Health Consultation

Assessing the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns As Part of the

MIDLOTHIAN AREA AIR QUALITY PETITION RESPONSE

MIDLOTHIAN, ELLIS COUNTY, TEXAS

JULY 28, 2015

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry Division of
Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation.

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

This health consultation is one of a series of six health consultations being prepared by ATSDR for this site. Completion of all six health consultations concludes the health consultation process for this site, and unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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ELLIS COUNTY, TEXAS

Prepared By:

U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR) Division of Community Health Investigations

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Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CARB	California Air Resources Board
DRI	Desert Research Institute
EPA	U.S. Environmental Protection Agency
ERG	Eastern Research Group, Inc.
^{o}F	Degrees Fahrenheit
GC/MS	Gas chromatography with mass spectrometry detection
ICP/MS	Inductively coupled plasma/mass spectrometry
LP	Limited partnership
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NEI	National Emissions Inventory
PAC	Polycyclic aromatic compound
PAH	Polycyclic aromatic hydrocarbon
PM	Particulate matter
PM_{10}	Particulate matter with aerodynamic diameter of 10 microns or less
$PM_{2.5}$	Particulate matter with aerodynamic diameter of 2.5 microns or less
QAPP	Quality assurance project plan
SNCR	Selective non-catalytic reduction
sVOC	Semi-volatile organic compound
TACB	Texas Air Control Board
TCEQ	Texas Commission on Environmental Quality
TDSHS	Texas Department of State Health Services
TNRCC	Texas Natural Resources Conservation Commission
TRI	Toxics Release Inventory
TSP	Total suspended particulate
UT-Arlington	The University of Texas at Arlington
VOC	Volatile organic compound
XRF	X-ray fluorescence

SUMMARY

INTRODUCTION

The Agency for Toxic Substances and Disease Registry (ATSDR) and the Texas Department of State Health Services (TDSHS) are conducting an extensive review of environmental health concerns raised by community members in Midlothian, Texas.

The goal of this review is to determine if chemical releases from local industrial facilities could or have affected the health of people and animals in the area. The facilities of concern are three cement manufacturing facilities and a steel mill. ATSDR plans to achieve this goal through a series of projects. This health consultation documents ATSDR's findings from the first project: assessing the adequacy of the ambient air monitoring database for evaluating community health concerns.

ATSDR decided to address this issue first after recognizing that community members have many concerns about the various air pollution measurements that have been collected in Midlothian since 1981. The purpose of this first health consultation is to take a very careful look at the available monitoring data and determine which measurements are—and are not—suitable for use in ATSDR's subsequent health evaluations. This health consultation identifies pollutants, time frames, and locations for which the available data provide a sufficient basis for reaching health conclusions; it also identifies important gaps in the data. The findings of this document are based on all validated ambient air monitoring data and related information available to ATSDR as of October 31, 2011.

By design, this first health consultation does not include evaluations of human health or animal issues. ATSDR remains committed to addressing those very important concerns and do so in our additional documents for this site. As ATSDR's Public Health Response Plan indicates, these documents address environmental data, health outcome data, and animal issues and concerns. The review of air pollution measurements in this document is the first of four health consultations that evaluate environmental data and is intended to serve as a foundation for ATSDR's media-specific and health outcome evaluations.

A public comment period for this health consultation was from 5/10/12 through 6/29/12. The comments received by ATSDR and responses to these comments can be found in Appendix E. In addition, ATSDR conducted a peer review of this health consultation after the completion of the public comment period (see Appendix F for peer

	review comments and ATSDR responses). Peer reviewers received all public comments and ATSDR responses to these comments and any changes made to this health consultation based on responses to the public comments.

CONCLUSIONS	ATSDR reached a main conclusion and six additional conclusions in this health consultation:
MAIN CONCLUSION	The available ambient air monitoring data for the Midlothian area are sufficient to support public health evaluations for numerous pollutants of concern and for many years that local industrial facilities operated. However, the monitoring data also have some limitations identified in the remaining six conclusions. For pollutants with little or no available environmental monitoring data, ATSDR believes there is utility in modeling air quality impacts to determine if additional sampling is warranted. The modeled data cannot be used to definitively determine if the potential exposure was, or is, a public health hazard.
BASIS FOR DECISION	ATSDR evaluated six key issues to reach this conclusion: • the pollutants monitored (see Conclusion 1) • the methods used to measure air pollution (see Conclusion 2) • the quality of these measurements (see Conclusion 3) • the time frames that monitoring occurred (see Conclusion 4) • the frequency and duration of monitoring (see Conclusion 5) • the monitoring locations (see Conclusion 6)
NEXT STEPS	ATSDR proposes continuing its evaluations of environmental data, bearing in mind the limitations in the ambient air monitoring data identified in this health consultation. The health evaluations consider exposure to individual pollutants and the overall mixture of air pollutants observed in the Midlothian area.

QUESTION 1	Has ambient air monitoring been conducted for all pollutants expected to be released from cement kilns and steel mills?
CONCLUSION 1	Air monitoring has occurred for some, but not all, of these pollutants: • Some monitoring data are available for every inorganic pollutant (e.g., metals and elements) included in facility emission reports, except for hydrochloric acid, sulfuric acid, and vapor-phase mercury. ATSDR has identified gaps in the available environmental monitoring data because of a lack of air measurements for these three pollutants. • For volatile organic compounds (VOCs), monitoring has occurred for the subset of pollutants that the facilities have released in greatest quantities. Monitoring is far less extensive or not available for VOCs that the facilities released in smaller quantities. • No ambient air monitoring has occurred for semi-volatile organic compounds including dioxins, furans, and polycyclic aromatic hydrocarbons (PAHs). ATSDR has identified this lack of information as a gap in the available environmental monitoring data. • Ambient air monitoring data are available for all the U.S. Environmental Protection Agency's criteria pollutants directly emitted by the facilities (lead, nitrogen dioxide, particulate matter, and sulfur dioxide) except for carbon monoxide.
BASIS FOR DECISION	These findings were determined by comparing the pollutants identified in the facilities' emission reports to the pollutants considered across all monitoring programs. Pollutants for which monitoring data were lacking are considered by ATSDR as identified gaps in the environmental monitoring data. For pollutants with little or no available environmental monitoring data, ATSDR believes there is utility in modeling worst-case air quality impacts to determine if additional sampling is warranted. Section 4.2 documents in greater detail ATSDR's basis for reaching this conclusion.
NEXT STEPS	ATSDR will proceed with evaluating the health implications of the measured concentrations, considering the findings outlined in Tables 13 to 16 of this health consultation.

The lack of air measurements for certain VOCs, hydrochloric acid, sulfuric acid, vapor-phase mercury, dioxins and furans, PAHs, and carbon monoxide are gaps in the available environmental monitoring data. ATSDR used models and other site-specific information in health consultations that follow to examine these pollutants further. These health consultations also consider the need for additional measurements of these pollutants in water, surface soil, and food items.

QUESTION 2

Is monitoring being conducted using scientifically defensible methods?

CONCLUSION 2

Nearly all monitoring in Midlothian has been conducted using scientifically defensible methods that are sensitive enough to measure air pollution at levels of potential health concern. However, there are important exceptions:

- Before 2001, air samples for inorganics (metals) were collected in 1981 and between 1991 and 1994. These samples were analyzed using a method that was commonly applied at the time, but later found to potentially understate air pollution levels. This finding does not apply to lead, because the methods used to measure airborne lead were well established during this time frame.
- The method that has been used to measure inorganics is also known to underestimate concentrations of nitrates.
- The ambient air monitoring methods used in the Midlothian area have generally been sensitive enough—that is, they have detection limits low enough—to measure ambient air concentrations at levels of potential health concern. The only exceptions are that the methods used to measure air concentrations of arsenic, cadmium, 1,2-dibromoethane, and hydrogen sulfide did not always achieve the sensitivity ATSDR would prefer to have for making health conclusions. However, there is no evidence that the Midlothian facilities use, process, or release 1,2-dibromoethane.

BASIS FOR DECISION

ATSDR identified every monitoring method that has been used in Midlothian since 1981 and compared those to both (1) methods that were widely used at the time and (2) methods that are currently documented in peer-reviewed and well-established guidance documents published by the U.S. Environmental Protection Agency (EPA). Section 4.3 documents in greater detail ATSDR's basis for reaching this conclusion.

NEXT STEPS	ATSDR's subsequent health consultations: 1) use data generated by valid methods for health evaluations. However, metals data before 2001 and all nitrate data are used with caution. 2) evaluate the valid measurements of certain VOCs, arsenic, cadmium, and hydrogen sulfide and that evaluation considers the fact that some of those measurements were not capable of measuring air pollution levels at concentrations near the most health-protective screening values.
QUESTION 3	Are the air monitoring data collected in the Midlothian area accurate, reliable, and of a known and high quality?
CONCLUSION 3	For the data generated using defensible methods, nearly all measurements were found to be reliable and to have met standard data quality objectives. The only exceptions are: • Two types of monitoring devices have been used in Midlothian to measure air pollution levels for fine particulate matter ($PM_{2.5}$). The concentrations measured by the continuous monitoring device, on average, are lower than the measurements made by the more reliable non-continuous device. • Several inorganics (barium, total chromium, copper, manganese, molybdenum, and silver) were detected in filter blank samples during certain studies. This means that measured air pollution levels for these pollutants are sometimes higher than actual air pollution levels. • Monitoring results for acrolein will be interpreted with caution due to data quality concerns that EPA has recently expressed for the sampling method that has been used for this pollutant. This concern is general and applies to all acrolein monitoring nationwide, and not only to the monitoring in Midlothian.
BASIS FOR DECISION	This conclusion is based on various data quality indicators that ATSDR obtained for every monitoring program that has been conducted in Midlothian. The difference between the continuous and non-continuous $PM_{2.5}$ measurements was determined by evaluating a large set of concurrent side-by-side measurements that were made using the two devices. Section 4.4 documents in greater detail ATSDR's basis for reaching this conclusion.
NEXT STEPS	When interpreting the continuous $PM_{2.5}$ monitoring data in our health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide,

ATSDR considered the fact that these devices may be underestimating ambient air concentrations.

When evaluating any data for inorganics, ATSDR considered the possibility of "false positive" detections due to metals naturally found in the filters used to collect the air samples. This issue, known as blank contamination, will most likely affect the measurements of barium, total chromium, copper, manganese, molybdenum, and silver.

QUESTION 4

Are monitoring data available for the time frames of greatest interest?

CONCLUSION 4

The answer to this question depends on the pollutant category. The time frames for which at least some valid air pollution measurements are available through calendar year 2010 follow:

- Particulate matter: 1981-1984 and 1991-2010
- Lead: 1981-1984, 1992-1998, and 2001-2010
- Inorganics (other than lead): 2001-2010
- Volatile organic compounds: 1993-2010
- Sulfur compounds: 1985 and 1997-2010
- Nitrogen oxides: 2000-2010
- Ozone: 1997-2010

Gaps in the available environmental monitoring data that are most important because they cannot be reliably filled by estimates made using surrogate sources of information are:

- No ambient air monitoring data are available before 1981.
- No air monitoring data were collected in the vicinity of the Ash Grove Cement facility during the years (1986-1991) that the facility (under different management) was permitted to burn hazardous waste.

BASIS FOR DECISION

This conclusion is based on the years for which valid measurements are available. The conclusion excludes data that ATSDR determined were not suitable for health assessment purposes (see Conclusion 2).

NEXT STEPS

In additional health consultations, ATSDR evaluated the health implications of the measured air pollution levels for all years when ambient air monitoring data were collected.

For years when no measurements were collected, ATSDR derived estimates of air pollution levels from other sources of information, such as facility specific fuel usage statistics, emission rates, efficiency of air pollution controls, and air models. All such estimates are documented.

QUESTION 5	Is ambient air monitoring being conducted at appropriate frequencies and durations?
CONCLUSION 5	The monitoring frequency in Midlothian ranges from sampling that occurs continuously to sampling that occurs every 6 days. The duration of individual samples for most pollutants ranges from 1-hour averages to 24-hour averages; and 5-minute average measurements were reviewed for sulfur dioxide. These frequencies and durations are consistent with monitoring methodologies commonly used throughout the country. The available air pollution measurements and facility-specific emission measurements provide no evidence that the Midlothian facilities alter their emissions on days when 1-in-6 day samples are collected. Data collected in Midlothian show that 1-in-6 day sampling schedules adequately characterize air pollution levels over the long term, such as annual average concentrations. On the other hand, a 1-in-6 day sampling schedule generally does not capture the highest short term air pollution levels, unless the day with the highest air pollution levels happened to coincide with a sampling date. For $PM_{2.5}$, data from Midlothian indicate that the highest 24-hour average measurement from a 1-in-6 day sampling schedule could be as much as 44 percent lower than the highest 24-hour average air pollution level that actually occurred. This analysis would, however, only be applicable to these $PM_{2.5}$ data and would not necessarily be applicable to different time frames or other contaminants. However, it illustrates the concern that sampling may miss ‘peak exposures’.
BASIS FOR DECISION	This conclusion is based on a detailed evaluation of several different types of air pollution measurements and facility-specific air emission estimates. Section 4.6 documents in greater detail the specific data sources that ATSDR considered and how they were evaluated in order to reach this conclusion.
NEXT STEPS	In its additional health consultations, ATSDR considered the limitations posed by a 1-in-6 day sampling schedule by evaluating continuous monitoring and available shorter-term monitoring (e.g., 1-hour)

QUESTION 6	Are the monitoring stations placed in locations that adequately characterize outdoor air pollution?
CONCLUSION 6	The number and placement of air monitoring stations in Midlothian has varied greatly by pollutant and year. The locations of monitoring stations in Midlothian were chosen for different reasons. Some monitors were placed in locations to capture the highest levels of air pollution anticipated for the area or to measure air pollution in areas with the most citizen complaints. These monitors were placed at or near locations where an EPA modeling study predicted the highest air quality impacts would occur. Three monitors were located south of the TXI Operations facility: the Midlothian Tower station, the Mountain Creek station, and the Mountain Peak Elementary School station. These locations are typically upwind from the main sources of air pollution in Midlothian. While measurements from these monitors are valid, they are not reasonable indicators of the worst-case air pollution levels. Several monitors have operated in the area immediately north of Gerdau Ameristeel and TXI Operations. The two monitors that have been operating the longest are at Old Fort Worth Road and at Wyatt Road. Air pollution levels tended to be higher at Old Fort Worth Road. This station's measurements are a reasonable indicator of air quality in the residential neighborhoods along Cement Valley Road and Wyatt Road even if the Old Fort Worth Road monitor is due east of this area. The monitoring that has been conducted in Midlothian clearly does not characterize air pollution levels at every single residential location over the entire history of facility operations. In ATSDR's judgment, the most notable gap in monitor placement is the lack of monitoring data for residential neighborhoods in immediate proximity to the four industrial facilities, where fugitive emissions would be expected to have the greatest air quality impacts.
BASIS FOR DECISION	This conclusion is based on ATSDR's review of multiple sources of information: the rationale that different parties provided for selecting monitoring locations; outputs from modeling studies; and observed changes in Midlothian's air pollution levels over relatively short distances. Section 4.7 documents in greater detail how ATSDR arrived at this conclusion.
NEXT STEPS	In subsequent health consultations, ATSDR interpreted data collected at the various monitoring locations, recognizing that some of the

	monitors were placed in areas typically upwind from the facilities of interest. In those documents, recommendations for future sampling were made.
FOR MORE INFORMATION	If you have questions about this document or ATSDR's ongoing work on the Midlothian facilities, please call ATSDR at 1-800-CDC-INFO and ask for information about the "Midlothian, Texas Evaluations." If you have concerns about your health, you should contact your health care provider.

1.0 Purpose and Statement of Issues

Purpose of this Document
ATSDR prepared this Health Consultation to evaluate the utility of the ambient air monitoring data currently available for the Midlothian area for public health assessment purposes.

This document identifies pollutants, time frames, and locations for which the available data provide a sufficient basis for reaching health conclusions. This document also identifies gaps in the available data set and addresses community concerns specific to the air monitoring network.

This document **does not** present any public health evaluations of the ambient air monitoring data. After this document is finalized, ATSDR will evaluate the public health implications of exposures to environmental contamination in the Midlothian area and document those findings in future health consultations.

In July 2005, a group of residents of Midlothian, Texas, submitted a petition to the Agency for Toxic Substances and Disease Registry (ATSDR). The petition expressed multiple concerns, but primarily that nearby industrial facilities were emitting air pollutants at levels that were affecting the health of residents. ATSDR accepted this petition, and the Texas Department of State Health Services (TDSHS), under a cooperative agreement with ATSDR, prepared a response.

Specifically, in December 2007, TDSHS, with ATSDR concurrence, issued a public comment draft health consultation that attempted to respond to many concerns outlined in the original petition. Many comments were received on the draft health consultation.

During the process of evaluating these comments, the ATSDR and National Center for Environmental Health Director requested that the ATSDR and TDSHS team take a more comprehensive look at the site. Specifically, this new evaluation would review the initial petitioner's concerns which questioned whether or not the data generated by air monitors was being collected in a manner that could provide pertinent answers to the community health concerns. ATSDR and TDSHS are now looking at all available data to determine if there is a relationship between air emissions and health concerns in the community. As outlined in its Midlothian Public Health Response Plan [ATSDR 2011], ATSDR is completing this reevaluation in a series of projects.

This ATSDR health consultation was developed to assess the utility of existing ambient air monitoring data for addressing Midlothian residents' concerns regarding air emissions from four industrial facilities, while also considering additional air quality impacts from other sources (e.g., motor vehicle traffic). The technical evaluations in this document are organized into six sections:

1. Pollutants monitored
2. Monitoring, sampling, and analytical methods used
3. Data quality of the air pollution measurements
4. Time frames covered

5. Monitoring frequencies and durations

6. Monitoring locations

To evaluate these issues, ATSDR first gathered relevant information on facility emissions, local meteorological conditions, and ambient air monitoring data. The findings in this document are based on all validated ambient air monitoring data and related information available to ATSDR as of October 31, 2011. ATSDR accessed information from multiple parties, including: the petitioner, local community groups, industry, and consultants; scientists from The University of Texas at Arlington (UT-Arlington); TDSHS; the Texas Commission on Environmental Quality (TCEQ); and the U.S. Environmental Protection Agency (EPA).

2.0 Background

This section presents background information that ATSDR considered when evaluating the utility of the ambient air monitoring studies previously conducted in the Midlothian area. Refer to Section 4 of this health consultation for ATSDR's interpretations of this background information and assessment of the ambient air monitoring conducted in the Midlothian area.

2.1 Air Emission Sources

Midlothian is located in Ellis County, Texas, approximately 30 miles south of the Dallas-Fort Worth metropolitan area. Figure 1 shows the location of Midlothian and the four industrial facilities of interest. This section provides background information on the various emission sources that affect air quality in Midlothian, with a focus on the four industrial facilities shown in Figure 1.

Air Emissions in Midlothian
The air exposure pathway begins with air emission sources—processes that release pollutants into the air. Once released, these pollutants move from their sources to locations where people may be exposed. This section presents background information on the air emission sources of interest in the Midlothian area: a steel mill and three cement manufacturing facilities that operate multiple kilns. Other local emission sources are also identified and discussed.

Operations at all four facilities of interest have changed over the years. Some changes would have increased air emissions (e.g., increased production levels, use of different fuels in the kilns) while others would have decreased air emissions (e.g., installation of pollution control devices). In some cases, changes at the facilities may have simultaneously decreased emissions of certain pollutants and increased emissions of others. These changing operations are important to consider when evaluating the air quality issues in the Midlothian area. Emissions can also change considerably from one hour to the next—an issue addressed later in this health consultation.

The four facilities of interest in Midlothian emit several pollutants at rates that have consistently ranked among the highest for industrial facilities in Ellis County that submit data to TCEQ's Point Source Emissions Inventory. Accordingly, this section presents detailed summaries of emission data for the four facilities of interest. Other emission sources (e.g., motor vehicles) are briefly acknowledged and characterized for completeness.

2.2 Background on Relevant Industrial Processes

This section presents general information on the relevant manufacturing processes for the facilities of interest in Midlothian, with a focus on the types of air emissions commonly found at cement kilns and steel mills.

2.2.1 Air Emissions from Cement Kilns

Cement is a commercial product that is used to make concrete. While cement manufacturing facilities employ various production technologies to make their products, most facilities share some common design features. A very simplified account of common elements of cement manufacturing follows.

Cement is typically manufactured by feeding crushed limestone, shale, and other materials into kilns that operate at very high temperatures, typically at least 2,700 ^{o}F [EPA 1993]. Facilities burn various fuels to sustain these kiln temperatures. Fuels used across industry include coal, oil, natural gas, hazardous waste, and tires. When the raw materials are heated to the temperatures achieved in the kilns, they form a material known as “clinker,” which is the solid output from the kilns that is cooled and mixed with gypsum to form the cement product.

Though the main product from the kiln is clinker, many by-products are also formed and exit the kiln in air exhaust. The primary by-product is cement kiln dust, which is a highly alkaline dust of fine particle size. Air pollution control equipment, such as baghouses and electrostatic precipitators, are typically used to reduce emissions of cement kiln dust in the exhaust air from the kilns. Cement kiln dust not collected in the controls or otherwise captured for further processing is emitted in the stacks typically found at cement kilns, along with combustion by-products, which include carbon monoxide, nitrogen oxides, sulfur dioxide, and various volatile organic compounds (e.g., formaldehyde) and semi-volatile organic compounds (e.g., dioxins and furans).

Besides their kilns, cement manufacturing facilities have many other operations that process materials. These may include mining for limestone at on-site quarries, crushing and blending of raw materials, and other material handling processes. Air emissions from these and various other operations tend to occur at ground level and are not always vented through air pollution controls.

Table 1 identifies general categories of pollutants typically emitted from cement kilns and explains the origin of these emissions. Detailed information specific to the Midlothian facilities is presented later in this section.

2.2.2 Air Emissions from Steel Mills

Most steel in the United States is manufactured in either basic oxygen furnaces or in electric arc furnaces [EPA 2000a]. Electric arc furnaces are the manufacturing technology of choice at facilities that manufacture steel from scrap metal, as occurs in Midlothian. With this technology, scrap metal and, if necessary, alloys are loaded into the furnace. Electrical energy is then used to melt the scrap metal. During the melting process, impurities in the steel react with the air in the furnace to form various by-products that are vented to the air, typically after passing through some form of air pollution control device. These emissions can include inorganics (i.e., metals and elements) originally found in the scrap, as well as volatile organic compounds (VOCs) that can form from the impurities present in the melting process.

After each batch of scrap metal is melted, the electric arc furnace is tilted and the contents are poured into a mold, in which the molten steel gradually cools and takes its final form. The steel then usually undergoes additional finishing processes (e.g., rolling, beam straightening) to make the final product. Slag is a solid by-product from the melting process. Steel mills employ various strategies for managing slag, including disposal and beneficial reuse.

Overall, pollutants typically emitted from steel mills that melt scrap in electric arc furnaces include particulate matter (PM) or dust, VOCs, carbon monoxide, nitrogen oxides, and sulfur dioxide. The PM emitted from these facilities contains various inorganics.

2.3 Air Emissions Sources in Midlothian

For each facility of interest, this section summarizes the industrial processes and air emissions (among other factors) to provide context for this document's technical evaluation. When preparing this document, ATSDR accessed and thoroughly reviewed extensive additional information on each facility's history, although every observation is not documented in this section. TCEQ is the regulatory permitting authority for all four facilities, and that agency's records document the history of these facilities' air permits and compliance status. The following information is reviewed in Sections 2.3.1 through 2.3.4 for the four facilities of interest:

- Overview. Information is provided on the facilities' history, ownership, location, and main production processes, including types and amounts of fuels used to power their furnaces and kilns. This section also documents the number and nature of community complaints regarding facility operations that residents filed with TCEQ between January 2002 and June 2010. (Table B-1 in Appendix B documents every complaint specific to the Midlothian facilities for this time frame, based on information accessed from a TCEQ online database of facility-specific complaints.) This time frame was selected because it represents the entire history of information available from TCEQ's online compilation of complaints at the time ATSDR gathered these data. ATSDR fully appreciates that the list of available complaints from TCEQ does not represent the only dates when residents were concerned about air quality. ATSDR has identified other specific dates when residents were concerned about air quality, even if an official complaint was not filed. This was accomplished by evaluating dated pictures and videos from the community. These dates, along with the official complaint dates and emission events were further evaluated (see below).

- Annual estimated air emissions. The facilities' self-reported estimated annual air emissions are summarized, using data that the facilities submitted to EPA's Toxics Release Inventory (TRI) and to TCEQ's Point Source Emissions Inventory.

  TRI data provide insights on facility-specific air toxic emissions. Taken together, the four facilities have submitted hundreds of annual emission estimates to TRI over the past 20 years. This section uses three different approaches to summarize these data, although ATSDR fully evaluated the trends and patterns among the complete set of data when preparing this report [EPA 2010a]. First, this section summarizes total annual air emissions (i.e., summed across all pollutants) reported by the facilities of interest over all years for which TRI data are available (1988–2010). Second, this section identifies the pollutants accounting for the majority of facility emissions between 2000 and 2010. This particular time frame was selected because changes to the reporting requirements that became effective in 2000 resulted in many industrial facilities disclosing information on emissions that they had not disclosed previously. Third, this section identifies any pollutants for which the individual facilities' self-reported emissions for 2008 rank among the nation's top 100 facilities in terms of air emissions reported to TRI; 2008 was selected for this analysis because that was the most recent year of TRI data available when ATSDR began evaluating these data. ATSDR used the TRI data as a qualitative indicator of facilities' emission data, although this limited presentation of information does not account for finer nuances in facility emissions (e.g., relatively small emissions of extremely toxic pollutants can be more significant than larger releases of more benign pollutants). Detailed quantitative analyses of these data are not included here for various reasons, one of which being that all TRI data are self-reported. EPA does require that facilities use the best available information when preparing release estimates for TRI, which may include use of monitoring data. However, many of the data points are estimated and cannot be readily validated.

  TCEQ's Point Source Emissions Inventory data were accessed for criteria pollutants (e.g., carbon monoxide, lead, particulate matter [PM], sulfur dioxide, nitrogen oxides) and precursors to some criteria pollutants (e.g., VOCs). This section summarizes annual emission data from 2000 to 2009. The year 2000 was selected as a starting point because it is the first year in which fine PM emission rates (i.e., $PM_{2.5}$) were included in this inventory; and 2009 is the most recent year for which inventory data were available at the writing of this report. As with the TRI data, the criteria pollutant emission data in the Point Source Emissions

Inventory are also self-reported. However, annual emission data for some criteria pollutants are based on continuous emission monitoring data at the facilities of interest. Continuous emission monitors are devices that continuously measure air emissions inside stacks and other process areas. In other words, these devices directly measure emissions, so facilities do not need to estimate their emissions. This section also identifies whether any of the facilities' annual emissions rank among the state's top 25 emitters in the Point Source Emissions Inventory.

While much of this section will focus on facility-specific information, ATSDR ultimately evaluates the public health implications of exposure to environmental contamination levels, which reflect contributions from all local sources combined. This distinction is acknowledged in ATSDR's subsequent health consultations, which present the agency's health interpretations of the environmental monitoring data.

- Short-term estimated air emissions. This section summarizes the frequency and magnitude of certain short-term air releases, which annually-averaged emission data do not characterize. TCEQ regulations require industrial facilities to disclose information associated with certain scheduled activities that lead to excess emissions (e.g., process maintenance, planned shutdowns) as well as unscheduled emission events (e.g., following process upsets or accidental releases). Whether reporting is required depends on several factors, such as the nature of the release and the amount of pollutants emitted.

  Facility-specific information on short-term estimated air emissions is based on data that facilities submitted to TCEQ's "Air Emission Event Reports" database. TCEQ in turn makes these emission event reports publicly available in summary form on its website. ATSDR accessed the entire history of online emission event data, which dates back to 2003 [TCEQ 2010a]. Facility submission of an emission event report does not necessarily mean that emissions exceeded permit limits, as there can be many reasons why facilities submit these reports (e.g., in advance of certain maintenance activities).

  Most information on emission events is self-reported emission estimates; however, evidence of emission events and some of the release quantities documented in these events are based on continuous emissions monitors (or direct measurements of stack emissions). Appendix B lists the reported emission events for the four Midlothian facilities of interest. It is possible that elevated short-term events have occurred at the facilities of interest but were never reported to TCEQ (e.g., events not associated with the stacks that are continuously monitored). Note that in some cases, environmental impacts of these events would be detected by nearby offsite ambient air monitoring devices; this would happen when winds blew emissions toward the monitors and if the monitors were sampling for the pollutants that were emitted. Understanding the short-term emissions is an important consideration for at least two reasons. First, several community members have voiced concern specific to acute (or short-term) exposures. Second, tabulations of annual average emissions and air pollution levels may mask important peaks in facility releases. Therefore, this document and ATSDR's additional health consultations consider the implications of both short-term and long-term air pollution levels.

- Analysis of odor complaints and emission event logs. To address residential concerns regarding whether or not complaint and emission event logs reflect a change in air quality, ATSDR evaluated the relationship between odor complaints, unplanned emission events, and measured air data. The purpose of this analysis was to examine if sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$) levels were higher during days listed in databases documenting odor complaints and when unplanned releases occurred at the facilities. Ambient data collected in the area were used to evaluate the correlation between available short-term (1-hour) NAAQS data with odor complaints and unplanned releases. The specific facilities evaluated in this analysis include the "Cement Valley" facilities (TXI and Gerdau Ameristeel) plus the Holcim Ltd. and Ash Grove Cement plants.

  Meteorological and air measurement data were downloaded for three locations (Midlothian Tower, Old Fort Worth Road, and Wyatt Road) from TCEQ's TAMIS database. Data for this analysis were acquired from:
  - TCEQ emissions events reports (http://www11.tceq.texas.gov/oce/eer);
  - TCEQ complaint logs (http://www2.tceq.texas.gov/oce/waci); and
  - Video and photographic material provided by residents.

  The major conclusion of this analysis is that ATSDR did not find an appreciable difference in levels of sulfur dioxide, nitrogen dioxide and $PM_{2.5}$ on the event/complaint days as compared to the days with no event or complaint. There are potentially many reasons for this, such as: 1) lag time between odors and reporting; 2) lack of information regarding the time of day the complaint was made; 3) the fact that people tend to only complain when they are home, potentially skewing an assessment of releases and complaints (if releases occurred during work or school hours); 4) or other unknown reasons.

  Furthermore:
  - Levels of SO_2 and NO_2 were clearly associated with local sources (strongly related to TXI, see Figures 2 and 3; see Appendix D for a description of what is shown in the polar plots);
  - $PM_{2.5}$ and ozone had no clear association with local sources;
  - Wind direction and speed strongly effects concentration of the pollutants;
  - Pollutant levels have changed over time or are associated with time periods (e.g., we found that weekday NO_2 levels were higher than weekend); and
  - Similar to wind direction, outdoor temperature appeared to also be related to the amount of pollutant measured.

Appendix D presents more detailed information about ATSDR's analysis of complaints and unplanned emission events with air measurement data for several NAAQS pollutants.

2.3.1 Ash Grove Cement

Facility Profiles
The following pages in this document present brief profiles for the four facilities of interest. The purpose of this section is to document some of the most relevant background information that ATSDR collected. These should not be viewed as comprehensive summaries of the individual facilities and their histories.

While this section, by design, focuses on the individual facilities separately, ATSDR's final evaluations for this site—both in this document and in future health evaluations—consider the combined air quality impacts from all four facilities, as well as additional air emission sources throughout the Midlothian area.

- Overview. Ash Grove Texas L.P. is a business entity that operates a Portland cement manufacturing facility located north of Midlothian, referred to in this document as "Ash Grove Cement."[1] The parent company of this facility is Ash Grove Cement Co. From 1990 until 2003, the facility in Midlothian was owned and operated by another entity called North Texas Cement Company, L.P.; and prior to 1990, the facility was owned and operated by Gifford Hill Cement Company. The facility was constructed in 1965 and began operating in 1966, and it currently operates three rotary kilns to manufacture cement. These kilns began operating in 1966, 1969, and 1972 [TNRCC 1995]. Cement is manufactured by feeding limestone, shale, and other raw materials into the rotary kilns, which operate at temperatures reaching 4,000 degrees Fahrenheit (^{o}F). Most of the raw materials used in the process are from an onsite quarry, but some materials come from offsite sources via truck and rail. The solid product from the kilns—known as clinker—is subsequently ground together with gypsum to make Portland cement.

  Various fuels have been used at the facility over the years to fire its kilns. For example, only natural gas was used to fire the kilns after the facility was first built. In the 1970s, fuel oil handling equipment was added, with other fuels (e.g., coal, coke, wood chips) added in subsequent years. As described further below, waste-derived fuel was burned in the mid-1980s into the early-1990s, and whole tires were allowed as a fuel starting in the 1990s. The facility is currently not able to use tire chips and has never used tire chips. The facility has not extensively used wood chips or used oil in the last decade. Currently, the facility employs a combination of coal, petroleum coke, and tires to fire its kilns; natural gas was typically used only for startup of the kilns but usage has expanded in recent years.

  As noted previously, from 1986 to 1991, the facility was also authorized to burn waste-derived fuel in its kilns as a supplemental energy source. Starting in 1989, industrial facilities managing hazardous waste were required to submit biannual reports to EPA on

[1] This document primarily uses "Ash Grove Cement" to refer to the cement manufacturing facility located in Midlothian. Ash Grove Texas L.P. is the business entity that currently operates that facility. References to "the facility" throughout this document refer to the cement manufacturing plant, which was owned and operated by different entities over the years.

the quantities of waste that were managed. In 1989, 55,000 tons of hazardous waste were reportedly used for purposes of energy recovery; and in 1991, 14,200 tons of hazardous waste were used for this purpose [EPA 2010b]. The practice of burning hazardous waste ceased in 1992.

At the time, hazardous waste combustion in cement kilns was regulated under an EPA regulation that addressed combustion of hazardous waste in boilers and industrial furnaces. That regulation required affected facilities to conduct compliance tests to determine allowable waste feed rates, use of automatic waste feed cutoffs to prevent feed rates from exceeding these limits, and other safeguards. In 1995, the facility received authorization to burn whole tires in its cement kilns and the facility is required to report to TCEQ its ongoing usage of tire-derived fuel [TCEQ 2009a]. Annual statistics for the facility's usage of tire-derived fuel follow [Ash Grove Cement 2010]:

1996	5,500 tons	2003	39,400 tons
1997	18,400 tons	2004	43,300 tons
1998	33,400 tons	2005	43,000 tons
1999	37,100 tons	2006	43,400 tons
2000	38,200 tons	2007	42,400 tons
2001	38,200 tons	2008	44,800 tons
2002	37,400 tons	2009	29,300 tons

The previous compilation of data show varying annual usage of tire-derived fuel, including a substantial decrease in usage in 2009. According to Ash Grove Cement's air permit, the facility is currently allowed to fire its kilns with multiple fuels.

Ash Grove Cement's production processes have numerous sources of air emissions. Exhaust air from the three kilns, for example, vents to the atmosphere through 150-foot tall stacks, after first passing through electrostatic precipitators designed to capture PM and other pollutants before being released to the air. Selective non-catalytic reduction technology has recently been implemented in all three kilns to reduce air emissions of nitrogen oxides. These air pollution controls collect a large portion of the kiln's emissions, including cement kiln dust, but are not 100 percent efficient and every kiln at Ash Grove Cement emits various pollutants through its stacks. The facility is required to continuously monitor emissions of carbon monoxide, nitrogen oxides, and sulfur dioxide (and the facility was previously required to monitor emissions of VOCs), although many other pollutants are released from this source. These continuous monitors are placed directly in the kiln stacks.

In 2007, Ash Grove Texas, L.P. installed and operated a Selective Non-catalytic Reduction (SNCR) unit on one of its kilns. By summer of 2008, all three kilns were retrofitted with an SNCR system. The SNCR system reduces emissions of nitrogen oxides from the combustion process in the kilns by injecting an aqueous solution of ammonia or urea into the kilns. The ammonia or the urea reacts with nitrogen oxides, reducing the emissions of this gas. In 2013, the facility began a $150 million upgrade to decommission its three older kilns and construct one modern kiln to reduce emissions of oxides of nitrogen (NOx) and sulfur dioxide (SO_2) (Ash Grove, 2013).

Emissions also occur from the facility's quarry activities, physical processing of raw materials (e.g., crushing, grinding, milling), materials handling operations, stockpiles, and other storage areas. Many of these other emission sources are also equipped with air pollution controls to help reduce releases. For example, dust collectors capture PM from many of the materials handling operations. Facility-wide emissions can vary considerably with time, because Ash Grove Cement has occasionally changed its fuel sources and design of its unit operations; new equipment has been added over the years, while some older equipment has been taken out of service.

According to queries run on TCEQ's Web site, the agency received no complaints from residents about air emissions specifically from Ash Grove Cement between 2002 and 2010 (Table 2) [TCEQ 2010b].

- Annual estimated air emissions. Figure 4 shows the long-term trend of air emissions that Ash Grove Cement reported to TRI. For each year between 1988 and 2010, the figure displays the total air emissions on the facility's TRI forms. For the years in which Ash Grove Cement reported to TRI, total air emissions summed across all pollutants ranged from 1,923 pounds to 140,463 pounds. From 2000 to the present, stack emissions of sulfuric acid aerosols have accounted for more than 98 percent of the total air emissions that Ash Grove Cement has reported to TRI. Other pollutants reported most frequently since 2000 include various metals—compounds of chromium, lead, manganese, and mercury—and dioxin and dioxin-like compounds. For every pollutant that Ash Grove Cement reported to TRI in 2008, the facility's annual air emissions did not rank among the top 100 emitters in the nationwide database.

  Table 3 presents the criteria pollutant emission data that Ash Grove Cement submitted to TCEQ's Point Source Emissions Inventory between 2000 and 2009, the years during which the inventory covers the most complete list of pollutants of interest. As the table shows, year-to-year changes in emission rates occurred for many pollutants, with both increases and decreases occurring in the overall time frame. For one out of the seven pollutants listed in Table 3, Ash Grove Cement's annual emissions in 2007 ranked among the top 25 facilities in Texas: the facility's sulfur dioxide emissions were the 19^{th} highest among the more than 2,000 industrial facilities that submitted data to this statewide inventory.

- Short-term estimated air emissions. According to data ATSDR accessed in 2011, Ash Grove Cement submitted 257 air emission event reports to TCEQ dating back to 2003 (Table 2). Of these, 87 were scheduled maintenance, startup, or shutdown activities. The remaining 170 events were excess opacity events and emission events. Only one of these event reports included a pollutant-specific emission rate, however. On February 16, 2005, Ash Grove Cement experienced an hour-long emission event that released 106 pounds of carbon monoxide into the air; no other pollutants were identified in the excess emission event report. It should be noted that some reports made by Ash Grove Cement were reportedly based on an expectation that there was a chance that the type of event (i.e., startup, shutdown, or maintenance) could result in emissions of one or more pollutants over a permit limit. Reporting of such information should not be inferred to mean that emissions above permitting limits automatically occurred.

2.3.2 Gerdau Ameristeel

- Overview. Gerdau Ameristeel—sometimes referred to as Chaparral Steel—operates a secondary steel mill located southwest of Midlothian and adjacent to TXI Operations (see Section 2.3.4). The facility began operating in 1975 [TNRCC 1995] and currently uses two electric arc furnaces and three rolling mills to melt and recycle scrap steel. The scrap steel is obtained from an automobile shredder and junkyard, also located at the facility. The two electric arc furnaces melt scrap steel, and then casting operations form the material into structural steel beams, reinforcing bars, and other shapes and forms. Note that this facility does not operate coke ovens to generate energy; therefore, coke oven emissions will not be considered in this investigation.

  Gerdau Ameristeel's production processes have multiple emission sources. Air emissions from the two furnaces are controlled through the use of positive and negative pressure baghouses, which collect airborne particles that would otherwise be released to the environment. Exhaust air from these baghouses vents to the atmosphere through any of three stacks; two are 150 feet tall, and the third is 80 feet tall. Emissions also occur from the facility's automobile shredding operation, melt shop, and scrap and slag handling. Many of these operations are also equipped with air pollution controls. For example, the slag crusher and alloy handling processes have baghouses that capture PM from exhaust streams that would otherwise be emitted to the air. The extent of air pollution controls changed over time. For instance, in 1988, Gerdau Ameristeel installed a new baghouse that considerably reduced emissions of particulate matter; and further reductions occurred in the early 1990s when another new baghouse was installed and the facility's "roof vents" in certain production areas were removed. A complete list of these controls is available from the facility's submissions to TCEQ's Point Source Emission Inventory. Currently, Gerdau Ameristeel is not required to continuously monitor pollutant emission rates from any of its main stacks.

  According to queries run on TCEQ's Web site, the agency received 52 complaints from residents about air emissions from Gerdau Ameristeel between 2002 and 2010 (Table 2) [TCEQ 2010b]. These complaints were filed for various reasons: odor was cited as a reason for 24 of these complaints. The most frequently cited odor was a burning plastic smell (for 12 of the complaints). Residents also reported detecting diesel, metal, sulfur, and chemical odors. Other reasons that residents filed complaints included deposition of dust, visible smoke, and general complaints about excessive industrial activity. Nearly every complaint specific to Gerdau Ameristeel occurred during nighttime hours.

- Annual estimated air emissions. Figure 4 shows the long-term trend of Gerdau Ameristeel's TRI air emissions. For each year between 1988 and 2010, the figure displays the total air emissions (summed across all pollutants) on the facility's TRI forms. For the years in which Gerdau Ameristeel reported to TRI, total air emissions summed across all pollutants ranged from 8,809 pounds to 208,388 pounds. From 2000 to the present, air emissions of zinc compounds have accounted for 63 to 73 percent of the total air emissions that the facility reported to TRI. Other pollutants reported most frequently during this time frame are metals—compounds of cadmium, chromium, copper, lead, manganese, mercury, and nickel. For two pollutants, Gerdau Ameristeel's reported emissions in 2008 ranked among the top 100 facilities nationwide: total air emissions of cadmium compounds ranked 20th highest among the nation's facility-specific TRI submissions, and mercury compounds ranked 34th.

Table 3 presents the criteria pollutant emission data that Gerdau Ameristeel submitted to TCEQ's Point Source Emissions Inventory between 2000 and 2009. For each of the pollutants shown in the table (carbon monoxide, lead, nitrogen oxides, PM, sulfur dioxide, and VOCs), annual emissions in 2009 were lower than those reported for 2000. For lead, Gerdau Ameristeel's annual emissions in 2007 ranked 10th among the industrial facilities that submitted data to the statewide inventory. For the remaining pollutants, Gerdau Ameristeel's emissions did not rank among the highest 25 facilities in the state, according to TCEQ's Point Source Emissions Inventory.

- Short-term estimated air emissions. Between 2003 and 2011, Gerdau Ameristeel submitted 30 air emission event reports to TCEQ (Table 2): 28 excess opacity events and two emission events. One of the emission events involved approximately 800 excess pounds of PM released to the air over a 32-hour time frame, when dust control measures for unpaved roads were suspended due to a failed water supply well.

2.3.3 Holcim

- Overview. Holcim Texas Limited Partnership (LP) (referred to in this document as "Holcim") is a Portland cement manufacturing facility located northeast of Midlothian. The facility began its operations as Box Crow Cement Company and subsequently became Holnam Texas LP before being renamed to Holcim Texas LP. Holcim operates two dry kilns: the first began operating in 1987 and the second in 2000. An onsite quarry provides limestone and other raw materials used to feed the rotary kilns, which operate at temperatures reaching 3,000 ^{o}F. Raw materials are crushed and milled onsite prior to being fed to pre-heaters that precede the kilns. The solid product from the kilns, or clinker, is cooled and ground together with gypsum to make Portland cement.

  Since 1987, Holcim has used multiple fuels to fire its kilns. The facility was originally permitted to use coal and natural gas. In 1994, Holcim was also authorized to burn tire chips as supplemental fuel in pre-processing operations. Data that the facility reported to TCEQ indicate that the amount of tire scraps burned at Holcim varies considerably from one year to the next [TCEQ 2009a]. Annual statistics for the facility's usage of tire-derived fuel follow [TCEQ 2009a, 2010e]:

1994	5,313 tons	2002	15,480 tons
1995	18,722 tons	2003	25,629 tons
1996	18,513 tons	2004	8,403 tons
1997	11,076 tons	2005	13,137 tons
1998	1,647 tons	2006	14,464 tons
1999	417 tons	2007	9,918 tons
2000	829 tons	2008	9,256 tons
2001	1,015 tons	2009	10,430 tons

According to Holcim's air permit, the facility is currently allowed to fire its kilns with natural gas, coal, tire chips, oil, non-hazardous liquids, non-hazardous solids, and petroleum coke.

Holcim's cement manufacturing operations emit air pollutants from multiple sources, and various measures are in place to reduce facility emissions. Both kilns now operate with selective non-catalytic reduction (SNCR) technology to reduce emissions of nitrogen oxides. Exhaust air from the two kilns (and other production areas) passes through baghouses to reduce PM in emissions and wet scrubbers to reduce sulfur dioxide emissions. Process gases from the kilns eventually vent to the atmosphere through 250-foot and 273-foot tall stacks, in which the facility continuously monitors emissions of sulfur dioxide, carbon monoxide, nitrogen oxides, and ammonia. Emissions also occur from the facility's quarry activities, physical processing of raw materials, materials handling operations, and storage areas, and some of these emission sources are also equipped with baghouses to remove PM from process exhaust streams.

In July 2005, following an application to increase nitrogen oxide emissions, Holcim reached a settlement agreement with DFW Blue Skies Alliance and Downwinders at Risk. This agreement led to Holcim funding several projects to reduce emissions and monitor local air quality. For example, Holcim agreed to continuously measure downwind ambient air concentrations of fine PM—a project that operated from 2006 to 2010 (see Section 4.1). In 2014, Holcim requested to amend their permit to install addition air pollution control technologies to reduce total hydrocarbons (THC) to meet emission limits for the Portland Cement Manufacturing Industry (TCEQ, 2014).

According to queries run on TCEQ's Web site, the agency received 11 complaints from residents about air emissions from Holcim between 2002 and 2010 (Table 2) [TCEQ 2010b]. Five of these complaints were filed between May 2005 and April 2006. Most of the complaints pertained to a strong burning plastic or burning chemical odor emanating from the facility. The odor reportedly caused headaches in some residents and forced others to stay indoors.

- Annual estimated air emissions. Figure 4 shows the long-term trend of air emissions that Holcim reported to TRI. For each year between 1988 and 2010, the figure displays the total air emissions on the facility's TRI forms. For the years in which Holcim reported to TRI (2000 to 2010), total air emissions summed across all pollutants ranged from

35,247 pounds to 254,195 pounds. From 2000 to the present, the pollutants most frequently reported on Holcim's TRI reports were benzene, toluene, several metals (compounds of chromium, lead, mercury, and zinc), and dioxin and dioxin-like compounds. Over the history of Holcim's TRI reporting, benzene and toluene accounted for the largest portion of emissions, followed by sulfuric acid aerosols and xylene. The profile of pollutants included in Holcim's TRI reports has changed from year to year. For example, sulfuric acid aerosols were reported every year from 2000 to 2003 and not in the following years, while ammonia was reported from 2006 to 2010 and not in earlier years. For all pollutants that Holcim reported to TRI in 2008, only one ranked among the nation's top 100 facilities in terms of total air emissions: Holcim's benzene emissions were the 31st highest among industrial facilities nationwide that submitted data to TRI.

Table 3 presents the criteria pollutant emission data that Holcim submitted to TCEQ's Point Source Emissions Inventory between 2000 and 2009. Annual emissions for the individual pollutants varied from one year to the next. For carbon monoxide, nitrogen oxides, PM, sulfur dioxide, lead, and VOCs, annual emissions in 2009 were lower than their corresponding 2000 levels. For three out of the seven pollutants in Table 3, Holcim's annual emissions in 2007 ranked among the top 25 facilities in Texas: the facility's carbon monoxide emissions ranked 12th statewide; nitrogen oxides emissions ranked 23rd; and fine PM emissions ranked 21st.

