.405330	29.994890	P	3	0.0	0.00	295	
	SAMPLE79	L	-90.405610	29.993970	P	3	0.0	0.00	295	
	SAMPLE80	L	-90.405890	29.993330	P	3	0.0	0.00	295	
	SAMPLE81	L	-90.399560	30.015050	P	3	0.0	0.00	295	
	SAMPLE82	L	-90.398610	30.015750	P	3	0.0	0.00	295	
	SAMPLE83	L	-90.398390	30.016420	P	3	0.0	0.00	295	
	SAMPLE84	L	-90.406420	29.993470	P	3	0.0	0.00	295	
	SAMPLE85	L	-90.399390	30.015970	P	3	0.0	0.00	295	
	SAMPLE86	L	-90.403200	30.000220	P	3	0.0	0.00	295	
	SAMPLE87	L	-90.404980	30.005640	P	3	0.0	0.00	295	
	SAMPLE88	L	-90.404440	30.007390	P	3	0.0	0.00	295	
	SAMPLE89	L	-90.404530	30.007140	P	3	0.0	0.00	295	
	SAMPLE90	L	-90.404500	30.007250	P	3	0.0	0.00	295	
	SAMPLE91	L	-90.404470	30.007310	P	3	0.0	0.00	295	
	SAMPLE92	L	-90.402690	29.999310	P	3	0.0	0.00	295	
	SAMPLE93	L	-90.411060	29.992830	P	3	0.0	0.00	295	
	SAMPLE94	L	-90.401860	30.003830	P	3	0.0	0.00	295	
	SAMPLE95	L	-90.405440	29.996470	P	3	0.0	0.00	295	
	SAMPLE96	L	-90.404980	30.001640	P	3	0.0	0.00	295	
	SAMPLE97	L	-90.405110	30.001860	P	3	0.0	0.00	295	
	SAMPLE98	L	-90.407140	30.002830	P	3	0.0	0.00	295	
	SAMPLE99	L	-90.407200	30.002670	P	3	0.0	0.00	295	
	SAMPL100	L	-90.404270	29.998810	P	3	0.0	0.00	295	
	SAMPL101	L	-90.404530	30.007080	P	3	0.0	0.00	295	
	SAMPL102	L	-90.404140	30.001640	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals

APPENDIX 3. Continuation

Refinery	Source ID	Location type (U=UTM, L=lat/lon)	Longitude (decimal) [use center for point sources]	Latitude (decimal) [use center for point sources]	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Motiva Norco (Fugitive Emissions) Cont.	SAMPL103	L	-90.404140	30.001640	P	3	0.0	0.00	295	Tank Cars and Trucks
	SAMPL104	L	-90.406040	30.007990	P	17	0.0	0.00	295	Cooling Towers
	SAMPL105	L	-90.402110	29.999790	P	18	0.0	0.00	295	Cooling Towers
	SAMPL106	L	-90.407290	29.999900	P	10	0.0	0.00	295	Cooling Towers
	SAMPL107	L	-90.402040	30.002500	P	3	0.0	0.00	295	Cooling Towers
	SAMPL108	L	-90.404180	29.999830	P	1	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL109	L	-90.407150	30.005300	P	3	0.0	0.00	295	Fugitive Emissions Miscellaneous: Sampling/Non-Asphalt Blowing/Purging/etc.
	SAMPL110	L	-90.406110	30.005280	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL111	L	-90.401990	30.004300	P	1	0.0	0.00	295	Fugitive Emissions
	SAMPL112	L	-90.406070	30.007090	P	3	0.0	0.00	295	Wastewater Treatment Oil/Water Separator
	SAMPL113	L	-90.406140	30.004380	P	3	0.0	0.00	295	Wastewater Treatment Oil/Water Separator
	SAMPL114	L	-90.400020	30.000650	P	3	0.0	0.00	295	Wastewater Treatment Oil/Water Separator
	SAMPL115	L	-90.398980	30.000630	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Jet Naphtha (JP-4): Standing Loss (67000 Bbl. Tank Size)
	SAMPL116	L	-90.398980	30.000630	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Jet Naphtha (JP-4): Standing Loss (67000 Bbl. Tank Size)
	SAMPL117	L	-90.402110	29.999790	P	3	0.0	0.00	295	Wastewater TreatmentOil/Water Separator
	SAMPL118	L	-90.399000	29.999730	P	3	0.0	0.00	295	Wastewater TreatmentOil/Water Separator
	SAMPL119	L	-90.400060	29.998850	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL120	L	-90.407130	30.006210	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL121	L	-90.400040	29.999750	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL122	L	-90.401050	30.000670	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL123	L	-90.402110	29.999790	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL124	L	-90.399500	30.020490	P	3	0.0	0.00	295	Wastewater System: Aerated Impoundment
	SAMPL125	L	-90.401050	30.000670	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL126	L	-90.405220	29.999850	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL127	L	-90.404070	30.004340	P	3	0.0	0.00	295	Wastewater System: Open Trench
	SAMPL128	L	-90.402160	29.997990	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL129	L	-90.407170	30.004400	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL130	L	-90.404140	30.001640	P	3	0.0	0.00	295	Wastewater Treatment w/o Separator
	SAMPL131	L	-90.402630	30.019650	P	3	0.0	0.00	295	Wastewater System: Non-aerated Impoundment
	SAMPL132	L	-90.402790	30.013340	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL133	L	-90.402110	29.999790	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL134	L	-90.401050	30.000670	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL135	L	-90.406090	30.006190	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL136	L	-90.400040	29.999750	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL137	L	-90.400060	29.998850	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL138	L	-90.405220	29.999850	P	9	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL139	L	-90.402130	29.998890	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL140	L	-90.401050	30.000670	P	9	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL141	L	-90.401100	29.998870	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL142	L	-90.402060	30.001600	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL143	L	-90.405130	30.003460	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Crude Oil: Standing Loss - External - Primary Seal
	SAMPL144	L	-90.405130	30.003460	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL145	L	-90.406300	29.998070	P	3	0.0	0.00	295	Industrial Processes Petroleum Industry Fugitive EmissionsCompressor Seals
	SAMPL146	L	-90.405290	29.997150	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Working Loss (Tank Diameter Independent)
	SAMPL147	L	-90.404230	29.998030	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL148	L	-90.403920	30.009750	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL149	L	-90.402870	30.010630	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL150	L	-90.402910	30.008830	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL151	L	-90.403950	30.008850	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL152	L	-90.402940	30.007930	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL153	L	-90.403920	30.009750	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL154	L	-90.405050	30.006170	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal

APPENDIX 3. Continuation

Refinery	Source ID	Location type (U=UTM, L=lat/lon)	Longitude (decimal) [use center for point sources]	Latitude (decimal) [use center for point sources]	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Motiva Norco (Fugitive Emissions) Cont.	SAMPL155	L	-90.402790	30.013340	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL156	L	-90.400700	30.014200	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL157	L	-90.401730	30.014220	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL158	L	-90.402770	30.014240	P	3	0.0	0.00	295	Fugitive EmissionsCompressor Seals
	SAMPL159	L	-90.404000	30.007050	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL160	L	-90.403900	30.010650	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL161	L	-90.404020	30.006150	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL162	L	-90.401970	30.005200	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL163	L	-90.405310	29.996250	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL164	L	-90.406370	29.995370	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL165	L	-90.406400	29.994470	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL166	L	-90.407360	29.997190	P	3	0.0	0.00	295	Industrial ProcessesPetroleum Industry Fugitive EmissionsCompressor Seals
	SAMPL167	L	-90.407390	29.996290	P	3	0.0	0.00	295	Industrial ProcessesPetroleum Industry Fugitive EmissionsCompressor Seals
	SAMPL168	L	-90.407390	29.996290	P	3	0.0	0.00	295	Industrial ProcessesPetroleum Industry Fugitive EmissionsCompressor Seals
	SAMPL169	L	-90.401050	30.000670	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL170	L	-90.405220	29.999850	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL171	L	-90.404230	29.998030	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL172	L	-90.404980	30.008870	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL173	L	-90.404980	30.008870	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL174	L	-90.404980	30.008870	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL175	L	-90.404980	30.008870	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL176	L	-90.404250	29.997130	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes)Specify Liquid: Standing Loss - Internal
	SAMPL177	L	-90.403120	30.000720	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL178	L	-90.402700	30.016940	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL179	L	-90.411580	29.994570	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL180	L	-90.409530	29.993630	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Specify Liquid: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL181	L	-90.407430	29.994490	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL182	L	-90.407430	29.994490	P	3	0.0	0.00	295	Floating Roof Tanks (Varying Sizes) Specify Liquid: Standing Loss - Internal
	SAMPL183	L	-90.406140	30.004380	P	3	0.0	0.00	295	Fugitive Emissions Pipeline Valves: Gas Streams
	SAMPL184	L	-90.401880	30.008810	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Distillate Fuel #2: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL185	L	-90.399690	30.013280	P	3	0.0	0.00	295	Fugitive Emissions Compressor Seals
	SAMPL186	L	-90.399590	30.016880	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Distillate Fuel #2: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL187	L	-90.399590	30.016880	P	3	0.0	0.00	295	Fixed Roof Tanks (Varying Sizes) Distillate Fuel #2: Breathing Loss (67000 Bbl. Tank Size)
	SAMPL188	L	-90.402630	30.019650	P	3	0.0	0.00	295	Wastewater System: Lift Station
Valero St. Charles (Vertical Emissions)	SAMPL189	L	-90.372220	29.964920	P	21	3.7	6.49	750	Blowdown System w/ vapor recovery system with flaring
Valero St. Charles (Fugitive Emissions)	SAMPL190	L	-90.372220	29.964920	P	3	0.0	0.00	295	Wastewater Treatment Process Drains and Wastewater Separators
	SAMPL191	L	-90.372220	29.964920	P	13	0.0	0.00	295	Cooling Towers 1
	SAMPL192	L	-90.372220	29.964920	P	20	0.0	0.00	295	Cooling Towers 2
	SAMPL193	L	-90.372220	29.964920	P	13	0.0	0.00	295	Cooling Towers 3
	SAMPL194	L	-90.372220	29.964920	P	3	0.0	0.00	295	Pipeline Valves and Flanges
	SAMPL195	L	-90.372220	29.964920	P	3	0.0	0.00	295	Wastewater Treatment Process Drains and Wastewater Separators
	SAMPL196	L	-90.372220	29.964920	P	3	0.0	0.00	295	Wastewater Treatment Process Drains and Wastewater Separators

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Refinery	Source ID	Location type (U=UTM, L=lat/lon)	Longitude (decimal) [use center for point sources]	Latitude (decimal) [use center for point sources]	Source type (P=point, A=area, V=volume)	Stack height (m)	Stack diameter (m)	Exit velocity (m/sec)	Exit temperature (K)	Source Description
Valero St. Charles (Fugitive Emissions) - Cont.	SAMPL197	L	-90.372220	29.964920	P	3	0.0	0.00	295	Petroleum and Solvent Evaporation Transportation and Marketing of Petroleum Products Marine Vessels Distillate Oil: Loading Barges
	SAMPL198	L	-90.372220	29.964920	P	13	0.0	0.00	295	Cooling Towers
	SAMPL199	L	-90.372220	29.964920	P	3	0.0	0.00	295	Wastewater Treatment Oil / Water Separator
	SAMPL200	L	-90.372220	29.964920	P	3	0.0	0.00	295	
	SAMPL201	L	-90.372220	29.964920	P	3	0.0	0.00	295	
	SAMPL202	L	-90.372220	29.964920	P	3	0.0	0.00	295	
	SAMPL203	L	-90.372220	29.964920	P	3	0.0	0.00	295	Petroleum and Solvent Evaporation Petroleum Product Storage
	SAMPL204	L	-90.372220	29.964920	P	3	0.0	0.00	295	Blowdown System with Vapor Recovery System with Flaring

VITA

Nadia Roa was born in Barquisimeto, Lara State, Venezuela. She received her Bachelor of Science in Chemical Engineering in Aug. 2001 from UNEXPO University. She already has six years of experience in Process Engineering developing minor capital projects in the Oil Refining Industry. The author started the Graduate Program Environmental Engineering at University of New Orleans in Aug., 2005 as part-time student, as a way of diversifying her career. Her fields of interest inside Environmental Engineering area are those related to air & water media. She will graduate with a GPA of 3.875.