- Short-term estimated air emissions. Between 2003 and 2010, Holcim submitted 17 air emission event reports to TCEQ (Table 2). Of these, six were scheduled maintenance, startup, or shutdown activities. The remaining 11 events were excess opacity events and emission events. All but one of these were of relatively short duration (i.e., roughly between 5 minutes and 2.5 hours long); one event reportedly lasted approximately 9 hours. Opacity measurements appeared to trigger most of these reportable events, and none were apparently triggered by an excessive pollutant-specific emission rate.

2.3.4 TXI Operations

- Overview. TXI Operations, the largest of the three Portland cement manufacturing facilities in Midlothian, is located southwest of the city center, adjacent to Gerdau Ameristeel. The facility was formerly known as Midlothian Cement Plant, and has recently merged with and taken the name of Martin Marietta Materials. For the purposes of this health consultation, we will refer to the facility as "TXI". TXI Operations began operating in 1960 and operates five cement kilns that came online in 1960, 1964, 1967, 1972, and 2002. Four of these are "wet kilns," and the newest is a "dry kiln." An onsite quarry provides the limestone and shale used to manufacture cement. Other raw materials are delivered via truck. The kilns are fired at temperatures that reach 2,800 ^{o}F and produce clinker, which is ground together with gypsum to make the Portland cement product.

  TXI Operations has used multiple fuels to fire its kilns. The kilns were originally fired with natural gas. In 1974, TXI Operations was also permitted to fire its kilns with fuel oil. In 1980, 1983, and 1987, the facility was authorized to fire kilns using coal, petroleum coke, and waste-derived fuel, respectively. When this health consultation was first drafted, the four wet kilns were authorized to fire natural gas, fuel oil, coal, petroleum coke, and waste-derived fuel. The dry kiln is authorized to fire natural gas and coal as fuel. Though TXI Operations was permitted to burn hazardous waste since 1987, the facility has not used this fuel continuously over the years. Data summarized later in this section indicate that the facility burned hazardous waste between 1991 and 2007. TXI no longer burns hazardous waste in their wet kilns; TXI has permanently shut down its wet kilns and the authority to operate these kilns has been removed from their permit.

TXI Operations has many air emission sources that are typically found at cement manufacturing facilities. Exhaust air from the active kiln[2] passes through a high efficiency fabric filter baghouse to reduce emissions of PM and a wet scrubber to reduce emissions of sulfur dioxide, nitrogen oxides, and other pollutants. Finally, this exhaust gas passes through a regenerative thermal oxidizer, which reduces emissions of carbon monoxide and VOCs. Ultimately, the exhaust from the kilns exits through 200-foot or 310-foot tall stacks, in which TXI Operations continuously monitors emissions of several pollutants, including carbon monoxide, nitrogen oxides, and sulfur dioxide. The specific monitoring requirements varied across the kilns, though not only a single kiln operates. In addition to pollution controls for kiln emissions, the facility has equipped a number of other process operations with baghouses and other types of dust collectors to reduce PM emissions.

Every other year, TXI Operations is required to provide EPA information on the amount of waste-derived fuel (i.e., hazardous waste) that the facility feeds to its kilns for energy recovery purposes [EPA 2010b]. That information is loaded into EPA's Biennial Reporting System (BRS) database, which can be queried by the public. Currently, BRS waste management statistics are available for every other year between 1989 and 2009. Following is a summary of the total amount of hazardous waste that TXI Operations burned for purposes of energy recovery, according to the facility's BRS reports:[3]

1991	40,600 tons	2001	62,400 tons
1993	56,200 tons	2003	31,600 tons
1995	90,700 tons	2005	50,000 tons
1997	57,700 tons	2007	42,100 tons
1999	74,700 tons		

On average, across the years listed in the previous compilation, TXI Operations burned approximately 56,200 tons of hazardous waste annually for purposes of energy recovery [EPA 2010b]—an amount roughly equivalent to burning more than 150 tons of hazardous waste per day, assuming continuous operations. The quantities burned since 2001 are

[2] When the wet kilns were operating, their stack emissions were controlled by good combustion practices and electrostatic precipitators.

[3] The BRS data are presented for all years with available information. Data shown are for the amount of hazardous waste burned for purposes of energy recovery. TXI Operations did not report any data to BRS for 1989. All data points are rounded to three significant figures.

relatively low in comparison to other years due in part to permit restrictions that limited the number of kilns that could operate simultaneously. This waste has come almost entirely from offsite sources. Examples of the specific types of waste burned at TXI Operations include, but are not limited to, organic liquids and sludge, waste oils, and solvents. During the years TXI Operations burned hazardous waste, automatic waste feed cutoff systems were employed to ensure that the quantities of waste-derived fuel did not exceed pre-established input limits that were based on compliance testing. Further, continuous emissions monitoring for total hydrocarbons provided data that could be used to assess the adequacy of fuel combustion. Various other requirements were mandated under an EPA regulation affecting combustion of hazardous waste in boilers and industrial furnaces.

TCEQ's Web site documents 84 complaints that residents submitted to the agency between 2002 and 2010 regarding TXI Operations' air emissions (Table 2) [TCEQ 2010b]. More than half of these complaints were filed due to odors, when residents and passers-by reported smelling strong chemical and chlorine-like odors. Some odor complaints referenced odors of sulfur and burning tires, and nearly every odor complaint occurred at night. The other complaints mostly pertained to dust and smoke coming from the facility. In some cases, the complainants reported symptoms (e.g., cough, burning sensation in nostrils) believed to result from facility emissions.

- Annual estimated air emissions. Figure 4 shows the long-term trend of air emissions that TXI Operations reported to TRI. For each year between 1988 and 2010, the figure displays the total air emissions on the facility's TRI forms. For the years in which TXI Operations reported to TRI, total air emissions summed across all pollutants ranged from 60 pounds to 1,274,852 pounds. Between 2000 and 2010, TXI Operations submitted TRI reports to EPA for 64 different pollutants. Of these, the following pollutants were reported every year between 2000 and 2010: sulfuric acid aerosols; and compounds of chromium, manganese, and nickel. In terms of the magnitude of pollutant emissions, sulfuric acid aerosols consistently accounted for more than 97 percent of the total air toxic emissions disclosed on the facility's forms during this time frame, except for 2008, when this proportion dropped to 91 percent. Other pollutants with the highest quantity of emissions between 2000 and 2010 include several VOCs (e.g., benzene, naphthalene, styrene, toluene, xylene isomers), metals (e.g., compounds of chromium, manganese, nickel, and zinc), and hydrochloric acid aerosols. For all pollutants that TXI Operations reported to TRI in 2008, only sulfuric acid aerosols rank among the nation's top 100 facilities in terms of total air emissions. Specifically, the facility's estimated sulfuric acid emissions were the 82nd highest among reporting industrial facilities nationwide.

  Table 3 presents the criteria pollutant emission data that TXI Operations submitted to TCEQ's Point Source Emissions Inventory between 2000 and 2009. For lead, TXI Operations' facility-wide emissions in 2009 were higher than its emissions in 2000; for all other pollutants shown in Table 3, the facility's emissions in 2009 were less than or equal to emissions in 2000. For nitrogen oxides, TXI Operations' annual emissions in 2007 ranked 21st among the industrial facilities that submit data to the statewide inventory. For the remaining pollutants shown in Table 3, the facility's emissions did not rank among the highest 25 facilities in the state.

- Short-term estimated air emissions. Between 2003 and 2011, TXI Operations submitted 36 air emission event reports to TCEQ (Table 2). Thirty-five were excess opacity events and emission events and the other was a scheduled maintenance event. Four emission events in the database were reported for the following: the safety valve in a storage tank ruptured in April 2005, releasing several VOCs; a dislodged brick in a rotary kiln in August 2006 caused increased emissions reported as excess opacity; a kiln shutdown in February 2008 led to excess emissions of sulfur dioxide; and problems encountered with a pump in April 2008 caused ammonia emissions to exceed allowable levels for 3 hours. None of these emission events occurred on days when TCEQ received complaints about TXI Operations' emissions.

2.3.5 Other Emission Sources

Air quality in Midlothian is affected by emissions from all local (and some distant) sources and not only by emissions from the four main facilities of interest. Consequently, the ambient air monitors in the area measure air pollution levels that reflect contributions from a large number of emission sources.

Most industrial facilities, like the cement kilns and steel mill in Midlothian, are referred to as point sources. Other emission sources are typically classified into two categories: area sources and mobile sources. Area sources are smaller air pollution sources that individually do not emit enough pollutants to be considered a point source, but collectively throughout an area can account for a considerable quantity of emissions. Examples of area sources include agricultural tilling, dry cleaners, and gasoline stations. Mobile sources refer to any vehicle or equipment with a gasoline or diesel engine (e.g., on-road and off-road motor vehicles, construction equipment), as well as aircraft and recreational watercraft. The following paragraphs briefly review information on emissions from sources other than the four facilities of interest, because all of these emission sources combined affect Midlothian's air quality.

EPA's National Emissions Inventory (NEI) estimates the relative magnitude of annual emissions from point, area, and mobile sources for every county across the nation. According to the 2005 NEI, the most recent release available when ATSDR started this evaluation, the four industrial facilities of interest emit approximately 85 percent of the sulfur dioxide and 60 percent of the nitrogen oxides released to the air throughout all of Ellis County; and they account for approximately 20 percent of the countywide emissions of carbon monoxide and fine PM [EPA 2010c]. NEI does not present emission data for short-term emission events.

These data offer some insights on the different types of emission sources found in and near Midlothian but must be interpreted in proper context. While the NEI data suggest that sources other than the facilities of interest may account for the majority of countywide emissions for certain pollutants, that does not necessarily mean air pollution levels at a given location are dominated by these other sources. On the contrary, emissions from the four facilities of interest are expected to have considerably greater air quality impacts at locations nearest these facilities, especially considering their close proximity. Thus, the remainder of this health consultation focuses on the Midlothian industrial facilities' air quality impacts, while acknowledging that area sources and mobile sources also contribute to the levels of air pollution measured throughout Ellis County.

2.4 Demographics

ATSDR examines demographic data to determine the number of people who are potentially exposed to environmental contaminants and to consider the presence of sensitive populations, such as young children (age 6 years and younger), women of childbearing age (between ages 15 and 44 years), and the elderly (age 65 and older). This section considers general population trends for residents in the city of Midlothian and also identifies residential areas closest to the facilities.

- General population trends. Figure 5 summarizes demographic data for areas within 3 miles of the property boundaries of the four industrial facilities of interest, based on information compiled in the 2000 U.S. Census. Overall, an estimated 38,908 persons live within 3 miles of any of these facilities, with some individuals being life-long residents. The main population center of Midlothian is located between the facilities of interest, although several residential developments and individual property owners are located throughout the area shown in Figure 5. According to the Census data, approximately 11 percent of the population within 3 miles of these facilities is children; 6 percent is considered elderly; and 22 percent is women of childbearing age.

- Population growth. The total population in the Midlothian area has grown considerably in recent decades. Census data suggests that the local population roughly tripled between 1990 and 2010. Therefore, the number of life-long residents and long-term residents in Midlothian is likely considerably less than the current population estimates might otherwise imply.

- Residents closest to the facilities. All four main industrial facilities in Midlothian own relatively large tracts of land (see Figure 1), which helps ensure that no one lives in immediate proximity to the facilities' main industrial operations, where air quality impacts from some emission sources would likely be greatest. Observations from site visitors and review of aerial photographs, however, confirm that numerous residents live just beyond the four facilities' property lines. For instance, several dozen homes are located along the eastern boundary of TXI Operations. Multiple homes along Ward Road, Wyatt Road, Cement Valley Road, and other streets are located across U.S. Highway 67 from TXI Operations and Gerdau Ameristeel. Similarly, a residential area and Jaycee Park are located along the southeastern boundary of Ash Grove Cement, and another residential area is near the facility's northeastern boundary. Holcim also has nearby residential receptors, with the closest ones living near the facility's northwestern and southeastern boundaries.

- Nearest areas with potential for elevated short-term exposures. In addition to the residential neighborhoods and areas listed above, ATSDR also considered whether the monitoring stations in the Midlothian area adequately reflect short-term exposures that residents, visitors, and passers-by might experience when they are in close proximity to the four industrial facilities. These short-term exposures can occur at many places, such as: along U.S. Highway 67, which passes along the boundary of all four facilities; at recreational facilities near the facility boundaries (e.g., Jaycee Park, Pecan Trails Golf Course, Massey Lake); and at various nearby business establishments.

2.5 Local Climatic and Meteorological Conditions

ATSDR reviewed climatic and meteorological conditions in the Midlothian area because these factors affect how air emissions move from their sources to downwind locations. The Midlothian area is relatively flat with gently rolling terrain. The National Climatic Data Center (NCDC) collects climatic data at multiple locations in Ellis County, and the Waxahachie weather station has the longest period of record. Between 1971 and 2000, the average temperature in this area ranged from 46.0 °F in January to 84.6 °F in July, and the area received an average of 38.81 inches of precipitation a year, almost entirely in the form of rain [NCDC 2004].

To assess the prevailing wind patterns, ATSDR obtained wind speed and wind direction data for multiple meteorological stations in the Midlothian area. ATSDR summarized data for two of these stations in a format known as a wind rose. A wind rose displays the statistical distribution of wind speeds and directions observed at a meteorological station. These two stations were selected because they were the only stations with nearly complete records of wind observations for a recent 5-year period (2002–2006). Figure 6 shows the wind rose generated for 5 years of data collected at a meteorological station along Old Fort Worth Road, located north of Gerdau Ameristeel and TXI Operations; Figure 7 shows the wind rose for 5 years of data from the Midlothian Tower meteorological station, which is located on TXI Operations' property, but south of the facility's main industrial operations. The wind roses in Figures 6 and 7 indicate that the prevailing wind direction in the Midlothian area is from south to north, although pronounced contributions are also observed from north to south and from southeast to northwest. Later sections of this document revisit this issue, particularly when commenting on the placement of the monitoring stations.

ATSDR also examined the extent to which prevailing wind patterns in the Midlothian area vary by month and time of day. At the Old Fort Worth Road and Midlothian Tower meteorological stations, average wind speeds were highest in March and April and lowest in August and September; wind speeds, on average, were also highest during the early afternoon hours (2:00 to 4:00 p.m.); wind speeds at both stations tended to be lightest around sundown (6:00 to 8:00 p.m.) and sunup (4:00 to 6:00 a.m.). In nearly every month of the year, winds blew most frequently from south to north. Contributions from the other main directions in the area varied slightly from month to month. Wind direction did not vary considerably with time of day.

2.6 General Air Quality in Ellis County

For more than 20 years, EPA and state environmental agencies have evaluated general air quality in populated areas by measuring ambient air concentrations of six common air pollutants, also known as criteria pollutants. These pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, two forms of PM, and sulfur dioxide. For every criteria pollutant, EPA has established a health-based National Ambient Air Quality Standard. In cases where air quality does not meet a

NAAQS, states are required to develop and implement plans to bring air pollution levels into attainment with the health-based standards. The following paragraphs review the general air quality near Midlothian, as gauged by measured levels of criteria pollutants:

- Ozone. Currently, numerous ambient air monitoring stations measure ozone levels throughout selected summer and fall months in the Dallas-Fort Worth metropolitan area. Measured ozone levels at several of these stations have exceeded EPA's health-based standards, suggesting that the air quality in this area is at times unhealthy. As a result, the Dallas-Fort Worth area is currently designated as a "non-attainment area" for ozone. All of Ellis County is included in this non-attainment area. Air quality warnings are typically issued when ozone levels are expected to be elevated. Residents can learn more about ozone at http://www.AirNow.gov.

  The ozone air quality issues in Dallas-Fort Worth are complex and result from numerous industrial and motor vehicle emissions over a broad geographic region. The exact contribution from any single source to elevated ozone levels is difficult to assess. ATSDR's additional health consultations comment on the public health implications of concurrent exposure to site-related air pollution and elevated levels of ozone.

- Other pollutants. For the remaining criteria pollutants (carbon monoxide, lead, nitrogen dioxide, PM, and sulfur dioxide), the Dallas-Fort Worth area is considered to be in attainment with EPA's health-based air quality standards. In June 2010, EPA strengthened its health-based standard for sulfur dioxide, but the agency recently reported that air quality in the Dallas-Fort Worth metropolitan area currently meets the stricter (and more health-protective) standard [EPA 2010d].

3.0 Community Concerns

> **Concerns Addressed in This Document**
>
> This Health Consultation addresses community concerns regarding the adequacy of the past and ongoing ambient air monitoring in the Midlothian area. Additional health consultations address the residents' concerns regarding human and animal health and other issues pertaining to the Midlothian facilities.

Since 2005, ATSDR and TDSHS have been collecting and documenting community concerns regarding the Midlothian facilities. The agencies have learned of these concerns through various means, including a door-to-door survey of residents, a community survey, and multiple public meetings and availability sessions held in Midlothian. The concerns expressed by community members have addressed many topics, including human health, animal health, and the adequacy and reliability of ambient air monitoring data collected in the Midlothian area.

Most generally, the concern expressed by many community members has been: Is the scope of the air monitoring data broad enough to address the full impact of exposure to pollutants and could it stand alone and be the sole basis for making public health judgments? In addition to this overarching issue, community members provided several specific examples of their underlying concerns. This health consultation addresses the following community concerns specific to the adequacy of the monitoring network:

- Has ambient air monitoring been conducted for all pollutants expected to be released from cement kilns and steel mills?
- Is monitoring being conducted using scientifically defensible methods?
- Are the monitoring data collected in the Midlothian area accurate, reliable, and of a known and high quality?
- Are valid monitoring data available for the time frames of greatest interest?
- Is ambient air monitoring being conducted at appropriate frequencies and durations?
- Are the monitoring stations placed in locations that adequately characterize outdoor air pollution?

A public comment period for this health consultation was from 5/10/12 through 6/29/12. The comments received by ATSDR and responses to these comments can be found in Appendix E. In addition, ATSDR conducted a peer review of this health consultation after the completion of the public comment period (see Appendix F for peer review comments and ATSDR responses). Peer reviewers received all public comments and ATSDR responses to these comments and any changes made to this health consultation based on responses to the public comments.

4.0 Discussion

Topics covered in this section
Background – Section 4.1
Pollutants monitored – Section 4.2
Monitoring methods – Section 4.3
Data quality – Section 4.4
Time frames covered – Section 4.5
Monitoring frequencies – Section 4.6
Monitoring locations – Section 4.7
Summary – Section 4.8

This section presents ATSDR's evaluation of ambient air monitoring in the Midlothian area. Background information on the various monitoring programs implemented over the years is reviewed first (Section 4.1), followed by detailed evaluations of the six main categories of community concerns that residents have expressed to the agencies (Sections 4.2 to 4.7).

Note: Sections 4.2 to 4.7 review each concern individually. Section 4.8 then integrates the findings from these individual topics into ATSDR's overall conclusions regarding the utility of the existing ambient air monitoring data set for public health assessment purposes.

4.1 Air Monitoring Programs in Midlothian

Background
This section describes the different ambient air monitoring programs that have occurred in the Midlothian area, without interpretation. Sections 4.2 through 4.8 present ATSDR's findings regarding these monitoring programs.

Routine ambient air monitoring in the Midlothian area dates back to 1981. Since then, the ambient air monitoring in the area has varied greatly in terms of pollutants measured, methods used, monitoring frequencies, and monitoring locations. Figure 8 shows the location of every ambient air monitoring station that has operated in the area over the last 30 years, and Table 4 identifies the pollutants that these stations measured and the time frames over which they operated. Although monitoring has occurred at numerous places and times, most monitoring can be classified into five categories, which ATSDR defined for purposes of the data quality reviews (see Section 4.4). The following paragraphs describe these monitoring efforts, with more detailed information and interpretations presented later in this section.

- Holcim settlement agreement monitoring. From 2006 to 2010, continuous ambient air monitoring for fine PM occurred along Holcim's northern property line (station 4 in Figure 8). As noted previously, Holcim conducted this monitoring to fulfill terms of a settlement agreement reached between the facility, DFW Blue Skies Alliance, and Downwinders at Risk. Trinity Consultants, Inc., an environmental consulting company, installed and operated the continuous PM monitor and submitted quarterly results to representatives of and technical advisors for Holcim and Downwinders at Risk. Researchers from UT-Arlington then further evaluated the monitoring data in technical memoranda submitted periodically to Downwinders at Risk. ATSDR has obtained copies of all quarterly reports and UT-Arlington technical memoranda issued as of March 1, 2010.

- Midlothian Ambient Air Collection and Analytical Chemical Analysis. To fill gaps in the available environmental monitoring data identified in the public comment health consultation issued by TDSHS in December 2007, TCEQ recently funded additional ambient air monitoring in the Midlothian area. The main goal of this year long monitoring effort was to further characterize air quality in the Midlothian area by (1) measuring pollutants that had not been evaluated previously (e.g., hexavalent chromium) and (2) monitoring at locations of potential exposure that had not been evaluated previously (e.g., several schools and parks). TCEQ, in coordination with Midlothian residents, designed the monitoring program, and URS Corporation, an environmental consulting company, implemented the program. This monitoring effort included four locations (stations 5, 6, 12, and 16 in Figure 8) where five VOC and inorganic samples were collected quarterly, and four additional locations (stations 8, 11, 15, and 20 in Figure 8) where five VOC and inorganic samples were collected during a single calendar quarter. Every sample collected during this program was a 24-hour average sample, and no continuous monitoring took place. All laboratory analyses were conducted by Eastern Research Group, Inc. (ERG)[4]. ATSDR has accessed the entire set of concentration measurements from this monitoring program, the quarterly data summary reports prepared by URS Corporation, and the summary report for the overall study [TCEQ 2010f].

- TCEQ's routine criteria pollutant monitoring. Since the 1970s, Texas environmental agencies—the Texas Air Control Board (TACB), the Texas Natural Resources Conservation Commission (TNRCC), and now TCEQ—have managed the state's ambient air monitoring network of criteria pollutants. TCEQ currently operates dozens of criteria pollutant monitoring stations statewide. Two general types of criteria pollutant monitoring have occurred in Midlothian in recent years: continuous monitoring and periodic sampling. For sulfur dioxide, ozone, nitrogen oxides, and fine PM, TCEQ has operated continuous ambient air monitors that directly measure ambient air

[4] ERG also holds a mission support contract with ATSDR and provided technical assistance with interpreting data for this Health Consultation.

concentrations in the field, without the need for laboratory analysis. For PM and lead, the agency has conducted integrated sampling at regular frequencies: 24-hour average integrated samples are collected on filters every 6th day, and the sampling filters are sent to a contractor's laboratory to determine the PM and lead concentrations.[5] This sampling frequency (1-in-6 day sampling) is routinely applied in ambient air monitoring programs nationwide, in part because it ensures that sampling events occur on every day of the week over the course of a monitoring program. TCEQ provided ATSDR an electronic database of its entire history of criteria pollutant monitoring data for the Midlothian area.

- TCEQ's monitoring for inorganics. In addition to the recent measurements conducted as part of the Midlothian Ambient Air Collection and Analytical Chemical Analyses (as described earlier in this list), TCEQ has monitored for inorganics at multiple locations. As noted later in this report, the coverage of these monitoring stations varied with time: just one station operated in 1981, five stations operated for different periods between 1991 and 1993, and two stations operated for most years since 2002. At all of these locations, airborne inorganics in particulate matter—both PM_{10} and $PM_{2.5}$—were collected over 24-hour average sampling periods onto filters. No continuous monitoring for constituents of particulate matter has occurred, but continuous monitoring methods are not widely available for these pollutants. For nearly all of this time frame, TCEQ shipped the collected samples to contract laboratories for analysis, with the majority of filters analyzed by either Research Triangle Institute (RTI) or Desert Research Institute (DRI). TCEQ provided ATSDR an electronic database of its entire history of monitoring data for inorganics collected in the Midlothian area.

- TCEQ's VOC monitoring. In addition to the recent VOC measurements conducted as part of the Midlothian Ambient Air Collection and Analytical Chemical Analysis (as described earlier in this list), TCEQ has conducted VOC monitoring at multiple locations (stations 5, 12, 14, and 19 in Figure 8) in the Midlothian area since 1993. At all of these locations, integrated canister samples were collected for either 1-hour or 24-hour averaging periods. No continuous ambient air monitoring has occurred for VOCs in the Midlothian area. TCEQ personnel oversee sample collection and samples are analyzed at a central TCEQ laboratory. TCEQ provided ATSDR an electronic database of its entire history of VOC monitoring data for the Midlothian area.

The remainder of this health consultation focuses on the five general categories of ambient air monitoring data listed above. ATSDR acknowledges that some additional short-term sampling efforts have been conducted in the Midlothian area, but these typically involved collecting a small number of samples over a very short time frame. Those results are considered in the subsequent health consultations, but are not reviewed here because they account for such a small fraction of the overall set of air pollution measurements.

[5] In the Midlothian area, TCEQ has conducted both continuous monitoring and periodic sampling for PM. Note that continuous PM measurements are only available for fine particulate matter ($PM_{2.5}$).

4.2 Pollutants Monitored

The ambient air monitoring programs in the Midlothian area have measured various pollutants since 1981. Taken together, these programs have generated ambient air monitoring data for more than 160 individual pollutants, including numerous pollutants (e.g., PM, inorganics, VOCs) expected to be emitted from cement kilns and steel mills.

As one indicator of the coverage of the pollutants measured to date, ATSDR compared the list of monitored pollutants to those that the facilities of interest have included in their TRI emission reports to EPA.[6] Table 5 lists every pollutant for which any of the four facilities included on TRI reports between 1988 and 2010. The table breaks this list of pollutants into those that have been included in some monitoring effort (Table 5A) and those for which no air pollution measurements are available (Table 5B).

The comparison shown in Table 5 reveals several notable findings, organized below by groups of pollutants. The text box on this page briefly summarizes these findings, and more detail on this assessment follows:

- Inorganics. The available ambient air monitoring data include measurements for more than 20 different inorganics. Some ambient air monitoring has occurred for every metal and metal compound category included on the Midlothian facilities' TRI forms between 1988 and 2010. Most of these data were collected in the respirable range ($PM_{2.5}$ and PM_{10}). All of this monitoring has been conducted by collecting

Main Findings

The available ambient air monitoring data include measurements for some, but not all, of the pollutants emitted from the facilities of interest:

- At least some air monitoring has occurred in the Midlothian area for 32 percent of the pollutants documented on any of the four facilities' TRI reports over the entire history of reporting.

  Some monitoring data is available for every **inorganic** pollutant included in the facilities' emission reports, except for hydrochloric acid, sulfuric acid, and vapor-phase mercury.

  For **VOCs**, monitoring has occurred for nine out of the ten pollutants that the facilities emitted in greatest quantities (e.g., toluene, benzene, and xylenes), based on their annual TRI emission reports. Numerous other VOCs—primarily those on emission reports submitted by Ash Grove Cement and TXI Operations—have never been monitored (e.g., formaldehyde). More than 2/3 of these pollutants were released in relatively small quantities (i.e., <200 pounds across all four facilities' entire history of TRI reporting).

- No ambient air monitoring has occurred for **semi-volatile organic compounds** (sVOCs), which include several groups of toxic chemicals reported in facility emissions (e.g., dioxins, furans, polycyclic aromatic hydrocarbons [PAHs]).

- Monitoring has occurred for several **criteria pollutants and other substances** that do not fall under the previous categories, including some known odorous pollutants and irritants. These include PM and sulfur compounds. Carbon monoxide is the only criteria pollutant that has not been monitored in the Midlothian area.

For the pollutants with limited or no environmental monitoring data, ATSDR believes there is utility in modeling air conditions to determine if additional sampling is warranted. ATSDR will consider other sources of information (e.g., modeling data, engineering calculations) when evaluating their public health implications in future health consultations.

[6] ATSDR considered every chemical listed on the facilities' TRI reports, including those that have total air emissions of 0 pounds for a given year.

airborne PM on filters and then analyzing the collected material for metal content. This is a fairly standard measurement approach for characterizing potential air quality impacts for most inorganics, but mercury presents an exception. In comparison to other metals, mercury has a much lower vapor pressure, which means a greater portion of mercury will be emitted in the vapor state and not bound to particulate matter. Some of the vapor phase mercury may eventually bind to airborne particles downwind from the facilities, but the extent to which this occurs is not known [EPA 1997a]. Therefore, because it is all based on particle-bound measurements, the available ambient air monitoring data for mercury in the Midlothian area understates actual airborne concentrations. The ATSDR health consultation on VOCs and metals presents a model of mercury emissions and compares the modeled data to health protective comparison values.

Another issue of concern regarding these data is the availability of data on different forms of chromium. This concern stems from the fact that airborne chromium exists in multiple forms, with some forms having a significantly different toxicity than others. The most common forms of chromium found in ambient air are trivalent chromium and hexavalent chromium. Trivalent chromium is an essential nutrient for humans and is relatively less toxic. Hexavalent chromium, on the other hand, is considerably more toxic, both for cancer and non-cancer health effects. Many of the commonly used sampling and analytical methods for metals measure ambient air concentrations of total chromium, without determining the relative quantities of the trivalent and hexavalent forms. However, the recent air monitoring study in Midlothian sponsored by TCEQ included methodologies suitable for quantifying the levels of airborne hexavalent chromium. Thus, some monitoring data are available for hexavalent chromium. Section 4.5 indicates the time frame for which the hexavalent chromium data are available, and the limitations associated with the temporal coverage of this monitoring.

Table 5 lists two additional inorganic pollutants—sulfuric acid and hydrochloric acid—that are included in some of the facilities' TRI forms that have not been measured in air monitoring studies. To evaluate "sulfuric acid," it is important to consider the various different chemical forms of sulfur expected to be found in stack emissions and ambient air. Sulfur is found in most fossil fuels. When the fuels are burned, the sulfur is initially released to the air primarily as sulfur dioxide or sulfur trioxide, but sulfur trioxide reacts quickly with airborne water to form sulfuric acid [EPA 1998a]. Therefore, industrial facilities that burn fossil fuels often times report air emissions of sulfur dioxide, sulfuric acid, or sometimes both pollutants. In ambient air, away from release sources, the chemical forms most commonly found are sulfur dioxide (a gas) and sulfate ion (found in fine PM) [EPA 2008]. Ambient air monitoring for both of these chemical forms has occurred in the Midlothian area; however, modeling of these constituents were conducted in two additional health consultations on ambient air pollutants to better understand air quality impacts from sulfur emissions.

In the case of hydrochloric acid, emissions most likely occur due to the combustion processes. Fuel sources at the cement kilns contain chlorine, and fossil fuel combustion and combustion of wastes typically releases hydrochloric acid [EPA 1999a]. All three cement kilns in Midlothian have disclosed hydrochloric acid emissions on TRI forms at some point over the past 20 years. However, TXI Operations is the only facility that included this pollutant on its most recent forms that were available when ATSDR first began the present evaluation (i.e., for reporting year 2008). However, this facility's estimated hydrochloric acid emissions in 2008 were more than 10 times lower than the facility's estimated sulfuric acid emissions. Once in ambient air, the hydrochloric acid may be found in fine PM as chloride ion. However, no chloride ion measurements have been made in the various monitoring programs in Midlothian. Given that hydrochloric acid emissions have been consistently lower than the cement kilns' sulfuric acid emissions, ATSDR's health consultation on criteria pollutants and hydrogen sulfide uses the measured sulfate concentrations as an extreme upper bound estimate of the potential chloride ion levels in the Midlothian ambient air, while recognizing that the actual air concentrations of chloride ion are likely considerably lower.

- VOCs. The available ambient air monitoring data include measurements for dozens of different VOCs. Many of the VOCs that were monitored (see Table 5A) are also known to be emitted by the facilities of interest in Midlothian. To examine this issue further, ATSDR summed TRI air emissions data across all four facilities and all reporting years (1988 to 2008) to identify the toxic VOCs emitted in greatest quantities. The ten VOCs that accounted for the highest area-wide emissions on the TRI forms were, in decreasing order of air emissions: toluene, benzene, xylene (all isomers combined), 1,3-butadiene, naphthalene, styrene, chlorobenzene, ethylbenzene, 1,1,1-trichloroethane, and methyl ethyl ketone. As Table 5A shows, ambient air monitoring has occurred for nine of these ten VOCs, with no data currently available for naphthalene. Therefore, even though ambient air monitoring may not have been conducted for a large portion of the VOCs that the Midlothian facilities documented on their TRI forms, ambient air monitoring data are available for the VOCs that were emitted in the greatest quantities.

  As Table 5B notes, no monitoring data are available for several dozen VOCs identified on at least one of the Midlothian facilities' TRI forms (e.g., formaldehyde). Closer examination of Table 5B reveals that the overwhelming majority of these VOCs were included on TRI reports for either Ash Grove Cement or TXI Operations, most likely due to the quantities of these substances in the hazardous waste that the facilities have burned. Further, for the overwhelming majority of VOCs listed in Table 5B, the total emissions across all four facilities and all available TRI reporting years are less than 200 pounds. Thus, while no ambient air monitoring data are available for dozens of VOCs emitted by some Midlothian facilities over the past 20 years, the overwhelming majority of these pollutants have been released in relatively small quantities, based on the facilities' TRI forms.

  In summary, the VOC monitoring data available for the Midlothian area generally cover the specific toxic pollutants that the facilities have emitted in greatest quantities. While many additional VOCs that some facilities emitted over the years were never monitored, most of these pollutants appear to have been released in relatively small quantities. ATSDR's additional health consultations use modeling and other site-specific information to evaluate VOCs for which no ambient air monitoring data are available.

- Semi-volatile organic compounds (sVOCs). To date, no ambient air monitoring for sVOCs has been conducted in the Midlothian area. sVOCs are organic chemicals that have higher boiling points than VOCs. Due to this and other differences, ambient air concentrations of sVOCs and VOCs typically cannot be measured reliably with a single sampling and analytical method and therefore must be measured separately.

  At cement kilns, sVOCs are emitted to the air as products of incomplete combustion, and publicly available emission data and EPA guidance confirm that the facilities of interest release sVOCs into the air. For instance, all four facilities have reported air emissions of "dioxin and dioxin-like compounds" to TRI at least once since reporting year 2000. This TRI listing, by definition, is comprised of 17 individual pollutants that include both dioxins and furans [EPA 2000b]. Further, all four facilities may emit polycyclic aromatic hydrocarbons (PAHs). This statement is based on the fact that one facility (TXI Operations) has included polycyclic aromatic compounds (PACs), a subset of PAHs, on its recent TRI forms. Also, EPA emission estimation guidance indicates that PACs tend to be released into the air from combustion of coal and fuel oil [EPA 1998b, 2001][7].

  To assess the significance of this gap in the available environmental monitoring data, ATSDR conducted dispersion modeling to evaluate the facilities' air emissions of dioxins, furans, and PAHs. ATSDR also examined the relative contributions of facility emissions to releases coming from other sources, particularly considering that some sVOCs (particularly PAHs) originate from a wide range of industrial and non-industrial sources (e.g., automobile exhaust, wood smoke). ATSDR's additional health consultations conclude whether additional sampling is warranted to look for these compounds in other environmental media (e.g., soil, water, food products).

- Criteria pollutants and hydrogen sulfide. In addition to the three main categories of pollutants listed above, ambient air monitoring in Midlothian has occurred for several other pollutants that all four facilities of interest are known to release into the air, including some odorous pollutants and known irritants. These pollutants include sulfur dioxide, ozone, hydrogen sulfide, nitrogen oxides, and three different types of PM defined by particle sizes: (1) total suspended particulate (TSP), which contains a wide range of particles, including some that are so large that they typically are not inhaled by humans; (2) particulate matter with diameters of 10 microns or less (PM_{10}), which are particles with sizes that can pass through the nose and throat and enter the lungs in humans; and (3) particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$), which can penetrate deep into the lungs. Particulate sampling should detect airborne cement kiln dust.

  The only criteria pollutant directly emitted by the facilities for which no ambient air monitoring data are available is carbon monoxide. In additional health consultations, ATSDR uses modeling and other site-specific information to evaluate this pollutant.

[7] "PACs" is a chemical category listing in EPA's TRI reporting requirements. This category includes a subset of 21 PAHs selected for special consideration due to their persistence and toxicity.

In summary, this evaluation suggests that at least some ambient air monitoring has been conducted in the Midlothian area for most metals of interest (though measurements of vapor-phase mercury have not been collected), for the VOCs that the facilities appear to emit in greatest quantities, and for selected gases (e.g., sulfur dioxide, nitrogen oxides, and ozone). No monitoring data are available for sVOCs, hydrochloric acid, or sulfuric acid.

The previous evaluation was intended to assess whether monitoring has been conducted for the pollutants of greatest interest. Using comparisons to TRI reports has limitations, because facilities may emit pollutants that do not appear on the TRI forms.[8] However, the available monitoring data include measurements for many inorganics and VOCs in addition to those listed in Table 5. Thus, monitoring may have been conducted for pollutants released by the facilities but not disclosed on their TRI reporting forms.

[8] There are many reasons why the facilities might emit chemicals not included on the TRI forms. For instance, some emitted chemicals may not be reportable to TRI, and the facilities might use and emit certain chemicals in quantities below the TRI reporting thresholds.

4.3 Monitoring, Sampling, and Analytical Methods Used

From 1981 to the present, ambient air monitoring in the Midlothian area has been conducted using many different methodologies. During this same time, considerable progress has been made in the underlying science of air pollution measurements. This section identifies the various methods that have been used over the years, whether for continuous monitoring of air pollution or for integrated sampling followed by laboratory analysis. This section also presents ATSDR's evaluation of the methods used to date.

> **Main Findings**
>
> Methods. Nearly every air monitoring, sampling, and analytical method that has been used in the Midlothian area is well established, peer-reviewed, and capable of generating data of known quality. EPA currently uses several of these same methods in its various nationwide monitoring programs.
>
> In short, ATSDR has confidence in the reliability of the various monitoring methods, with two exceptions:
>
> - The metals samples collected in 1981 and between 1991 and 1993 were analyzed using a method that was commonly used at the time, but later found to potentially underestimate ambient air concentrations. This limitation will be considered in future health consultations. (Note: The lead sampling data from these time frames were collected using standard methodologies.)
> - The method used to measure inorganics is known to significantly underestimate concentrations of nitrates.
>
> Measurement sensitivity. For many pollutants, the ambient air monitoring methods used in the Midlothian area are sensitive enough to measure ambient air concentrations at levels of potential health concern. Meaning, the detection limits are either below or on the same order of magnitude of the most health-protective comparison values.
>
> As the exceptions, the detection limits achieved by Desert Research Institute for arsenic and cadmium, the detection limits achieved by TCEQ for certain VOCs, and the detection limits for some of the hydrogen sulfide monitoring are not sensitive enough to measure concentrations at levels of potential health concern—a fact that ATSDR's future Health consultations must take into account when interpreting data for these chemicals. Those documents will also consider the fact that these methods can report valid concentrations at levels below the detection limits.

- Inorganics. Every PM sample that was analyzed for inorganics (i.e., metals, elements, and inorganic compounds) in the Midlothian area shares some common features: the samples were collected by passing ambient air through sampling filters for 24 hours; the filters were removed from their high-volume measurement devices and sent to laboratories for analysis; and the laboratories measured the amounts of selected metals, elements, and inorganic compounds collected on the filters. Other than these general similarities, the individual monitoring programs differed in the measurement methodologies as follows:

- During the 2008-2009 Midlothian Ambient Air Collection and Analytical Chemical Analysis Special Study, sampling and analysis of metals and elements in PM_{10} was conducted according to EPA Method IO-3.5 [URS 2009a]. This particular method involves collecting PM on quartz filters and analyzing the filters with inductively coupled plasma/mass spectrometry (ICP/MS). This sampling and analytical method has been extensively peer reviewed [EPA 1999b], and it is the same method that EPA currently uses in its National Air Toxics Trend Stations monitoring network and in its Schools Monitoring Initiative.

Table 6 lists the method detection limits reported for several inorganics. The method detection limits for EPA Method IO-3.5 are typically at least an order of magnitude—and often more than two orders of magnitude—lower than the detection limits achieved by the other methods described later in this section.

The 2008-2009 study also included monitoring for hexavalent chromium, which was conducted using a modified form of California Air Resources Board (CARB) Method 039 [URS 2009a]. While the CARB method involves collection of TSP on filters, the method used in this program collected a smaller particle size fraction (PM_{10}) on cellulose filters followed by analysis with ion chromatography. Except for the fact that the method used in the 2008-2009 study focuses on respirable particles as opposed to total particles, the method is identical to what EPA currently uses in its National Air Toxics Trend Stations monitoring network. The hexavalent chromium sampling and analytical method used in the Midlothian area achieves a method detection limit of 0.0000065 $\mu g/m^3$. This detection limit is low enough to measure ambient air concentrations of hexavalent chromium at levels of interest for public health assessment purposes. In other words, this detection limit is lower than ATSDR's most protective health-based comparison value for hexavalent chromium (0.00008 $\mu g/m^3$).

- From 2002 to 2009, TCEQ collected 24-hour average PM samples at its routine monitoring sites in the Midlothian area. These samples were collected for two different sizes of particles: PM_{10} and $PM_{2.5}$. The $PM_{2.5}$ samples collected between 2002 and 2004 were analyzed by Research Triangle Institute, and samples collected between 2004 and 2009 were analyzed by Desert Research Institute (DRI). The PM_{10} samples were analyzed by the TCEQ Houston Laboratory. Over the entire time frame, the $PM_{2.5}$ samples were collected on Teflon filters, and the PM_{10} samples were collected on quartz filters. The $PM_{2.5}$ samples were subsequently analyzed using energy dispersive x-ray fluorescence (XRF), following procedures consistent with those outlined in EPA Method IO-3.3. This sampling and analytical method has also been extensively peer reviewed [EPA 1999b] and is currently used to analyze samples collected under EPA's nationwide Chemical Speciation Network. The PM_{10} samples were analyzed using inductively coupled plasma spectroscopy, another well established and peer reviewed method.

While both methods listed in the previous paragraph have been shown to generate highly accurate and precise results, particularly for pollutants found at higher concentration, the method used for $PM_{2.5}$ analyses have also been reported to "significantly underestimate" ambient air concentrations of non-volatile nitrate [Tropp et al. 2007]. Though nitrate data are included in the final database of measurement results, ATSDR used caution when interpreting these data in additional health consultations.

Table 6 lists the average method detection limits that DRI has reported between 2004 and 2009. While these detection limits are higher than those reported for the 2008-2009 study, the method is still sensitive enough to measure ambient air concentrations of metals and elements at levels of potential health concern, with the exceptions of arsenic and cadmium.

- In 1981 and from 1991 to 1993, the Texas state environmental agencies at the time used what was then a fairly standard methodology for measuring ambient air concentrations of PM: high-volume samplers were used to collect airborne particulates on quartz filters. After the samples had been collected and weighed to determine ambient air concentrations of PM, some of the quartz filters were sent to a laboratory for metals analysis by XRF. The 1981 sampling was for TSP and the 1991-1993 sampling was for PM_{10}.

  While this sampling and analytical approach was widely used at the time, research published since 1993 has suggested that analyses by XRF are not appropriate for samples collected on pure quartz filters. For instance, a widely-cited publication on particulate matter measurements does not list XRF as a compatible analytical method for particles collected on pure quartz filters [Chow 1995]. Based on this and other research, EPA's Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, which was first published in 1999, also does not list XRF as a compatible analytical method for particles collected on pure quartz filters [EPA 1999b]. The incompatibility results from the fact that particles can penetrate quartz filters at depths that the XRF analyses cannot resolve. It is for this reason that other filter types (e.g., Teflon) have been used more widely in recent years when conducting laboratory analyses using XRF.

  Given the incompatibility between the filter medium (quartz) and analytical method used (XRF), ATSDR concludes that the metals data collected in Midlothian in 1981 and between 1991 and 1993 are of unknown quality, and may underestimate actual ambient air concentrations. These data are used for screening purposes, but not for drawing health conclusions in subsequent health consultations.

- VOCs. All VOC measurements in the Midlothian area have been collected since 1993. This timing is significant because EPA published the first edition of its compendium of sampling and analytical methods for organic compounds in 1988 [EPA 1988]. Thus, widely accepted sampling and analytical methods have been available for the entire time frame that VOC monitoring has occurred in Midlothian. The majority of VOC measurements during this time frame were made from 24-hour average samples, though some 1-hour average samples were also collected.

  The VOC monitoring during the 2008-2009 Midlothian Ambient Air Collection and Analytical Chemical Analysis has been conducted according to EPA Method TO-15 [EPA 1999c]. By this method, ambient air is drawn into a stainless steel canister, and the sampling container is analyzed by a laboratory using gas chromatography with mass spectrometry detection (GC/MS). This is the method that EPA currently uses in its National Air Toxics Trend Stations monitoring network and was used in its Schools Monitoring Initiative. TCEQ has historically used stainless steel canister sampling for its routine VOC monitoring. The agency's current standard operating procedures are publicly available [TCEQ 2010c].

  Table 7 lists the detection limits for selected VOCs achieved by the laboratories that have been analyzing the overwhelming majority of VOC samples collected in the Midlothian area. Two sets of detection limits are reported. The first set pertains to the detection limits reported for the 2008-2009 sampling effort. For this study, the analytical laboratory achieved detection limits for almost every pollutant either below or on the same order of magnitude of the health-based comparison values, indicating that the methods achieve adequate sensitivity for health assessment purposes. In the case of 1,2-dibromoethane, the detection limits are more than 30 times higher than the lower health-based comparison value. However, there is no evidence that the Midlothian facilities use, process, or release 1,2-dibromoethane.

The second set of detection limits shown in Table 7 are those reported by TCEQ's analytical laboratory [TCEQ 2010c]. These detection limits apply to the VOC data collected in Midlothian before the 2008-2009 study. As the table shows, this second set of detection limits is not as sensitive as those achieved in the 2008-2009 study. There can be many reasons why detection limits vary from one laboratory to the next, even when they follow the same sampling and analytical method. For every pollutant listed in Table 7, TCEQ's detection limit is at least ten times higher than the corresponding detection limit reported for the 2008-2009 study. Further, for the majority of pollutants listed in the table, TCEQ's detection limits are greater than the health-based comparison values, indicating that these laboratory analyses do not always achieve the sensitivity that would be desired for assessing these pollutants—a fact that ATSDR considers in its health consultation that interprets the health implications of exposures to VOCs. Although the published detection limits are higher before 2008, it is important to note that TCEQ routinely reported data below the detection limit and down to the reporting limit of 0.01 ppb. The reporting limit is the value below which the instrument is not capable of measuring and reporting a value, and would be considered a non-detect. These data are still useful for evaluating exposures, and ATSDR used statistical methods to correct for censored data in additional health consultation documents. Readers interested in more information on the TCEQ detection limits for VOC are referred to the agency's standard operating procedures for EPA Method TO-15 [TCEQ 2010c].

- Criteria pollutants. Since 1981, ambient air monitoring for criteria pollutants in the Midlothian area has occurred for different size fractions of PM, lead, sulfur dioxide, ozone, and nitrogen oxides. For these pollutants, EPA publishes and frequently updates a list of federal reference methods and automated equivalent methods [EPA 2010e]. EPA assigns this distinction to scientifically rigorous methods that have been shown to be capable of generating highly accurate and precise measurements at concentrations comparable to the agency's health-based air quality standards.

  With one exception, all monitoring of criteria pollutants in the Midlothian area has been conducted using one of these EPA-approved methods. Specifically, the devices used to measure nitrogen oxides (Teledyne Advanced Pollution Instrumentation model 200E), ozone (Teledyne Advanced Pollution Instrumentation model 400E), and sulfur dioxide (Teledyne Advanced Pollution Instrumentation model 100E) all appear on EPA's most recent listing of federal reference methods and automated equivalent methods [EPA 2010e]. For these three pollutants, measurements occur continuously and the devices record and output 1-hour average concentrations. ATSDR also reviewed 5-minute average data for sulfur dioxide.

The exception is that continuous $PM_{2.5}$ monitoring in Midlothian is conducted using a rigorous and widely-used technology (Thermo Scientific tapered element oscillating monitor), but the measurements are not used to assess compliance with the federal health-based National Ambient Air Quality Standards. ATSDR found that measurements using this device correlated well with measurements conducted using the federal reference method. ATSDR therefore concludes that the monitoring methods that have been used in Midlothian to measure criteria pollutants are suitable for health assessment purposes. However, as described in the next section, the continuous $PM_{2.5}$ monitoring data were found to have a slight negative bias.

- Hydrogen sulfide. The previous discussion comments on every ambient air monitoring method that has been used in the Midlothian area, except for the method used to measure hydrogen sulfide. ATSDR reviews the hydrogen sulfide monitoring methodology separately, because hydrogen sulfide is not designated as a criteria pollutant. Therefore, EPA has not published any lists of required or recommended methods for continuous hydrogen sulfide measurements.[9] The overwhelming majority of hydrogen sulfide monitoring data for the Midlothian area is generated using a Teledyne Advanced Pollution Instrumentation model 101E hydrogen sulfide analyzer. This device measures ambient air concentrations of hydrogen sulfide continuously and outputs 1-hour average values. The method typically achieves hydrogen sulfide detection limits lower than ATSDR's Minimal Risk Level and has been successfully applied in other ambient air monitoring programs. ATSDR believes this method is capable of generating data of a known and high quality. However, two limitations are noted: (1) monitoring results from the Cedar Drive monitoring station are not being considered, because they were collected using a highly insensitive device that never detected hydrogen sulfide; and (2) monitoring results from 1997 to 1999 had a detection limit of approximately 5 to 10 ppb, which is acceptable for evaluating short-term exposures but is not sensitive enough to measure concentrations that may be of interest for long-term exposures. ATSDR's health consultation on criteria pollutants and hydrogen sulfide considers this finding when interpreting the hydrogen sulfide data collected prior to 2000.

[9] No "federal reference methods" or "automated equivalent methods" have been developed for hydrogen sulfide. However, some of EPA's automated equivalent methods for sulfur dioxide can be operated in a manner to measure hydrogen sulfide concentrations.

4.4 Data Quality of the Air Pollution Measurements

Community members have expressed concern to ATSDR about the validity of the ambient air monitoring data that have been collected in the Midlothian area over the years. This section presents ATSDR's evaluation of data quality of the various monitoring efforts. Separate data quality evaluations were performed for the five different monitoring programs identified in Section 4.1. In these evaluations, ATSDR considered many different indicators of data quality, such as completeness (the fraction of scheduled sampling events that resulted in a valid measurement), precision (the repeatability of measurements), and accuracy (the extent to which monitoring data represent the actual air pollution levels).

Main Findings

ATSDR reviewed various data quality indicators from the ambient air monitoring programs that have been conducted in the Midlothian area. Overall, except for the special considerations listed below, these indicators suggest that the air pollution measurements are of a known quality and suitable for health assessment purposes.

Special considerations for ATSDR's future health consultations are:

- The continuous $PM_{2.5}$ monitoring devices used in Midlothian appear to be systematically understating ambient air concentrations. At the Old Fort Worth Road monitoring station, for instance, concentrations measured by the continuous device are, on average, lower than those measured by the federal reference method monitor. This slight negative bias, which varies across years and seasons, will be accounted for in the future Health Consultation on criteria pollutants.
- Ambient air concentrations for inorganics have been shown to be highly precise, but measurement precision decreases as concentrations becomes less than the limit of quantitation and near the substances' detection limits (as occurs for most ambient air sampling and analytical methods).
- Some inorganics reported in the monitoring data are also found in trace levels in the sampling filters. Measured concentrations comparable to levels found in field blanks should be interpreted with caution.
- Monitoring results for acrolein will be interpreted with caution due to data quality concerns that EPA has recently expressed for the sampling method that has been used for this pollutant. This concern is general and applies to all acrolein monitoring nationwide, and not only to the monitoring in Midlothian.

- Holcim settlement agreement monitoring. ATSDR based its data quality evaluation for the continuous $PM_{2.5}$ monitoring on information documented in the quarterly reports prepared by the consultant that oversees this program. When ATSDR first drafted this health consultation, nearly every quarterly report from 2006 to 2009 was available for review [Trinity Consultants 2006-2010]. The quarterly reports document the completeness for 3-month time frames. Between January 2006 and June 2009, the monitor successfully operated 91 percent of the time. Gaps in the available environmental monitoring data occurred for various reasons. For example, short-term data gaps on the order of a few hours tended to result from power outages, inclement weather, and unit maintenance. Five data gaps of 1 week or longer have also occurred, and these were typically due to malfunctioning equipment. The quarterly reports document various calibrations, audits, and other procedures that have been conducted to ensure the monitoring equipment operated according to manufacturer specifications.

  Based on the information documented in the quarterly reports, ATSDR finds the data generated by the continuous $PM_{2.5}$ monitor to be suitable for health assessment purposes.[10] For the five extended time frames when the monitor was not operating, insights on potential $PM_{2.5}$ air pollution levels can be evaluated based on a review of Holcim's continuous emission monitoring data.

- Midlothian Ambient Air Collection and Analytical Chemical Analysis. ATSDR based its data quality evaluation for the recent 2008-2009 monitoring in Midlothian on the four summary reports that URS issued for this program [URS 2009b,c,d,e]. This program followed quality control procedures outlined in the monitoring program's Quality Assurance Project Plan [URS 2009a]. Sampling and analysis for VOCs and metals followed the performance guidelines specified in the peer-reviewed EPA methods. As noted in the document, the parties that implemented this monitoring program conducted extensive quality control activities before any samples were collected.

  TCEQ's contractor has also tracked several data quality indicators. The measurement completeness for metals and hexavalent chromium was 100 percent, which means that every single scheduled sampling event resulted in a validated measurement. The measurement completeness for VOCs was just below 100 percent: one sample out of 260 scheduled samples did not result in a valid measurement. These high completeness fractions suggest that the program was implemented effectively.

  The quarterly data reports also provide insights on measurement precision, as gauged by analyses of duplicate samples. The monitoring program's data quality objectives indicate that measurement precision for VOCs and hexavalent chromium should fall within 30 percent and measurement precision for metals should fall within 20 percent [URS 2009a]. For most of the target VOCs listed in Table 7, the percent difference in concentrations measured in duplicate samples was lower than 30 percent, consistent with the program's data quality objectives. Poorer precision was observed for the two trimethylbenzene isomers, methylene chloride, and xylene isomers. For the trimethylbenzene isomers the poorer precision most likely occurred because ambient air concentrations for these pollutants were very close to the detection limit, where measurement variability is known to be greater. For m,p-xylene, the average relative percent difference observed across the program was 83 percent. The principal investigators of this program concluded that the poor precision for xylene and that measurements for this pollutant do not appear to reflect large systemic laboratory errors [URS 2009e]. For metals, the initial duplicate sample collected during the first quarter did not show good agreement for several pollutants [URS 2009b]; however, the program average precision estimates were all near or below the program's data quality objectives [URS 2009e]. The measurement precision was worst for silver, cadmium, and mercury, but the observed relative percent differences for these pollutants are within ranges that ATSDR views as acceptable for health assessment purposes (especially considering the magnitude of the concentrations measured). It should be noted that ATSDR uses the highest concentration reported between duplicate samples to provide a health-protective approach to exposure assessment.

[10] Researchers from UT-Arlington have issued several technical memoranda reviewing the ambient air concentrations reported by this continuous monitor [UT-Arlington 2008-2010]. None of these memoranda raise concerns about the quality of the monitoring data that have been generated to date.

The quarterly data reports also present data on VOCs and metals found in field blanks. Several metals were found in at least two field blanks at concentrations greater than five times their detection limits: barium, total chromium, copper, manganese, molybdenum, and silver [URS 2009b,c]. This is significant because it suggests that the measured concentrations for these metals are likely overestimates, because some of the metals identified in these samples may have originated in the filters themselves and not in the ambient air that was being tested. ATSDR's subsequent health consultations consider field blank results when interpreting measured ambient air concentrations of metals and elements.

Finally, since the 2008-2009 study was completed, EPA has reported on difficulties associated with measuring ambient air concentrations of acrolein—one of the VOCs considered during the study. Specifically, recent research found that air pollution measurements of acrolein using stainless steel canisters (i.e., the method that was used in Midlothian) can be biased high for various reasons [EPA, 2010f]. This finding, which was not published at the time the 2008-2009 study was completed, complicates efforts to interpret these results, due to the possibility of a positive bias in the sampling results. This concern is not specific to the Midlothian study, but applies to all ambient air monitoring nationwide that used this method to measure concentrations of acrolein. ATSDR's health consultation for this site that evaluates exposures to VOCs and metals considers this issue further.

Overall, ATSDR finds the ambient air monitoring data collected during the Midlothian Ambient Air Collection and Analytical Chemical Analysis project to be of a known and high quality.

- TCEQ's routine criteria pollutant monitoring. ATSDR considered two sources of information when reviewing the quality of TCEQ's routine criteria pollutant monitoring data, as documented below:
  - Data quality indicators reported to EPA. In addition to submitting measured ambient air concentrations to EPA, state environmental agencies that are responsible for routine criteria pollutant monitoring must generate and submit data quality indicators to EPA regarding those measurements. Examples of the type of information that agencies must report include outputs from concentration audits, outputs from flow rate audits, and concentrations measured by co-located samplers. To examine TCEQ's performance in criteria pollutant monitoring, ATSDR accessed the most recent annual data quality indicator reports posted to EPA's Ambient Monitoring Technology Information Center website [EPA 2010e]. This review indicated that TCEQ meets its requirement to report data quality indicators to EPA and the reported indicators for the Midlothian area monitors meet the corresponding guidelines that EPA has established.
  - Inter-method comparisons. In recent years, TCEQ has simultaneously operated two different $PM_{2.5}$ monitoring devices at the same monitoring location. This occurred both at the Midlothian Tower and the Old Fort Worth Road monitoring stations (see Table 4). At both locations, two different measurement devices were

used. The first is a federal reference method $PM_{2.5}$ monitor, in which ambient air is drawn through a filter for a 24-hour period and the filter is later weighed in a laboratory to measure the $PM_{2.5}$ concentration. These samples are collected once every six days. The second monitoring device is a continuous $PM_{2.5}$ monitor, in which ambient air passes over a filter cartridge that collects the airborne $PM_{2.5}$ and constantly weighs the mass of material collected. The air stream in the continuous device is heated to 50 degrees Celsius before sampling, and this heating may volatilize some compounds before measurement occurs. This continuous device outputs measured concentrations on an hourly basis.

In theory, the federal reference method $PM_{2.5}$ measurements and the continuous $PM_{2.5}$ measurements for the same time frames should be identical. However, slight differences in the underlying sampling technologies leads to slight differences in the measured concentrations, even for the same time frame. Because TCEQ simultaneously operated federal reference method devices and continuous devices, ATSDR could quantify the differences between the measurements for the specific dates when the two devices generated valid results. Such calculations are known as inter-method comparisons.

Table 8 compares the $PM_{2.5}$ measurements generated by the two different methods. In general, the 24-hour average concentrations for the federal reference method and the continuous $PM_{2.5}$ monitors were highly correlated; however, the federal reference method, on average, reported $PM_{2.5}$ concentrations that were 13 percent and 23 percent higher than those reported by the continuous monitor; the two different percentages correspond to the data sets for the two different monitors shown in Table 8. Given that the federal reference method is often viewed as the "gold standard" for $PM_{2.5}$ measurements, it is likely that the continuous $PM_{2.5}$ monitors understate actual ambient air concentrations by as much as 23 percent—an observation that was factored into ATSDR's health consultation on criteria pollutants (which includes $PM_{2.5}$). The negative bias in this particular type of continuous $PM_{2.5}$ monitor is consistent with findings that have previously been reported in the peer-reviewed literature [e.g., Allen et al. 2007]. The magnitude of the negative bias does vary from year to year and also across seasons.

- TCEQ's monitoring for inorganics. As noted previously, TCEQ currently sends its PM filters collected in Midlothian to DRI for laboratory analysis. DRI carries accreditation by the National Environmental Laboratory Accreditation Conference for analyzing these samples. This accreditation was issued after DRI passed proficiency tests coordinated by the accrediting body. DRI's laboratory supports many environmental monitoring efforts, including EPA's nationwide Interagency Monitoring of Protected Visual Environments network.

  ATSDR considered multiple information sources when evaluating the quality of analytical data generated by DRI. ATSDR first accessed two memos documenting EPA audits of DRI's laboratory, both of which were conducted as part of the agency's quality assurance oversight for the nationwide Chemical Speciation Network [EPA 2005, 2007].

After considering multiple analytical procedures at DRI, the audits concluded that the laboratory's XRF analyses followed "good quality control practices," and EPA did not identify any deficiencies regarding the XRF analyses [EPA 2007].

ATSDR also evaluated documents provided by DRI. Of note, DRI's quality assurance project plan (QAPP) requires that replicate analyses of a filter occur with each set of ten filters. Should measured concentrations of selected elements in these replicate analyses differ by more than 10 percent, DRI reanalyzes the entire batch of filters until acceptable consistent results are achieved [DRI 2009]. Similarly, ATSDR considered scientific publications issued by DRI researchers. One such publication, for example, evaluated a large database of co-located samples and reported generally good comparability between measurements, except when concentrations approached the detection limits [Tropp et al. 2007]. This publication also emphasized the need to consider field blank data when interpreting measured concentrations of metals and elements, because some of these pollutants are commonly found at trace levels in certain filter media.

- TCEQ's monitoring for VOCs. All VOC canister samples that TCEQ collects in the Midlothian area are analyzed by the agency's Air Laboratory. The Air Laboratory is accredited through the National Environmental Laboratory Accreditation Program (NELAP) for this analysis. Of note, TCEQ is also the NELAP-Recognized Accreditation Body for the state of Texas, and is responsible for providing NELAP accreditation to other laboratories in the state of Texas. TCEQ analyzes VOC samples according to the agency's standard operating procedure #AMOR-006, which is a modified form of EPA Method TO-15 [TCEQ 2010c]. TCEQ's analytical procedures document and discuss all deviations from the EPA method. ATSDR has reviewed these deviations and has no reason to believe they affect the quality of the VOC measurements. TCEQ's standard operating procedures document numerous quality control checks that must be passed for the VOC samples. For instance, the laboratory periodically will conduct "duplicate measurements" of VOCs in a canister. In a duplicate measurement, the laboratory will measure the amount of VOCs in a sample and then make another measurement from the same sample; the two sets of measurements are then compared to assess the precision of the method. At TCEQ's laboratory, duplicate analysis of VOC samples occurs at least once out of every 20 samples that are analyzed, and compounds found above the detection limit must be measured within 25 percent precision. In addition, to assess measurement accuracy, laboratory control samples are analyzed once in every batch of 20 samples and the measured concentrations must fall within 30 percent of the known values. Through these and other measures, TCEQ ensures that its VOC measurements are highly precise and accurate at concentrations above the limit of quantitation. (Note: In cases where sampling events have duplicate analyses, ATSDR will choose the higher measurement for health evaluation purposes, which is a health protective approach.)

  Quantitative indicators of TCEQ's laboratory performance are available from a recent sampling program, in which the agency collected four "split samples" that were analyzed both by TCEQ and by an external laboratory (Test America). ATSDR evaluated the differences between TCEQ's measurements and the external laboratory's measurements, based on the raw data that the two laboratories reported [TCEQ 2010d]. Across the four split samples, ATSDR computed concentration differences for the pollutants that both laboratories detected. In most cases, the two laboratories' measured concentrations differed by less than 30 percent, indicating good agreement for this method. In 16 instances, the measured concentrations differed by more than 30 percent. However, in 13 out of 16 of these instances, TCEQ's laboratory measured a concentration higher than the external laboratory. This comparison suggests that the TCEQ laboratory likely does not have a systematic negative bias in its measurements.

4.5 Time Frames Covered by Monitoring Programs

One of this document's objectives is to specify the time frames for which available ambient air monitoring data are suitable for health assessment purposes. Though the response to this question varies by pollutant and location in the Midlothian area, this section documents the time frames over which validated ambient air monitoring data are available for at least one monitoring station in the Midlothian area. The findings that follow are also depicted in the time line shown in Figure 9 and in the station-specific data availability shown in Table 4. This section considers monitoring data available through calendar year 2010. Some monitoring stations in Midlothian continue to operate into 2012.

Main Findings

Prior to May 1981, no ambient air monitoring data are available for the Midlothian area. Since 1981, validated ambient air monitoring data suitable for health assessment purposes are available for several time frames, but the availability of validated data varies by pollutant and changes from one year to the next.

The time frames up through 2010 for which at least some valid measurements are available follow:

- PM: 1981-1984 and 1991-2010
- Metals (except lead): 2001-2010
- Lead: 1981-1984, 1992-1998, and 2001-2010
- VOCs: 1993-2010
- Sulfur compounds: 1985 and 1997-2010
- Nitrogen oxides: 2000-2010
- Ozone: 1997-2010

Environmental monitoring data clearly are not available for all pollutants, over all time frames, and across all locations of interest. The most important data gaps are (1) the lack of any monitoring data before 1981 and (2) the lack of data in the vicinity of Ash Grove Cement during years when the facility burned hazardous waste. As described in this section, very few agencies throughout the United States conducted ambient air monitoring prior to 1981, especially for VOCs and metals.

- PM data availability. As Figure 9 shows, PM monitoring data were first collected in Midlothian in 1981. From 1981 to 1984, the PM monitoring measured ambient air concentrations of TSP, as was standard practice during this time.

  Routine PM monitoring in the Midlothian area did not continue again until 1991, when PM_{10} monitors were installed in the area. Monitoring for this particle size fraction continued through 2004.

  With a growing body of scientific research linking exposure to fine particulate matter ($PM_{2.5}$) and health effects, environmental regulatory agencies began launching $PM_{2.5}$ monitoring networks in the late 1990s. Consistent with this trend, ambient air monitoring for $PM_{2.5}$ in Midlothian has occurred between 2000 and 2010.

- Inorganics data availability. Referring again to Figure 9, ambient air monitoring for inorganics first occurred in Midlothian in 1981. However, for reasons outlined in Section 4.3, the methodology that the Texas environmental agencies used to measure ambient air concentrations of inorganics (except for lead) during and prior to 1994 is not suitable to use to draw health conclusions. These data will, however, be used for screening purposes and to help understand ambient trends over time. The first ambient air monitoring data for metals useful for health assessment purposes were generated in 2001.

Lead is an exception because EPA had already published rigorous sampling and analytical methodologies prior to 1981, and these methodologies were followed whenever ambient air monitoring for lead was conducted in the Midlothian area. Therefore, for lead, at least some valid measurements are available for a longer time frame than for the other metals and elements.

- VOC data availability. As Figure 9 shows, some VOC ambient air monitoring has occurred in the Midlothian area between 1993 and 2010, but no monitoring was conducted prior to 1993. While no VOC data are available for earlier years, it is not uncommon for that to be the case. For reference, EPA's Air Quality System database does not contain any speciated VOC monitoring data in years prior to 1985.

- Sulfur compound data availability. Ambient air monitoring for sulfur compounds—sulfur dioxide and hydrogen sulfide—occurred in 1985 and 1986 and again from 1997 to the present. No data are available for these pollutants for other years.

Overall, this section is only meant to identify (1) the time frames during which any ambient air monitoring occurred in Midlothian and (2) the time frames when no monitoring took place. Later sections of this health consultation evaluate the spatial coverage of monitors for the time frames when monitoring occurred.

For years in which no monitoring took place, ATSDR may still be able to make inferences about public health implications of exposure. Such inferences will have to be based on multiple factors, including the feasibility of conducting modeling, the nature and extent of facility operations, the amounts and types fuels used (e.g., coal, tires, hazardous waste), installation and operation of air pollution controls, and changes in meteorological conditions. When making inferences based on these and other factors, ATSDR acknowledges uncertainties associated with reaching health conclusions for time frames when ambient air monitoring did not occur.

4.6 Monitoring Frequencies and Durations

Main Findings
This section documents ATSDR's review of the monitoring schedules and explains why the agency reached the following conclusions:

- The monitoring frequencies and durations used in the Midlothian area vary from one pollutant to the next, and are consistent with monitoring methodologies commonly used throughout the country.

  Depending on the pollutant, concentration data are reported either entirely as 1-hour average values (hydrogen sulfide, nitrogen dioxide, ozone, sulfur dioxide), entirely as 24-hour average values (inorganics), or as a combination of the two averaging times (PM, VOCs). These averaging times are adequate for evaluating the implications of short-term and long-term exposures.

- The ambient air monitoring data and facility continuous emission monitoring data provide no evidence that the Midlothian facilities alter their emissions on days when 1-in-6 day samples are collected.

- Trends among the Midlothian monitoring data indicate that 1-in-6 day sampling schedules are sufficient for characterizing air pollution levels over the long term (e.g., for periods of 1 year and longer) and for characterizing 90th percentile concentrations in 24-hour average concentrations.

- Trends among the Midlothian monitoring data confirm that 1-in-6 day sampling schedules may not capture the days with the highest air pollution levels. $PM_{2.5}$ monitoring data suggest that the maximum concentrations from 1-in-6 day sampling can understate the actual highest 24-hour average air pollution levels by as much as 44 percent. Therefore, for pollutants that are not monitored continuously (inorganics and VOCs), there is a greater likelihood that peak air pollution levels are not being characterized. This is simply due to the greater probability that higher concentrations occur on non-sampling days, and not due to any evidence of facilities altering their emissions based on the sampling schedule.

Several community members asked ATSDR to comment on the durations and sampling frequencies that have been used in the Midlothian area. The duration of samples refers to the amount of time over which air is sampled to measure a concentration. Some durations for Midlothian are as short as one hour, while other measurements are based on 24-hour average samples; and for sulfur dioxide, measurements are available for 5-minute averaging times. Sampling frequencies refer to how often measurements are made. Some monitors in the Midlothian area report ambient air concentrations continuously (e.g., every hour of the day, every day of the week), while others collect samples at set frequencies (e.g., one 24-hour average sample collected every sixth day).

Overall, the duration and frequency of sampling used in the Midlothian area are fairly standard for ambient air monitoring programs. Nonetheless, ATSDR conducted several quantitative analyses to evaluate specific community concerns regarding the timing of the monitoring and sampling activities. The remainder of this section addresses these specific community concerns.

- Do facilities intentionally lower emission rates when 1-in-6 day samples are scheduled? At several public meetings, community members have voiced concern to ATSDR about the utility of 1-in-6 day sampling because local facilities know in advance when these samples are being collected. Some community members have suggested that the facilities might be intentionally adjusting (i.e., lowering) their emissions on days when the 1-in-6 day samples were collected to avoid having their emissions detected. If this were the case, then ATSDR would expect to see elevated air pollution levels on the continuous real time monitors and higher facility emission rates on dates when 1-in-6 day samples were not collected. ATSDR evaluated continuous PM ambient air monitoring data and continuous emission monitoring data to evaluate this concern:

- Evaluation of continuous ambient air monitoring data. Two ambient air monitoring stations—Old Fort Worth Road (station 12 in Figure 8) and Midlothian Tower (station 19 in Figure 8)—were previously equipped with both a continuous PM monitor and a 1-in-6 day sampling device. The continuous PM monitoring data from these sites can therefore be used to compare PM levels on days when 1-in-6 day samples were collected to levels on days when these samples were not collected. Table 9 presents this comparison.

  As the table shows, ambient air concentrations of $PM_{2.5}$ at both the Old Fort Worth Road and Midlothian Tower monitoring stations are virtually no different between days when 1-in-6 day samples were collected and days when no sampling occurred. For example, the average $PM_{2.5}$ levels were higher on days when 1-in-6 day sampling occurred as compared to days when no sampling occurred, but this concentration difference was marginal (5.3 percent at the Midlothian Tower site and 1.0 percent at the Old Fort Worth Road site) and not statistically significant, which means the concentration difference could have been by chance.

  ATSDR repeated this evaluation for hydrogen sulfide and sulfur dioxide, because these pollutants are also measured continuously south of Midlothian and are emitted by the facilities of interest (particularly sulfur dioxide). As Table 9 indicates, concentrations for these two pollutants also were, on average, highly similar between days when 1-in-6 day air samples were collected in the area and days when no samples were scheduled.

  Thus, whether looking at $PM_{2.5}$, hydrogen sulfide, or sulfur dioxide, the continuous monitors upwind and downwind from the Gerdau Ameristeel and TXI Operations facilities provide no evidence of considerably higher or lower air pollution levels on the specific days when 1-in-6 day samples were being collected. Otherwise stated, the continuous $PM_{2.5}$, hydrogen sulfide, and sulfur dioxide ambient air monitoring data provide no evidence of Gerdau Ameristeel or TXI Operations considerably altering their emissions to obscure trends in off-site ambient air monitoring data.

- Evaluation of continuous emission data. As noted previously in this health consultation, three of the four Midlothian facilities are required to continuously monitor air emissions of several pollutants. ATSDR could not conduct similar evaluations for Gerdau Ameristeel, because the facility's air permit does not require any continuous emission monitoring. For the remaining three facilities, the continuous emission monitoring data provide another opportunity to assess whether the facilities intentionally alter emissions on days when air samples are scheduled. To investigate this issue, ATSDR compared measured pollutant- specific emission rates on days when 1-in-6 day samples were collected to measured emission rates on days when no sampling occurred. Table 10 presents this comparison.

As Table 10 indicates, over a recent 3-year period (September 2005 to December 2008), TXI Operations' emissions of four pollutants—carbon monoxide, nitrogen oxides, sulfur dioxide, and total hydrocarbons—were virtually no different on days when 1-in-6 day PM samples were collected at nearby offsite air monitors as compared to days when offsite samples were not collected. The differences in emission rates shown in Table 10 were minimal (not more than 2.4 percent for the pollutants considered) and not statistically significant, which means the differences could have been by chance.

Therefore, TXI Operations' continuous emission monitoring data confirm that the facility's stack emissions of several major pollutants, on average, were not systematically and significantly higher or lower on days when 1-in-6 day samples were collected at the offsite ambient air monitors. This finding is consistent with the analyses of continuous ambient air monitoring data, described above and presented in Table 9.

To examine this issue further, ATSDR also considered whether air emissions from Ash Grove Cement and Holcim exhibited any signs of increased emissions when 1-in-6 day samples were not collected, even though these facilities are located further away from the air monitors with the longest period of record for 1- in-6 day sampling. Table 10 presents those analyses for every pollutant that is monitored continuously in Ash Grove Cement's and Holcim's kiln stacks. As the table shows, emission rates of carbon monoxide, nitrogen oxides, and sulfur dioxide from Ash Grove Cement's and Holcim's main stacks have minimal differences between days when 1-in-6 day air samples were collected in the Midlothian area and days when these samples were not scheduled. Further, these differences in emission rates were not statistically significant, which means the minimal differences may be due to chance alone.

Taken together, ATSDR's evaluation of continuous ambient air monitoring data (Table 9) and continuous emission monitoring data (Table 10) found no evidence of systematic bias in the 1-in-6 day ambient air sampling schedule. Whether looking at PM air pollution levels or at the most relevant continuous emission data available for analysis (i.e., from TXI Operations and Ash Grove Cement), there are no notable differences between days when offsite samples are collected and when no sampling occurs.

While ATSDR was completing the draft of this health consultation, TCEQ published its interpretation of monitoring data collected during the 2008-2009 Midlothian Ambient Air Collection and Analytical Chemical Analysis. One of the goals of TCEQ's study was to assess whether industry changed its operations based on knowledge of when 1-in-6 day samples were being collected. Based on its review of the monitoring data, TCEQ concluded "…there is no difference between a regulatory every 6th-day sampling day and the other sampled days during this study" [TCEQ 2010f]. In short, TCEQ reached the same conclusion as ATSDR, even though TCEQ's evaluation was based on an entirely different data set.

- How effective are 1-in-6 day sampling schedules for characterizing long-term exposures? Several community members have voiced concern to ATSDR about the utility of 1-in-6 day sampling schedules for public health assessment purposes. This section uses continuous ambient air monitoring data from the Midlothian area to evaluate the utility of the 1-in-6 day measurements for characterizing long-term exposures.

  Three ambient air monitoring stations in the Midlothian area are (or have been) equipped with continuous $PM_{2.5}$ monitors. That means these monitors are constantly measuring ambient air concentrations of $PM_{2.5}$. With these continuous results, ATSDR could actually quantify the effectiveness of 1-in-6 day sampling by constructing some "what if" scenarios. This was done as follows: For a given station, ATSDR first compiled a time series of the 24-hour average $PM_{2.5}$ concentrations measured by the continuous monitor. With this time series, ATSDR calculated the average concentration over the entire period of record. ATSDR then used data from these three stations—more than 5,500 24-hour measurements in all—to examine the utility of 1-in-6 day sampling. This was done by comparing (1) the average concentrations for each station's entire time series of monitoring data to (2) average concentrations calculated from every sixth day of measurements from these stations. Table 11 presents these results.

  As the table shows, at all three monitoring stations with continuous data, the average $PM_{2.5}$ concentrations calculated from every sixth day of measurements were virtually no different[11] from the average $PM_{2.5}$ concentrations calculated based on the continuous set of data. This observation indicates, at least for particulate matter measurements, that 1-in-6 day sampling is adequate for reliably characterizing air pollution levels over the long term (i.e., time frames of 1 year or longer).

  This sufficiency of 1-in-6 day sampling for assessing annual average concentrations of particulate matter has also been documented in other publications. EPA guidance indicates that 1-in-6 day sampling is adequate for air monitoring to assess compliance with the agency's annual particulate standards [EPA 1997b], though more frequent monitoring is necessary to capture episodic events. The adequacy of 1-in-6 day sampling for characterizing annual average $PM_{2.5}$ concentrations has also been reported in the scientific literature [Rumburg et al. 2001]. Specifically, this research reported that annual average concentrations computed from 1-in-6 day sampling schedules are not more than 7.7 percent different from the annual average values calculated from daily sampling.

  Based on this information, ATSDR concludes that the 1-in-6 day sampling schedule for particulate matter is clearly sufficient for evaluating the public health implications of exposures for time frames of 1 year or longer. ATSDR believes this conclusion also holds for the metals and elements because they are constituents of particulate matter. The trends

[11] More precisely, the differences in average concentrations between the time series of continuous $PM_{2.5}$ measurements and the every sixth day data set were all less than 5 percent, indicating a high level of agreement.

in continuous emissions monitoring for total hydrocarbons suggest this is also the case for VOCs.

- How effective are 1-in-6 day sampling schedules for characterizing short-term exposures? ATSDR also considered the adequacy of 1-in-6 day sampling schedules for evaluating short-term exposures. In general, as sampling frequency decreases, the likelihood that a monitor collects a sample on the day with the highest concentrations decreases. The significance of the sampling frequency ultimately depends on site-specific conditions. For example, in areas where air pollution levels do not vary greatly from one day to the next, the highest concentrations measured using a 1-in-6 day sampling schedule can provide a reasonable estimate of the maximum 24-hour air concentration. On the other hand, in areas with highly variable air pollution levels, the highest 24-hour measurement from a 1-in-6 day monitor can be considerably lower than peak air pollution levels.

  To characterize this issue further, ATSDR again referred to the continuous $PM_{2.5}$ monitoring data to assess the effectiveness of 1-in-6 day sampling for characterizing short-term exposures. In this case, ATSDR first compiled a timeline of daily $PM_{2.5}$ measurements for the three monitoring stations listed in Table 11 and identified the maximum 24-hour average concentrations as determined by the continuous monitors. ATSDR then determined from the timeline what the highest 24-hour average concentrations would have been had these stations instead operated on a 1-in-6 day sampling schedule. This assessment was conducted by covering all possibilities of 1-in-6 day sampling (i.e., assuming the first 1-in-6 day sample was collected on January 1, then assuming the first 1-in-6 day sample was collected on January 2, and so on).

  This evaluation revealed the potential utility of 1-in-6 day sampling for capturing the highest 24-hour average $PM_{2.5}$ concentrations in Midlothian. As the best case scenario, if a 1-in-6 day sample were to have occurred on the date with the worst air pollution levels, the 1-in-6 day sample would be considered adequate for assessing short-term exposures have contained the overall sample maximum. However, as Table 11 indicates, these available monitoring data indicate that it is possible that the 1-in-6 day sampling might understate the highest 24-hour average $PM_{2.5}$ concentrations by as much as 44 percent. This analysis would, however, only be applicable to these $PM_{2.5}$ data and would not necessarily be applicable to different time frames or other contaminants. However, it illustrates the concern that sampling may miss ‘peak exposures’. ATSDR considered this issue when evaluating acute $PM_{2.5}$ exposure scenarios in the health consultation on criteria pollutants and hydrogen sulfide.

  Note: The analyses described in the previous paragraphs are different from the analyses earlier in this section (“Do facilities intentionally lower emission rates when 1-in-6 day samples are scheduled?”). That earlier analysis only considered whether any systematic differences in emissions or ambient air quality occurred on dates of scheduled sampling events; no evidence of such differences was found.

  The analyses in the previous paragraphs address the possibility of 1-in-6 day sampling understating the highest air pollution levels, which would happen if the peak air pollution did not occur on a scheduled sampling date, simply by chance. These are two entirely different analyses.

- What inferences about less-than-daily exposures can be gleaned from 24-hour average samples? The available monitoring data characterize air pollution levels for different durations. For hydrogen sulfide, sulfur dioxide, ozone, and nitrogen oxides, continuous air pollution measurements are available on an hourly basis; ATSDR also reviewed 5-minute average concentration data for sulfur dioxide. Some hourly data are also available for $PM_{2.5}$ and VOCs. The availability of hourly measurements for these pollutants results primarily from two factors: (1) well established real-time monitoring methods are available for these pollutants, and these methods have been proven to measure short-term concentrations both accurately and precisely; and (2) the fact that some of these pollutants have federal or state air quality standards pertaining to durations shorter than 24 hours. The available hourly data for the pollutants listed earlier in this paragraph are at adequate temporal resolution for public health assessment purposes.

  For the remaining pollutants (i.e., PM, inorganics, VOCs[12]), the overwhelming majority of air pollution measurements are 24-hour average concentrations. While many of these pollutants are known to exhibit acute toxicity, these pollutants generally do not have published health-based air quality standards for averaging periods shorter than 24 hours. Nonetheless, when evaluating the public health implications of exposures to these pollutants, ATSDR considers the possibility of less-than-daily air concentrations being higher than the measured 24-hour average values. ATSDR explored various options for conducting these evaluations, such as using dispersion models or reviewing temporal variability in the facilities' continuous emission monitoring data. ATSDR's additional health consultations document the agency's assumptions for assessing less-than-daily exposures for pollutants that only have 24-hour average air quality measurements.

[12] VOC monitoring in Midlothian includes some 1-hour average measurements and some 24-hour average measurements.

4.7 Monitoring Locations

Main Findings

The number and placement of ambient air monitoring stations in the Midlothian area has varied by pollutant and year. Specific findings regarding the monitoring locations follow:

- Tables 13-16 and Figures 10-13 describe how the coverage of monitors changed with time for each pollutant group. Important gaps in the monitoring networks are noted.
- Over the years, monitoring locations were selected for various reasons. These include: to characterize facility-specific air quality impacts; to measure air pollution levels in areas with the most citizen complaints; to assess exposures at schools and parks; and to understand the "background" levels of air pollutions that are moving from the south into the Dallas-Fort Worth metropolitan area. ATSDR will consider the rationale for selecting monitoring locations when interpreting the data generated at each site.
- The monitors immediately downwind (north) of Gerdau Ameristeel and TXI Operations were placed in very close proximity to locations predicted to have the greatest air quality impacts from these facilities' emissions. Data from these stations should offer a reasonable indication of the highest air pollution levels in the populated areas of Cement Valley.
- The monitors, by design, measure outdoor air pollution at fixed locations. Monitoring data from these locations provide insights on air quality impacts at fixed locations and have traditionally been used as an indicator of exposure to outdoor air pollution. Residents' actual exposure will depend on the locations where they travel during the day and their level of physical activity during those times.
- For some pollutants and years, ambient air monitoring data are available for a single location, yet community members have expressed concern over air pollution levels for a larger geographic area. In these cases, ATSDR will evaluate the broader set of ambient air monitoring data to determine if the monitoring results for a single location are reasonable indicators for air quality at other locations.

Community members have voiced concern to ATSDR about the placement of ambient air monitoring stations in the Midlothian area. Some residents have questioned whether the air concentrations measured at these locations represent actual air pollution levels throughout the Midlothian area and have asked ATSDR to comment on whether these stations have been "optimally placed." This section presents ATSDR's evaluation of the monitoring locations.

- General information on selecting monitoring locations. Historically, ambient air monitoring programs throughout the United States have been conducted for many different reasons. For instance, monitoring has been conducted to assess compliance with environmental regulations, to characterize worst-case air pollution levels where people live, to measure "background" concentrations of air pollutants, and to provide insights on community-wide air pollution levels.

  A monitoring program's objectives typically dictate where monitoring stations are located. When determining the ideal monitoring locations for a given program and purpose, principal investigators typically rely upon some combination of air dispersion models, analyses of prevailing wind patterns, professional judgment, and community input. Logistical concerns—such as equipment security and ready access to electricity and property—are also considered when determining the actual monitoring locations used.

For ambient air monitoring programs designed to characterize air quality impacts from a particular facility, the type of facility emission sources must be considered when deciding where monitors should be placed. Figure 10 displays typical profiles of air quality impacts as a function of downwind distance for stack sources and ground-level emission sources:

- Stacks. As Figure 10A shows, emissions from stack sources tend to have no impact on air quality at the base of the stack itself (i.e., downwind distance equal to zero). Estimated air quality impacts then gradually increase to a point of maximum concentration. The distance to this point is determined by many factors including stack height, emission exit velocity and temperature, and local meteorological conditions. Ambient air concentrations then gradually decrease with further downwind distance.

- Ground-level, passive releases. Figure 10B depicts a typical dispersion pattern for emission sources at ground-level with little or no appreciable exit velocity. These can include emissions of wind-blown dust and evaporation emissions from tanks. In general, air quality impacts from these sources are greatest at locations alongside the sources themselves and then tend to decrease sharply with downwind distance.

These general insights are useful for evaluating the placement of monitoring stations in Midlothian. However, the four Midlothian facilities all have many different types of emission sources, including several stacks of various size and design and numerous ground-level sources. In such cases, scientists typically use models to understand how air pollution levels likely vary from one location to the next.

- Rationale for placement of monitors in Midlothian. Before evaluating the adequacy of the monitoring locations in Midlothian, ATSDR first contacted the various parties that implemented ambient air monitoring programs to better understand why monitors have been placed at their existing or former locations. The following discussion presents the reasons that were provided to ATSDR for placing monitors at particular locations:

    - Holcim settlement agreement monitoring. The location of this continuous $PM_{2.5}$ monitor (station 4 in Figure 8) was selected by Holcim, with concurrence from the other parties involved in this settlement agreement [Holcim 2005]. This particular location was selected for monitoring for several reasons: modeling results suggest that the location would capture emissions from the kiln stacks; the monitoring location is in close proximity to areas where concerned residents live; and the location meets many EPA siting criteria.

    - Midlothian Ambient Air Collection and Analytical Chemical Analysis. The 2008-2009 monitoring in Midlothian included numerous monitoring locations. The exact locations were selected for multiple purposes, and input from selected community members was considered in the design of this network [URS 2009a]. The locations of the fixed monitors, for instance, were selected primarily because they were directly downwind of one of the facilities [URS 2009b] and were in close proximity to residences. The locations of this program's temporary monitors were placed to meet a program objective of evaluating air quality close to parks and schools.

- TCEQ's routine criteria pollutant monitoring. TCEQ, like most other state environmental agencies, conducts routine ambient air monitoring for criteria pollutants for multiple reasons. In most cases, this monitoring is conducted in fulfillment of EPA regulations (i.e., to assess attainment with the agency's National Ambient Air Quality Standards), and EPA guidance sets minimum criteria for siting ambient air monitors. For instance, guidelines specify the minimum number of monitors for a given metropolitan area and the minimum distance required between monitors and certain emission sources, roadways, and obstructions in air flow. Consequently, these monitors tend to provide insights on community exposures, without intending to capture the maximum impacts from a given source.

  However, TCEQ has also placed criteria pollutant monitoring devices in certain Midlothian localities that have been the focal point of citizen complaints. For example, the PM_{10} and $PM_{2.5}$ monitors at CAMS 302 - Wyatt Road (station 14 in Figure 8) were intentionally placed in an area where residents complained about exposure to facility emissions.

- TCEQ's monitoring for inorganics. TCEQ monitored ambient air concentrations of inorganics in multiple studies. An overview of the 2008-2009 study is presented earlier in this section; and, as Section 4.3 explains, ATSDR will only be using the metals data (except for lead) that were collected during and prior to 1994 for screening purposes. The only other locations where TCEQ measured ambient air concentrations of metals and elements were at: Midlothian Tower (station 19 in Figure 8), Old Fort Worth Road (station 12 in Figure 8), and CAMS 302 - Wyatt Road (station 14 in Figure 8). Monitoring at these particular locations was conducted to bracket the emission sources at Gerdau Ameristeel and TXI Operations that were subject of the most citizen complaints.

- TCEQ's VOC monitoring. Outside of the 2008-2009 study (reviewed above), TCEQ has conducted VOC monitoring at four locations in Midlothian. Three of these locations were selected to measure potential air quality impacts downwind of cement kilns. The Tayman Drive Water Treatment Plant station (station 5 in Figure 8) monitored VOCs downwind of Ash Grove Cement from 1993 to 1997. These measurements provide insights on air quality impacts during a time when the facility burned tires, but does not overlap with the time when the facility burned hazardous waste. Additionally, VOC monitoring occurred downwind of Gerdau Ameristeel and TXI Operations at the Old Fort Worth Road site (station 12 in Figure 8) and at the CAMS 302 - Wyatt Road site (station 14 in Figure 8). The VOC monitoring conducted at Midlothian Tower (station 19 in Figure 8) was conducted in part to characterize air pollution levels moving into the Dallas-Fort Worth metropolitan area, and not necessarily to capture facility-specific air quality impacts in Midlothian.

- ATSDR's assessment of monitor placement. The following paragraphs review ATSDR's evaluation of the placement of monitors in the Midlothian area. When assessing this issue, ATSDR first considered findings from a 1996 modeling study conducted by EPA as part of a multi-pathway risk assessment evaluating air emissions from the Midlothian facilities [EPA 1996]. ATSDR considered this particular modeling study (as opposed to facility-specific studies found in TCEQ permitting files) to be significant because it was the only published report found in the site records that modeled air quality impacts from all four facilities of interest.

  The modeling was based on emissions data from the mid-1990s. This timing is important because it reflects conditions when Ash Grove Cement and TXI Operations were burning hazardous waste. However, the modeling does not consider changes that have occurred since 1996, such as increased production rates at some facilities and the installation of newer kilns at Holcim and TXI Operations. Figure 11 shows the specific points where EPA's modeling study predicted maximum annual average air concentrations for selected pollutants and maximum deposition of multiple pollutants. As expected, these points of maximum impact were downwind of the facilities, based on two of the most dominant wind directions found in the Midlothian area (i.e., from south to north and from north to south). ATSDR considered these findings when evaluating the placement of the monitoring stations.

  Another consideration in ATSDR's evaluation was a screening modeling analysis that the agency performed to assess the furthest reaches of maximum ground-level impacts from the Midlothian facilities. This analysis was designed to establish the potential area of impact, which the agency considered the area within which it could be reasonably confident that the highest ambient air concentrations due to facility emissions are found. Appendix C documents ATSDR's modeling which was used to construct the potential area of impact shown in Figure 11. This area represents the locations where ATSDR believes that the highest ground-level impacts at any given time may be expected to occur, and this area remains the focus of the evaluation of monitoring locations. Note that the figure is not meant to imply that air emissions from the facilities have no impact beyond the lines shown in Figure 11. Pollutants released by the facilities do reach locations beyond the potential area of impact, but most likely not at levels higher than the maximum concentrations observed at monitors within this boundary.

  Finally, ATSDR considered observed spatial variations in air pollution levels when evaluating monitor placement. Community members have voiced concern over this issue, particularly questioning whether monitors downwind from Gerdau Ameristeel and TXI Operations are truly capturing the highest air quality impacts. The available monitoring data provide useful insights into this issue, because concurrent monitoring has occurred at two locations downwind from these facilities: the Old Fort Worth Road site (station 12 in Figure8) and at the CAMS 302 - Wyatt Road site (station 14 in Figure 8).

To assess spatial variations in this part of the Midlothian area, ATSDR compared measurements from these two locations for the only pollutants that were measured concurrently: nitrogen oxides, sulfur dioxide, and PM_{10}. Table 12 presents the comparison, which shows that ambient levels of PM_{10} were virtually identical across the two sites, ambient levels of nitrogen oxides were slightly higher at the Old Fort Worth Road site, and ambient levels of sulfur dioxide were considerably higher (except for the peak value) at the Old Fort Worth Road site. Thus, even though the CAMS 302 - Wyatt Road monitoring station is located closer to the industrial facilities of interest, the measured concentrations at Old Fort Worth Road for these three pollutants are all comparable or higher. Therefore, for the numerous years when no monitors were located at CAMS 302 - Wyatt Road, ATSDR will use the nitrogen oxides, sulfur dioxide, and PM_{10} measurements from the Old Fort Worth Road monitoring station as an indicator for air quality in the neighborhoods near the CAMS 302 - Wyatt Road station, such as the homes along Cement Valley Road. The comparisons in Table 12 suggest that this approach will likely be health-protective (i.e., it will not underestimate ambient air concentrations of these pollutants at this particular location).

While certain pollutants clearly had higher or comparable concentrations at the Old Fort Worth Road monitoring station when compared to the CAMS 302 - Wyatt Road monitoring station, the 2008-2009 monitoring program exhibited slightly different spatial variations, primarily for inorganics. It is important to note that the 2008-2009 study was a special study and did not involve the same monitors that TCEQ operates through its CAMS network. In the context of the 2008-2009 study, for 20 out of the 22 inorganic pollutants considered, the highest concentrations were observed at the special study's Wyatt Road monitoring location [URS 2009e]. Further, for cadmium, lead, manganese, and zinc, the average levels at the special study's Wyatt Road monitoring location were at least three times higher than those measured at the same time at the special study's Old Fort Worth Road monitoring station. These observations indicate that monitoring data at Old Fort Worth Road for these inorganic pollutants likely understate the pollution levels that would have been observed at Wyatt Road.

ATSDR considered EPA's modeling, the delineation of the potential area of impact in Figure 11, and other factors when evaluating the placement of monitoring locations. Following are ATSDR's findings, organized by pollutant category and time frame:

- PM. Of the four pollutant categories considered in this section, PM has the greatest number and spatial coverage of monitoring stations. Prior to 1991, only a single PM monitor operated in the area: TSP monitoring occurred from 1981 to 1984 at Midlothian City Hall. Though the monitoring data from this station appear to be valid and of a known and high quality, two important considerations factor into ATSDR's evaluation of these data: (1) TSP includes larger particles that are not respirable, limiting the utility of these data for health assessment purposes; and (2) this monitoring location is more than 2 miles away from the facilities of interest and is not commonly directly downwind from the facilities.

  Starting in 1991, coverage of PM monitoring devices increased considerably (see Figure 12). Almost continually from 1991 to the present, ambient air monitoring for PM—whether PM_{10} or $PM_{2.5}$—has occurred at locations immediately upwind and downwind of Gerdau Ameristeel and TXI Operations. Moreover, these monitors were placed at, or in very close proximity to, the nearest residents and the locations where EPA's modeling predicted maximum air quality impacts would occur. This placement of monitors likely provides a reasonable portrayal of the PM ambient air concentrations that nearby residents were exposed to in the vicinity of these facilities. However, the monitors may not adequately characterize PM levels for all residents located immediately adjacent to certain onsite operations, such as limestone quarry activity. This gap in the available environmental monitoring data is identified in Section 4.8.

PM monitors were also placed immediately downwind of Ash Grove Cement and Holcim, but these monitors operated for only part of the time between 1991 and the present. Specifically, the PM monitors downwind from Ash Grove Cement operated in 1992-1996 and again in 2008-2009; and the monitors downwind from Holcim operated in 1993-1995 and again in 2006-2010. While this monitoring effort is useful for assessing air quality impacts near these facilities, ATSDR notes that no PM monitoring occurred downwind from Ash Grove Cement during the time that the facility burned hazardous waste.

Table 13 briefly summarizes how ATSDR plans to use the PM monitoring data in other public health assessment activities.

- Inorganics. As Figure 13 illustrates, the spatial coverage of ambient air monitoring for inorganics in the Midlothian area has also varied with time. The following paragraphs first evaluate the coverage of monitors for multiple inorganics, and then present some additional insights on monitoring for lead.

  Prior to January 2001, ambient air monitoring for inorganics within particulate matter occurred at several locations. However, as Section 4.3 indicates, these measurements were collected using methods commonly applied at the time, but later found to potentially underestimate ambient air concentrations. Therefore, ATSDR used data for metals and elements (except for lead, which is discussed below) that were measured prior to January 2001 for screening purposes only.

  Between 2001 and 2005, ambient air monitoring for inorganics occurred at two locations. At the Midlothian Tower (station 19 in Figure 8), $PM_{2.5}$ samples collected every 6 days from May 2002 to August 2005 were analyzed for inorganic constituents. At the CAMS 302 - Wyatt Road site (station 14 in Figure 8), PM_{10} samples collected every 6 days between January 2001 and June 2004 were also analyzed for inorganic constituents. The 1-in-6 day monitoring at these locations was found to be of a known and high quality. Further, the monitoring is likely representative of highest air pollution levels, as supported by the fact that EPA's previous modeling predicted that some peak air concentrations would occur near these monitoring locations (see Figure 11).

At the end of August 2005, the monitoring device used to measure inorganics at the Midlothian Tower station was shut down and moved to the Old Fort Worth Road station (station 12 in Figure 8), where it began operating the following month. From September 2005 through November 2008, this was the only monitoring station in the Midlothian area that measured ambient air concentrations of inorganics within PM, specifically $PM_{2.5}$. ATSDR found these data to be of a known and high quality and used them for health assessment purposes. This station is in close proximity to a location where EPA's earlier modeling analysis predicted maximum deposition of multiple air pollutants released by Gerdau Ameristeel and TXI Operations (see Figure 11). As discussed previously, ATSDR found evidence suggesting that air concentrations of three pollutants measured at the Old Fort Worth Road monitoring station are reasonably representative of, and if anything higher than, those that occurred at the CAMS 302 - Wyatt Road monitoring station (see Table 12). However, for most inorganics, ambient air concentrations were highest at the near-field Wyatt Road monitoring station. ATSDR drew upon the entire set of monitoring data for the locations downwind from Gerdau Ameristeel and TXI Operations when making conclusions about inorganics in additional health consultations.

From December 2008 to July 2009, the Midlothian Ambient Air Collection and Analytical Chemical Analysis measured ambient air concentrations of metals and elements at eight locations throughout the Midlothian area. This monitoring occurred at residential locations immediately downwind from most of the facilities of interest, and the measurements were found to be of a known and high quality. ATSDR used these data for health assessment purposes. However, interpretations acknowledge that facility operating conditions during this time frame were not representative of earlier years. For example, TXI Operations was not burning hazardous waste in 2009; Ash Grove Cement's annual usage of tire- derived fuel in 2009 was considerably lower than in previous years; and production levels at other facilities might not have been representative of trends over the longer term.

Table 14 briefly summarizes how ATSDR used the monitoring data for inorganics in our public health assessment activities.

Note: The previous discussion indicates that ATSDR's subsequent health consultations used data for inorganics that were collected prior to January 2001 for screening purposes and trend analysis. However, this statement does not apply to lead. The lead measurements collected in Midlothian between 1981 and 1985 and starting again in 1993 are all of a known and high quality, largely because EPA published federal reference methods for lead long before the agency issued its compendium of approved methods for inorganic compounds.

- VOCs. Figure 14 shows the history of VOC monitoring in the Midlothian area. This monitoring first began in January 1993, when a single monitoring location operated along the northern border of Ash Grove Cement (station 5 in Figure 8).

The monitor was placed between the facility and the nearest offsite neighborhood, and east of a location that EPA's previous modeling study predicted would have the highest facility-related air quality impacts (see Figure11). This monitor collected 1-in-6 day samples between January 1993 and March 1997, using methods known to generate data of a known and high quality. ATSDR used this monitoring to evaluate potential air quality impacts during a time when Ash Grove Cement burned tires as a fuel, though data presented earlier in this document (see Section 2.3.1) indicate that this facility's annual tire usage rate more than doubled after this VOC monitoring ceased. Additionally, the data cannot be used to assess air quality impacts from the time when the facility burned hazardous waste, because that practice ended before this monitoring began.

At the end of March 1997, the VOC monitoring device north of Ash Grove Cement was shut down and moved to the Old Fort Worth Road station (station 12 in Figure 8), where it then began operating. VOC monitoring continued at this station, with 24-hour average samples collected once every 6 days, through December 2008.[13] This monitoring occurred downwind of the Gerdau Ameristeel and TXI Operations facilities, near a location where EPA's earlier modeling analysis predicted maximum deposition of multiple air pollutants released from these facilities (see Figure 11). ATSDR used these data for health assessment purposes, because they are of a known and high quality and are indicative of outdoor air pollution levels in the areas north of these two facilities. As noted previously, ATSDR found that measured concentrations of other pollutants (see Table 12) tended to be higher at the Old Fort Worth Road monitoring station than at the Wyatt Road monitoring station. Therefore, to a first approximation, ATSDR assumed that the measured VOC concentrations at Old Fort Worth Road, on average, are reasonably representative of air pollution levels in neighborhoods surrounding the Wyatt Road monitoring station.

From December 2008 to July 2009, the Midlothian Ambient Air Collection and Analytical Chemical Analysis measured ambient air concentrations of VOCs at seven locations throughout the Midlothian area. This monitoring occurred at residential locations immediately downwind from most of the facilities of interest, and the measurements were found to be of a known and high quality. ATSDR used these data for health assessment purposes. However, interpretations acknowledge that facility operating conditions during this time frame were not representative of earlier years. For example, TXI Operations was not burning hazardous waste in 2009; Ash Grove Cement's annual usage of tire-derived fuel in 2009 was considerably lower than in previous years; and production levels at other facilities might not have been representative of trends over the longer term.

[13] Between November 2004, and March 2006, no VOC monitoring took place at Old Fort Worth Road, because this monitoring device was temporarily moved to the Wyatt Road monitoring station during this time frame.

Table 15 briefly summarizes how ATSDR used the VOC monitoring data in additional public health assessment activities.

- Sulfur compounds. As Figure 15 indicates, continuous monitoring of selected sulfur compounds—hydrogen sulfide and sulfur dioxide—has occurred during different time frames at four locations around the Gerdau Ameristeel and TXI Operations facilities. The data are of a known and high quality and are therefore used in additional ATSDR health consultations. Although the monitoring data were collected during certain time frames, ATSDR will consider trends in continuous emission data and annual emission estimates to make inferences about air pollution levels during other years and at other locations in the Midlothian area. The approaches and assumptions that ATSDR uses to make these inferences are documented in the subsequent health consultations.

  Table 16 briefly summarizes how ATSDR used the sulfur compound monitoring data in our public health assessment activities.

- Other pollutants. The other pollutants not covered by the previous evaluation are ozone, carbon monoxide, and nitrogen oxides. As Section 2.6 explains, ozone is a regional air quality issue in the vicinity of Dallas and Fort Worth. ATSDR's health consultation on criteria pollutants and hydrogen sulfide considers the ozone levels that have been measured at the Old Fort Worth Road monitoring station, as well as those observed elsewhere in the non-attainment area. The placement of ozone monitors throughout the metropolitan area appears to be adequate for determining whether the region's air quality meets EPA's health-based air quality standards.

  For carbon monoxide, a previous section of this document (Section 4.2) notes that no ambient air monitoring for this pollutant has occurred in the Midlothian area. Therefore, in its additional health consultations, ATSDR uses modeling and other site-specific information to assess emissions of carbon monoxide.

  Finally, for nitrogen oxides, continuous monitoring at Old Fort Worth Road, CAMS 302 - Wyatt Road, and Midlothian Tower—the sites that bracket the Gerdau Ameristeel and TXI Operations facilities—has occurred at different times between 2000 and 2009. These monitoring data should form a sufficient basis for reaching conclusions on these facilities' air quality impacts during this time frame. ATSDR considered continuous emission monitoring data and annual emission inventory data when deciding if conclusions can be reached for years before the nitrogen oxides monitoring first occurred.

4.8 Summary

Between 1981 and the present, the extent of ambient air monitoring programs in the Midlothian area has varied widely. In some years, extensive monitoring occurred for numerous different pollutants and at several locations of interest; but, in other years, no ambient air monitoring occurred at all. Additionally, some of the older monitoring data were conducted using methods that have since been found to potentially understate air pollution levels.

As a result of these observations, ATSDR's conclusions regarding the utility of the monitoring data for health assessment purposes vary by pollutant, by year, and by location. Tables 13-16 summarize the availability of data and how ATSDR intends to use them for evaluating the health implications of exposure to air pollution in subsequent health consultations.

The available monitoring data characterize air quality at different times and locations and for different pollutants throughout the Midlothian area, but several gaps in the available environmental monitoring data exist. The more important data gaps that will affect the conclusions that can be drawn follow:

- Prior to 1981, no monitoring data are available for the Midlothian area, and between 1981 and 1988, data are limited to just a few pollutants. Moreover, between 1981 and 1988, facility-specific air emission data and facility-specific fuel usage statistics are also very limited. Thus, not only are there few direct measurements of air pollution levels during this time frame, but limited surrogate information for inferring what air pollution levels might have been. Efforts to infer past air quality levels are complicated by the fact that air pollution controls have become more effective over time.

- No ambient air monitoring data were collected in the vicinity of Ash Grove Cement during the years that the facility burned hazardous waste.

- VOC monitoring in the vicinity of TXI Operations occurred during several years when the facility burned hazardous waste. However, the sampling and analytical method used for much of this time frame (1997 to 2008) was not sensitive enough to measure ambient air concentrations at levels near ATSDR's health screening values. While the monitoring that occurred in 2008-2009 achieved considerably lower detection limits, TXI Operations was not burning hazardous waste during much of this time.

- Several monitoring stations in the Midlothian area were placed near or at locations believed to either have high air quality impacts from facility operations or a high potential for exposure. Ambient air monitoring data are more limited for the residential neighborhoods in immediate proximity to the cement manufacturing facilities' limestone quarries.

- For VOCs and inorganics, most monitoring followed 1-in-6 day sampling schedules. Data analyses demonstrate that these schedules are adequate for characterizing long-term average air pollution levels, but provide less confidence in characterizing short-term or episodic pollution events.

The significance of these gaps in the available environmental monitoring data are discussed further in ATSDR's additional health consultations.

5.0 Conclusions

Monitoring of outdoor air pollution levels in the Midlothian area first started in 1981. Since then, the nature and extent of the monitoring has varied greatly by pollutant category, location, and year. Tables 13-16 of this health consultation document ATSDR's findings regarding the utility of the available monitoring data sets for health assessment purposes.

For the various pollutants, time frames, and locations identified as gaps in the available environmental monitoring data, ATSDR's additional health consultations either (1) make no health conclusions for the issues identified as data gaps or (2) make inferences about air pollution levels based on surrogate information, such as dispersion modeling data. When such inferences are made, ATSDR documents its assumptions and characterizes the level of confidence associated with any conclusions that are not based directly on ambient air monitoring data. ATSDR also made recommendations for additional sampling, where warranted.

The following text presents ATSDR's findings for the main criteria considered when evaluating the utility of the available ambient air monitoring data:

Main Conclusion

The available ambient air monitoring data for the Midlothian area are sufficient to support public health evaluations for numerous pollutants of concern and for many years that local industrial facilities operated. However, the data also have some limitations identified in the remaining six conclusions. For pollutants with little or no available environmental monitoring data, ATSDR believes there is utility in modeling air quality impacts to determine if additional sampling is warranted. The modeled data cannot be used to definitively determine if the potential exposure was, or is, a public health hazard.

Question 1: Pollutants Monitored (Section 4.2)

- Some ambient air monitoring data are available for every inorganic pollutant included in the facilities' annual emission reports, except for hydrochloric acid, sulfuric acid, and vapor-phase mercury.

- For VOCs, ambient air monitoring has occurred for the subset of pollutants that the facilities have released in greatest quantities.

- No ambient air monitoring has occurred for semi-volatile organic compounds, which include dioxins, furans, and polycyclic aromatic hydrocarbons.

- Ambient air monitoring data are available for all criteria pollutants directly emitted by the facilities (lead, nitrogen dioxide, particulate matter, and sulfur dioxide) except for carbon monoxide.

Question 2: Monitoring, Sampling, and Analytical Methods Used (Section 4.3)

- Nearly every ambient air monitoring, sampling, and analytical method that has been used in the Midlothian area is well established, peer-reviewed, and capable of generating data of a known and high quality. The following points identify exceptions to this conclusion.

- The PM samples collected in 1981 and between 1991 and 1994 were analyzed for inorganics by a method that was commonly used at the time, but was later found to potentially understate actual ambient air concentrations. This finding does not apply to lead, because the methods used to measure airborne lead were well established during this time frame.

- The method that has been used to measure ambient air concentrations of nitrates in PM samples has also been found to understate actual air pollution levels.

- The ambient air monitoring methods used in the Midlothian area have generally been sensitive enough—that is, they have detection limits low enough—to measure ambient air concentrations at levels of potential health concern. The only exceptions are that the methods used to measure air concentrations of arsenic, cadmium, hydrogen sulfide, and 1,2-dibromoethane did not always achieve the sensitivity ATSDR would prefer to have for making health conclusions. However, there is no evidence that the Midlothian facilities use, process, or release 1,2-dibromoethane. For arsenic, cadmium, and hydrogen sulfide, other considerations will have to factor into the evaluation of potential exposures.

Question 3: Data Quality of the Air Pollution Measurements (Section 4.4)

- ATSDR reviewed various data quality indicators for the available ambient air monitoring programs in the Midlothian area. Except for the special considerations listed below, these indicators suggest that the air pollution measurements are of a known and high quality and suitable for health assessment purposes.

- The continuous $PM_{2.5}$ monitoring devices used in the Midlothian area measured slightly lower concentrations, on average, than more rigorous monitoring methods, suggesting that the continuous devices have a slight negative bias in their measurements.

- For metals and elements, measurements near the detection limits must be interpreted with caution because measurement precision is lowest in this range. Further, filter blank data should be considered when interpreting any of the data for metals and elements. These issues apply to most any ambient air monitoring program for metals and elements, and should not be interpreted as a criticism of the monitoring programs implemented in the Midlothian area.

Question 4: Time Frames Covered by the Monitoring Programs (Section 4.5)

- Prior to May 1981, no ambient air monitoring data are available for the Midlothian area. Since 1981, validated ambient air monitoring data suitable for health assessment purposes are available for several time frames. The availability of validated data varies by pollutant and year. Tables 13-16 address this issue in greater detail.

- Monitoring data clearly are not available for all pollutants, over all time frames, and across all locations of interest. However, the available monitoring data can be used to make inferences about air pollution levels during time frames when—and at locations where—no monitoring occurred. When ATSDR makes such inferences, subsequent health consultations document all assumptions used and characterize the confidence in those findings.

Question 5: Monitoring Frequencies and Durations (Section 4.6)

- The monitoring frequencies and durations used in the Midlothian area vary from one pollutant to the next, but are generally consistent with monitoring methodologies commonly used throughout the country.

- The ambient air monitoring data and facility continuous emission monitoring data provide no evidence that the Midlothian facilities alter their emissions on days when 1-in-6 day samples are collected.

- Trends among the Midlothian monitoring data indicate that 1-in-6 day sampling schedules are sufficient for characterizing PM exposures over the long term (e.g., for periods of 1 year and longer) and for characterizing 90^{th} percentile concentrations.

- This evaluation revealed the potential utility of 1-in-6 day sampling for capturing the highest 24-hour average $PM_{2.5}$ concentrations in Midlothian. As the best case scenario, if a 1-in-6 day sample were to have occurred on the date with the worst air pollution levels, the 1-in-6 day sample would be considered adequate for assessing short-term exposures have contained the overall sample maximum. However, as Table 11 indicates, these available monitoring data indicate that it is possible that the 1-in-6 day sampling might understate the highest 24-hour average $PM_{2.5}$ concentrations by as much as 44 percent. This analysis would, however, only be applicable to these $PM_{2.5}$ data and would not necessarily be applicable to different time frames or other contaminants. However, it illustrates the concern that sampling may miss 'peak exposures'.

Question 6: Monitoring Locations (Section 4.7)

- The number and placement of ambient air monitoring stations in the Midlothian area has varied by pollutant and year. Tables 13-16 describe how the coverage of monitors changed with time for each pollutant group and important gaps are noted. For many years and pollutants, monitoring occurred at or near locations that EPA previously identified as having the greatest air quality impacts from at least some of the Midlothian facilities.

- The specific monitoring locations used in the ambient air monitoring programs were selected for various reasons. These reasons include: to characterize facility-specific air quality impacts; to measure air pollution levels in areas with the most citizen complaints; to assess exposures at schools and parks; and to understand the "background" levels of air pollution that is moving from the south into the Dallas-Fort Worth metropolitan area. ATSDR considered the rationale for selecting monitoring locations when interpreting the data generated at each site.

- For some pollutants and years, ambient air monitoring data are available for a single location, yet community members have expressed concern over air pollution levels for a larger geographic area. In these cases, ATSDR evaluated the broader set of ambient air monitoring data to determine if the monitoring results for a single location are reasonable indicators for air quality at other locations.

6.0 Public Health Actions Planned

General:

- ATSDR proposes continuing its evaluations of environmental data, bearing in mind the limitations in the ambient air monitoring data identified in this health consultation. The health evaluations consider exposure to individual pollutants and the overall mixture of air pollutants observed in the Midlothian area. Readers should refer to ATSDR's Public Health Response Plan [ATSDR, 2011] for a complete listing of the upcoming health evaluations that the agency is conducting.

- For the known gaps in the ambient air monitoring data (see Section 4.8), ATSDR's health consultations that follow this one should either document health evaluations using other information sources (e.g., dispersion models, emissions data) or conclude that not enough information is available to make defensible conclusions. Further, ATSDR's evaluations should identify sources of uncertainty and characterize the level of confidence associated with the health conclusions.

Pollutants monitored:

- ATSDR proceeded with evaluating the health implications of the measured concentrations, considering the findings outlined in Tables 13 to 16 of this health consultation.

Monitoring methods:

- ATSDR's additional health consultations used data generated by valid methods for health evaluations. However, metals data before 2001 and all nitrate data was used with caution.

- ATSDR's additional health consultations evaluated the valid measurements of certain VOCs, arsenic, cadmium, and hydrogen sulfide, and that evaluation considers the fact that some of those measurements were not capable of measuring air pollution levels at concentrations near the most health-protective screening values.

Data quality:

- When interpreting the continuous $PM_{2.5}$ monitoring data in future health consultations, ATSDR considered the possibility that these devices were underestimating ambient air concentrations.

- When evaluating any data for inorganics, ATSDR considered the possibility of "false positive" detections due to metals naturally found in the filters used to collect the air samples. This issue, known as blank contamination, will most likely affect the measurements of barium, total chromium, copper, manganese, molybdenum, and silver.

Time frames:

- In future health consultations, ATSDR evaluated the health implications of the measured air pollution levels for all years when ambient air monitoring data were collected.

- For years when no measurements were collected, ATSDR derived estimates of air pollution levels from other sources of information, such as facility specific emission rates and air modeling. All such estimates and uncertainties are documented.

Monitoring frequency and duration:

- In additional health consultations, ATSDR considered the limitations posed by a 1-in-6 day sampling schedule. In those documents, ATSDR acknowledged uncertainties associated with using 1-in-6 day sampling schedules to assess short term air pollution levels.

Monitoring locations:

- In additional health consultations, ATSDR interpreted data collected at the various monitoring locations, recognizing that some of the monitors were placed in areas typically upwind from the facilities of interest. In those documents, recommendations for future sampling are included.

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Tables and Figures

Figure 1. Facilities of Interest in Midlothian

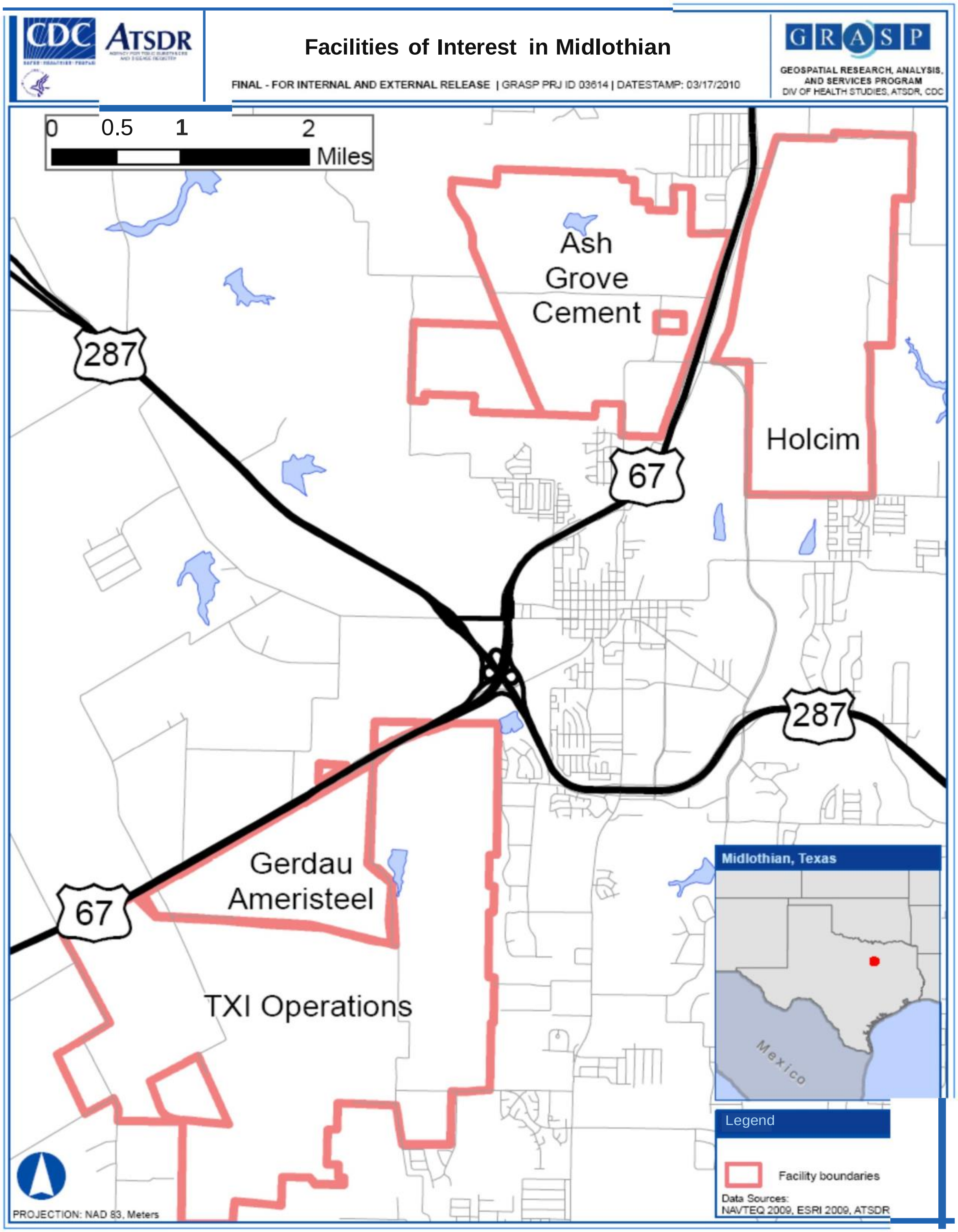


Figure 2:S02 Polar Plots at Long Term Monitoring Stations

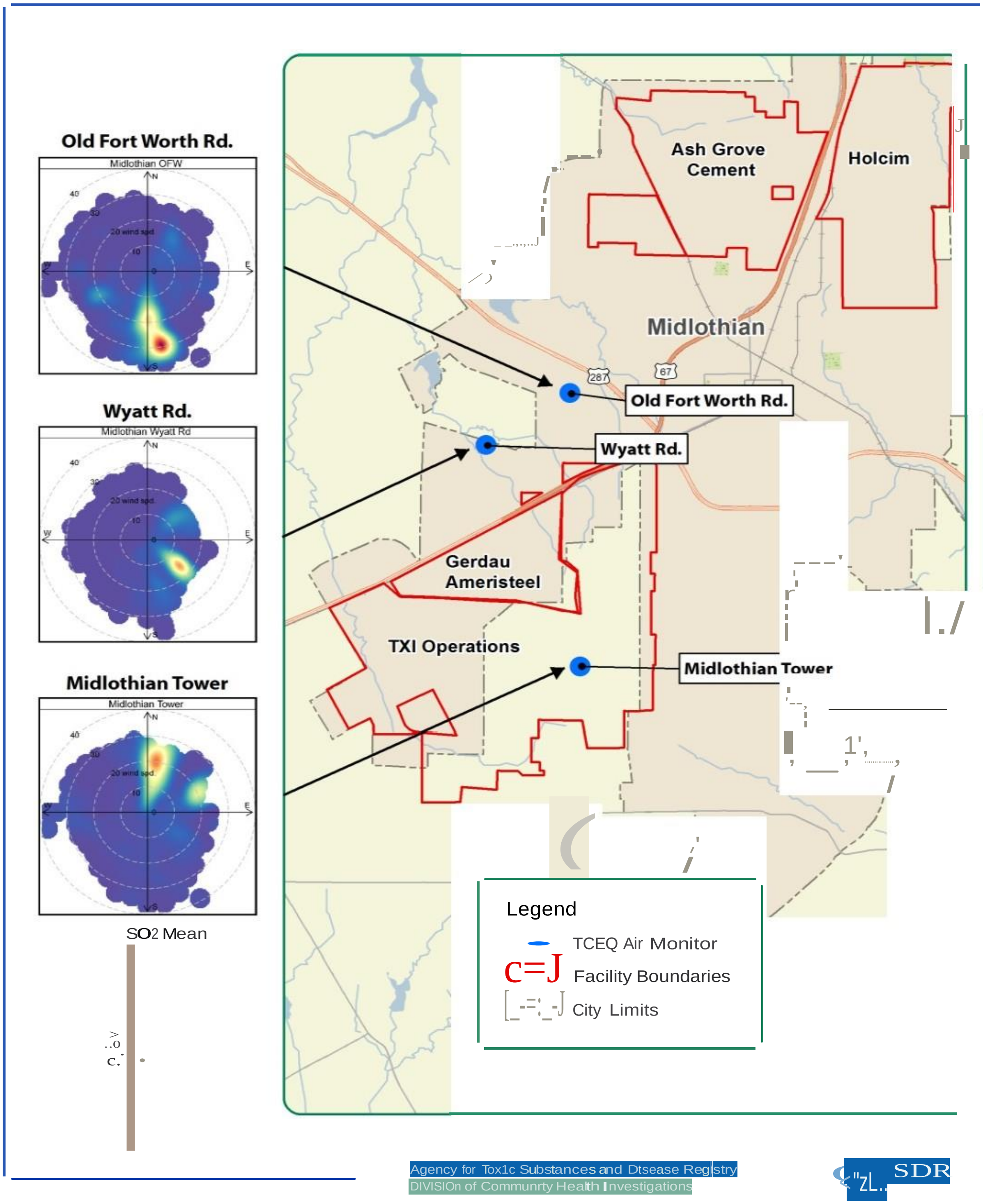


Figure 3: *NOz* Polar Plots at Long Term Monitoring Stations

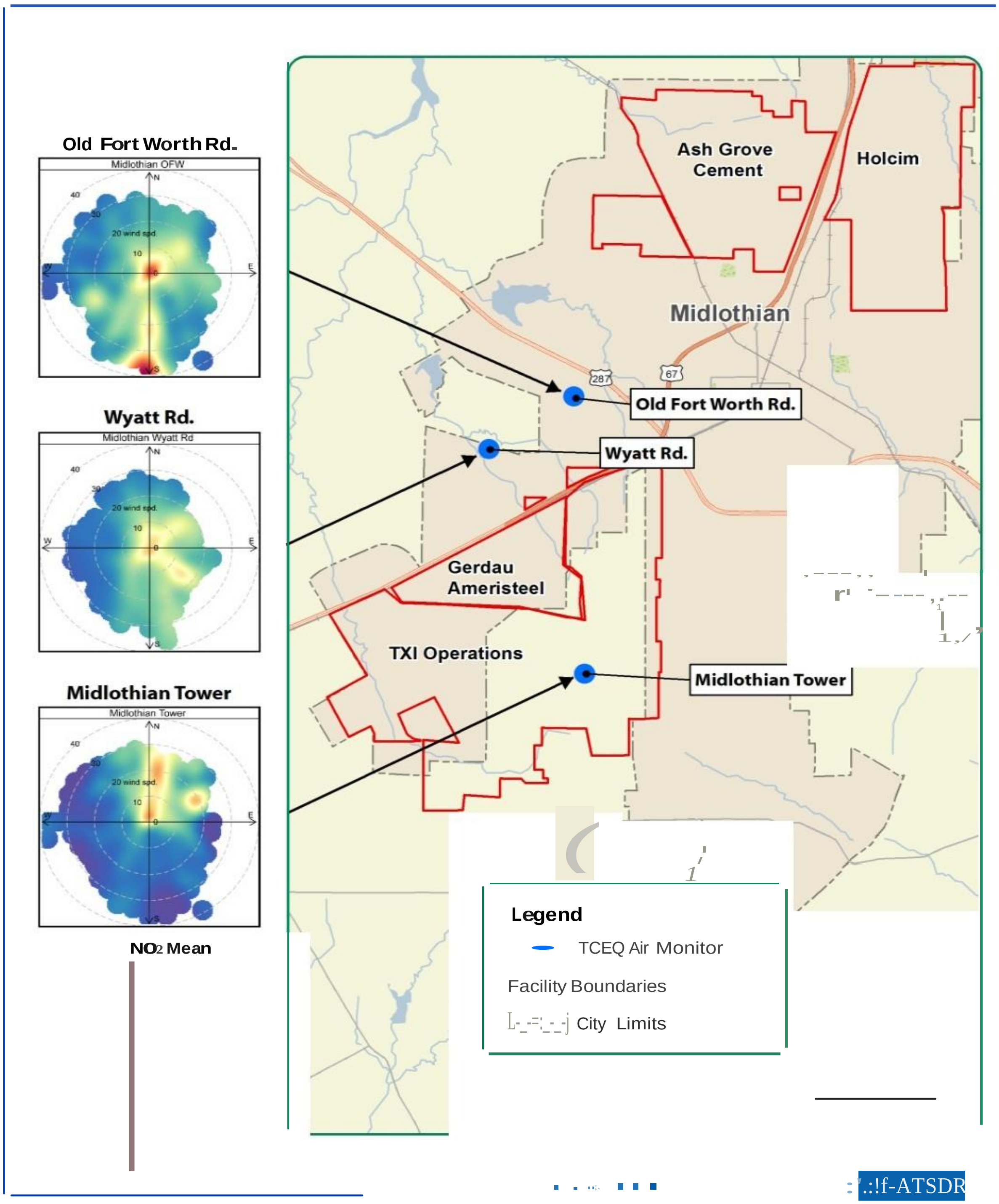
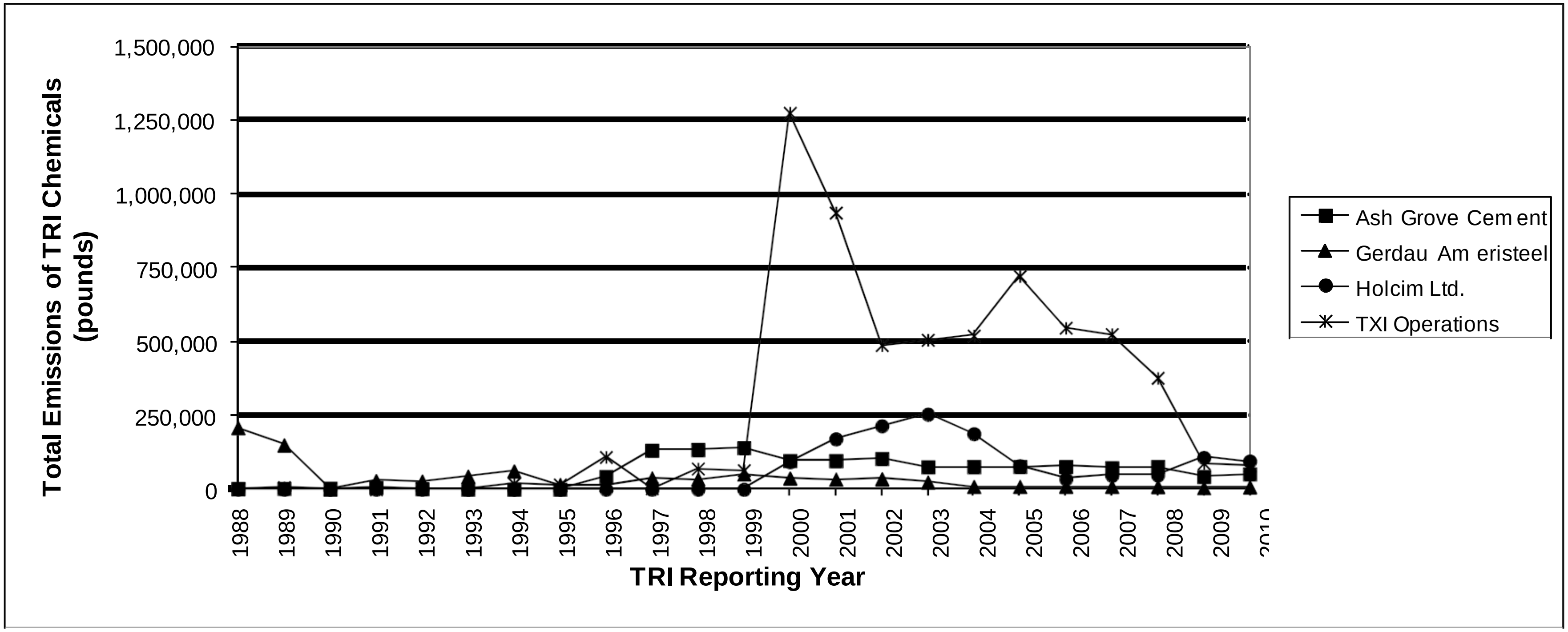


Figure 4. Total Air Emissions Reported by Midlothian Facilities to TRI, 1988–2010



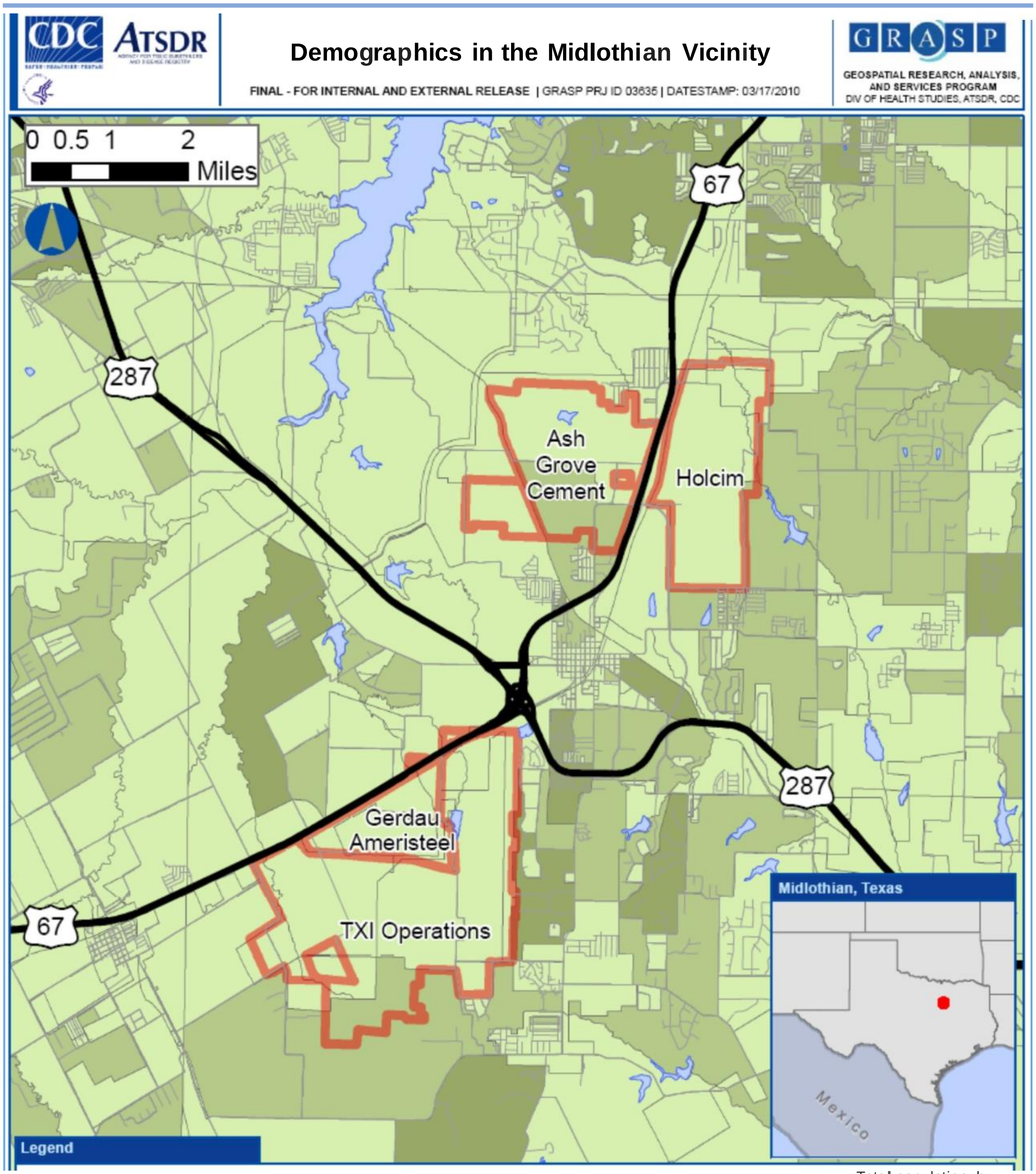
Data source: EPA 2010a

Notes: Figure presents total air emissions (stack and fugitive) from the four facilities of interest.

Long-term trends in emission data can reflect actual changes in facility emissions, as well as changes in the TRI reporting requirements. For instance, the reporting requirements for certain persistent bioaccumulative pollutants (e.g., mercury) and lead changed in 2000 and 2001, respectively, which resulted in some facilities reporting for certain pollutants they did not report for previously.

In some cases, facilities did not report any emissions to TRI during the time frame covered in this figure. This most likely resulted from either the facilities not meeting the chemical usage requirements necessary for triggering reporting or the facilities failing to report as required. It is beyond the scope of this health consultation to speculate on the exact reason why no TRI reports were submitted in certain years.

Figure 5. Demographics in the Midlothian Vicinity



Demographic profile of area

Distance from Facilities	Total population	WHITE		OTHER	AGE <a 6	AGE >o 65	Female15 44	Households
Within 1mile	8,271	7,614(92'')		510 (6'')	952(12'')	512(6'')	1866(23''	2,940
Within 2 miles	19.578	17,697(90'')	660 (3'')	1,221(7%)	2,219(11'')	1,215 (6%)	4437 (23'')	6 837
Within 3 miles	38,908	33,236(85'')	2,844 (8%)	2,828 11"1	4,299 III)	2,233 (6%)	8704 (22''	12,835

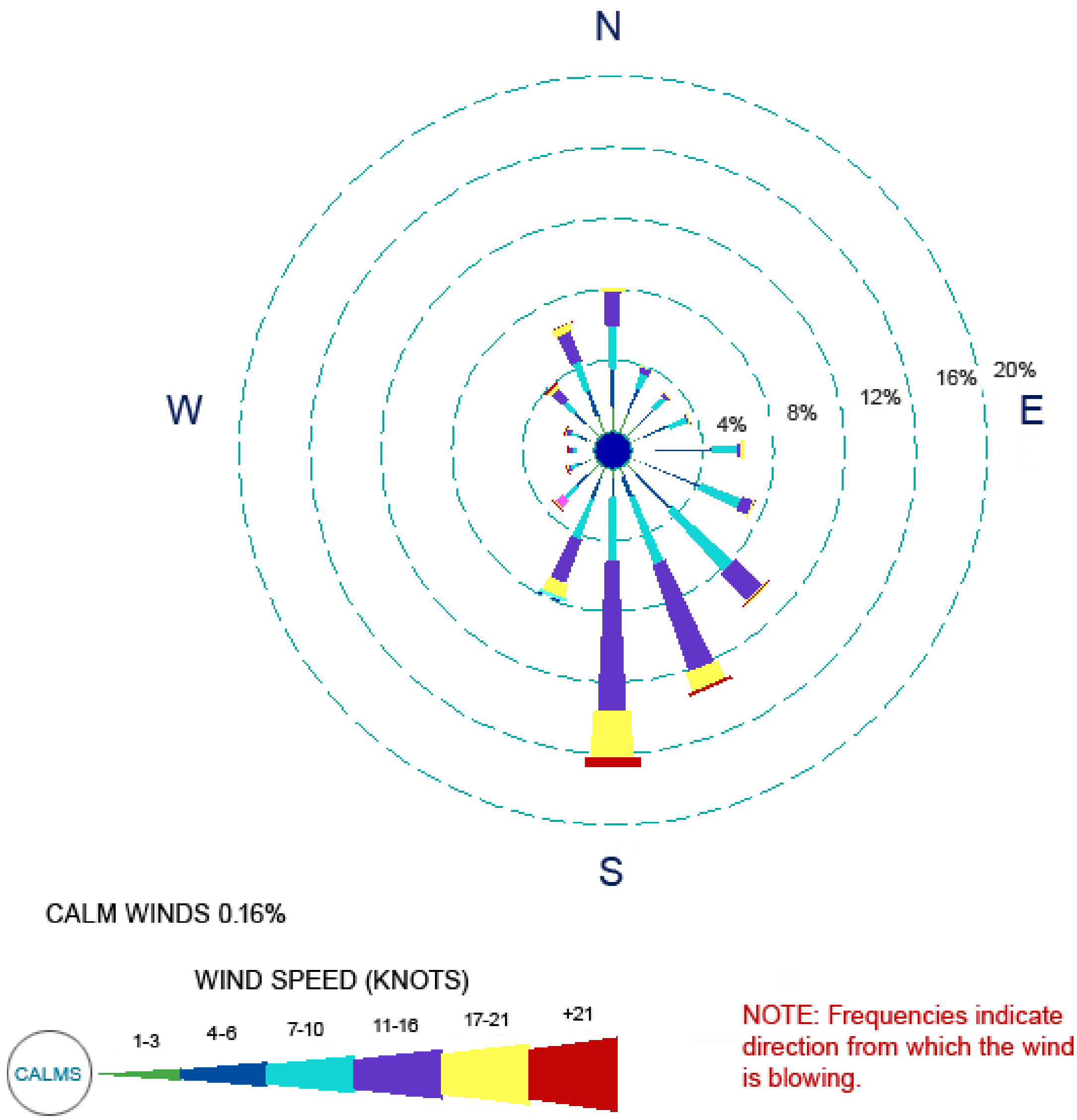
Total population by census block (natural breaks method)

- 0-76
- 77 - 326
- 327 - 913
- 914-2418
- 2418 - 7675
- Facility boundaries

Data Sot.rces:
NAVTEO 200Q, ESRI 200Q, ATS R

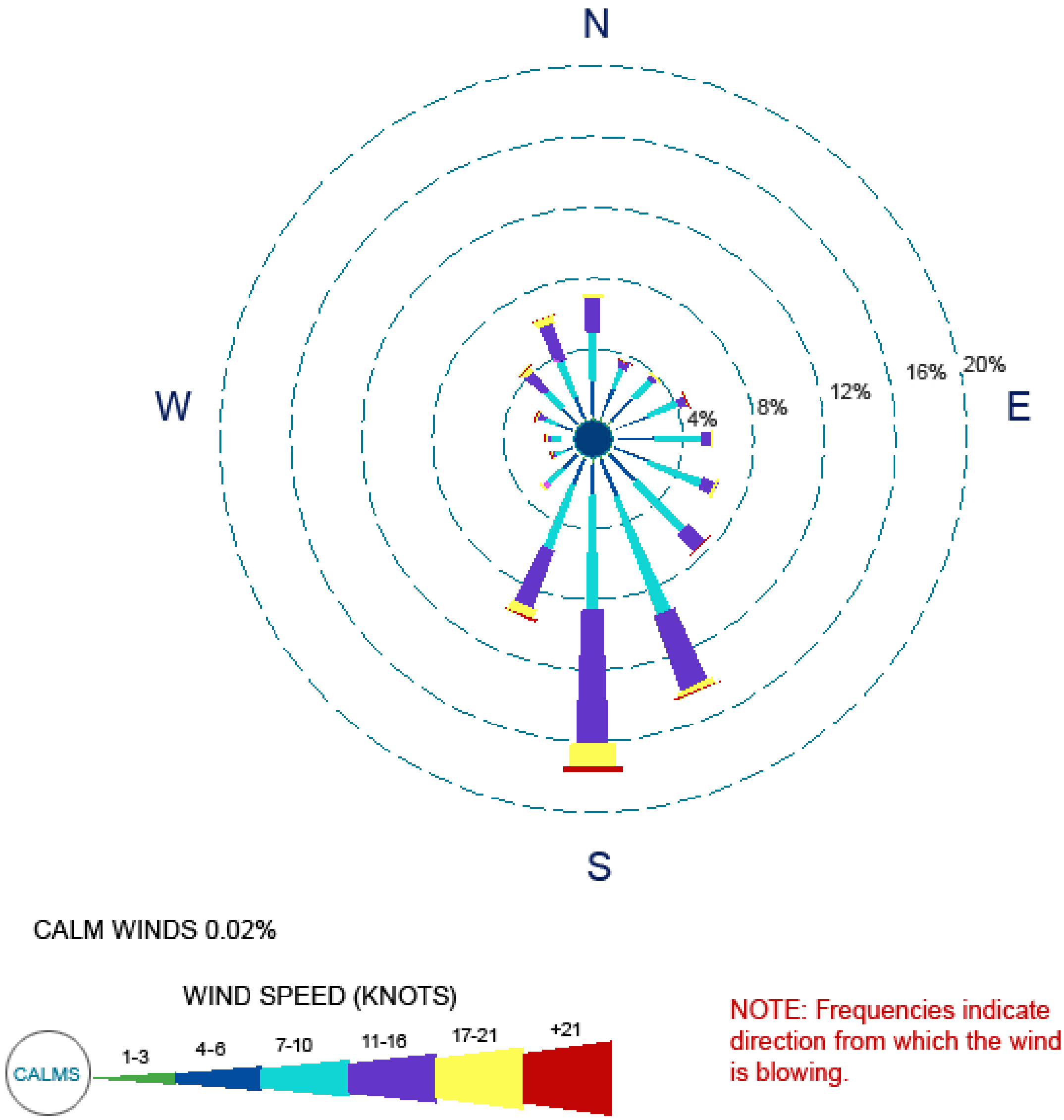
MAP AUTHOR: JR HENRY

Figure 6. Wind Rose for the Old Fort Worth Road Monitoring Station, 2002–2006



Data source: TCEQ 2009b

Figure 7. Wind Rose for the Midlothian Tower Monitoring Station, 2002–2006



Data source: TCEQ 2009b

Figure 8. Monitoring Locations in Midlothian Area, January 1981 to Present

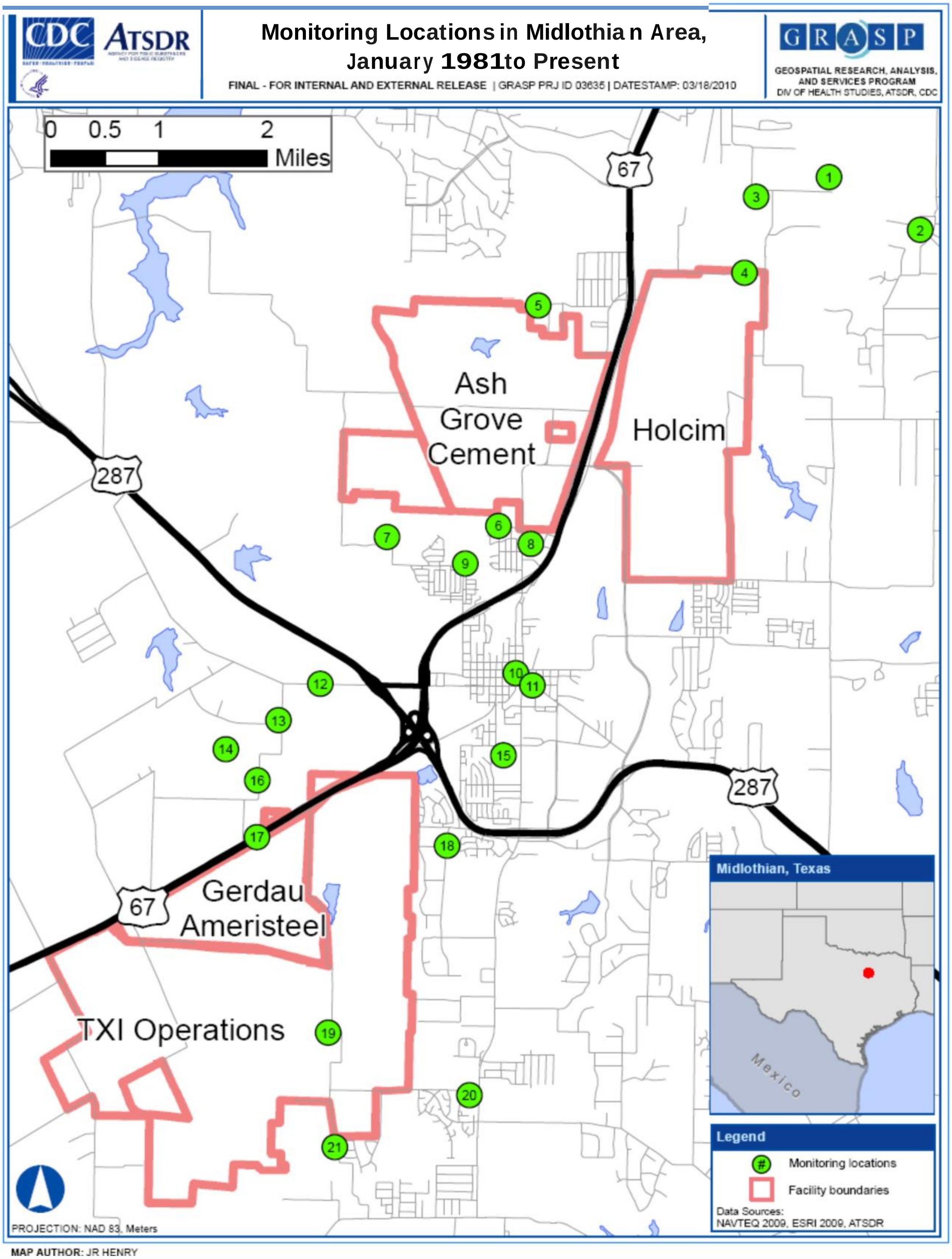
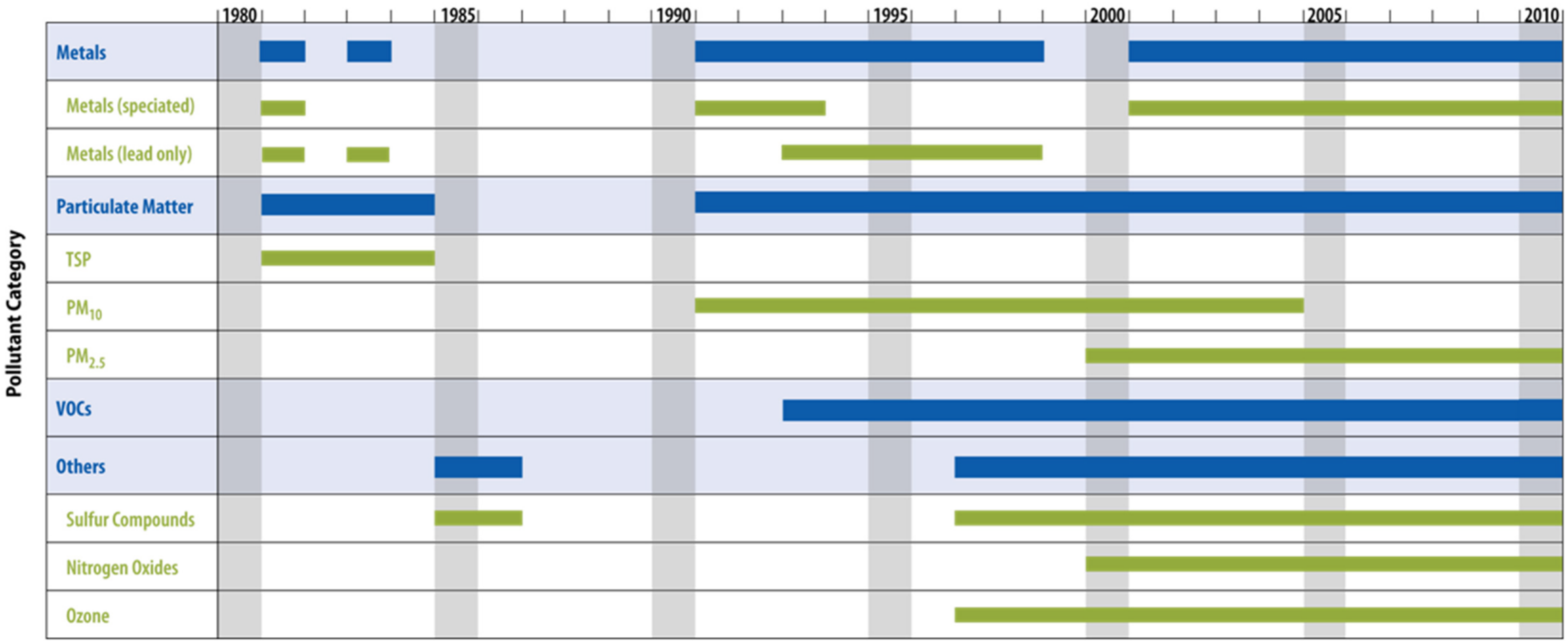


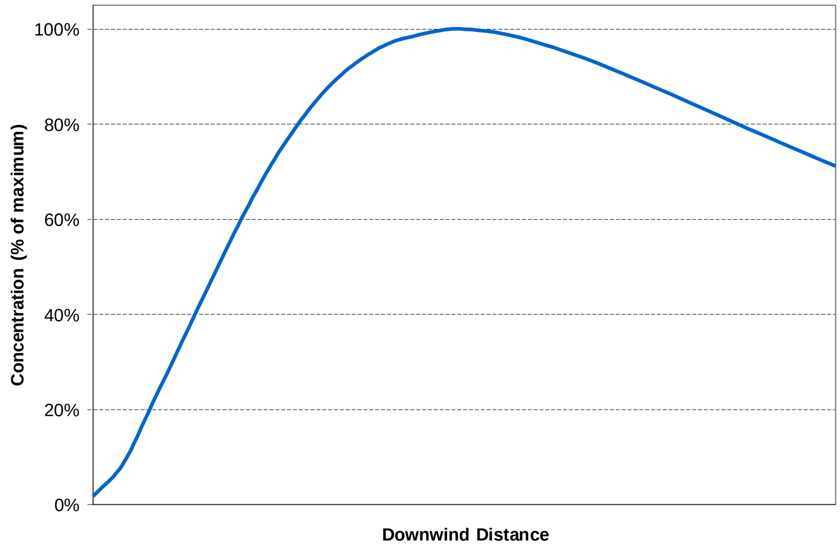
Figure 9. Timeline of Ambient Air Monitoring Activities by Pollutant Group, 1980–2010



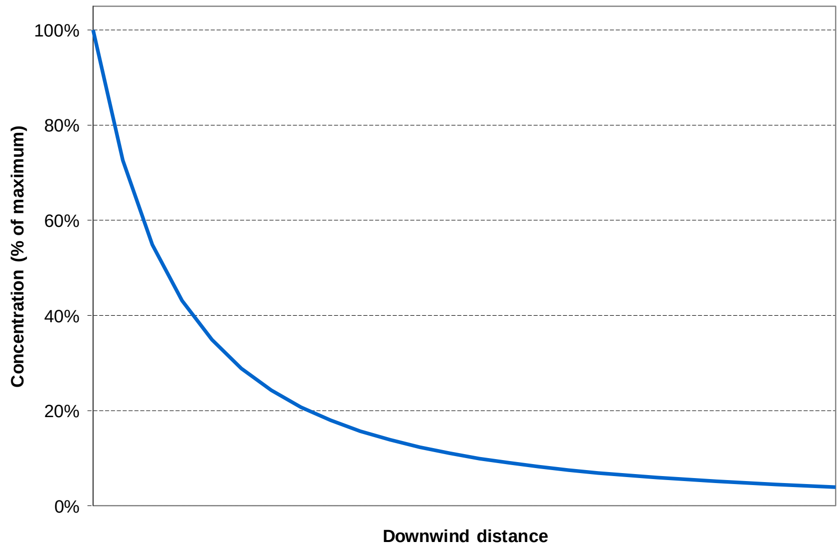
Notes: The timeline indicates the years in which ambient air monitoring occurred at any location in the Midlothian area. Section 4.2 of this health consultation provides more detailed information on the temporal coverage of the monitoring activities (e.g., the specific months when monitoring was conducted, the frequency with which samples were collected). Figures 9 through 12 of this health consultation show how the spatial coverage of monitoring stations varied by pollutant category and year. Although speciated metals monitoring was conducted in 1981 and from 1991 to 1993, ATSDR concluded that these data should not be used for public health assessment purposes, due to data quality concerns. Section 4.4 describes this issue in greater detail.

Figure 10. Air Concentrations versus Downwind Distance for Example Emission Sources

A] Ground-level ambient air concentrations as a function of downwind distance for a typical stack source

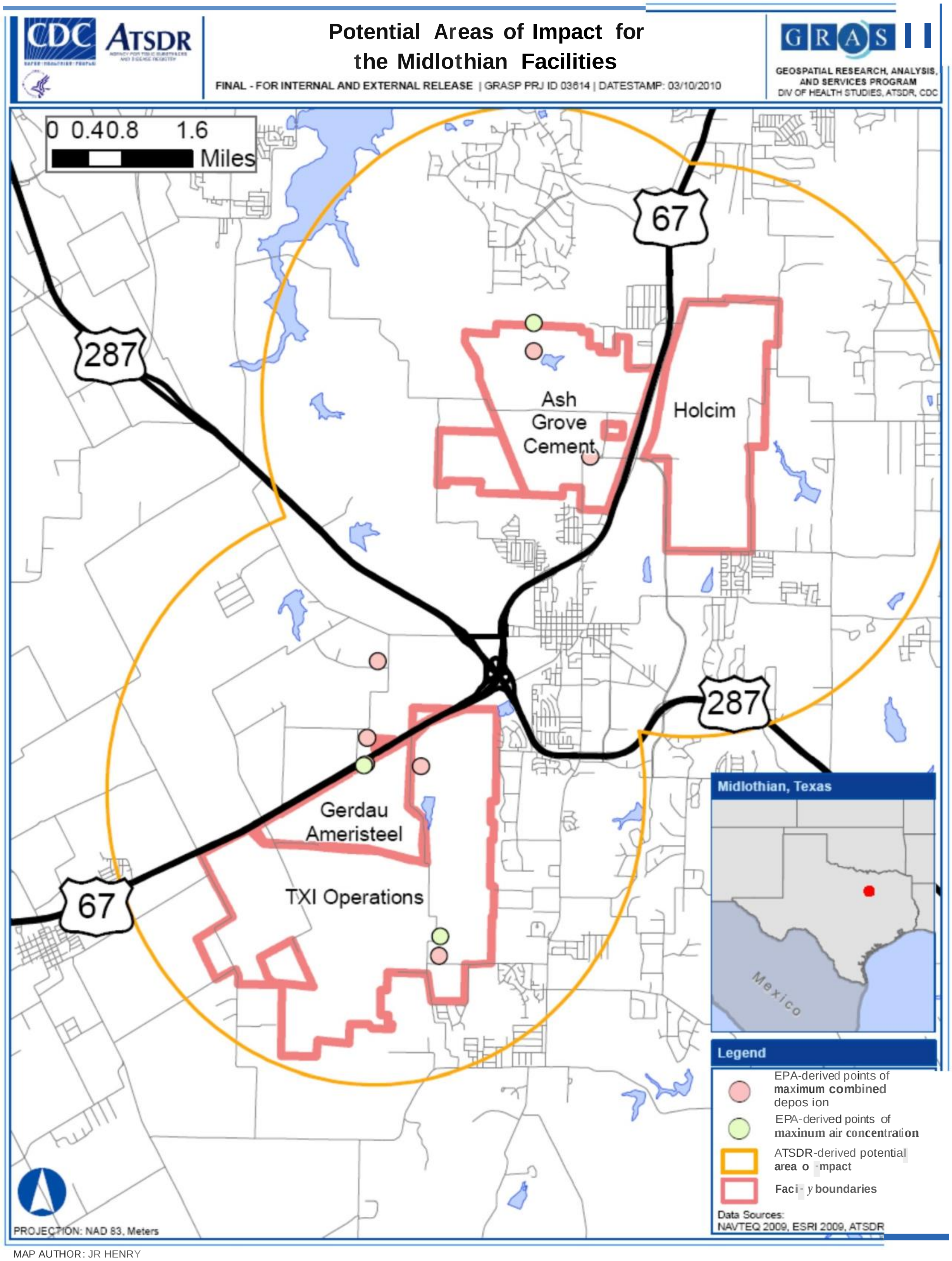


B] Ground-level ambient air concentrations as a function of downwind distance for a typical ground-level, passive release



Notes: Concentration profiles generated using SCREEN3 model and inputs for hypothetical scenarios.
For stack emissions, source parameters (e.g., stack heights, exit velocities) and meteorological conditions will determine the actual downwind distance to a peak concentration, the magnitude of the peak concentration, and the rate which concentrations decay further from the source.
For ground-level, passive releases, source parameters (e.g., dimensions of the source) and meteorological conditions will determine the magnitude of the ambient air concentrations and how quickly they decay with downwind distance.

Figure 11. Potential Areas of Impact for the Midlothian Facilities



Note: Please refer to Appendix C *for how areas of impact were determined.*

Figure 12. PM Monitoring Locations within Area of Interest

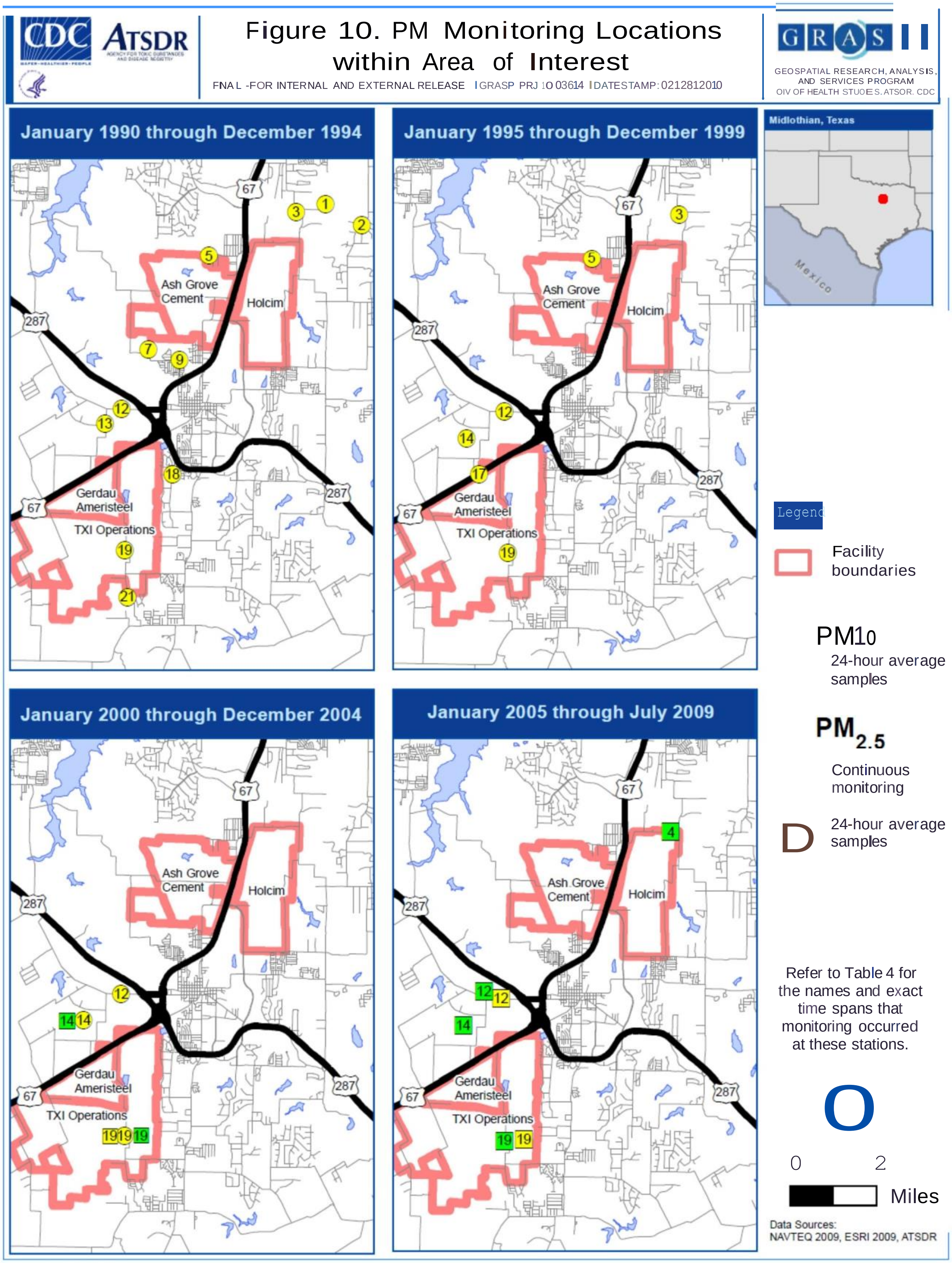


Figure 13. Inorganics (Metals) Monitoring Locations within Area of Interest

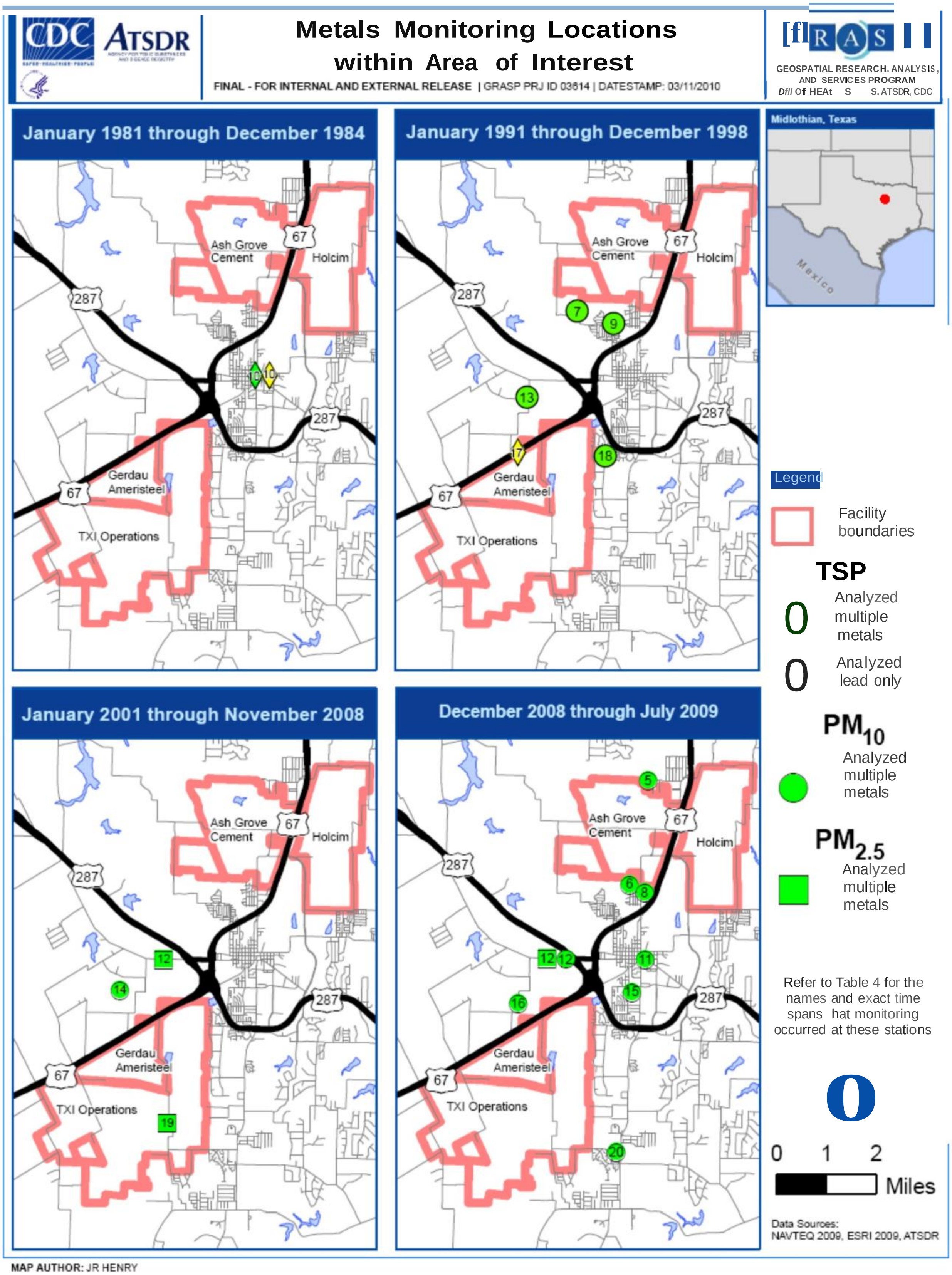
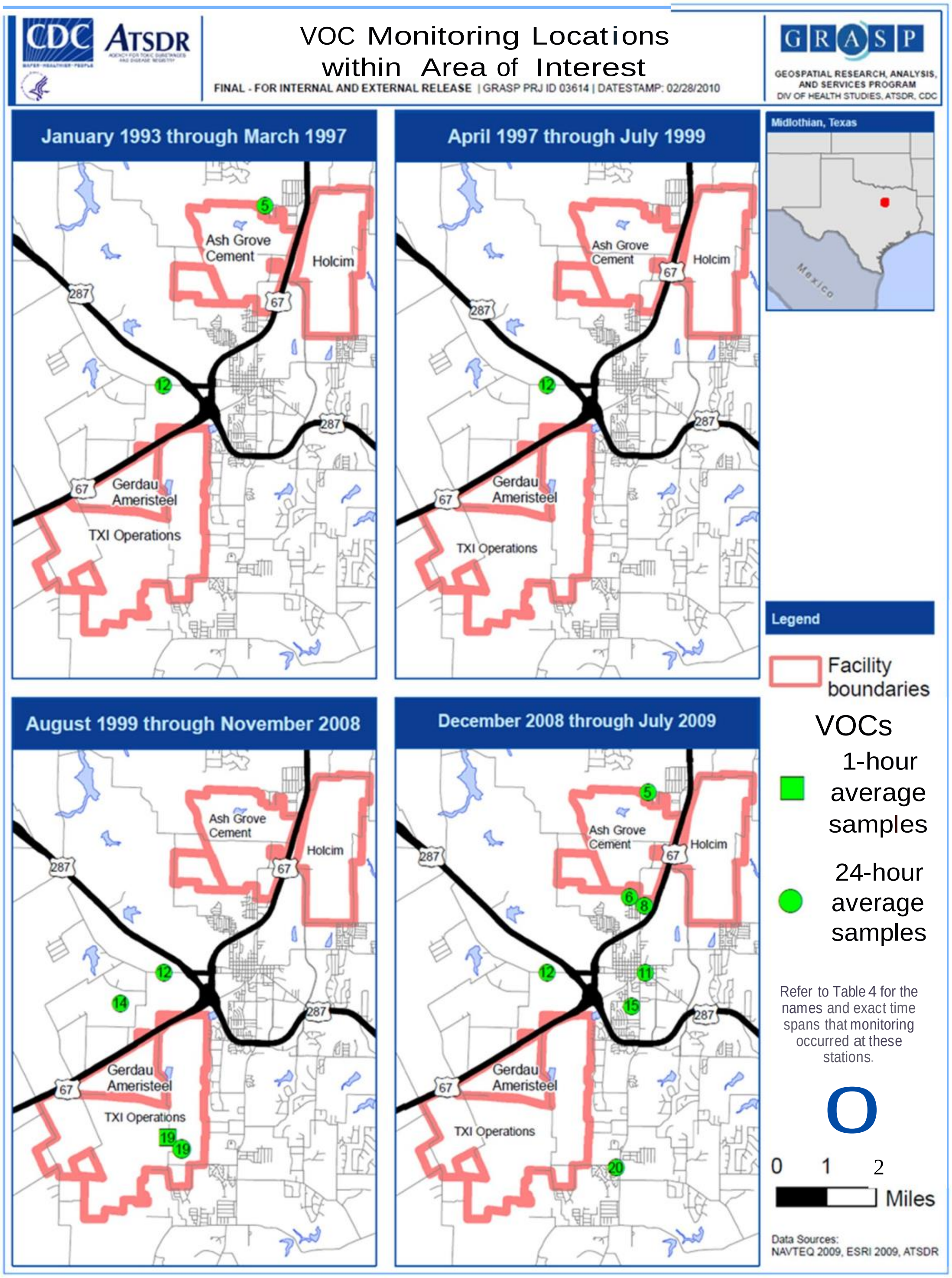


Figure 14. VOC Monitoring Locations within Area of Interest



MAP AUTHOR: JR HENRY

Figure 15. Sulfur Compound Monitoring Locations within Area of Interest, August 1985 through May 2009

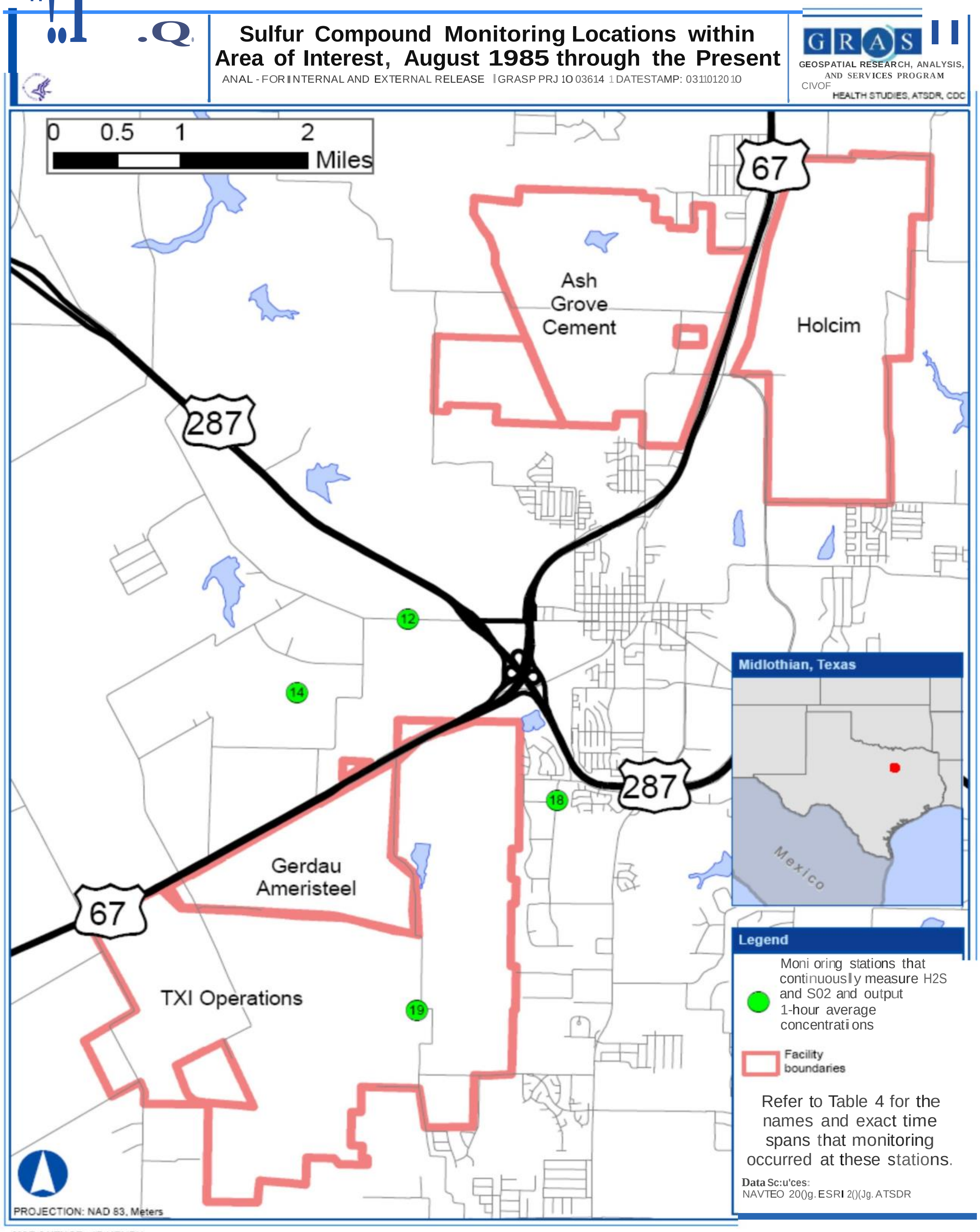


Table 1. Categories of Pollutants Emitted from Cement Kilns

Category	Pollutants within Category	Origin of Emissions
Particulate matter (PM)	$PM_{2.5}$, PM_{10}, TSP	Particles in the kiln exhaust that are not collected in pollution controls are emitted from the stacks as PM. This would include cement kiln dust. PM is also emitted from materials handling processes and many other supporting operations at ground-level.
Inorganics	Metals, elements, inorganic compounds	Most metals and elements emitted from cement kilns are found within the particles that are emitted as PM. The main exception is mercury, which is emitted as a gas from high temperature sources (i.e., the kilns). Some inorganic compounds (e.g., sulfates, hydrochloric acid, sulfuric acid) are also found in particles emitted from stacks, while other inorganic compounds (e.g., carbon monoxide, nitrogen oxides, sulfur dioxide, hydrogen sulfide) are released as gases.
Volatile organic compounds (VOCs)	Organic (or carbon-containing) compounds with high volatility	The high temperatures in cement kilns are expected to destroy most of the VOCs present, but some VOCs may still be found in stack emissions. These include constituents of the various raw materials and fuels and pollutants formed during the combustion of fuels.
Semi-volatile organic compounds (sVOCs)	Organic compounds with low volatility, which include dioxins, furans, and polycyclic aromatic compounds	Combustion of fuels, tires, and hazardous waste can create various products of incomplete combustion and other by-products, which include a wide range of sVOCs. At cement kilns, these would be expected to be found primarily in the stack emissions.

Table 2. Background Information on Midlothian Facilities

Parameter	Facility Name			
	Ash Grove Cement	Gerdau Ameristeel	Holcim	TXI Operations
Approximate years of operation	44	35	23	50
Number of furnaces or kilns	3	2	2	5
Energy sources allowed by the facility air permits	Coal, fuel oil, natural gas, petroleum coke, tires, wood chips	Electricity	Coal, natural gas, tire-derived fuel, alternative fuels	Coal, fuel oil, natural gas, petroleum coke, waste-derived fuel
Number of facility-specific complaints logged in TCEQ's database from 2002 through 2009	0	52	11	84
Number of air emission event reports filed with TCEQ from 2003 through 2011, by type of event:				
Emission event	18	2	8	8
Maintenance	41	0	4	1
Shutdown	4	0	1	0
Startup	3	0	1	0
Excess opacity	136	28	3	23

Data sources: Facility-specific complaint data: TCEQ 2010b
Emission event report data: TCEQ 2010a
Both types of data are reported exactly as queried from TCEQ's Web site.

Table 3. Criteria Pollutant Emission Data Reported to TCEQ's Point Source Emissions Inventory, 2000–2009

Pollutant	Facility	Emissions (tons) by Year									
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Carbon monoxide	Ash Grove Cement	530	590	420	380	360	510	480	500	410	170
	Gerdau Ameristeel	1,700	1,600	1,600	1,600	1,600	1,600	1,700	1,700	1,500	910
	Holcim	4,400	5,400	5,100	5,100	6,100	3,500	4,200	3,400	5,400	2,500
	TXI Operations	820	720	760	690	610	780	1,000	770	650	290
Nitrogen oxides	Ash Grove Cement	2,900	2,900	2,600	2,600	2,300	2,200	2,200	1,800	1,400	1,270
	Gerdau Ameristeel	510	480	490	460	470	460	500	480	440	210
	Holcim	3,500	3,100	4,200	3,700	4,200	4,900	3,100	2,900	3,200	950
	TXI Operations	4,500	4,400	4,200	3,500	4,300	4,300	3,400	2,900	2,900	1,000
Lead	Ash Grove Cement	0.023	0.014	0.014	0.013	0.014	0.014	0.014	0.013	0.013	0.008
	Gerdau Ameristeel	2.1	1.9	2.0	1.3	0.52	0.50	0.55	0.54	0.48	.028
	Holcim	0.074	0.085	0.016	0.14	0.085	0.085	0.084	0.076	0.079	0.043
	TXI Operations	0.006	0.0038	0.002	0.002	0.0021	0.018	0.018	0.026	0.026	0.016
PM_{10}	Ash Grove Cement	500	450	450	270	270	280	290	280	270	170
	Gerdau Ameristeel	170	160	160	150	160	160	170	160	150	110
	Holcim	390	360	380	340	340	330	500	400	340	200
	TXI Operations	310	370	300	300	310	330	270	300	290	160
$PM_{2.5}$	Ash Grove Cement	260	96	350	230	240	240	250	240	230	140
	Gerdau Ameristeel	140	130	130	130	140	140	150	140	130	97
	Holcim	390	360	380	300	320	310	470	360	300	170
	TXI Operations	100	140	120	110	130	130	140	160	150	80
Sulfur dioxide	Ash Grove Cement	4,400	4,900	4,400	5,000	6,200	6,000	6,300	6,200	4,800	2,600
	Gerdau Ameristeel	130	120	120	120	130	120	130	130	110	74
	Holcim	4,500	2,400	3,200	2,500	2,700	2,700	3,300	2,500	2,700	1700
	TXI Operations	6,300	4,300	2,100	2,300	2,300	3,400	2,600	2,500	1,700	550
VOCs	Ash Grove Cement	13	15	15	15	23	22	23	21	22	13
	Gerdau Ameristeel	360	330	340	340	350	340	370	360	320	200
	Holcim	590	650	630	610	630	640	610	560	580	310
	TXI Operations	72	64	43	71	60	77	61	66	72	15

Data source: TCEQ 2009b
Note: Data rounded to two significant figures.

Table 4. Ambient Air Monitoring in the Midlothian Study Area

Location (Figure 6)	EPA Site Number	TCEQ Site Number	Station Name	Pollutants Measured	Sampling Duration	Time Frame
1	48-139-0011	N/A	Hidden Valley	PM_{10}	24-hour	9/92 - 10/93
2	48-139-0006	N/A	Gorman Road	PM_{10}	24-hour	3/92 - 4/93
3	48-139-0014	N/A	Box Crow	PM_{10}	24-hour	11/93 - 1/95
4	N/A	N/A	Holcim facility boundary	$PM_{2.5}$	Continuous	1/06 - present
5a	48-139-0007	N/A	Tayman Drive Water Treatment Plant	PM_{10}	24-hour	3/92 - 12/96
				109 VOCs	24-hour	1/93 - 3/97
5b	N/A	N/A	Tayman Drive Water Treatment Plant (2008-2009 Study)	22 inorganics (PM_{10})	24-hour	12/08 - 7/09 [a]
				60 VOCs	24-hour	12/08 - 8/09 [a]
6	N/A	N/A	Jaycee Park	22 inorganics (PM_{10})	24-hour	12/08 - 7/09 [a]
				60 VOCs	24-hour	12/08 - 7/09 [a]
7	48-139-0013	N/A	Auger Road Water Treatment	PM_{10}	24-hour	1/91 - 1/92
						1/93 - 11/94
				16 inorganics (PM_{10})	24-hour	1/91 - 12/91
						2/93 - 6/93
8	N/A	N/A	J.A. Vitovsky Elementary School	22 inorganics (PM_{10})	24-hour	5/09 [b]
				60 VOCs	24-hour	5/09 [b]
9	48-139-0004	N/A	Auger Road	PM_{10}	24-hour	1/91 - 1/93
				16 inorganics (PM_{10})	24-hour	1/91 - 10/92
10	48-139-0001	N/A	City Hall Roof	TSP	24-hour	5/81 - 12/84
				56 inorganics (TSP)	24-hour	5/81 - 12/81
				Lead	24-hour	5/81 - 12/81
						1/83 - 12/83
11	N/A	N/A	Triangle Park	22 inorganics (PM_{10})	24-hour	12/08 [b]
				60 VOCs	24-hour	12/08 [b]

Location (Figure 6)	EPA Site Number	TCEQ Site Number	Station Name	Pollutants Measured	Sampling Duration	Time Frame
12a	48-139-0016	CAMS 52/137	Old Fort Worth (OFW) Road	PM_{10}	24-hour	11/94 - 6/04
				$PM_{2.5}$	24-hour	9/05 - present
					Continuous	4/06 - present
				88 inorganics ($PM_{2.5}$)	24-hour	9/05 - present
				88 VOCs	24-hour	3/97 - 10/04
						4/06 - present
				Sulfur compounds	Continuous	8/97 - present
				Nitrogen oxides	Continuous	3/03 - 10/04
						1/05 - present
				Ozone	Continuous	4/06 - present
12b	N/A	N/A	Old Fort Worth (OFW) Road (2008-2009 Study)	22 inorganics (PM_{10})	24-hour	12/08 - 7/09 [a]
				60 VOCs	24-hour	12/08 - 7/09 [a]
13	48-139-0005	N/A	Cement Valley Road	PM_{10}	24-hour	1/92 - 6/92
				16 inorganics (PM_{10})	24-hour	1/92 - 5/92
14	48-139-0017	CAMS 302	CAMS 302 - Wyatt Road	PM_{10}	24-hour	11/99 - 6/04
				$PM_{2.5}$	Continuous	8/00 - 3/06
				25 inorganics (PM_{10})	24-hour	1/01 - 6/04
				109 VOCs	24-hour	10/04 - 3/06
				Sulfur compounds	Continuous	10/04 - 3/06
				Nitrogen oxides	Continuous	10/04 - 3/06
15	N/A	N/A	Midlothian High School	22 inorganics (PM_{10})	24-hour	7/09 [b]
				60 VOCs	24-hour	7/09 [b]
16	N/A	N/A	Wyatt Road	22 inorganics (PM_{10})	24-hour	12/08 - 7/09 [a]
17	48-139-0012	N/A	Gerdau Ameristeel	PM_{10}	24-hour	1/96 - 12/98
				Lead	24-hour	1/93 - 8/98
18	48-139-0084	N/A	Cedar Drive	PM_{10}	24-hour	1/92 - 10/94
				16 inorganics (PM_{10})	24-hour	1/92 - 8/92
						2/93 - 6/93
				Sulfur compounds	Continuous	8/85 - 12/85
						3/86 - 7/86

Location (Figure 6)	EPA Site Number	TCEQ Site Number	Station Name	Pollutants Measured	Sampling Duration	Time Frame
19	48-139-0015	CAMS 94/158/160	Midlothian Tower	PM_{10}	24-hour	10/94 - 6/04
				$PM_{2.5}$	Continuous	2/00 - 12/06
				$PM_{2.5}$	24-hour	5/02 - 8/05
				70 inorganics ($PM_{2.5}$)	24-hour	5/02 - 8/05
				105 VOCs	1-hour	8/99 - 10/99
						5/00 - 10/00
						5/01 - 7/01
						5/02 - 10/02
						7/03 - 10/03
						6/04 - 9/04
						5/05 - 10/05
						5/06 - 7/06
				105 VOCs	24-hour	4/04 - 8/07
				Sulfur compounds	Continuous	8/97 - 8/07
				Nitrogen oxides	Continuous	10/00 - 8/07
				Ozone	Continuous	8/97 - 8/07
20	N/A	N/A	Mountain Peak Elementary School	22 inorganics (PM_{10})	24-hour	2/09 - 3/09 [b]
				60 VOCs	24-hour	2/09 - 3/09 [b]
21	48-139-0008	N/A	Mountain Creek	PM_{10}	24-hour	3/92 - 4/93

Note: N/A = Not applicable. Some monitoring sites do not have EPA or TCEQ site identification numbers.
"Inorganics" refers to metals, other elements, and inorganic compounds detected in particulate filters that were analyzed for chemical composition.
This table was compiled in 2010. Therefore, "present" refers to monitors that were active at some point in 2010.
[a] These sites did not operate continuously during the time frame listed. They collected 20 samples over the course of the 2008-2009 air quality study.
[b] These sites did not operate continuously during the time frame listed. They collected 5 samples on 5 consecutive days during the 2008-2009 air quality study.

Table 5. Availability of Monitoring Data for Pollutants Listed on the Facilities' TRI Forms

A) Pollutants Included on TRI Forms for which Some Air Monitoring Data Are Available		
1,1,1-Trichloroethane	Carbon tetrachloride*	Mercury compounds
1,1,2-Trichloroethane*	Chlorine	Methyl ethyl ketone
1,2,4-Trimethylbenzene	Chlorobenzene	Methyl isobutyl ketone
1,3-Butadiene	Chloroethane*	Methyl methacrylate*
1,4-Dichlorobenzene*	Chloroform*	Methyl tert-butyl ether*
Acetonitrile*	Chloromethane*	n-Hexane
Acrylonitrile*	Chromium compounds	Nickel compounds
Aluminum oxide	Copper compounds	Propylene* Styrene
Ammonia	Cyclohexane	Tetrachloroethylene*
Barium Benzene	Dichloromethane	Toluene
Bromine	Ethyl acrylate	Trichloroethylene*
Butyraldehyde*	Ethylbenzene	m-, o-, or p-Xylene
Cadmium compounds	Lead compounds	Zinc compounds
Carbon disulfide*	Manganese compounds	

B) Pollutants Included on TRI Forms for which No Air Monitoring Data Are Available		
1,2,3-Trichloropropane*	di(2-Ethylhexyl)phthalate*	n-Butyl alcohol*
1,2,4-Trichlorobenzene*	Dicyclopentadiene*	n-Dioctyl phthalate*
1,2-Butylene oxide	Diepoxybutane	Nitrobenzene*
1,2-Dichlorobenzene*	Diethanolamine	N-Methyl-2-pyrrolidone*
1,3-Dichlorobenzene*	Dimethyl phthalate*	N-Nitrosodimethylamine*
1,4-Dioxane*	Dinitrobutyl phenol*	o-Cresol*
2,4-Dichlorophenol*	Dioxin and dioxin-like	Osmium tetroxide
2,4-Dimethylphenol*	compounds Diphenylamine*	p-Cresol*
2-Chloroacetophenone*	Epichlorohydrin*Ethylene glycol	Pentachlorophenol*
2-Ethoxyethanol*	Ethylene oxide*	Phenanthrene
2-Methoxyethanol*	Formaldehyde*	Phenol
2-Methylpyridine*	Freon 113*	Phthalic anhydride*
2-Nitropropane*	Glycol ethers*	Polychlorinated biphenyls
Acetaldehyde	Hydrochloric acid	Polycyclic aromatic
Acetone	Isobutyraldehyde*	compounds
Acetophenone	Isopropyl alcohol*	Propionaldehyde*
Acrylamide*	Maleic anhydride	Propylene oxide*
Allyl alcohol*	m-Cresol*	Quintozene*
Aniline*	Methanol	sec-Butyl alcohol*
Anthracene*	Methyl acrylate*	Sulfuric acid
Biphenyl	N,N-Dimethylformamide*	tert-Butyl alcohol
Bis(tributyltin)oxide*	Naphthalene	Urethane*
Butyl acrylate*		Vinyl acetate*
Cumene		
Cyanide compounds*		

Notes: The table shows any pollutant that is listed on any of the four industrial facilities' TRI forms at least once between 1988 and 2010, including pollutants that were listed with 0 pounds of air emissions.

Separate listings for a metal (e.g., "lead") and the corresponding metal compounds (e.g., "lead compounds") are grouped together in this table as the metal compound category. These listings were placed in the upper half of this table if ambient air monitoring for the parent metal has been conducted.

Asterisks (*) denote VOCs with total estimated emissions summed across all four facilities and all TRI reporting years less than 200 pounds. Section 4.2 of this health consultation reviews the significance of this evaluation. Asterisks were not applied to sVOCs (e.g., dioxins), regardless of their total emissions.

Table 6. Method Detection Limits for Selected Metals and Elements

Metal or Element	Lowest ATSDR or EPA Health-Based Comparison Value (µg/m^3)	Detection Limits (µg/m^3), by Study		
		2008-2009 Midlothian Ambient Air Collection and Analytical Chemical Analysis	2004-2009 Average Method Detection Limits for Routine Speciation Samples Collected by TCEQ	1991-1993 Method Detection Limits for Detailed Study of Midlothian Air Quality
Antimony	NA	0.000007	0.023	0.009
Arsenic	0.0002 (ATSDR)	0.000009	0.004	0.0009
Cadmium	0.0006 (ATSDR)	0.000029	0.008	0.006
Chromium	5 (ATSDR)	0.000165	0.002	0.0013
Lead	0.15 (EPA)	0.000056	0.008	0.0041
Manganese	0.05 (ATSDR)	0.000057	0.002	0.0031
Mercury	0.2 (ATSDR)	0.000017	0.013	0.0027
Nickel	0.09 (ATSDR)	0.000152	0.004	0.0009
Selenium	21 (EPA)	0.000013	0.004	0.0019
Vanadium	0.2 (ATSDR)	0.000014	0.003	0.0003

Notes: Data sources: ERG 2009; DRI 2010; TNRCC 1995.

The 2008-2009 method detection limits are based on analyses using ICP/MS; and the other two sets of method detection limits are based on analyses using XRF.

Method detection limits are available for numerous additional metals and elements. This table presents only those for metals and elements that were measured by all three monitoring programs.

The health-based comparison values were selected as follows: (1) If ATSDR has published a comparison value for a substance, the lowest value is shown in the table; and (2) if a substance has no ATSDR-derived values, EPA comparison values are shown. Note that some comparison values are derived for cancer health endpoints, and others for non-cancer. ATSDR's health consultations for additional projects document the approaches used to select health-based comparison values and the public health implications of exposures. This display is used to demonstrate that the monitoring methods employed are generally sensitive enough to measure ambient air concentrations at or near the method detection limits.

The health-based comparison value for chromium is based on trivalent chromium oxide. Section 4.3 of this health consultation presents information on the comparison value for hexavalent chromium, which has been measured separately. Neither ATSDR nor EPA has published health-based comparison values for antimony.

Table 7. Method Detection Limits for Selected VOCs

Pollutant	Lowest ATSDR or EPA Health-Based Comparison Value (µg/m^3)	Detection Limits (ppb), by Study	
		2008-2009 Midlothian Ambient Air Collection and Analytical Chemical Analysis	Detection Limits Report by TCEQ's Analytical Laboratory for VOC Sampling
Benzene	0.04	0.010	0.27
1,3-Butadiene	0.02	0.005	0.27
Carbon tetrachloride	0.01	0.004	0.27
Chloroform	0.009	0.007	0.21
1,2-Dibromoethane	0.0002	0.007	0.20
1,2-Dichloroethane	0.01	0.009	0.27
Methylene chloride	0.6	0.018	0.14
1,1,2,2-Tetrachloroethane	0.003	0.009	0.20
1,1,2-Trichloroethane	0.01	0.008	0.21
1,2,4-Trimethylbenzene	1.5	0.016	0.27
1,3,5-Trimethylbenzene	NA	0.016	0.25
Vinyl chloride	0.04	0.005	0.17
m,p-Xylene	20	0.019	0.27

Notes: Data sources: ERG 2009; TCEQ 2010c.

All detection limits are based on analyses of canister samples by GC/MS.

Method detection limits are available for numerous additional VOCs. This table presents only those for the "target compound" VOCs identified in the 2008-2009 study [URS 2009].

For the final column in the table, note that the reporting limit is the value below which the instrument is not capable of measuring and reporting a value, and would be considered a non-detect. A value that is below the detection limit but above the reporting limit represents a value in which there is less than 99% confidence that the value is greater than background (or zero).

The health-based comparison values were selected as follows: (1) If ATSDR has published a comparison value for the substance, the lowest value is shown in the table; and (2) if a substance has no ATSDR-derived values, EPA comparison values are shown. Note that some comparison values are derived for cancer health endpoints, and others for non-cancer. ATSDR's health consultations for additional projects will document the approaches used to select health-based comparison values and the public health implications of exposures. This display is used to demonstrate that the monitoring methods employed are generally sensitive enough to measure ambient air concentrations at or near the method detection limits.

Neither ATSDR or EPA have published health-based comparison values for 1,3,5-trimethylbenzene.

Table 8. Inter-Method Comparisons for TCEQ's $PM_{2.5}$ Monitoring

Parameter	Midlothian Tower Monitoring Station	Old Fort Worth Road Monitoring Station
Time frame of co-located $PM_{2.5}$ measurements using two different methods	May 2002 – August 2005	April 2006 – December 2008
Number of days for which both monitoring methods generated valid results	192	163
Average concentration for these days as measured by the continuous $PM_{2.5}$ monitor	10.1 $\mu g/m^3$	9.4 $\mu g/m^3$
Average concentration for these days as measured by the federal reference method $PM_{2.5}$ monitor that collects 24-hour average samples	11.5 $\mu g/m^3$	11.8 $\mu g/m^3$
Percent difference between the two monitoring methodologies	12%	20%
Correlation between the continuous and 24-hour $PM_{2.5}$ data sets	$R^2 = 0.87$	$R^2 = 0.88$

Notes: ATSDR calculated all data in this table from the validated $PM_{2.5}$ monitoring database provided by TCEQ. Percent difference was calculated by dividing the difference between the two concentrations by federal reference method concentrations. Please note that TCEQ, from 2005 forward, adjusted all data from continuous monitoring by 2 $\mu g/m^3$ to account for the negative bias from these types of monitors. (Personal Communication, Tracie Phillips, TCEQ, 2012). The data presented for the continuous monitor at Midlothian Tower was not adjusted (except for those data points in 2005); whereas, all the data shown from the Old Fort Worth Road continuous monitor were adjusted.

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Table 9. $PM_{2.5}$, Hydrogen Sulfide (H_2S), and Sulfur Dioxide (SO_2) Air Pollution Levels: Days When 1-in-6 Day Samples Are Collected Versus All Other Days

Parameter	Summary of Continuous Ambient Air Monitoring Data	
	Days when 1-in-6 Day Ambient Air PM Samples Were Collected	Days when 1-in-6 Day Ambient Air PM Samples Were Not Collected
Ambient air monitoring data for the Midlothian Tower Monitoring Station		
Time frame considered	May 2002 – August 2005	
Number of days of valid data	194	1,004
Average $PM_{2.5}$ concentration (μg/m^3)	9.4	8.9
Average H_2S concentration (ppbv)	0.40	0.39
Average SO_2 concentration (ppbv)	1.09	1.06
Ambient air monitoring data for the Old Fort Worth Road Monitoring Station		
Time frame considered	April 2006 – December 2008	
Number of days of valid data	159	799
Average $PM_{2.5}$ concentration (μg/m^3)	10.2	10.1
Average H_2S concentration (ppbv)	0.39	0.35
Average SO_2 concentration (ppbv)	1.75	1.62

Notes: The table summarizes all valid $PM_{2.5}$ measurements from the Midlothian Tower and Old Fort Worth Road monitoring stations during the time when side-by-side measurements were collected with the continuous monitor and the 1-in-6 day sampler.

For both monitoring stations, the concentration differences shown in this table are not statistically significant, as determined by a large sample test of a hypothesis, which considers whether the difference between arithmetic means for two unmatched distributions is statistically significant.

Table 10. Continuous Emission Monitoring Data: Days When 1-in-6 Day Samples Are Collected Versus All Other Days

Parameter	Days when 1-in-6 Day Ambient Air PM Samples Were Collected at Offsite Monitors	Days when 1-in-6 Day Ambient Air PM Samples Were Not Collected at Offsite Monitors
Summary of TXI Operations' Continuous Emission Monitoring Data		
Time frame considered	September 2005 – December 2008	
Number of days of valid data	202	1,011
Average CO emission rate (pounds/day)	4,700	4,610
Average NO_x emission rate (pounds/day)	18,200	17,900
Average SO_2 emission rate (pounds/day)	13,400	13,300
Average THC emission rate (pounds/day)	335	327
Summary of Ash Grove Cement's Continuous Emission Monitoring Data		
Time frame considered	May 2002 – December 2008	
Number of days of valid data	398	2,026
Average CO emission rate (pounds/day)	2,410	2,400
Average NO_x emission rate (pounds/day)	11,700	11,700
Average SO_2 emission rate (pounds/day)	30,500	30,600
Summary of Holcim's Continuous Emission Monitoring Data		
Time frame considered	May 2002 – December 2008	
Number of days of valid data	399	2,038
Average CO emission rate (pounds/day)	23,300	23,800
Average NO_x emission rate (pounds/day)	19,900	18,900
Average SO_x emission rate (pounds/day)	13,800	13,700

Notes: CO = carbon monoxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; THC = total hydrocarbons

Table is based on all valid continuous emission monitoring data for the time frame when 1-in-6 day PM samples were collected at the Midlothian Tower and Old Fort Worth Road monitoring stations.

The emission rates shown are the sum of emissions from the five kiln stacks for which at least some continuous emission monitoring is required.

Data are not presented for Gerdau Ameristeel because the facility's permit does not require continuous emission monitoring for individual pollutants.

For all pollutants shown in the table, the differences between emission rates measured on days when 1-in-6 day samples were collected and emission rates on all other days are not statistically significant. Statistical significance was assessed using a large sample test of a hypothesis, which considers whether the difference between arithmetic means for two unmatched distributions is statistically significant.

Table 11. Effectiveness of 1-in-6 Day Sampling for Evaluating Long-Term and Short-Term Exposures

Parameter	Old Fort Worth Road Station		Midlothian Tower Station		Holcim Station	
	Statistics Considering Every 6th Day of Data	Statistics Considering Entire Data Set	Statistics Considering Every 6th Day of Data	Statistics Considering Entire Data Set	Statistics Considering Every 6th Day of Data	Statistics Considering Entire Data Set
Time frame considered	April 2006 – May 2009		February 2000 – December 2006		January 2006 – June 2009	
Number of days with valid data	191	1,141	418	2,505	207	1,241
Average $PM_{2.5}$ concentration (μg/m^3)	9.4 – 10.0	9.7	8.7 – 9.1	8.9	10.7 – 11.3	11.1
90th percentile of $PM_{2.5}$ concentrations (μg/m^3)	15.8 – 16.7	16.3	14.9 – 16.1	15.4	17.7 – 18.6	18.2
Highest 24-hour average $PM_{2.5}$ concentration (μg/m^3)	29.0 – 50.6	50.6	27.7 – 49.6	49.6	27.1 – 42.2	42.2

Notes:
1. Data source: All validated continuous $PM_{2.5}$ monitoring data provided by TCEQ and UTA.
2. Data are summarized for the three monitoring stations equipped with continuous $PM_{2.5}$ monitoring devices. The entire period of record of valid results was considered for this analysis. For each data set, a range of values is shown for “statistics considering every 6th day of data.” Use of range was necessary because statistics were first computed by assigning the first day of record as the first every 6th day sampling event; statistics were then recalculated by assigning the second day of record as the first every 6th day sampling event; and so on. The range shown in this table is the span of possible values for the six different scenarios considered.
3. This table was generated to address community concerns about the ability of 1-in-6th day sampling to adequately characterize exposures. For chronic exposures, our assessment indicates that 1-in-6th day sampling is appropriate. However, the highest concentrations may not be captured by this approach.
4. The purpose of this table is to evaluate the representativeness of 1-in-6th day sampling. It should not be used to assess attainment of the NAAQS.

Table 12. Comparison of Air Pollution Measurements at Old Fort Worth Road (OFW) and Wyatt Road (Wyatt)

Parameter	Nitrogen Oxides Data		PM_{10} Data		Sulfur Dioxide Data	
Start of concurrent measurements	January 27, 2005		January 1, 2000		January 27, 2005	
End of concurrent measurements	March 29, 2006		June 26, 2004		March 29, 2006	
Days with concurrent data	417		252		425	
	OFW Data	Wyatt Data	OFW Data	Wyatt Data	OFW Data	Wyatt Data
Average concentration	15.2	11.1	25.6	25.9	2.40	0.85
90^{th} percentile concentration	33.1	21.7	40.9	40.9	5.65	1.72
95^{th} percentile concentration	47.7	33.4	44.5	45.5	12.85	3.31
Maximum concentration	245.5	170.1	78	73	153.6	180.0
Date of maximum concentration	January 25, 2006	January 25, 2006	May 9, 2003	July 26, 2003	January 11, 2006	August 2, 2005

Notes: Data source: validated monitoring data collected at TCEQ's OFW and Wyatt Road monitoring stations.
The number of days with concurrent data were calculated after excluding dates for which no valid results were collected.
For nitrogen oxides and sulfur dioxide, the underlying data set is continuous 1-hour average measurements, and all concentrations in the table are reported in units of ppb; for PM_{10}, the underlying data set is 24-hour measurements collected every six days, and all concentrations in the table are reported in units of micrograms per cubic meter.

Table 13. Utility of Particulate Matter Monitoring Data for Health Assessment Purposes

Time Frame	Findings
Prior to 1981	No PM monitoring data are available. ATSDR will either (1) consider this time frame a data gap and make no health conclusions regarding PM levels or (2) make inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
1981 – 1984	Limited PM monitoring data are available. PM monitoring is limited to TSP measurements at a single location (Midlothian City Hall). Though these data were collected with well-established methods and appear to be of a known and high quality, the data very likely do not characterize ambient air concentrations of PM immediately downwind of the industrial facilities due to the location where this monitor was placed. ATSDR will evaluate these data as rough indicators of exposure in this specific part of the Midlothian area, but they will not be assumed to reflect air pollution levels at other locations.
1985 – 1990	No PM monitoring data are available. ATSDR will either (1) consider this time frame a data gap and make no health conclusions regarding PM levels or (2) make inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
1991 – 2009	Locations nearest Gerdau Ameristeel and TXI Operations. Some form of PM monitoring has occurred almost continually, both at locations upwind and downwind from the two facilities, and during times when TXI Operations was and was not burning hazardous waste. This monitoring was conducted using rigorous methods known to be capable of generating measurements of a known and high quality. These monitors were placed at or near locations believed to have the greatest air quality impacts, based on EPA's previous modeling study (see Figure 10). Thus, ATSDR concludes that monitoring data from these stations are reasonably representative of the outdoor air concentrations of PM in the offsite areas most heavily impacted by the two facilities' emissions.
	Locations nearest Ash Grove Cement and Holcim. PM monitoring using the same or similar methods has also occurred downwind of Ash Grove Cement and Holcim, but only for a few years between 1991 and 2009, and not when Ash Grove Cement was burning hazardous waste. ATSDR used these data to evaluate the health implications of exposure. This evaluation specifically acknowledged that no monitoring data were collected downwind of Ash Grove Cement in 1991 and from 1997 to 2007; and no monitoring data were collected downwind from Holcim from 1996 to 2005. ATSDR will research other indicators of facility emissions (e.g., continuous emission monitoring data, types and quantities of fuels burned, production levels) to determine if defensible conclusions regarding PM concentrations can be reached for these locations during times when ambient air monitors were not operating.
	Other considerations. When interpreting the PM monitoring data, ATSDR considers two findings discussed earlier in this health consultation. First, though widely used in field applications, the continuous $PM_{2.5}$ monitoring devices used in Midlothian understated air concentrations by as much as 23 percent (see Section 4.4). Second, collection of 24-hour average samples every sixth day has proven to be highly reliable at quantifying annual average concentrations and 90^{th} percentile concentrations. However, this sampling schedule likely does not capture the highest pollution levels that occurred, and ATSDR's review of other Midlothian data suggests that the maximum PM concentration from a 1-in-6 day data set might understate the actual highest 24-hour average PM concentration by as much as 44% (see Section 4.6).

Table 14. Utility of Inorganics Monitoring Data for Health Assessment Purposes

Time Frame	Findings
All time frames	General considerations. Some monitoring data are available for every inorganic included in the facilities' emission reports. However, no monitoring has been conducted for vapor-phase mercury (see Section 4.2), hydrochloric acid, and sulfuric acid, and data for nitrates should not be used for health assessment purposes (see Section 4.3). ATSDR considers other sources of information when evaluating these pollutants. Most metals sampling was conducted on a 1-in-6 day schedule, which provides a reasonable account of annual average levels but likely understates the highest 24-hour levels (see Section 4.6).
Prior to Jan. 2001	Some data on inorganics, but these will be used qualitatively (for screening and trend analysis only) and not for health assessment purposes.[14] Limited ambient air monitoring occurred during this time frame for inorganics. This monitoring used methods commonly used at the time, but these methods were later found to potentially underestimate ambient air concentrations (see Section 4.3). ATSDR used the metals and element measurements with caution from this time frame in additional public health assessment activity. When evaluating metals and elements other than lead, ATSDR will either: (1) consider this time frame a data gap and make no health conclusions or (2) make inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
Jan. 2001 – Aug. 2005	Monitoring data are available for metals and elements at two locations. Air monitoring for metal and elements during this time occurred at the Midlothian Tower and Wyatt Road sites, which bracket the Gerdau Ameristeel and TXI Operations facilities. ATSDR used these measurements in additional health assessment analyses, because they are valid and of a known and high quality. However, winds do not blow frequently from north to south and the Midlothian Tower station is typically upwind from the facilities of interest. ATSDR interpreted these data accordingly, and spatial variations in PM data was used to assess the extent to which Midlothian Tower data might understate the highest site-related air quality impacts that actually occurred in the Midlothian area.
Sept. 2005 – Dec. 2008	Monitoring for metals and elements downwind from two facilities. Ambient air monitoring for metal and elements during this time occurred only at the Old Fort Worth Road site, due north of Gerdau Ameristeel and TXI Operations. Because these measurements are valid and of a known and high quality, ATSDR used them in additional health assessment analyses. Monitoring occurred at a location near where EPA predicted maximum deposition of certain pollutants released by Gerdau Ameristeel and TXI Operations. ATSDR therefore views these measurements as reasonable indicators of the highest offsite concentrations downwind from these two facilities. In its subsequent evaluations, ATSDR used PM measurements from closer monitoring stations (e.g., Wyatt Road) and an analysis of metals data from the 2008-2009 study to comment further on the representativeness of the metals data from Old Fort Worth Road.
Dec. 2008 – Dec. 2009	Extensive monitoring for metals and elements. During this time frame, metals (including hexavalent chromium) and elements were monitored at eight locations throughout the Midlothian area. Monitors were placed at or near residential locations believed to have the greatest air quality impacts. ATSDR found the data to be of a

[14] As an exception, ATSDR's future health consultation will use monitoring data for lead collected during this time frame, because these measurements were made with an EPA Federal Reference Method and are considered to be of a known and high quality. Federal Reference Methods do not apply to the other metals and elements.

	known and high quality and used them for health assessment purposes, considering the fact that these data were collected during a time when certain facility operations differed from past operations (e.g., TXI Operations was not burning hazardous waste during this study).

Table 15. Utility of Volatile Organic Compounds Monitoring Data for Health Assessment Purposes

Time Frame	Findings
All time frames	General considerations. Monitoring data are available for nearly every VOC that the facilities emitted in greatest quantities (e.g., toluene, benzene, and xylenes). The facilities have emitted numerous other VOCs that have never been monitored, but many of these were emitted in relatively small quantities (see Section 4.2). For these other VOCs, ATSDR either: (1) considered them a data gap and make no health conclusions or (2) made inferences about these VOCs based on surrogate information and thoroughly document all assumptions in this analysis. Most VOC sampling was conducted on a 1-in-6 day schedule, which provides a reasonable account of annual average levels but likely understates the highest 24-hour levels (see Section 4.6). ATSDR's additional health consultation include a more in-depth review of continuous emission monitoring data to evaluate this issue further.
Prior to Jan. 1993	No VOC monitoring conducted. ATSDR either (1) considered this time frame a data gap and make no health conclusions regarding VOC levels or (2) made inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
Jan. 1993 – Mar. 1997	VOC monitoring at one station (Tayman Drive Water Treatment Plant). VOC monitoring occurred on the northern boundary of Ash Grove Cement, between the facility and the nearest residential neighborhood. The data were collected with appropriate methods and are of a known and high quality. ATSDR used the measurements to assess exposures for this time frame, which includes years when Ash Grove Cement used tires as fuel but does not include years when the facility burned hazardous waste. Data interpretations apply to areas downwind from Ash Grove Cement.
Apr. 1997 – Sep. 2004	VOC monitoring at two stations (south of Midlothian). VOC monitoring occurred at the Old Fort Worth Road and Midlothian Tower sites, which bracket Gerdau Ameristeel and TXI Operations. Because these measurements are valid and of a known and high quality, ATSDR uses them in additional health assessment analyses. Monitoring occurred at a location near where EPA predicted maximum deposition of certain pollutants released by Gerdau Ameristeel and TXI Operations. An important issue is whether VOC measurements at Old Fort Worth Road are reasonable indicators of highest offsite concentrations near these two facilities. However, data analyzed in this document (see Table 12) suggest that, for several pollutants, air concentrations at Old Fort Worth Road were likely comparable to or greater than those that occurred at Wyatt Road.
Oct. 2004 – Dec. 2008	VOC monitoring at three stations south of Midlothian. During some part of this time frame, VOC monitoring occurred at two locations downwind from Gerdau Ameristeel and TXI Operations and at one location typically upwind from the facilities. All three of these monitors were placed at or near locations where EPA previously predicted that facility air quality impacts and deposition rates would be greatest. ATSDR has found these measurements to be of a known and high quality and used them for health assessment purposes. No VOC monitoring occurred in the vicinity of Ash Grove Cement or Holcim during this time frame.
Dec. 2008 – Dec. 2009	VOC monitoring at seven stations. During this time frame, VOCs were monitored at seven locations throughout the Midlothian area. Monitors were placed at or near residential locations believed to have the greatest air quality impacts. ATSDR found the data to be of a known and high quality and used them for health assessment

	purposes, considering the fact that these data were collected during a time when certain facility operations differed from past operations (e.g., TXI Operations was not burning hazardous waste during this study).

Table 16. Utility of Sulfur Compound Monitoring Data for Health Assessment Purposes

Time Frame	Findings
All time frames	General considerations. For time frames when monitoring occurred, sulfur dioxide monitoring was conducted with acceptable methods and data were judged to be of a known and high quality, but hydrogen sulfide monitoring prior to 2000 did not achieve detection limits necessary for assessing long-term exposures. Therefore, ATSDR considered most of the validated measurements for health assessment purposes. All monitoring for sulfur compounds was continuous and focused on areas surrounding Gerdau Ameristeel and TXI Operations. ATSDR evaluated facility-specific annual emission estimates and continuous emission monitoring data to determine if conclusions can be reached for the areas surrounding Ash Grove Cement and Holcim.
Prior to Aug. 1985	No monitoring conducted. ATSDR either (1) considered this time frame a data gap and make no health conclusions regarding sulfur compound levels or (2) made inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
Aug. 1985 – July 1986	Monitoring at one station (Cedar Drive in Midlothian). H_2S and SO_2 monitoring occurred at this one location, almost directly east of the main production operations at Gerdau Ameristeel and TXI Operations. Because winds in the area rarely blow from west to east, this station likely did not capture the greatest site-related air quality impacts and the data will not be assumed to be representative of other locations.
Aug. 1986 – Mar. 1997	No monitoring conducted. ATSDR either (1) considered this time frame a data gap and make no health conclusions regarding sulfur compound levels or (2) made inferences about this time frame based on surrogate information and thoroughly document all assumptions in this analysis.
Apr. 1997 – Sep. 2004	Monitoring at two stations (Old Fort Worth Road and Midlothian Tower). Continuous monitoring of H_2S and SO_2 occurred throughout this time frame at Old Fort Worth Road. At Midlothian Tower, monitoring for SO_2 and H_2S started in April 1997 and April 2001, respectively. The two stations are in the primary upwind and downwind directions from the facilities, at or near locations where EPA's previous modeling analysis predicted the highest air quality impacts. An important issue is whether measurements at Old Fort Worth Road are reasonable indicators of highest offsite concentrations near these two facilities. ATSDR addresses this issue in a health consultation on criteria pollutants and hydrogen sulfide by evaluating differences in simultaneous measurements (2004-2006) of sulfur compounds at Old Fort Worth Road and at Wyatt Road.
Oct. 2004 – Mar. 2006	Monitoring at three stations. During this time frame, sulfur compound monitoring occurred at two locations downwind from Gerdau Ameristeel and TXI Operations and at one location typically upwind from the facilities. All three monitors were placed at or near locations where EPA previously predicted that facility air quality impacts and deposition rates would be greatest. ATSDR used these data for health assessment purposes.
Apr. 2006 – Aug. 2007	Monitoring at two stations (Old Fort Worth Road and Midlothian Tower). H_2S and SO_2 data are available for this entire time frame for both stations. Refer to the 1995-2004 time frame for additional information on how ATSDR evaluated these data.
Sep. 2007 – Dec. 2009	Monitoring at one station (Old Fort Worth Road). In recent years, sulfur compound monitoring has occurred only at the Old Fort Worth Road site, north of Gerdau Ameristeel and TXI Operations. As noted above, an important issue is whether measurements at Old Fort Worth Road are reasonable indicators of highest offsite concentrations near these two facilities. ATSDR addresses this issue in an additional

	health consultation by evaluating differences in simultaneous measurements (2004-2006) of sulfur compounds at Old Fort Worth Road and at Wyatt Road.

Appendix A. Glossary of Terms

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency in Atlanta, Georgia, with 10 regional offices in the United States. ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases from toxic substances. ATSDR is not a regulatory agency, unlike the U.S. Environmental Protection Agency (EPA), which is the federal agency that develops and enforces laws to protect the environment and human health. This glossary defines words used by ATSDR in communications with the public. It is not a complete dictionary of environmental health terms. For additional questions or comments, call ATSDR's toll-free telephone number, 1-888-42-ATSDR (1-888-422-8737).

Ambient
Surrounding (for example, ambient air).

Cement kiln
A high-temperature industrial process in which limestone and other raw materials are combined to form clinker, which is later used to make cement.

Cement kiln dust
A fine dust that is carried by the exhaust air from cement kilns, most of which is collected at cement manufacturing facilities by air pollution control equipment.

Concentration
The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Continuous emission monitoring
The continuous measurement of the amount of pollutants leaving a source (typically, a stack) over time.

Criteria pollutant
Six common air pollutants—carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide—for which EPA has developed National Ambient Air Quality Standards.

Deposition
The settling of air pollutants to the Earth's surface, both in wet form (e.g., pollutants brought to the ground in rainfall) or dry form (e.g., pollutants reaching the ground when it is not raining or snowing).

Detection limit
The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Dioxins and furans
A large family of pollutants that have a similar chemical structure. Certain pollutants within this family have been shown to be highly toxic.

Emissions
Pollutants released into the air from smokestacks, vents, and other industrial processes. Emissions can also occur from motor vehicles, household activities, and natural sources.

Emission inventory
A listing, by source, of the amount of air pollutants released into the air within a given area. Examples include EPA's Toxics Release Inventory, EPA's National Emissions Inventory, and TCEQ's Point Source Emissions Inventory. These inventories differ in terms of scope and pollutants addressed.

Exposure
Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term (acute exposure), of intermediate duration, or long-term (chronic exposure).

Inorganic pollutant (metal, element, inorganic compound)
Chemical substances of a mineral nature that are not typically made up of linked carbon atoms. Most inorganic pollutants considered in this health consultation are found in airborne particles.

Particulate matter
Small solid particles and aerosols found in air, including dust, smoke, mist, and fumes. Different subsets of particulate matter are defined based on the size of the particles.

Pollutant
Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems. Pollutants can come from many types of sources: industry, motor vehicles, agricultural, and nature.

Semi-volatile organic compound
Organic compounds that evaporate slowly at room temperature. These pollutants can be found in the air as gases and bound to particulate matter.

Steel mill
An industrial facility that manufactures steel.

Valid data
Environmental measurements generated by instruments or reported by laboratories that have met certain quality assurance and quality control criterion. Rejected data are not considered valid.

Volatile organic compound (VOC)
Any organic compound that evaporates readily at room temperature. VOCs tend to be found in air as gases. When in the air, these pollutants participate in the chemical reactions that form ozone.

Appendix B. Tabulation of Emission Events and Complaints

TCEQ regulations require industrial facilities to disclose information associated with certain scheduled activities that lead to excess emissions (e.g., process maintenance, planned shutdowns) as well as unscheduled emission events (e.g., following process upsets or accidental releases). Whether reporting is required depends on several factors, such as the nature and the amount of pollutants emitted. Industrial facilities report emission event data to TCEQ, and the agency compiles these data into a publicly accessible online database.

TCEQ maintains a separate online database tracking complaints that citizens file to the agency regarding environmental conditions at industrial facilities.

Table B-1 documents the entire history of emission events and complaints that ATSDR accessed from TCEQ's online databases. ATSDR

Table B-1. Emission Events and Complaints for the Midlothian Facilities, in Reverse Chronological Order (2002-2010)
(see notes at end of table)

Date	Facility	Type of Event
6/15/2010	Ash Grove Cement	Maintenance
5/10/2010	Ash Grove Cement	Excess Opacity
5/5/2010	TXI Operations	Excess Opacity
4/20/2010	Ash Grove Cement	Maintenance
4/4/2010	Ash Grove Cement	Maintenance
4/3/2010	Ash Grove Cement	Air Startup
2/20/2010	Holcim	Air Shutdown
2/1/2010	Ash Grove Cement	Emissions Event
1/21/2010	Ash Grove Cement	Emissions Event
1/11/2010	Ash Grove Cement	Maintenance
1/7/2010	Ash Grove Cement	Maintenance
11/12/2009	Holcim	Complaint (Odor)
11/4/2009	Ash Grove Cement	Maintenance
10/22/2009	Chaparral Steel	Complaint (Smoke)
10/20/2009	Chaparral Steel	Complaint (Odor)
10/20/2009	TXI Operations	Complaint (Other)
9/5/2009	Ash Grove Cement	Maintenance
9/5/2009	Ash Grove Cement	Maintenance
6/29/2009	Ash Grove Cement	Maintenance
6/28/2009	Ash Grove Cement	Excess Opacity
5/14/2009	Ash Grove Cement	Maintenance
3/18/2009	Ash Grove Cement	Excess Opacity
3/10/2009	Ash Grove Cement	Excess Opacity
3/2/2009	Ash Grove Cement	Maintenance
3/1/2009	Ash Grove Cement	Maintenance
2/17/2009	Holcim	Excess Opacity
2/8/2009	Ash Grove Cement	Maintenance
2/3/2009	Holcim	Excess Opacity
12/2/2008	Ash Grove Cement	Maintenance
11/23/2008	Ash Grove Cement	Maintenance
11/12/2008	Ash Grove Cement	Maintenance
10/28/2008	Ash Grove Cement	Excess Opacity
10/21/2008	TXI Operations	Complaint (Odor)
10/15/2008	Ash Grove Cement	Excess Opacity
9/24/2008	Holcim	Maintenance
9/19/2008	Ash Grove Cement	Excess Opacity
9/13/2008	Ash Grove Cement	Excess Opacity
9/8/2008	Ash Grove Cement	Emissions Event
8/6/2008	TXI Operations	Complaint (Other)
7/29/2008	Chaparral Steel	Complaint (Odor)
7/24/2008	TXI Operations	Complaint (Odor)
7/22/2008	Chaparral Steel	Excess Opacity
7/1/2008	Ash Grove Cement	Excess Opacity
6/26/2008	TXI Operations	Complaint (Odor)
6/18/2008	TXI Operations	Complaint (Odor)
6/11/2008	Chaparral Steel	Complaint (Industrial)
6/10/2008	Chaparral Steel	Complaint (Dust)
5/26/2008	Chaparral Steel	Complaint (Smoke)
4/29/2008	Holcim	Excess Opacity
4/7/2008	TXI Operations	Emissions Event
4/4/2008	Ash Grove Cement	Emissions Event
4/4/2008	Ash Grove Cement	Maintenance
3/19/2008	Chaparral Steel	Complaint (Industrial)
3/17/2008	TXI Operations	Complaint (Odor)
3/11/2008	Ash Grove Cement	Excess Opacity
3/9/2008	Ash Grove Cement	Excess Opacity
3/7/2008	Ash Grove Cement	Maintenance
3/3/2008	TXI Operations	Excess Opacity
2/26/2008	Ash Grove Cement	Excess Opacity
2/26/2008	Ash Grove Cement	Maintenance
2/11/2008	Holcim	Maintenance
2/11/2008	Chaparral Steel	Complaint (Smoke)
2/7/2008	Ash Grove Cement	Maintenance
2/5/2008	TXI Operations	Emissions Event
2/3/2008	TXI Operations	Excess Opacity
1/17/2008	Ash Grove Cement	Excess Opacity

Date	Facility	Type of Event
1/17/2008	Ash Grove Cement	Excess Opacity
1/13/2008	Holcim	Maintenance
1/8/2008	Ash Grove Cement	Excess Opacity
1/4/2008	Ash Grove Cement	Maintenance
12/17/2007	TXI Operations	Excess Opacity
12/11/2007	TXI Operations	Excess Opacity
12/9/2007	Ash Grove Cement	Excess Opacity
12/3/2007	Ash Grove Cement	Excess Opacity
12/2/2007	Ash Grove Cement	Maintenance
10/26/2007	TXI Operations	Excess Opacity
10/16/2007	TXI Operations	Complaint (Other)
9/26/2007	Holcim	Emissions Event
9/26/2007	Ash Grove Cement	Excess Opacity
9/24/2007	Holcim	Emissions Event
9/20/2007	TXI Operations	Excess Opacity
9/19/2007	Ash Grove Cement	Excess Opacity
9/10/2007	Holcim	Complaint (Odor)
9/5/2007	Ash Grove Cement	Emissions Event
8/8/2007	Holcim	Emissions Event
7/31/2007	Ash Grove Cement	Excess Opacity
7/24/2007	Ash Grove Cement	Air Startup
7/18/2007	Ash Grove Cement	Air Startup
7/11/2007	Ash Grove Cement	Air Shutdown
7/10/2007	Chaparral Steel	Complaint (Odor)
6/28/2007	Ash Grove Cement	Air Shutdown
6/26/2007	Ash Grove Cement	Air Shutdown
6/8/2007	Ash Grove Cement	Excess Opacity
5/13/2007	Ash Grove Cement	Excess Opacity
5/11/2007	TXI Operations	Complaint (Odor)
5/5/2007	Ash Grove Cement	Emissions Event
4/30/2007	Chaparral Steel	Complaint (Smoke)
4/4/2007	Ash Grove Cement	Emissions Event
4/3/2007	Chaparral Steel	Complaint (Odor)
4/3/2007	TXI Operations	Complaint (Odor)
3/28/2007	Chaparral Steel	Complaint (Odor)

Date	Facility	Type of Event
3/21/2007	Ash Grove Cement	Emissions Event
3/21/2007	Chaparral Steel	Complaint (Odor)
3/7/2007	Ash Grove Cement	Excess Opacity
2/24/2007	Ash Grove Cement	Excess Opacity
2/23/2007	Chaparral Steel	Complaint (Odor)
2/23/2007	TXI Operations	Complaint (Odor)
2/12/2007	TXI Operations	Complaint (Odor)
2/3/2007	Ash Grove Cement	Maintenance
2/1/2007	TXI Operations	Complaint (Odor)
1/7/2007	Ash Grove Cement	Excess Opacity
1/1/2007	TXI Operations	Complaint (Stormwater)
12/29/2006	Ash Grove Cement	Excess Opacity
12/20/2006	Ash Grove Cement	Excess Opacity
12/17/2006	Ash Grove Cement	Emissions Event
12/4/2006	Ash Grove Cement	Maintenance
12/3/2006	Ash Grove Cement	Maintenance
11/30/2006	Ash Grove Cement	Excess Opacity
11/15/2006	Ash Grove Cement	Emissions Event
11/15/2006	Ash Grove Cement	Emissions Event
11/15/2006	Ash Grove Cement	Emissions Event
10/31/2006	TXI Operations	Complaint (Odor)
10/30/2006	TXI Operations	Complaint (Odor)
10/24/2006	Ash Grove Cement	Excess Opacity
10/10/2006	Holcim	Air Startup
10/5/2006	Holcim	Emissions Event
10/3/2006	Ash Grove Cement	Excess Opacity
10/3/2006	Ash Grove Cement	Excess Opacity
9/23/2006	Ash Grove Cement	Excess Opacity
9/20/2006	TXI Operations	Complaint (Dust)
9/5/2006	Ash Grove Cement	Excess Opacity
9/5/2006	TXI Operations	Excess Opacity
8/3/2006	TXI Operations	Emissions Event
8/1/2006	TXI Operations	Complaint (Smoke)
7/27/2006	TXI Operations	Excess Opacity
7/26/2006	TXI Operations	Excess Opacity

Date	Facility	Type of Event
7/26/2006	TXI Operations	Excess Opacity
7/5/2006	TXI Operations	Excess Opacity
6/22/2006	Ash Grove Cement	Excess Opacity
6/15/2006	Ash Grove Cement	Excess Opacity
6/7/2006	Chaparral Steel	Complaint (Odor)
6/4/2006	Ash Grove Cement	Excess Opacity
6/4/2006	Ash Grove Cement	Excess Opacity
6/4/2006	Ash Grove Cement	Excess Opacity
6/3/2006	Ash Grove Cement	Excess Opacity
6/3/2006	TXI Operations	Excess Opacity
6/2/2006	TXI Operations	Excess Opacity
6/2/2006	TXI Operations	Excess Opacity
6/1/2006	TXI Operations	Excess Opacity
5/30/2006	TXI Operations	Complaint (Dust)
5/29/2006	Ash Grove Cement	Excess Opacity
5/29/2006	Ash Grove Cement	Excess Opacity
5/29/2006	Ash Grove Cement	Excess Opacity
5/23/2006	Chaparral Steel	Complaint (Odor)
5/13/2006	Ash Grove Cement	Excess Opacity
5/3/2006	Ash Grove Cement	Excess Opacity
5/3/2006	Ash Grove Cement	Excess Opacity
5/3/2006	Ash Grove Cement	Excess Opacity
5/2/2006	TXI Operations	Excess Opacity
4/28/2006	Ash Grove Cement	Excess Opacity
4/27/2006	Chaparral Steel	Emissions Event
4/17/2006	Ash Grove Cement	Excess Opacity
4/17/2006	Ash Grove Cement	Excess Opacity
4/17/2006	Ash Grove Cement	Excess Opacity
4/11/2006	TXI Operations	Complaint (Odor)
4/10/2006	Chaparral Steel	Complaint (Odor)
4/10/2006	Holcim	Complaint (Odor)
4/7/2006	TXI Operations	Complaint (Dust)
3/30/2006	TXI Operations	Complaint (Odor)
3/25/2006	Ash Grove Cement	Excess Opacity
3/25/2006	Ash Grove Cement	Excess Opacity

Date	Facility	Type of Event
3/24/2006	Ash Grove Cement	Excess Opacity
3/13/2006	Ash Grove Cement	Excess Opacity
3/10/2006	Ash Grove Cement	Excess Opacity
3/7/2006	Chaparral Steel	Complaint (Odor)
3/7/2006	TXI Operations	Complaint (Odor)
3/7/2006	TXI Operations	Complaint (Odor)
3/6/2006	Chaparral Steel	Excess Opacity
3/6/2006	Chaparral Steel	Complaint (Smoke)
3/6/2006	Holcim	Complaint (Smoke)
3/6/2006	TXI Operations	Complaint (Smoke)
2/28/2006	TXI Operations	Excess Opacity
2/18/2006	Ash Grove Cement	Excess Opacity
2/16/2006	Ash Grove Cement	Excess Opacity
2/8/2006	Ash Grove Cement	Excess Opacity
2/7/2006	TXI Operations	Complaint (Dust)
2/7/2006	Chaparral Steel	Complaint (Industrial)
2/6/2006	Ash Grove Cement	Maintenance
2/3/2006	Ash Grove Cement	Maintenance
2/1/2006	TXI Operations	Complaint (Odor)
1/29/2006	Ash Grove Cement	Excess Opacity
1/23/2006	TXI Operations	Complaint (Smoke)
1/17/2006	TXI Operations	Complaint (Smoke)
1/9/2006	Ash Grove Cement	Maintenance
1/9/2006	Ash Grove Cement	Maintenance
1/9/2006	Ash Grove Cement	Maintenance
12/30/2005	Chaparral Steel	Complaint (Odor)
12/30/2005	TXI Operations	Complaint (Odor)
12/27/2005	Chaparral Steel	Complaint (Dust)
12/27/2005	Ash Grove Cement	Excess Opacity
12/27/2005	Chaparral Steel	Complaint (Odor)
12/27/2005	TXI Operations	Complaint (Odor)
12/4/2005	Ash Grove Cement	Maintenance
12/1/2005	TXI Operations	Complaint (Odor)
11/30/2005	Chaparral Steel	Excess Opacity
11/30/2005	Chaparral Steel	Excess Opacity

Date	Facility	Type of Event
11/30/2005	Chaparral Steel	Excess Opacity
11/29/2005	Chaparral Steel	Complaint (Odor)
11/28/2005	Chaparral Steel	Excess Opacity
11/14/2005	Ash Grove Cement	Excess Opacity
10/25/2005	TXI Operations	Complaint (Dust)
10/25/2005	Holcim	Complaint (Odor)
10/19/2005	Ash Grove Cement	Excess Opacity
10/19/2005	Ash Grove Cement	Excess Opacity
10/6/2005	TXI Operations	Complaint (Odor)
10/4/2005	Ash Grove Cement	Excess Opacity
9/21/2005	Ash Grove Cement	Excess Opacity
9/21/2005	TXI Operations	Excess Opacity
9/16/2005	Ash Grove Cement	Excess Opacity
8/16/2005	Ash Grove Cement	Emissions Event
8/5/2005	Ash Grove Cement	Excess Opacity
8/5/2005	Ash Grove Cement	Excess Opacity
8/5/2005	Ash Grove Cement	Excess Opacity
8/1/2005	TXI Operations	Complaint (Dust)
7/21/2005	TXI Operations	Complaint (Odor)
7/18/2005	Holcim	Emissions Event
7/1/2005	Ash Grove Cement	Excess Opacity
7/1/2005	Ash Grove Cement	Excess Opacity
6/21/2005	Chaparral Steel	Excess Opacity
6/13/2005	Chaparral Steel	Complaint (Odor)
6/13/2005	Holcim	Complaint (Smoke)
5/23/2005	Chaparral Steel	Complaint (Odor)
5/19/2005	Holcim	Complaint (Dust)
4/22/2005	TXI Operations	Emissions Event
4/18/2005	Ash Grove Cement	Excess Opacity
3/28/2005	TXI Operations	Complaint (Other)
3/21/2005	TXI Operations	Complaint (Odor)
3/18/2005	Chaparral Steel	Excess Opacity
3/1/2005	TXI Operations	Complaint (Odor)
2/16/2005	Ash Grove Cement	Emissions Event
2/16/2005	Ash Grove Cement	Excess Opacity

Date	Facility	Type of Event
2/7/2005	Ash Grove Cement	Excess Opacity
2/6/2005	Ash Grove Cement	Maintenance
2/4/2005	Ash Grove Cement	Excess Opacity
2/3/2005	TXI Operations	Complaint (Other)
1/31/2005	Ash Grove Cement	Excess Opacity
1/28/2005	Ash Grove Cement	Excess Opacity
1/14/2005	Ash Grove Cement	Excess Opacity
1/13/2005	Ash Grove Cement	Excess Opacity
1/6/2005	TXI Operations	Complaint (Dust)
1/2/2005	Ash Grove Cement	Maintenance
12/26/2004	Chaparral Steel	Excess Opacity
12/8/2004	Chaparral Steel	Complaint (Odor)
12/8/2004	TXI Operations	Complaint (Odor)
11/29/2004	Holcim	Complaint (Odor)
11/28/2004	Ash Grove Cement	Maintenance
10/22/2004	Ash Grove Cement	Maintenance
10/19/2004	Ash Grove Cement	Excess Opacity
10/13/2004	Chaparral Steel	Excess Opacity
9/28/2004	TXI Operations	Complaint (Odor)
9/18/2004	Ash Grove Cement	Excess Opacity
9/16/2004	Chaparral Steel	Complaint (Dust)
9/8/2004	TXI Operations	Complaint (Odor)
9/8/2004	TXI Operations	Complaint (Smoke)
9/8/2004	TXI Operations	Complaint (Smoke)
8/25/2004	TXI Operations	Complaint (Dust)
8/12/2004	Ash Grove Cement	Excess Opacity
8/12/2004	Ash Grove Cement	Excess Opacity
8/12/2004	Ash Grove Cement	Excess Opacity
8/5/2004	Ash Grove Cement	Excess Opacity
7/29/2004	Ash Grove Cement	Emissions Event
7/29/2004	Ash Grove Cement	Excess Opacity
7/29/2004	Ash Grove Cement	Excess Opacity
7/18/2004	Ash Grove Cement	Emissions Event
7/13/2004	Ash Grove Cement	Excess Opacity
6/10/2004	TXI Operations	Complaint (Smoke)

Date	Facility	Type of Event
6/7/2004	Ash Grove Cement	Maintenance
6/4/2004	Ash Grove Cement	Maintenance
5/27/2004	Ash Grove Cement	Emissions Event
5/27/2004	Ash Grove Cement	Emissions Event
5/27/2004	Ash Grove Cement	Excess Opacity
5/5/2004	TXI Operations	Complaint (Odor)
4/15/2004	Ash Grove Cement	Excess Opacity
4/7/2004	Chaparral Steel	Complaint (Smoke)
4/6/2004	Ash Grove Cement	Excess Opacity
4/6/2004	Ash Grove Cement	Excess Opacity
4/6/2004	Ash Grove Cement	Excess Opacity
4/2/2004	Ash Grove Cement	Excess Opacity
3/22/2004	Ash Grove Cement	Excess Opacity
3/16/2004	Chaparral Steel	Complaint (Odor)
3/11/2004	Chaparral Steel	Complaint (Odor)
3/9/2004	Ash Grove Cement	Excess Opacity
3/9/2004	Ash Grove Cement	Excess Opacity
3/1/2004	Ash Grove Cement	Excess Opacity
3/1/2004	Ash Grove Cement	Excess Opacity
2/20/2004	Ash Grove Cement	Excess Opacity
2/14/2004	Ash Grove Cement	Excess Opacity
2/8/2004	Holcim	Maintenance
2/1/2004	Ash Grove Cement	Maintenance
1/30/2004	Chaparral Steel	Excess Opacity
1/29/2004	Chaparral Steel	Excess Opacity
1/15/2004	Ash Grove Cement	Excess Opacity
1/14/2004	TXI Operations	Complaint (Odor)
1/14/2004	Chaparral Steel	Complaint (Smoke)
1/4/2004	Ash Grove Cement	Maintenance
1/4/2004	Ash Grove Cement	Maintenance
12/24/2003	TXI Operations	Maintenance
12/17/2003	Ash Grove Cement	Excess Opacity
12/17/2003	Ash Grove Cement	Excess Opacity
12/17/2003	Ash Grove Cement	Excess Opacity
12/14/2003	TXI Operations	Emissions Event

Date	Facility	Type of Event
12/13/2003	Chaparral Steel	Excess Opacity
12/1/2003	Ash Grove Cement	Air Shutdown
12/1/2003	Chaparral Steel	Excess Opacity
11/25/2003	TXI Operations	Complaint (Odor)
11/22/2003	Chaparral Steel	Excess Opacity
11/12/2003	TXI Operations	Excess Opacity
11/9/2003	Ash Grove Cement	Excess Opacity
10/22/2003	Holcim	Complaint (Dust)
10/16/2003	Chaparral Steel	Excess Opacity
10/15/2003	Holcim	Emissions Event
10/8/2003	Chaparral Steel	Excess Opacity
10/6/2003	Ash Grove Cement	Excess Opacity
10/6/2003	Ash Grove Cement	Excess Opacity
10/6/2003	Ash Grove Cement	Excess Opacity
9/26/2003	Ash Grove Cement	Excess Opacity
9/22/2003	Chaparral Steel	Excess Opacity
9/18/2003	TXI Operations	Complaint (Odor)
9/18/2003	Chaparral Steel	Complaint (Smoke)
9/15/2003	Chaparral Steel	Excess Opacity
8/15/2003	Ash Grove Cement	Excess Opacity
8/15/2003	Chaparral Steel	Excess Opacity
8/6/2003	Ash Grove Cement	Excess Opacity
8/6/2003	Ash Grove Cement	Excess Opacity
8/4/2003	Ash Grove Cement	Excess Opacity
8/3/2003	Ash Grove Cement	Excess Opacity
7/22/2003	Chaparral Steel	Complaint (Odor)
7/22/2003	TXI Operations	Complaint (Odor)
7/22/2003	Chaparral Steel	Complaint (Smoke)
6/25/2003	Holcim	Complaint (Dust)
6/24/2003	Chaparral Steel	Complaint (Dust)
6/24/2003	Chaparral Steel	Complaint (Odor)
6/23/2003	TXI Operations	Complaint (Odor)
6/17/2003	Holcim	Emissions Event
6/17/2003	Holcim	Emissions Event
6/5/2003	Ash Grove Cement	Excess Opacity

Date	Facility	Type of Event
5/24/2003	Chaparral Steel	Excess Opacity
5/17/2003	Chaparral Steel	Excess Opacity
5/13/2003	TXI Operations	Complaint (Odor)
5/12/2003	Chaparral Steel	Complaint (Odor)
5/10/2003	Ash Grove Cement	Excess Opacity
5/10/2003	Ash Grove Cement	Excess Opacity
5/2/2003	Ash Grove Cement	Excess Opacity
5/1/2003	Chaparral Steel	Complaint (Smoke)
4/27/2003	Chaparral Steel	Emissions Event
4/24/2003	TXI Operations	Excess Opacity
4/24/2003	TXI Operations	Excess Opacity
4/24/2003	TXI Operations	Excess Opacity
4/20/2003	Ash Grove Cement	Excess Opacity
4/18/2003	Ash Grove Cement	Excess Opacity
4/17/2003	Ash Grove Cement	Excess Opacity
4/17/2003	TXI Operations	Complaint (Smoke)
4/15/2003	Ash Grove Cement	Excess Opacity
4/15/2003	Chaparral Steel	Excess Opacity
4/12/2003	Ash Grove Cement	Excess Opacity
4/12/2003	Chaparral Steel	Excess Opacity
4/8/2003	Ash Grove Cement	Maintenance
4/1/2003	TXI Operations	Complaint (Odor)
4/1/2003	TXI Operations	Complaint (Other)
3/27/2003	Ash Grove Cement	Excess Opacity
3/22/2003	Ash Grove Cement	Excess Opacity
3/22/2003	Ash Grove Cement	Excess Opacity
3/22/2003	Ash Grove Cement	Excess Opacity
3/22/2003	Chaparral Steel	Excess Opacity
3/18/2003	TXI Operations	Complaint (Odor)
3/11/2003	TXI Operations	Complaint (Odor)
3/8/2003	Ash Grove Cement	Excess Opacity
3/8/2003	Ash Grove Cement	Excess Opacity
3/8/2003	Ash Grove Cement	Excess Opacity
3/6/2003	TXI Operations	Emissions Event
3/3/2003	Chaparral Steel	Excess Opacity

Date	Facility	Type of Event
3/1/2003	Ash Grove Cement	Excess Opacity
3/1/2003	Ash Grove Cement	Excess Opacity
3/1/2003	Ash Grove Cement	Excess Opacity
2/28/2003	Ash Grove Cement	Excess Opacity
2/28/2003	Ash Grove Cement	Excess Opacity
2/28/2003	Chaparral Steel	Excess Opacity
2/27/2003	Chaparral Steel	Excess Opacity
2/14/2003	TXI Operations	Emissions Event
2/13/2003	TXI Operations	Complaint (Odor)
2/5/2003	TXI Operations	Complaint (Odor)
1/31/2003	TXI Operations	Emissions Event
1/29/2003	TXI Operations	Complaint (Odor)
1/29/2003	Chaparral Steel	Complaint (Smoke)
1/21/2003	Holcim	Complaint (Odor)
1/21/2003	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/12/2002	TXI Operations	Complaint (Odor)
12/4/2002	Chaparral Steel	Complaint (Odor)
11/21/2002	Chaparral Steel	Complaint (Dust)
11/21/2002	Chaparral Steel	Complaint (Smoke)
11/18/2002	TXI Operations	Complaint (Odor)
11/18/2002	TXI Operations	Complaint (Odor)
11/18/2002	TXI Operations	Complaint (Odor)
11/4/2002	Chaparral Steel	Complaint (Odor)
10/30/2002	TXI Operations	Complaint (Odor)
10/30/2002	TXI Operations	Complaint (Odor)
10/30/2002	TXI Operations	Complaint (Odor)
10/30/2002	TXI Operations	Complaint (Smoke)

Date	Facility	Type of Event
10/29/2002	Chaparral Steel	Complaint (Smoke)
10/25/2002	Chaparral Steel	Complaint (Smoke)
10/25/2002	Chaparral Steel	Complaint (Smoke)
10/25/2002	Chaparral Steel	Complaint (Smoke)
10/2/2002	TXI Operations	Complaint (Odor)
10/2/2002	TXI Operations	Complaint (Odor)
7/24/2002	TXI Operations	Complaint (Odor)
7/18/2002	Chaparral Steel	Complaint (Dust)
7/18/2002	Chaparral Steel	Complaint (Smoke)
7/12/2002	Chaparral Steel	Complaint (Smoke)

Notes: Events on this list do not imply permit violations.

Appendix C. ATSDR Modeling to Identify Potential Areas of Impact

As part of this assessment, ATSDR delineated a potential area of impact, which was defined as the geographic area surrounding the Midlothian facilities where the agency was reasonably confident that the greatest air quality impacts occurred, whether over the short term or the long term. This analysis considered only where facility-related *air pollution levels* would be expected to be the greatest, which may differ from areas of maximum impact to other media.

The potential area of impact (see Figure 9) was prepared as a preliminary step in ATSDR's health assessment process and is not intended to convey health conclusions. The area merely indicates locations where the greatest facility-related air quality impacts are expected to occur, and additional health consultations comment on the significance of these impacts. Moreover, the area should not be interpreted as suggesting that facility emissions do not transport beyond the area of impact. Models predict that pollutants emitted by the facilities can remain airborne for long distances, but their concentrations become immeasurably small beyond a certain distance from the facilities. Thus, pollutants released by the facilities likely are found in locations beyond the area of impact, even though the highest levels of facility-related air pollution are expected to occur in the areas shown in Figure 9.

ATSDR considered three factors when developing the area of impact:

Background information on the facilities and atmospheric dispersion. The facilities of concern at Midlothian—three cement kilns and a steel mill—are large facilities, each having dozens of emission sources documented in TCEQ's air emission inventory. The sources include both fugitive sources, which have no appreciable exit velocity and therefore tend to have their maximum offsite ground-level impacts at the facility boundary, and stack sources, which are released through confined streams (e.g., vents, stacks) and may have maximum ground-level impacts at locations further from the facility depending on various factors. ATSDR's delineation of the potential area of impact focused on stack emission sources, because their air quality impacts occur further downwind than those from fugitive sources. Accordingly, the remainder of Section C.1 focuses on stack emission sources.

Several factors determine how a given stack air emission source affects offsite air quality. Most atmospheric dispersion models consider four general categories of factors that affect dispersion:

- Meteorological conditions (e.g., wind speed, wind direction, atmospheric stability, temperature, and mixing height) all affect how pollutants move through the air. Representative data for most of these parameters are available from multiple meteorological stations operating in the Midlothian area.
- Characteristics of the emission sources also affect dispersion. For example, the height, diameter, exit velocity, and exit temperature all affect how pollutants disperse from stacks. These source characteristics are also well documented for the Midlothian facilities.
- Emission rates, or the amount of pollutants released over a given time frame, are also very important factors in atmospheric dispersion. While emission rate data are available for stack and fugitive emissions from all four facilities, most of these data (particularly for fugitive sources)

are estimates based on engineering calculations and are of unknown quality. Further, the emission rates can vary considerably with time.

- Other factors, such as local terrain features and the proximity of emission sources to buildings and other obstructions, also affect atmospheric dispersion. These factors are also relatively well characterized for these facilities.

For a given stack, all four of the above factors affect the *magnitude and location* of the point of maximum offsite air quality impacts; however, only three factors (meteorology, source parameters, and other factors) affect the *downwind distance* of maximum impact. Thus, the approximate *downwind distance* of maximum offsite impact can be estimated for every individual emission source, without being affected by uncertainties in the underlying emission rates. ATSDR considered this background information when deciding how to delineate the potential area of impact.

Review of EPA's Modeling. In January, 1996, EPA published a multi-pathway risk assessment evaluating air emissions from the four main facilities in Midlothian. An air dispersion model (Industrial Source Complex Short Term, or ISCST) was used to estimate off-site ambient air concentrations and deposition rates of selected pollutants. The model considered both stack emissions and fugitive emissions, with emission rates based on either stack testing data or engineering calculations. The risk assessment focused on multiple pollutants, including metals, dioxin and dioxin-like compounds, and polycyclic aromatic hydrocarbons.

Dispersion modeling results were communicated in text, tables, and figures. Figure 9 presents some of the findings from EPA's modeling. Specifically, points on the map indicate (1) locations where *deposition rates* were predicted to be highest for selected groups of pollutants and (2) locations where *ambient air concentrations* were predicted to be highest for the same groups of pollutants. All of these points fell either within facility boundaries or within ½-mile of the facility boundaries. Moreover, the points of maximum impact (whether for deposition or ambient air concentration) were located either directly south or north of the main facility emission points, which is consistent with prevailing wind directions in Midlothian.

The key inference to draw from EPA's analysis is that the estimated points of maximum impact, whether for deposition or air concentration, *when averaged over the long term*, are all in very close proximity to the facilities and typically found due north or south from the emission points. However, two limitations should be noted regarding this past modeling effort:

- By design, EPA's model evaluated air quality impacts over the long term. The locations with the greatest air quality impacts over the short term may be substantially different (e.g., further downwind, in different compass directions) than what EPA found, depending on the meteorological conditions at the time of a release event.

- EPA's analyses are based on data that were available 15 years ago, and many notable changes have occurred since then. For instance, many operational changes have occurred at the facilities of interest: since 1995, new kilns were added at some facilities, while others began burning different fuels. Therefore, the modeling results from 1995 may not adequately represent current conditions.

ATSDR's modeling analysis. To delineate the potential area of impact, ATSDR used a screening dispersion model (SCREEN3) to predict the offsite distance within which the agency is reasonably confident that maximum site-related air pollution levels impacts occur, whether over the short term or the long term. To complete this assessment, ATSDR accessed information on all emission sources from the four industrial facilities, as reported to TCEQ's Point Source Emission Inventory. For each facility, the agency then identified the emission source expected to have the furthest air quality impacts. This is typically the tallest stack with the highest release temperature and exit velocity. In cases where it was not immediately clear from the source parameters which stack would have the furthest impacts, the screening model was used to identify the stack whose plume would reach ground-level at the furthest distance from the stack base. This evaluation identified the following stacks for modeling:

- For Ash Grove Cement, modeling was conducted for "Kiln #1 Vent." Stack parameters for this source are: stack height = 45.7 meters; exit velocity = 10.3 meters/second; stack diameter = 3.2 meters; and temperature = 449.8 Kelvin.

- For Gerdau Ameristeel, modeling was conducted for "Baghouse B Vent." Stack parameters for this source are: stack height = 45.7 meters; exit velocity = 20.2 meters/second; stack diameter = 4.9 meters; and temperature = 338.7 Kelvin.

- For Holcim, modeling was conducted for "Kiln #2." Stack parameters for this source are: stack height = 94.5 meters; exit velocity = 16.0 meters/second; stack diameter = 4.2 meters; and temperature = 390.9 Kelvin.

- For TXI Operations, modeling was conducted for "Cement Kiln Stack." Stack parameters for this source are: stack height = 94.5 meters; exit velocity = 15.2 meters/second; stack diameter = 5.5 meters; and temperature = 394.3 Kelvin.

After identifying the stacks expected to have the furthest air quality impacts, ATSDR then ran SCREEN3 to assess how concentrations likely vary with distance from the facilities. The model was run using the "full meteorology" mode. In this mode, the model estimates 1-hour average concentrations at each downwind distance for more than 50 different combinations of meteorological parameters. Emission rates of 1 gram per second were used, because the goal of this modeling was to determine the point of maximum ground-level impacts—which is independent of the magnitude of the emission rate. The model outputs indicate, among other things, the distance from the stack base expected to have the highest air pollution levels out of all meteorological conditions considered.

For all four stacks considered, the point with the maximum ground-level impact was predicted to occur within 1,100 meters (or 3,600 feet) from the stack base. While the model suggested that facility-related air pollution levels at further distances would likely be lower than this worst-case scenario, ATSDR considered an additional margin to be reasonably confident that the area of impact truly contains the locations with the highest facility-related air pollution levels. Specifically, as a precautionary step to ensure that ATSDR did not underestimate the potential area of impact, the agency decided to set the boundaries for this area using the downwind distance where the estimated ground-level concentration from the stacks with the furthest reaching plumes were 75 percent below the estimated maximum concentration. (Note: This decay factor was selected based primarily on professional judgment, as no guidance exists for this type of assessment.) The downwind distance where concentrations fell at least 2.5 times below the maximum concentrations was found to be at least 5,900 meters (or 3.7 miles) from the base of the stacks modeled. ATSDR then used this downwind distance to construct the potential area of impact shown in Figure 9.

In summary, the potential area of impact represents ATSDR's judgment as to the locations where the agency is reasonably confident that the greatest facility-related air pollution levels are observed. The potential area of impact should not imply that facility emissions do not travel longer distances. Rather, the potential area of impact simply denotes the region within which ATSDR believes the highest facility-related air pollution levels occur and, under most scenarios, levels at further distances will be lower. These findings are consistent with the EPA modeling analyses, which found that long-term air quality impacts would likely occur within the potential area of impact. For short-term events, it is possible that plumes from the tallest stacks may reach ground level at further downwind distances, but this would be expected to occur only during meteorological conditions not commonly observed (e.g., calm winds and highly stable atmospheres). Moreover, in these cases, the plumes will have dispersed considerably before ever reaching ground level.

Table C-1. Input Parameters for Modeling of Potential Areas of Impact

Parameter	Facility-Specific Information			
	Ash Grove Cement	**Gerdau Ameristeel**	**Holcim**	**TXI Operations**
Stack height (meters)	45.7	45.7	94.5	94.5
Stack diameter (meters)	3.2	4.9	4.2	5.5
Exit velocity (meters/second)	10.3	20.2	16.0	15.2
Exit temperature (deg Kelvin)	449.8	339	390.9	394.3

Notes: 1. The stack parameters listed in the table are for the individual stacks that (1) vent emissions from kilns and furnaces and (2) are believed to contribute to the furthest distance offsite air quality impacts. These are generally the tallest stacks that vent emissions from the kilns and furnaces.
2. Stack parameters listed here were derived from the TCEQ Emission Inventory Questionnaires.

Appendix D. Emission Event/Complaint Analysis

Methods

R (version 2.15.1) was used in this analysis with the following packages:

- openair 0.7 [Carslaw and Ropkins 2012]
- ggplot2 0.9.2.1 [Wickam 2009]
- plyr 1.7.1 [Wickam 2011]
- lubriudate 1.2.0 [Grolemund and Wickam 2011]
- XLConnect 0.2-3 [Mirai Solutions GmbH 2012]
- reshape2 [Wickam 2007]
- mgcv [Wood 2006]

Procedures

Event/Complaint Data: The complaint and event data file was read sequentially into R. The data were cast to count the number of emission events or complaints by date per facility. Where no facility could be specified, a category of "unknown" was applied to the date. A logical event field was created to indicate dates where complaints or events had occurred, with TRUE indicating an event/complaint date and FALSE indicating a date without an event/complaint.

Meteorological Data: TCEQ's Texas Air Monitoring Information System (TAMIS) website (http://www5.tceq.state.tx.us/tamis/index.cfm?fuseaction=home.welcome) for the three stations analyzed. The TAMIS database was queried for the three sites for the years 2001 through 2011 for the hourly meteorological parameters and imported into R.

To examine the meteorological data for differences in wind characteristics, wind roses for the three stations were developed using the R package *openair*. A wind rose is a way of showing information about wind direction and speed. These pictures gives a summary of how often wind comes from a direction towards the weather station (wind from), as well as the wind speed during that time. The weather station is at the center of a wind rose, so a paddle to the east of the center indicates wind from the east. The paddles are labeled with a percent, which indicates the percent of time the wind was coming from that direction at that speed. Wind speeds are shown by the color of the paddle. Wind rose plots were created separating the wind roses by following variables:

- Site Name (Figure 1)
- Site Name and Year (Figure 2)
- Site Name and Location (Figure 3)
- Season and Daylight for only Midlothian Old Fort Worth Road (Figure 4)

Analysis of NAAQS contaminant Data

The data were plotted using summaryPlot function in *openair* to summarize the data for each station and to also display the trends in the number of events or complaints per day applicable to Cement Valley. The summaryPlot function provides a display of data availability (percentile numbers in each year of each panel), a plot of quantitative data at station over time (golden line plot), a histogram showing the distribution, periods of missing days (indicated by a red/blue strip chart along bottom of graph), and summary statistics. In addition to the standard plots in summaryPlot, the number of events/complaints applicable to the Cement Valley is plotted, which will also allow summaryPlot to calculate the percentage of days that had a complaint or event by year.

ATSDR then used polar plots and polar frequency plots to display the effects wind direction and wind speed on concentrations. Polar plots show the concentration of the contaminant as compared to the wind direction (in polar coordinate) and wind speed (indicated by distance from center). Nearby sources of these pollutants can often have an influence on the concentration and this effect will be seen when the data are plotted by wind direction and speed [Carslaw, Beevers, Ropkins, and Bell 2006]. If there is a point source (a single stack or location emitting the pollutant), then the polar plot will show elevated levels in the narrow range when the winds are blowing from the source towards the monitor. When winds are not blowing from the source towards the monitor, the concentration of the pollutant will be lower. When there is not a source present, the pattern of concentrations will appear more diffused. Polar frequency plots will graph contaminant concentrations binned according to wind direction (on a polar access with up corresponding to north) and wind speed (distance from center scaled to wind speed). The statistic displayed in each bin can be specified by the analyst. For instance, polar frequency plots were developed for maximum, mean, and median concentrations for SO_2, Ozone, and NO_2. Polar plots are similar in concept to polar frequency plots, except that a smoothing model is applied over the results prior to graphing. A strong relationship between wind direction and concentration will often be indicative of a nearby emission source. Additionally, wind speed may be important in characterizing the type of emission that is occurring. For instance, ground level concentrations from buoyant plumes (such as from a stack) will tend to peak as wind speed increases, whereas non-buoyant emissions (such as from automobile traffic), tend to have highest concentrations under low wind speed conditions [Carslaw, Beevers, Ropkins, and Bell 2006]. Polar plots for both the mean concentrations and the maximum concentrations for each combination of wind speed and direction were compared. Polar frequency plots were also checked to ensure that the smoothing functions were not masking any potential associations of interest.

Analysis of Relationship between NAAQS contaminants and Presence of Event/Complaint

Both visual and quantitative methods were used to examine for potential differences in air measurements on event/complaint days. For visual comparisons, bivariate polar plots were used to display the data conditioned on if there was or was not complaint/event logged for that day. Both the mean and the maximum concentrations polar plots were compared. Additionally, scatter and box plots of concentration versus date, conditioned on presence of complaint was checked to see if any apparent associations seen were driven by a few data points. Linear models (ordinary least squares) were then developed for daily averaged stations/contaminant combinations that appeared to have potential associations between the event/complaint log and the contaminant, adjusting for potential confounders such as seasonality, trend, wind speed & direction, temperature, and weekday/weekend. Natural cubic splines were used to fit both the outdoor temperature and the wind direction and speed. To adjust for the skewness in the data, daily $PM_{2.5}$ mean concentrations were log-transformed, SO_2 daily mean concentrations were transformed by their cubic root, and NO_2 concentrations were transformed by their square root. Wind direction and speed were converted to its northerly and easterly vector components by multiplying the sine of wind direction times the wind speed for the easterly vector, U, and cosine of the wind direction times wind speed for the northerly vector, V. Significance, prior knowledge, Akaike Information Criterion (AIC) and overall fit guided selection of parameters in the model. Model fits were assessed with standard plots of residuals (i.e., check for normality of residuals, that there was not a trend in the residuals, and that no points were unduly influencing the model). To assess for the possibility of co-liniearity, Variance Inflation Factors (VIF) were inspected and any term with VIF greater than 10 was considered suspect.

Generalized Additive Models (GAMs) were also used to assess the non-linear effects of the variables and to adjust for the effects of autocorrelation using package 'mgcv' (Mixed GAM Computation Vehicle) [Wood 2006]. GAMs, as implemented in mgcv use an automatic spline fitting process that penalizes the splines to reduce the likelihood of overfitting the data. GAMs have been used to detect trends and effects of pollution sources in several studies [e.g. Reiss 2006, Carslaw, Beevers, Ropkins, and Bell 2006, Carslaw and Carslaw 2007, Pierce *et al.* 2011]. Wind speed was used in the GAM as a smooth surface of northerly and easterly wind vector components, as well as a smooth of the effects of outdoor temperature and a smooth term for the lagged concentration of the pollutant (to account for the autocorrelation effect). For nitrogen dioxide, an additional variable was added to account for whether the day was a weekday or a weekend.

Since the variables were transformed, the measure of marginal effect (M.E.) is presented in percent units. It reflects the relative percent amount that the variable is increasing or decreasing the pollutant concentration, when controlling for the effects of the other variables in the model. The following equations were used to calculate marginal effect of complaint/non-complaint dates from the effect estimate of the model (β):

$$ME\ SO_2 = 100\ \times\ \beta^3$$
$$ME\ NO_2 = sign(\beta) \times |100\ \times\ \beta^2|$$
$$ME\ PM_{2.5} = 100\ \times (e^{\beta} - 1)$$

Results and Discussion

Wind Roses for Meteorological Data

For the three stations, there were minimal differences noted in the wind roses between each station (Figure 1).

Figure 1: Midlothian Wind Roses by Station

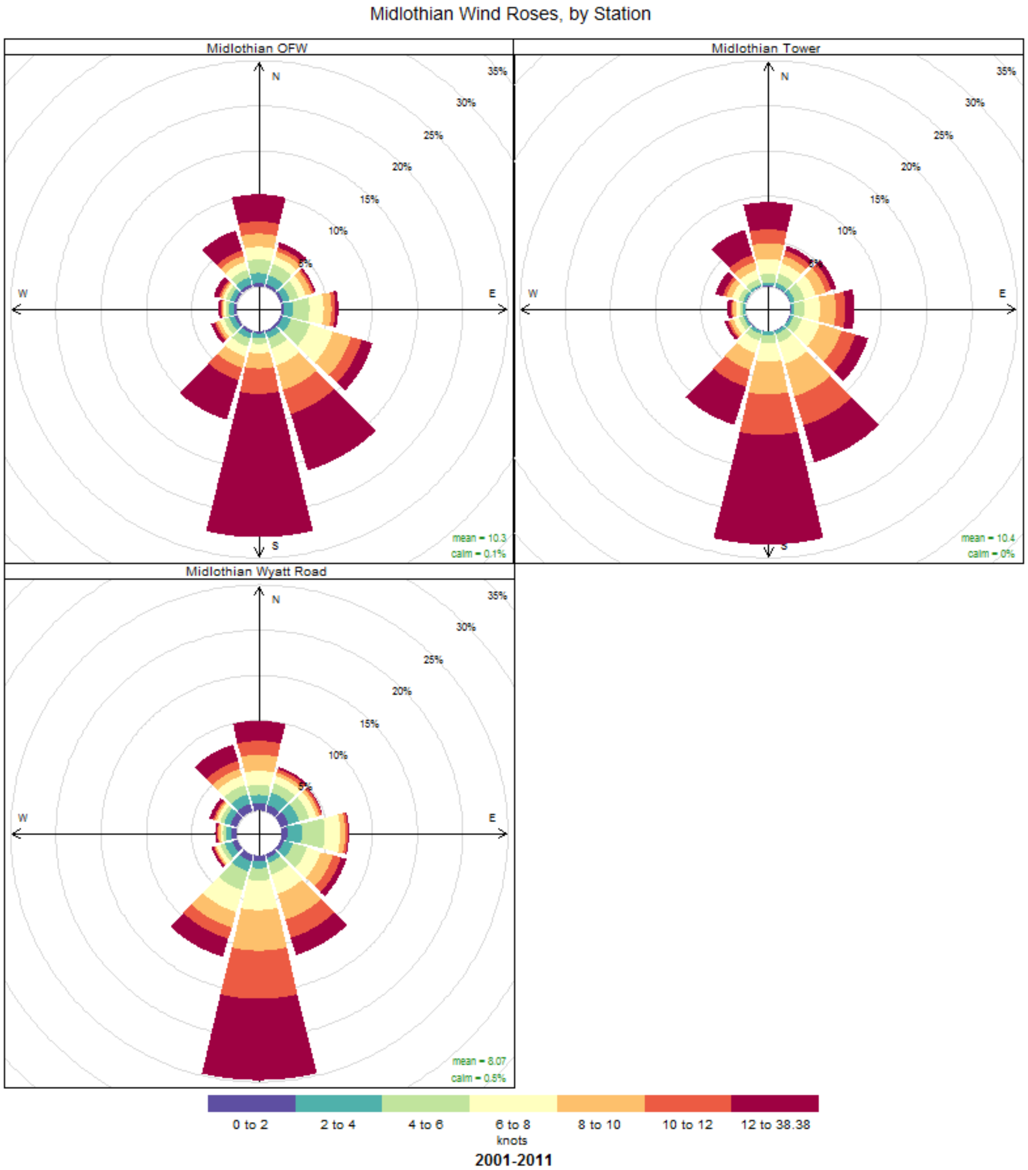
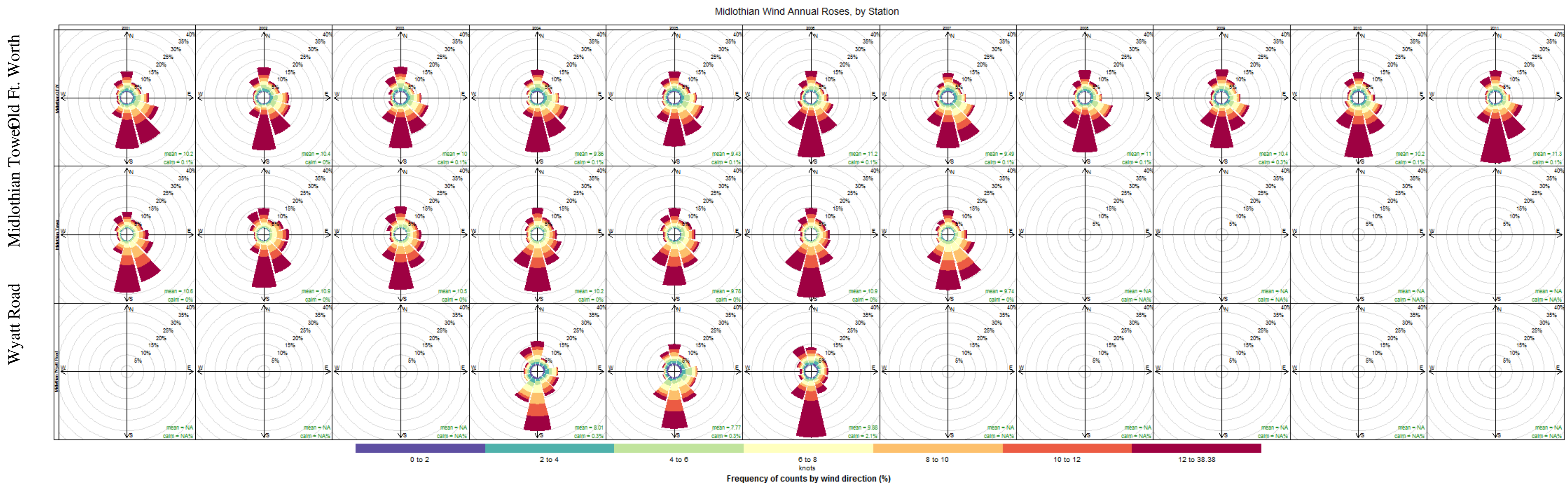


Figure 2: Midlothian Annual Wind Roses by Station, 2001-2011

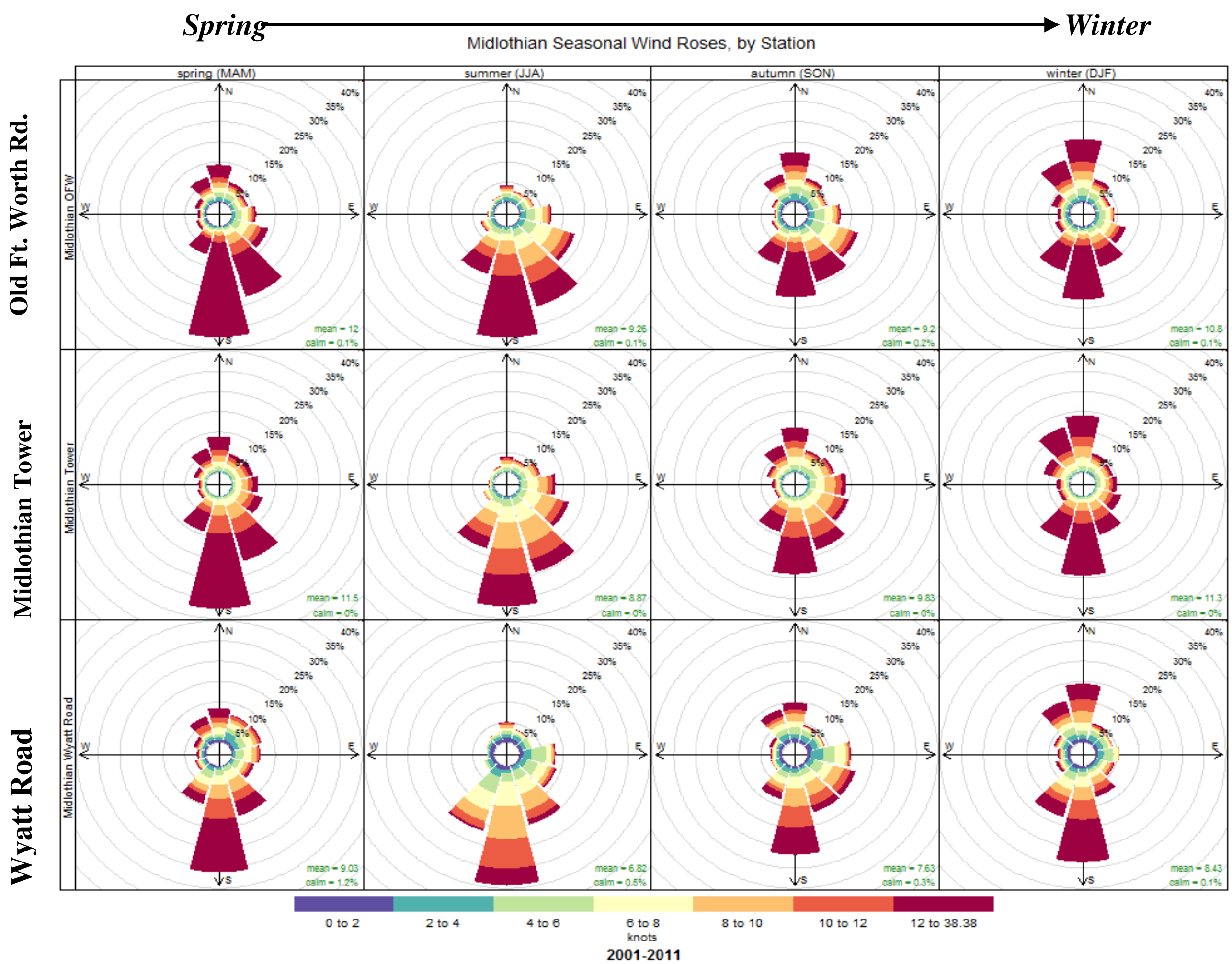
As shown in Figure 2, Old Fort Worth had data for all years (2001 – 2011), while Midlothian Tower had data for 2001 –2007. Meteorological data were available from late 2004 – early 2006 at the Midlothian Wyatt Road site. The wind roses at each of the stations showed similar patterns, as would be expected given their proximity and lack of terrain or other features separating them. No remarkable changes appear to be present in the wind roses from year to year across the stations, with the Old Fort Worth Station having almost complete winds data from 2001 through 2011.

2001 → ***2011***



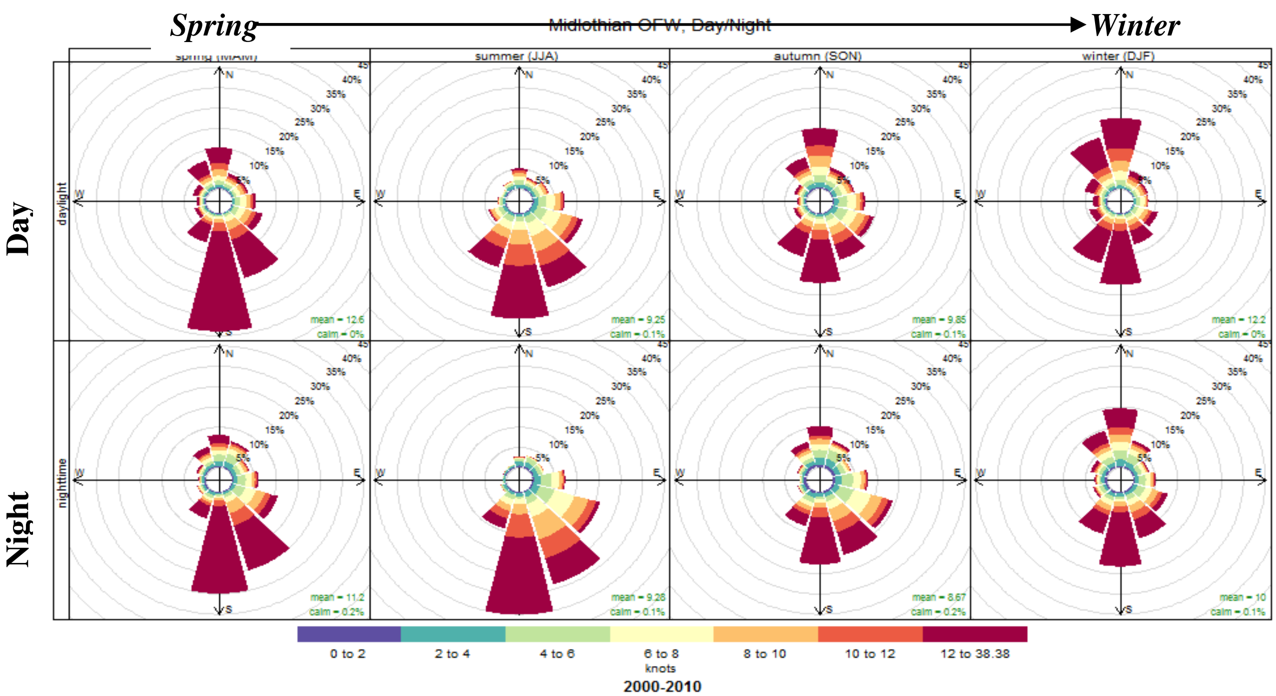
A seasonal wind pattern exists in at all three stations, with winds being from the south in the spring and summer, and more variable with dominant northerly components in the fall and winter months (Figure 3).

Figure 3: Midlothian Seasonal Wind Roses by Station



Since the wind roses were so similar across all stations, only data from Old Fort Worth Road are shown in the seasonal and diurnal conditioned wind roses are shown in Figure 4. This seasonal pattern to the winds was consistent regardless if it was day or night, although slightly lower wind speeds were observed (Figure 4).

Figure 4: Midlothian Old Fort Worth Road Wind Roses by Season and Day/Night*



**Day and night determined by the presence of daylight; within imported data, openair uses solar elevation angle to calculate daylight with appropriate latitude and longitude information for each station evaluated.*

Openair Analysis NAAQS Data

SummaryPlots for each of the three area monitoring locations are shown in Figures 5-7. Of the stations, Old Fort Worth Road has the longest period of observation for most NAAQS contaminants except $PM_{2.5}$. The SO_2 levels at Old Fort Worth Road appear to drop suddenly in 2008. Corresponding to this, the number of dates with a complaint or event appears to have dropped off as well. The Midlothian Tower station has data from 2001 –2008 for all NAAQS contaminants. From 2001 – 2006 Wyatt Road has excellent data availability in $PM_{2.5}$, but Wyatt Road only has limited data availability from 2005 – 2006 for other contaminants.

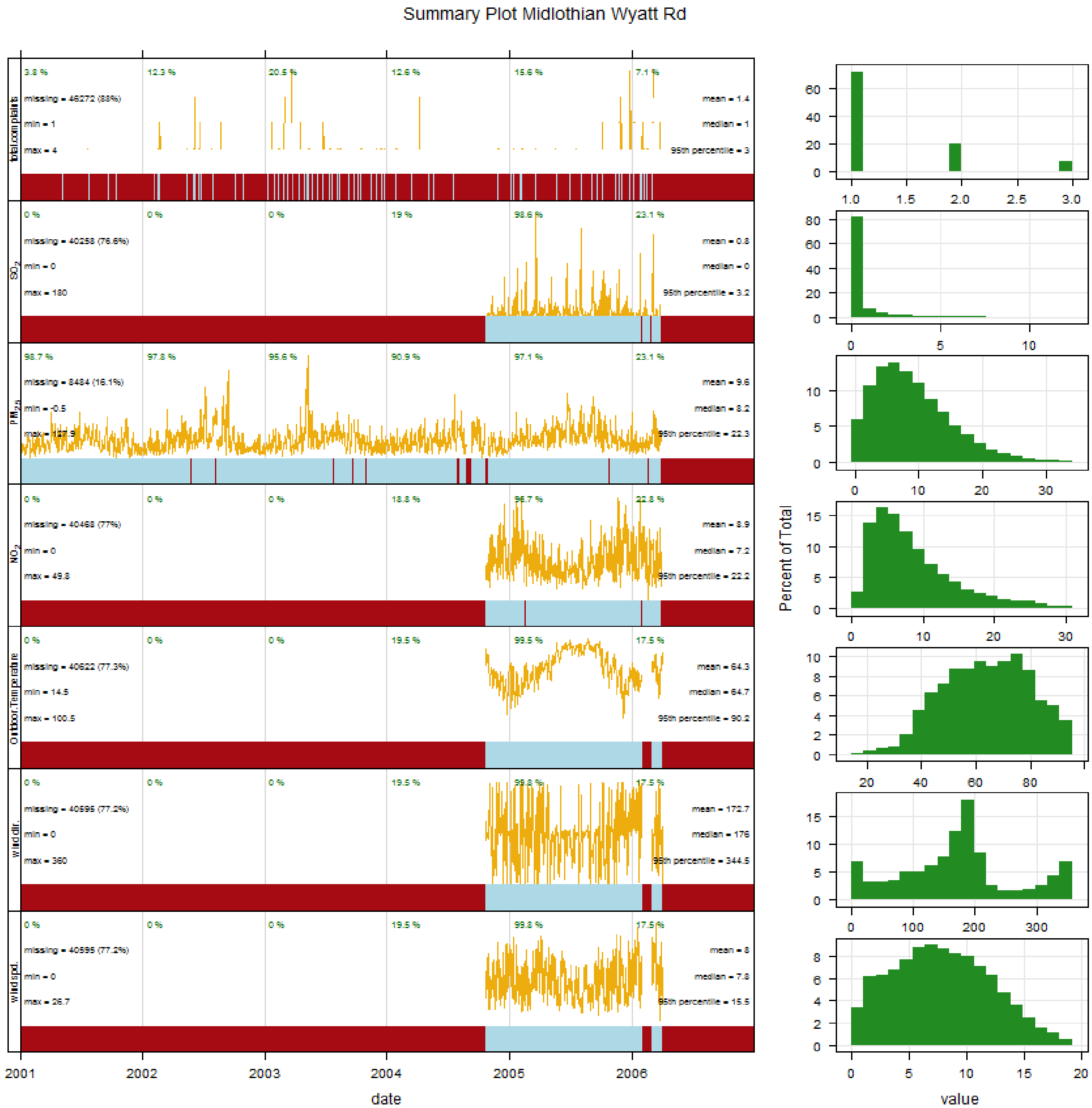
Figure 5: Summary Plot of Midlothian Old Fort Worth Road

The top left band of this figure shows the number of total complaints by year (years are along the bottom). In this band, the green % number runs across the top of the figure and tells you the % of days in a given year that had at least 1 complaint or unplanned release event. Red highlights periods where there are no complaints; blue shows when there was a complaint. In the bands of NAAQS pollutants, red along the bottom denotes missing data; Gold is a "spark line" illustrating concentration. In these NAAQS bands the green % number represents data availability (Percentage of hours with data). The green histograms on the right are the distribution curves of the data to their immediate left, where the X and y axes are the percent of time a value is detected, and the actual value.

Figure 6: Summary Plot of Midlothian Tower

The top left band of this figure shows the number of total complaints by year (years are along the bottom). In this band, the green % number runs across the top of the figure and tells you the % of days in a given year that had at least 1 complaint or unplanned release event. Red highlights periods where there are no complaints; blue shows when there was a complaint. In the bands of NAAQS pollutants, red along the bottom denotes missing data; Gold is a "spark line" illustrating concentration. In these NAAQS bands the green % number represents data availability (Percentage of hours with data). The green histograms on the right are the distribution curves of the data to their immediate left, where the X and y axes are the percent of time a value is detected, and the actual value.

Figure 7: Summary Plot Midlothian Wyatt Road



The top left band of this figure shows the number of total complaints by year (years are along the bottom). In this band, the green % number runs across the top of the figure and tells you the % of days in a given year that had at least 1 complaint or unplanned release event. Red highlights periods where there are no complaints; blue shows when there was a complaint. In the bands of NAAQS pollutants, red along the bottom denotes missing data; Gold is a "spark line" illustrating concentration. In these NAAQS bands the green % number represents data availability (Percentage of hours with data). The green histograms on the right are the distribution curves of the data to their immediate left, where the X and y axes are the percent of time a value is detected, and the actual value.

Polar plots are images that visually illustrate the wind directions most associated with elevated ambient concentrations of a pollutant. Essentially they show the direction from which the highest concentration of a pollutant is blowing to the monitor. In this analysis, polar plots show that both sulfur dioxide and nitrogen dioxide are consistent with the presence of a nearby point source (Figures 8 and 9). For SO_2, strong sources can be detected to the south at Old Fort Worth Road, to the north and northeast at Midlothian Tower, and to the southeast at Wyatt Road (Figure 8).

Figure 8: Polar Plot of SO_2 Mean Concentration[1]

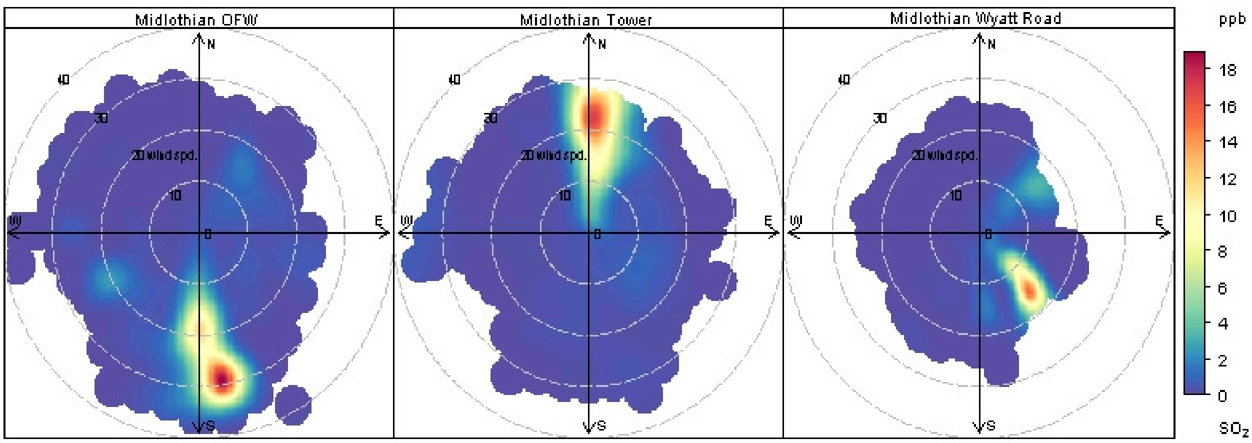
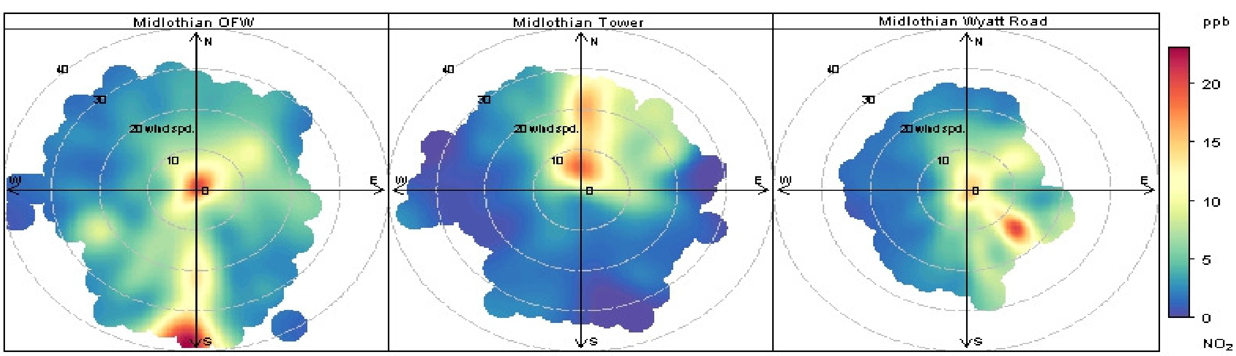


Figure 9: Polar Plot of NO_2 Mean Concentration



NO_2 also appeared to have nearby point sources and in similar directions as SO_2. Mean $PM_{2.5}$ was generally higher when winds were from the south at all stations (Figure 10), and the polar plot for ozone (Figure 11), did not indicate an apparent source as expected as ozone is typically a regional air pollutant that is created by photochemical processes in the air [EPA 2012]. In addition to mean concentrations, we plotted maximum concentrations in polar plots and polar frequency graphs. These graphs did not suggest alternative interpretations and are not shown.

Figure 10: Polar Plots of $PM_{2.5}$ (mean)

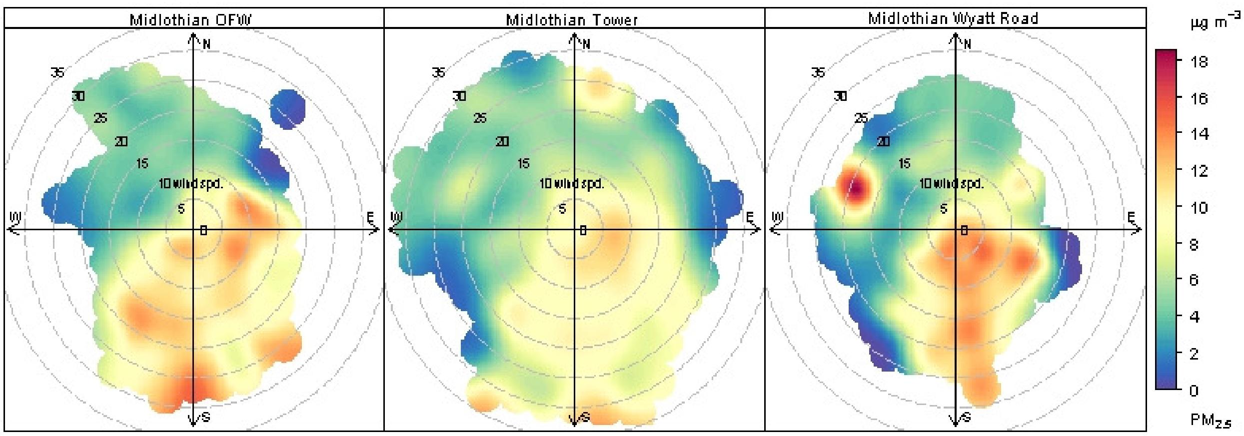
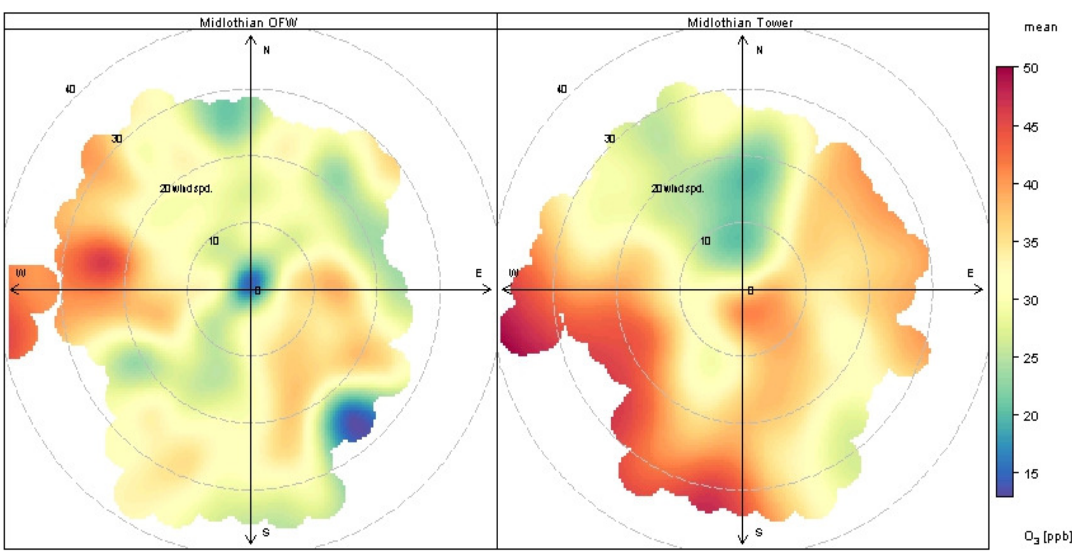
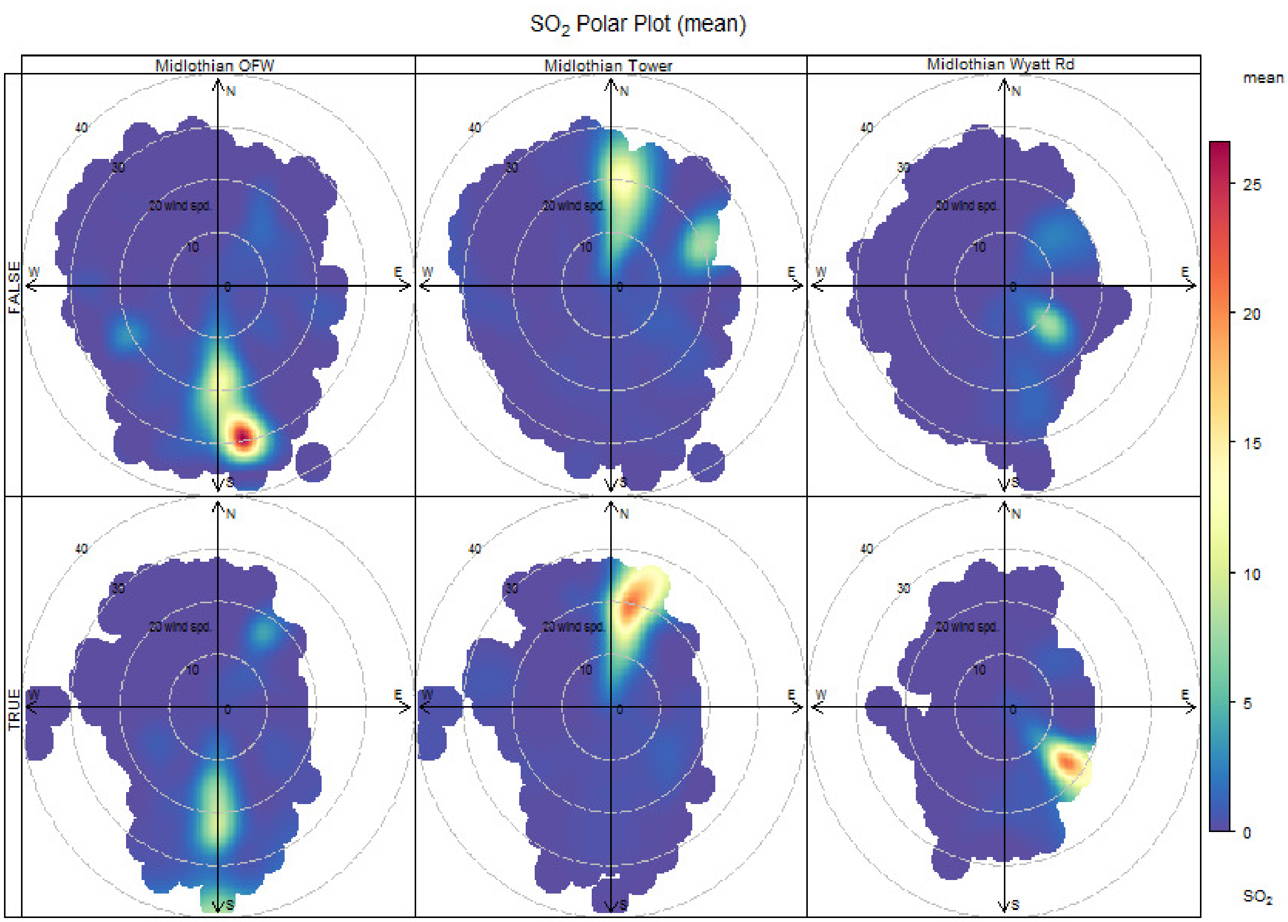


Figure 11: Bivariate Polar plots of Ozone (mean)



As a next step, we plotted the polar plots for SO_2, NO_2, and $PM_{2.5}$ conditioned on the presence of a complaint or event in the log indicating a complaint or event. These plots are shown in Figure 12, 13 and 14. Based on visual inspection, there was some indication that SO_2 may be slightly higher on event/complaint days at Midlothian Tower and Wyatt Road but not at Old Fort Worth Road (Figure 12). Note that the row labeled "False" indicates that there were no complaints or unplanned release events, and the one labeled "True" are days where there was at least one complaint or unplanned release event.

Figure 12: Polar plots of SO_2 Conditioned on Event/Complaint Log



At Old Fort Worth Road, mean NO_2 levels were slightly higher (Figure 13), but there was not a strong indication of a difference in complaint/event days for NO_2. There was some indication that $PM_{2.5}$ levels were higher on event/complaint days than non-complaint/event days for $PM_{2.5}$ (Figure 14). The overall effect of event/complaint dates though appears to be small.

Figure 13: Polar plots of NO_2 Conditioned on Event/Complaint Log

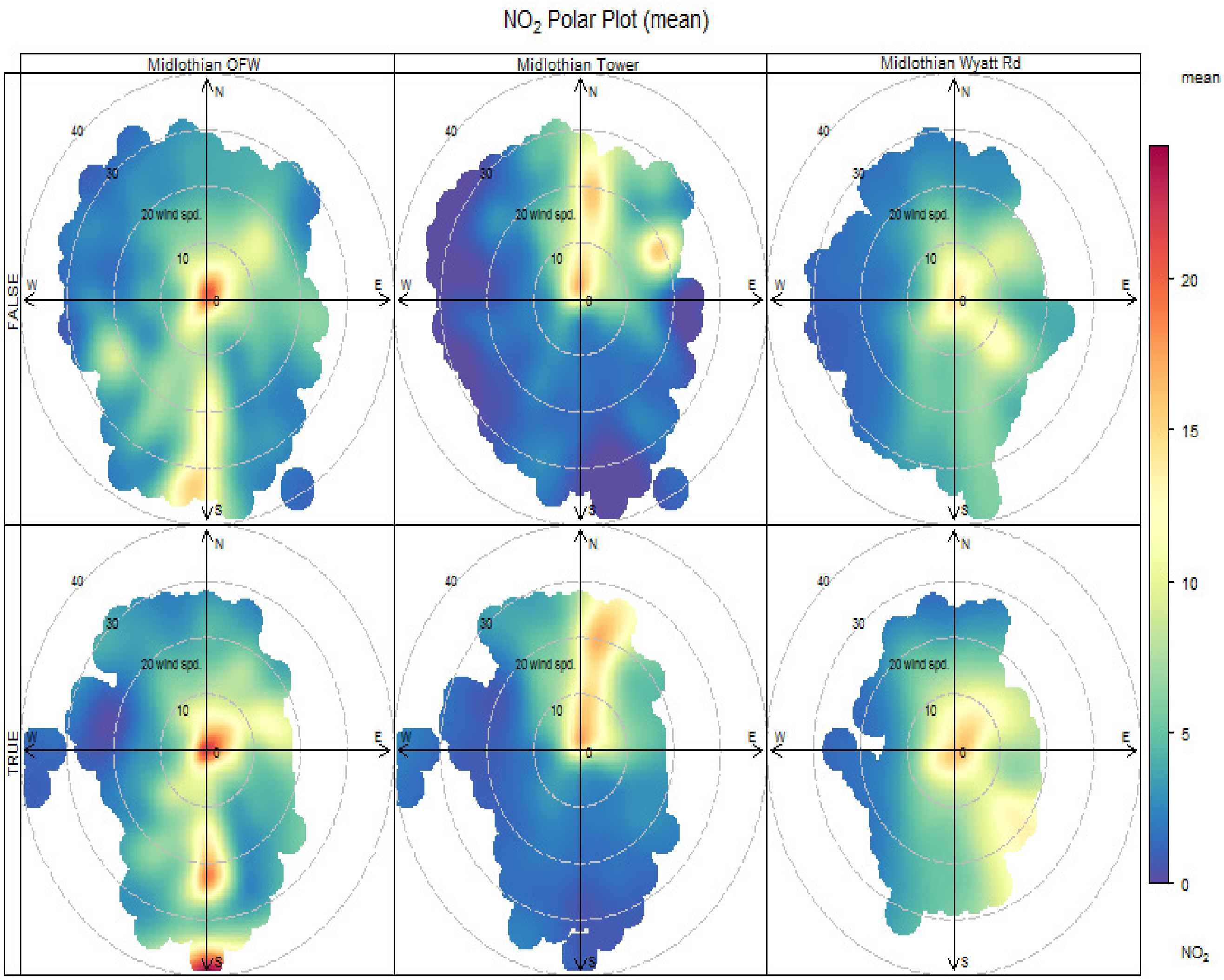
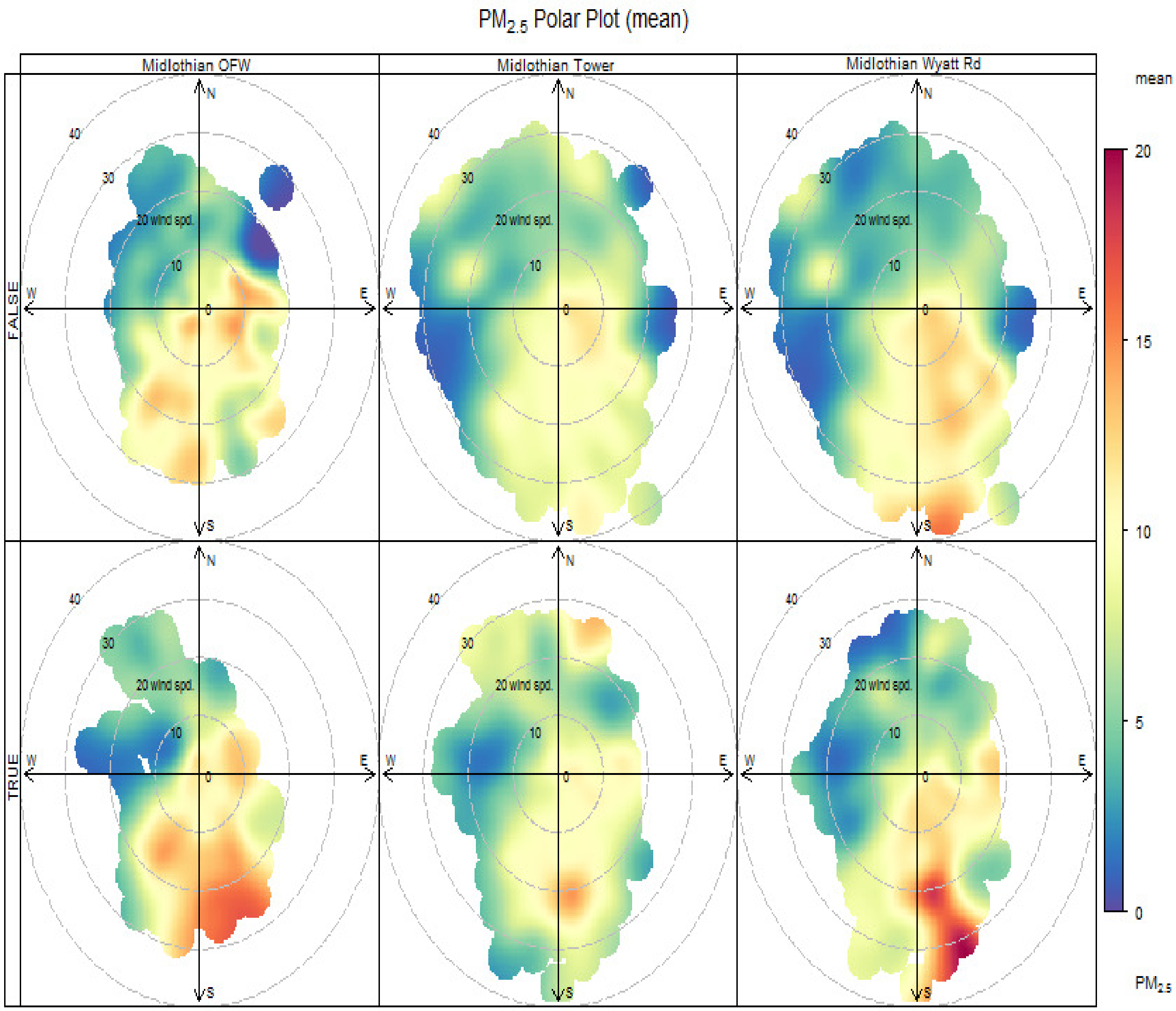


Figure 14: Polar plots of $PM_{2.5}$ Conditioned on Event/Complaint Log



Mean concentrations (uncontrolled for the effects of time and winds) between the mean contaminant levels on complaint/event dates and dates not on the event/complaint log are shown in Table 1. The data in the table indicate that mean concentrations of dates with releases and complaints are not appreciably different than dates without.

Table 1: Differences in Mean Hourly Concentrations on Event/Complaint days and Non-Complaint/Event at Midlothian Monitoring Sites

	Event/Complaint?	*Old Fort Worth Rd.*	*Midlothian Tower*	*Wyatt Road*
SO_2 [ppb]	No	1.5	1.14	0.75
	Yes	1.4	1.18	1.0
NO_2 [ppb]	No	9.0	5.9	8.8
	Yes	9.7	5.9	9.7
$PM_{2.5}$ [$\mu g.m^{-3}$]	No	9.8	9.3	9.5
	Yes	10.8	9.3	9.8

Modeling Relationship of NAAQS Contaminants and Event/Complaint Status

Modeling using OLS and GAMs were done for all pollutants at all locations. In general, even though natural splines were used in OLS, the GAM models did a better at explaining the effects than OLS, as measured by adjusted R squared values. Furthermore, the GAMs were built to account for the autocorrelation between the observations, and adjust for the effect. Marginal effects of an event/complaint day are shown in Table 2 (for OLS) and Table 3 (for GAMs). Nevertheless, some caution should be used in interpreting these results. The overall size of the effect is relatively small, and there in some cases are limited data available to support the conclusions reached by the model. For instance, even though event/complaints dates had a significant effect was shown at Midlothian Wyatt Road for NO_2, this conclusion is only based on approximately one year's worth of data. Model output is shown in Appendix B. For the GAMs, model smooths are also shown (with results shown as percent marginal effect). In the case of the effect of U and V, the smooth surface is plotted and should be read as a topograph with U indicating how easterly the winds are, and V indicating how northerly the winds are, and the contours indicating the marginal effect of the interaction of wind vectors (although the marginal effect is almost identical to what is seen in the polar plots).

Old Fort Worth Road

At Old Fort Worth Road, both the GAM and OLS showed that winds and temperature had a significant effect on concentration of SO_2. Both models also detected a statistically significant downward trend in SO_2. Event/Complaint days, when controlling for the effects of winds and temperature, did not have significantly higher average SO_2 than non-event/complaint days. Adjusted R^2 for the OLS model was 0.29. The GAM model had a higher adjusted R^2 of 0.48. For NO_2, there was statistically significant higher average levels of NO_2 on weekdays, in addition to significant effects of winds and temperature. The effect of event/complaint days were marginally insignificant in both the OLS (p=0.08) and GAM (p=0.06). The overall marginal

effect of an event/complaint day was 0.26% higher for OLS and 0.23% for the GAM. OLS for NO_2 had an adjusted R^2 of 0.54. For the GAM, the adjusted R^2 was 0.69.
Both the OLS and GAM revealed that $PM_{2.5}$ at Old Fort Worth Road also was significantly affected by winds and temperature. The OLS showed a marginally insignificant effect (12% higher, p=0.07) and the GAM also showed a marginally insignificantly higher concentration (8% p=0.06). The adjusted R^2 for the $PM_{2.5}$ OLS and GAM models were 0.46 and 0.68, respectively. This marginal effect should be treated with caution, however, as there is only a limited duration of time that $PM_{2.5}$ was monitored at this location.

Midlothian Tower
The OLS model for SO_2 was less than 1% higher on event/complaint days than non-complaint days. This marginal effect was insignificant. The GAM for SO2 showed a significant, but small (<1%) marginal effect. We found significant effects from both winds and temperatures in both OLS and GAM models. The R^2 for the OLS model for SO_2 was 0.31 and for the GAM model, it was 0.47.

For NO_2 the marginal effect of an event/complaint was small (also less than 1%) but was significant in both the OLS and GAM models. For comparison, weekdays had significantly higher levels of NO_2; the marginal effect of a weekday was found to be 5.29% higher by OLS and 7% higher by the GAM. Winds and temperature were also significantly associated with NO_2 concentrations. The adjusted $R^2$for the OLS and GAM models were 0.64 and 0.78, respectively. After adjusting for the significant effects of winds and temperature, the levels of $PM_{2.5}$ were not significantly different (marginal effects were less than -1%) in both the OLS and GAM models. The adjusted R^2 for the OLLS for $PM_{2.5}$ at Midlothian Tower was 0.33, while for the GAM it was 0.53.

Wyatt Road
Both the OLS and GAM models found significant effects of winds and temperature on SO_2 at Wyatt Road. After adjusting for the effects of winds and temperature, average SO_2 concentration at Wyatt road was less than 1% on event/complaint days than non-event/complaint days. This level of effect was not significantly different in both OLS and GAM models. OLS model for SO_2 had an adjusted R^2 of 0.33. For the GAM, the adjusted R^2 was 0.45.
NO_2 on event/complaint day was 0.88% marginally higher than non/complaint dates in OLS, and 1.6% higher in the GAM. The GAM showed a significant difference (p= 0.008) but the OLS marginally did not (p= 0.09). In OLS, weekdays were 11% higher and 13% higher in the GAM (p <0.001 in both models). Winds and outdoor temperature had significant effects on concentration. The adjusted R^2 for the OLS was 0.52, and for the GAM, the adjusted R^2 was 0.64.

For $PM_{2.5,}$ the event/complaint days were not significantly different. Marginal effects were below 1% in OLS, but in the GAM model was 1.7%. There were significant effects for winds and outdoor temperature. The adjusted R^2 for the OLS model of $PM_{2.5}$ was 0.42, while the adjusted R^2 for the GAM was 0.58.

Tables 2 and 3 illustrate that the levels of pollutants were only slightly different on days with an unplanned emission events or complaints.

Table 2: Marginal Effect of Event/Complaint Date on Daily Average Concentration – Ordinary Least Squares Model

Pollutant	Old Fort Worth Road	Midlothian Tower	Wyatt Road
SO_2	-008%	0.004%	0.005%
NO_2	0.26%	**0.76%***	0.88%
$PM_{2.5}$	12%	0.48%	-0.30%

* $p < 0.05$

Table 3: Marginal Effect of Event/Complaint Date on Daily Average Concentration – Generalized Additive Models

Pollutant	Old Fort Worth Road	Midlothian Tower	Wyatt Road
SO_2	-0.001%	**0.01%***	0.01
NO_2	0.23%	**0.61%***	**1.6%***
$PM_{2.5}$	10%	0.80%	1.70%

* $p < 0.05$

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Appendix E. ATSDR Response to Public Comments

In this section we present comments we received during the public comment period, from 5/10/12 through 6/29/12, for the Midlothian Area Air Quality Health Consultation titled, "Assessed the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns", and our responses to those comments. Please note that the numbering scheme is as follows: [Section, letter A-H. Subsection, letter A-D. Question number within the subsection].

All references to page numbers are for the public comment draft of the health consultation.

Section A. General Comments

Comments submitted from industry and the public that are general or overarching comments about our approach, findings, and requests for considering additional information are listed here.

Subsection 1. Overarching Comments:

A.1.1. Comment:
Thank you for the report and initial questions, conclusions and basis of your conclusions. Since you requested comments, I wish to add mine below.

You all are providing a lot of relevant data as to where testing is being done, the frequency and trend per location – as best able and commentary. You also provide the 6 main points related to the technical evaluations, which are very good with quality data and historical backup.

The one thing that seems to be missing is a top level executive summary of findings, trends for the overall community – in an easy, graphical, format for understanding. Your Graphic 9, the graphical output of the ATDSR modeling, is missing relevant information to allow the community to better understand your findings and analysis. I amplify this at the end of my email.

Response to comment A.1.1.: A discussion of the findings from Figure 9 (referred to as Graphic 9 in the comment) can be found in Section 4.7 (Monitoring Locations) and ATSDR's overall conclusions (our standard version of an executive summary) regarding monitoring placement can be found in the Summary. Specifically, Conclusion 6 addresses the question "Are the monitoring stations placed in locations that adequately characterize outdoor air pollution?".

A.1.2. Comment:
You do have the short summaries, per emission location, but it is hard to create an overall, graduated area impact of concentration levels, etc. Your Conclusions seem to state that the pollutants, and the extent of pollution, is type dependent and location dependent, so the local community can only assess the data based upon the location of the monitoring station, not from an overall community perspective.

Response to comment A.1.2: Unfortunately, data are generally collected at specific sites, thus impacts can generally be evaluated locally for individuals living near that site. Large area assessments of risk and exposures can best be estimated through modeling if detailed emissions inventories are available for sites of interest, as was done by U.S.EPA Region 5 in Midlothian in 1995. ATSDR will evaluate pollutants collected at specific locations (individual risk and cumulative risk, if possible) and modeling for pollutants that are emitted in fairly substantial quantities but that have not been monitored historically.

A.1.3. Comment:
On another note, this home gets very dusty, very quickly. What is in the air around here?

Response to comment A.1.3.: Section 4.2 of the health consultation identifies the types of pollutants released from the facilities of concern. Furthermore, dust-specific health impacts of exposure is addressed in the health consultation of NAAQS pollutants, which include particulate matter.

A.1.4. Comment:
Pages 31, 32, 33, and 34: On pages 31, 32, 33, and 34 the term "likely" or "most likely" are used; however, TCEQ suggests the use of "may" or "may be" as a more appropriate alternative. Specifically:

- Page 31 – the second to last sentence of the first paragraph, "likely"
- Page 32 – the second sentence of the first paragraph, "would most likely"
- Page 33 – the fourth sentence of the second paragraph, "likely"
- Page 34 – the last sentence in the paragraph, "is likely"

Response to comment A.1.4.: We provided references to support the caveats in the public comment health consultation, or made changes in wording as appropriate.

A.1.5. Comment:
Some critical data are absent for every time frame. For reasons pointed out in this report and reasons pointed out below, we feel this statement misrepresents the facts. Much data will need to be created by other means and even then cannot definitively determine whether exposure was or was not a public health hazard.

The correct statement should be, **"Available ambient air monitoring data for the Midlothian area are insufficient to support a complete public health evaluation for all years that local facilities operated; ATSDR will make every attempt to recreate this data by air modeling; however modeling data cannot be used to definitively determine if the potential exposure was, or was not, a public health hazard."**

Response to A.1.5: Thank you for providing this alternate text. We agree that there are gaps in the data as stated. Our intent was to convey that data were sufficient and adequate for certain pollutants and timeframes, and not for others. We feel the overarching conclusion makes both points. Therefore we do not believe changes are needed for this conclusion.

A.1.6. Comment:
As you prepare your final determination of the public health burden to residents of Midlothian, caused by the pollution from three large cement plants and a steel mill, you should consider data beyond the inadequate monitoring of those facilities' emissions over the last two decades by the Texas Commission on Environmental Quality (TCEQ).

TCEQ has repeatedly told the public that Midlothian is 'The most tested and monitored city in the state of Texas." TCEQ toxicologists have guaranteed Midlothian residents that it's safe to live downwind of the region's largest industrial polluters. Considering the many problems that ATSDR has identified with TCEQ's monitoring, those assurances ring hollow.

For example, there was, and is, no monitoring for dioxins and furans - pollutants that have no known safe exposure limits. There is also no monitoring for hydrochloric acid, sulfuric acid, vapor-phase mercury, or carbon monoxide. In several cases, the methods used to monitor are known to underestimate pollutants or are not capable of measuring concentrations near the health protective levels. Moreover; science now recognizes that there are synergistic effects of multiple pollutants, sometimes producing new compounds and different health effects. Current monitoring methods can't capture this phenomena.

Considering these and other substantial holes in the data available to A TSDR, an accurate health determination of Midlothian residents is impossible. We urge you to say so officially, and make recommendations towards providing a more systematic and complete monitoring system for the city's industries.

Response to comment A.1.6.: We recognize that there are data gaps, however we believe there are data available for certain timeframes and pollutants where data are useful for making health conclusions. Data gaps were filled with air modeling and/or recommendations for additional air sampling. ATSDR did its best to determine what the implications are for exposure to mixtures of air pollutants to the extent that available science will allow.

Comment A.1.7.: TCEQ released its "Risk Screening Analysis" of the TXI cement plant in November 1995 and claimed that it was the most thorough study of its kind ever conducted on a facility in Texas. But expert witness Stuart Batterman testified that the risks from mercury, dioxins and other emissions from TXI have been grossly underestimated by the TCEQ and EPA. He points out that both agencies' risk reviews were performed prior to the issuance of the final draft permit for TXI in 1997, which has allowed significantly higher emission levels.

Specifically, Batterman points out that smokestack emissions of mercury at TXI, as measured in past "test burns," are already three times higher than the permit limits called for in the new permit. Even though TXI is regularly exceeding these permit limits, they are still being used by the state to estimate human exposure to the toxic metal. In another example, Batterman points out that the TCEQ is basing its estimate of risks from TXI using an emission rate for dioxins - the most toxic substance ever tested by EPA - that is four times lower than the permit level being proposed by the agency. He concludes that the TCEQs "use of different and often low emission rates is not protective, and thus results from these analysis should be discounted." He also states that TCEQ consideration of a number of other kinds of exposures has been "incomplete or unsatisfactory." Because of these and other mistakes in the TCEQ's analysis, Batterman concludes that the predicted risks from TXI's burning of hazardous waste "considerably exceed regulatory levels for a variety of exposure scenarios.at a large number of sites. Even more significantly, risks at all property line residences exceed guideline levels for childhood exposures... Overall, my analysis and review indicates that TXI' s stack and fugitive emissions, by themselves and/or in conjunction with emissions from other sources in Midlothian, will be or may tend to be injurious to or adversely affect human health or welfare, and may interfere with the normal use and enjoyment of property." (Stuart A. Batterman, PhD, Huang, Yuli, M.S., The University of Michigan, Evaluation of The Screening Risk Analysis for the Texas Industries (TXI) Facility in Midlothian, Texas, May 1, 1996)

Response to comment A.1.7.: ATSDR has received Dr. Batterman's report. ATSDR concurs that that these data gaps are important and are evaluated in additional health consultations.

A.1.8. Comment:
The results of your "Health Consultation" will have far reaching implications, affecting every community in this country who is struggling with pollution from the cement industry. ATSDR has a moral obligation to admit that the data available to you is flawed and incomplete and the agency can make no assurances of health and safety to the citizens of Midlothian, Texas.

Response to comment A.1.8.: We agree that this assessment is a very important one in evaluating impacts from these types of facilities. To address concerns over the data quality, we will have outside air experts evaluate this document for scientific accuracy as well. Although there are data gaps, as identified throughout the document, we believe that much of the data are sufficient for evaluating health concerns. Furthermore, health surveillance data for outcomes potentially related to residential exposures to environmental emissions were considered in our Health Outcomes Data Evaluation Health Consultation.

A.1.9. Comment:
We appreciate this opportunity to provide comments on the ATSDR's Health Consultation and looks forward to participating in this process as it moves forward. As stated above, the commenter is interested in ensuring that this process is as objective and scientifically sound as possible.

To reiterate, this area has been extensively studied in the past decades and a significant volume of data has been developed about the Midlothian area. We are confident that diligent focus on environmental compliance and the ongoing stringent review of its operations by applicable government agencies, including the U.S. EPA, the Texas Commission on Environmental Quality (TCEQ) and its predecessor agencies, and the Texas Department of State Health Services over the previous years, has consistently indicated that there are no health impacts to the Midlothian community from our emissions.

In keeping with the large volume of data that has already been developed on this area, it remains highly important that ATSDR objectively demonstrate to the citizens of Midlothian, the scientific community and other key stakeholders that all analyses that it performs (HC1 and *other projected evaluations) are being prepared based on appropriate and sound scientific procedures.*

Response to comment A.1.9.:
Comment noted.

A.1.10. Comment:
Section 2.3.3. Should be corrected.

Overview. Holcim Texas Limited Partnership (LP) (referred to in this document as "Holcim") is a Portland cement manufacturing facility located northeast of Midlothian. The facility began its operations as ~~Holnam Texas LP, which was formerly known as~~ Box Crow Cement Company, and subsequently became Holnam Texas LP before being re-named to Holcim Texas LP. Holcim operates two dry kilns: the first began operating in 1987 and the second in ~~1998~~ 2000. An onsite quarry provides limestone and other raw materials used to feed the rotary kilns, which operate at temperatures reaching 3,000 F. ~~Some quarried~~ Raw materials are crushed and milled onsite prior to being fed to pre-heaters that precede the kilns. The solid product from the kilns, or clinker, is cooled and ground together with gypsum to make Portland cement.

No change in next paragraph.

Table citing TDF usage is accurate (This is information we gave to TCEQ to share with the consultant during 08/2010).

According to Holcim's air permit, the facility is currently allowed to fire its kilns with natural gas, coal, tire chips, oil, non-hazardous liquids, non-hazardous solids, and petroleum coke. ~~The facility's emissions likely change as a function of the composition of fuels used, but a detailed breakdown of fuel use by day is not publicly available.~~

Holcim's cement manufacturing operations emit air pollutants from multiple sources, and various measures are in place to reduce facility emissions. One of the kilns now operates with selective non-catalytic reduction (SNCR) technology to reduce emissions of nitrogen oxides.

In ~~August~~ July 2005, following an application to increase nitrogen oxide emissions, Holcim reached a settlement agreement with DFW Blue Skies Alliance and Downwinders at Risk. This agreement led to Holcim funding several projects to reduce emissions and monitor local air quality. For example, Holcim agreed to install SNCR technology onto its newer kiln to decrease nitrogen oxide emissions [TCEQ 2009a] and to continuously measure downwind ambient air concentration of fine PM – a project that has been operational ~~since~~ from 2006 to 2010 (see Section 4.1).

Section 4.1

Holcim settlement agreement monitoring. From 2006 to ~~present~~ January 2010, continuous ambient air monitoring for fine PM ~~has~~ occurred along Holcim's northern property line (station 4 in Figure 6). As noted previously, Holcim conducts this monitoring to fulfill terms of a settlement agreement reached between the facility, DFW Blue Skies Alliance, and Downwinders at Risk.

Trinity Consultants, Inc., an environmental consulting company, installed and ~~operates~~ operated the continuous fine PM monitor and ~~submits~~ submitted quarterly results to representatives of and technical advisors for Holcim, ~~&~~ and Downwinders at Risk and UT Arlington.

Response to comment A.1.10.: We reviewed your comments and updated the section accordingly.

A.1.11. Comment:

As you know, health risks in the Midlothian community have been studied extensively over the past two decades, but unresolved questions always seem to remain. The commenter welcomes the application of sound science by the Agency for Toxic Substances and Disease Registry (ATSDR) and the Texas Department of State Health Services (TDSHS) to resolve this uncertainty. We are submitting these comments to "Health Consultation, Public Comment Version, Assessing the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns, Midlothian Area Air Quality, Midlothian, Ellis County, Texas, May 10, 2012" (HC1) after having participated in your May 24, 2012 public meeting at the Midlothian Conference Center.

Response to comment A.1.11.: Comment noted.

A.1.12. Comment:
The comments that follow are submitted to the Agency for Toxic Substances and Disease Registry (ATSDR) concerning the public comment version of the Health Consultation 1 titled *Midlothian Area Air Quality – Assessing the Adequacy of the Ambient Air Monitoring Database for Evaluating Community Health Concerns* (PHC#1).

According to its website, the ATSDR, based in Atlanta, Georgia, is a federal public health agency of the U.S. Department of Health and Human Services. ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. As such ATSDR's failure to reassure the public based on the historic Midlothian data and studies is disappointing to the commenter, its employees, and its neighbors.

Having failed the mandate to provide trusted health information ATSDR instead proposes collecting information using un-scientific assumptions (e.g., gathering self-reported health symptoms, but failing to gather individual medical records; establishing roll your own model screening values that disregard federal and state agency risk assessment guidelines and policies, etc.). It is just a costly exercise that will yield an excessive amount of unreliable data that will introduce new uncertainty and unnecessarily perpetuates fear in the community.

Response to comment A.1.12.: Comment noted. Please refer to the following for our responses to your general comments and specific concerns.

A.1.13. Comment:
On page 15 to 16 there is a description of the Ash Grove Cement Company facility in Midlothian, TX. Generally the PHC # 1 made several references to the facility, the company that operates it today, and the companies that have operated it in the past using the name "Ash Grove Cement".

Although from context many of the statements that refer to "Ash Grove Cement" make it clear when the authors of the PHC #1 referred to the facility and when they referred to the company, in some parts, the reader may not clearly ascertain which reference is made. This is confusing or incorrect ATSDR should make every effort to make factual statements in the PHC #1.

For example, the PHC #1 on page 15 states that "Ash Grove Texas, L.P. ... is a Portland cement manufacturing facility located north of Midlothian." Please note that Ash Grove Texas, L.P. is really a business entity that operates a manufacturing facility. Further, note that Ash Grove Cement Company indeed directs Ash Grove Texas, L.P. in Texas as well as own and operate other cement plants in the United States. From about 1990 until 2003, the Ash Grove facility (the manufacturing plant) was owned and operated by another entity called North Texas Cement Company, L.P. and prior to 1990, the plant was owned and operated by Gifford Hill Cement Company.

In practical terms, Ash Grove Texas, L.P. or Ash Grove Cement Company **did** not, for example, receive authorization to burn hazardous wastes from 1986 to 1991. Instead, Gifford-Hill Cement and North Texas Cement are the entities that pursued the use of hazardous waste fuels at the facility before Ash Grove Cement Company was even involved in the Midlothian operations. Also, the predecessor of Ash Grove Cement (the company) is not North Texas Cement Company or Gifford Hill Cement as may be misinterpreted by some readers from the wording that was used.

We suggest that the PHC #1 be reviewed and where there is any doubt of what is referred by the words "Ash Grove Cement" that the terms "predecessor facility" be used when referring to the physical manufacturing facility, regardless of the ownership of the facility at the time, and Ash Grove Texas, L.P. or Ash Grove Cement Company as the legal business entity that currently operates, is permitted to operate, or directs the operation of the Ash Grove facility in Midlothian.

Response to comment A.1.13.: We modified the document as suggested.

A.1.14. Comment:
It is surprising how the Agency for Toxic Substances and Disease Registration (ATSDR) has spent over a hundred pages relating to reviews and evaluation of previous monitoring and testing (confirming most of which is a product of) Texas Commission on Environmental Quality (TCEQ), questioning and remarking as to the accuracy and credibility of the test results but including it in what is a long awaited and critical work you chose to offer as a "consultation".

Response to comment A.1.14.: The comment is correct that the document presents a very detailed evaluation of the available ambient air monitoring data. Please note that this is precisely what certain residents asked ATSDR to do, and they asked that we do this before conducting the public health evaluations. ATSDR not only reviewed the air monitoring data for quality, but we also evaluated its adequacy for a public health interpretation. It was very important to members of your community that we examine the strengths and limitations of the monitoring data before using them in our additional documents.

A.1.15. Comment: The ambiguities presented therein suggest caution in reliance of the work as a scientific compilation. There is deep concern that a "conclusion" establishing the air quality condition and its result upon the health of the residents negatively, past and present, from this "consultation" will become a target for many challenges from the local industries.

Response to comment A.1.15.: Comment noted.

A.1.16. Comment:
To conclude, public health and safety are the foremost interest and in circumstances where available data is not conclusive ATSDR's decisions must err on the side of public health and safety, not protection of industry. Medical facts and history weigh heavy in these situations. Industry has the TCEQ on its side, the public needs your agency to stand up against the lies and misinformation that has allowed a tragic injustice and human suffering to continue for so many years.
Response to comment A.1.16.: Comment noted.

Subsection 2. Conclusions:

A.2.1. Comment:
At the end, in Main Conclusion, you state, “The modeled data cannot be used to definitively determine if the potential exposure was, or is, a public health hazard”. The whole reason we read this data is to understand that determination – is there a health impact – if so, where. You provide quality data and background, but the data needs to be processed for an overall understanding of how the pollution sources impact the overall local community and downrange communities. If you do not do it – who will.

Response to comment A.2.1: The purpose of this document was to assess the adequacy of the data available to assess health impacts. Modeling is one tool we are using to screen data, but all measured data was used to assess potential impacts to public health.

A.2.2. Comment:
Question - Overall, for the community, is the air quality increasing, decreasing or neutral? Overall, where are the hot zones – are they growing, reducing or trending nominal?

Response to comment A.2.2.: The answer to your question varies by pollutant and was addressed in subsequent health consultations on class-specific pollutants (particulate matter, VOCs, metals, NAAQs, etc.).

Section B. Air Modeling

B. 1.1. Comment:
Question – Do you have downwind maps, in an aggregated map format that would show downwind plume analysis – emission strength, direction and range from point source? These maps could be used in the trend analysis for the overall community as well. You could then include the monitoring locations, within that map, so it would be easier to cross reference the specific monitoring locations against the adjacent sources. The wind rose information, per monitoring station, is great but it would be better to aggregate all of these onto a single graphic for an overall understanding.

Response to comment B.1.1.: We appreciate your comment, and although this pollutant-specific analysis is not presented in this document we will consider such a presentation in the pollutant-specific documents, as needed.

B.1.2. Comment:
The ATDSR modeling analysis provides downwind evaluations, from the 4 main locations, with exit velocities and stack height and the follow on paragraphs do indicate the worst case potentials and estimated ground level concentrations at a given distance from the stacks. Graphic 9 seems to be the output of the final analysis of the potential impact footprint. I feel you might get questions related to concentration levels and distance from the source. Can you not add this information, in a color format, to show the possible concentration level contours / intensity levels within the Graphic 9? You could also overlay the wind rose information to give the community a better summation of the footprint impact and concentration levels based upon seasonal wind patterns.

Response to comment B.1.2.: The purpose of Figure 9 is to illustrate the overall area of potential impact from all sources. Appendix C describes how we generated Figure 9 and what it means. Additional documents expand on this with pollutant-specific information on how air quality varies within this area.

Comment B.1.3.:
Where data gaps are identified, this report proposes applying air modeling to attempt to predict real world scenarios and fill in voids using facility specific fuel level statistics, emission rates, efficiency of air pollution controls, and air models. **Is it correct to assume activities inherent to operation such as composition of various fuels, local mining, crushing and blending, local disposition of cement dust in unlined quarries, all handling and transportation activities, fugitive releases, permit violations, etc. will be factored in?** Is it also correct to assume contributions from co-located industries (TX to Chaparral Steel and Ash Grove to Holcim) will be factored in?

What shortcomings are associated with these modeling techniques and how scientifically defensible a position would we be in to make judgments regarding public health implications?

What is the potential of this modeling? How fine-tuned to real world scenarios will the formulas/data be? I imagine it is extremely difficult and complex.

If modeling were an exact science all air monitoring systems would be dismantled and replaced with air modeling. The reliability of this modeling will depend on data used.

Scope of regulatory monitoring is not broad enough to produce sufficient data for evaluating public health. Hence the need to augment this data is understandable

Reliability of this data for assessing public health will only be as reliable as data that goes in.

Response to comment B.1.3.: Your comment raises various questions about modeling. Our modeling analysis are documented in additional health consultations. To answer some of your questions, the modeling considers emissions from all four facilities combined. Shortcomings are transparently presented and include inherent limitations of dispersion modeling and site-specific uncertainties.

B.1.4. Comment:
Most environmental scientists agree environmental air sampling generates very imprecise data. Air modeling is also very imprecise.

The quality of data generated by either of these methods depends upon what is captured or processed – **the what, when, where and why.**

What goes into a process comes out in like kind. There is a saying, "garbage in **–** garbage out." This is not to imply what we have is garbage. For our purpose this would translate to "imprecise data in – imprecise data out."

ATSDR is to be complimented for efforts to fill in gaps to make a public health analysis. But we need to ask ourselves, "Will we be weaving in and stacking imprecise data upon imprecise data just to end up where we started?"

Extreme caution must be taken to insure all activities generating air pollution are assessed to arrive at viable health based conclusions,

However, we feel air modeling data has the potential of being more precise than the air monitoring data – depending on the scope of data used and the depth to which it is analyzed.

Response to comment B.1.4.: There are strengths and limitations associated with air monitoring and air modeling. Monitoring provides direct measurement of exposure concentrations, but is usually too costly to do so over all locations and times. Modeling helps to fill gaps in monitoring data, but it only characterizes incremental impacts from the facilities being modeled; it also only offers estimates of air concentrations which may differ from measured air concentrations.

Because of these strengths and weaknesses, ATSDR believes it is appropriate to consider information derived from both types of evaluations.

B.1.5. Comment:
We propose you apply air modeling

- During years TXI incinerated HW (based on **all** factors associated with the operations) and compare this to air monitoring data for those years to see if it correlates. Note HW for the years 1987 to 1991 was classified as "waste recycling" and should be reflected in a different database.

- During years Ashgrove incinerated HW to both Ashgrove and Holcim concurrently since there was no monitoring data available for either of these facilities during these years. Note TXI and Ash Grove simultaneously burned HW (classified as "waste recycling") during this period.

- During years you are comfortable with the air monitoring data may to see how closely they correlate.

Response to comment B.1.5.: The comment makes three specific recommendations for information to include in the modeling. ATSDR appreciates receiving these; however, we are not aware of any data on hazardous waste combustion quantities or air toxics emissions data prior to 1991. Modeling was only conducted in instances where the pollutant has not been monitored.

B.1.6. Comment:
It would not be practical to assess future public health impact only on past data because of changes taking place. Until the economy gets back to full swing, current data would not be representative.

Air modeling factoring currently permitted levels of emissions, applications granted and changes to structures, changes in fuels, changes in classification of fuels, added, removed or bypassed emission controls, etc., along with **all** pollution generating processes inherent to the industries may give best insight. When evaluating fuel used, it is critical to analyze what "waste" is incinerated.

Response to comment B.1.6.: As mentioned previously, ATSDR used the highest historical emission rate for modeling purposes to estimate worst case conditions.

Comment B.1.7:
A modeling protocol should be provided for public comment prior to conducting air dispersion modeling.

Response to comment B.1.7.: ATSDR generally does not provide protocols for air modeling for public comment. However, internal and external peer review is scheduled for the documents that include air modeling. Within those documents, there is a detailed Appendix outlining all modeling assumptions and methods, which the public is welcome to comment on.

Comment B.1.8.: To assist in developing accurate data, the commenter should be given the opportunity to review all modeling inputs associated with our facility.

Response to comment B.1.8: All of our modeling assumptions, input parameters, and run-time options are documented in the public comment releases of additional health consultations. We will gladly consider any feedback that you provide on the modeling before issuing those health consultations in final form.

Comment B.1.9:
In the absence of a protocol, ATSDR should at the very least refer to the refined dispersion modeling that was conducted by the U.S. EPA and TCEQ for the pre-2000 time period.

Response to comment B.1.9. : We are aware of the detailed dispersion modeling mentioned in your comment, and refer to it in our analysis.

Comment B.1.10:
It is presumed from review of HC1 that the "exposure plume area manipulation will occur is represented by the clover-leaf pattern in Figure 9 of HC1, although this is not stated explicitly in the document. HC1 states that the cloverleaf pattern was developed based on the conservative SCREEN3 model with an emission rate of 1 gram/second. HC1 states further that the original intent of the modeling was to define the potential impact area as the location where the 1-hour plume concentration from each facility was maximized (generally at 0.68 miles from each stack). Then, for no apparent scientific reason, the "exposure plume area" was extended an additional three (3) miles.

Response to comment B.1.10: Appendix C of the draft health consultation documents the modeling referred to in this comment. The text in the appendix acknowledges that ATSDR chose a more conservative approach by selecting a larger area than indicated by the model. The final delineation of the area of potential impact was based in part on professional judgment, as no scientific guidance has been published for making these assessments.

Comment B.1.11.:
Finally, as discussed in Comment No. 2.1, ATSDR originally stated that it had no plans to conduct additional dispersion modeling beyond that generally described in the public meeting on the draft PHRP, which it confirmed in its response to public comment on the PHRP. However, ATSDR now states that it will perform additional modeling of some type to define "worst-case" air quality impacts, reversing its original position.

Response to comment B.1.11.: When responding to comments on the Public Health Response Plan, we stated: "ATSDR currently does not envision conducting its own refined dispersion modeling analyses for this site." That was our opinion at the time. However, after looking at the monitoring data in greater detail, particularly the gaps in the monitoring, ATSDR decided that refined dispersion modeling served a valuable purpose for this site in helping fill some of these data gaps.

Comment B.1.12.:
Comment 2.1: Please provide a Protocol for public comment prior to conducting air dispersion modeling.
Comment 2.1A: If performed, what model will ATSDR use to conduct the dispersion modeling?
Comment 2.1B: If performed, what model inputs (e.g. emission rates, source parameters) will ATSDR use to conduct the dispersion modeling?
Comment 2.1C: In the absence of a Protocol, ATSDR should refer to refined dispersion modeling conducted by EPA and TCEQ for the pre-2000 time period.
Comment 2.1D: Please provide a response to these comments prior to conducting the work so that substantive technical input can be provided to the process.
ATSDR states throughout the report that it will model worst-case air quality impacts to determine if additional sampling is warranted or to make inferences about air quality during time periods when monitoring data is not available (see pages 2 3 6 32, 33, 63, 66, 67 of HC1). In its response to comments on the Public Health Response Plan (PHRP), released at the same time as Health Consultation 1 (HC1), ATSDR states that it "currently does not envision conducting its own refined dispersion modeling analysis for this site" (see page 6 of the Response to Comments.)

Response to comment B.1.12.: Refer to the previous discussion (B.1.3-B.1.5 and B1.6-B.1.11) for ATSDR's response to these general comments.

Comment B.1.13:
Do these statements mean that ATSDR will use screening models such as SCREEN3 or AERSCREEN to conduct the dispersion modeling described throughout HC1? If so, then the Commenter notes that such models are inappropriate for evaluating long-term impacts because they estimate 1-hour average air concentrations and assume worst-case meteorology. The use of such models to estimate annual average concentrations will likely result in concentrations that exceed typical health based screening values, will result in a circle of worst case impacts and fail to account for site-specific terrain and meteorology, will provide no meaningful information about potential long-term exposures, and lead to unnecessary concern on the part of the public.

If, however, ATSDR intends to conduct refined dispersion modeling with AERMOD, ISC, or some other model, the Commenter notes that such models are complex and require refined input data. Neither the PHRP nor the HC1 describes specifically how ATSDR will perform the modeling or what input data it will use; thus, no substantive technical comments can be offered regarding ATSDR's plan for the modeling.

EPA requires facilities that conduct refined dispersion modeling to prepare a Protocol that describes how the modeling will be performed so that all stakeholders in the modeling process can have input into the development of the model inputs and how the model will be executed [*see 40 CFR Part 51, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Final Rule, 70 Federal Register 216 (09 November 2005), p. 68218.*] ATSDR stated in the public meeting held on May 24, 2012 that it will not prepare such a Protocol. In the interest of sound science, the commenter again requests that ATSDR prepare a Protocol for public comment before conducting any refined or screening dispersion modeling.

Response to comment B.1.13.: The comment addresses several issues. First, the comment asks about the type of dispersion modeling that planned in support of further health consultations. Our modeling was conducted using AERMOD and was not be a screening-level assessment. The subsequent health consultations will document all modeling assumptions, input parameters, and run-time options, and all parties will have the opportunity to comment on our modeling approach during the public comment periods of those documents. Second, the comment makes a case for allowing public input on the modeling process through comment on a dispersion modeling protocol. While ATSDR sees the benefit to this approach, we must also weigh this against the need to complete these assessments according to the schedule most recently communicated to the community. We feel that allowing public comment on the completed modeling analysis (rather than on a modeling protocol) is the best approach to meeting the schedule while allowing for public input.

Comment B.1.14.:
Finally, the Commenter notes that both EPA and TCEQ have prepared refined dispersion models to estimate worst case impacts for the time period prior to the year 2000, and that modeling shows that the ambient air concentrations of metals and VOCs are below the ATSDR Health Based Comparison Values as reported in HC1 for the cement kilns. [*See Table 1 attached and EPA's Midlothian Cumulative Risk Assessment and its Addendum (also attached), TCEQ's Screening Risk Analysis for Texas Industries Facility (11/2/1995), and TCEQ's Indirect Screening Risk Analysis for the North Texas Cement Company Facility (1/31/1996).*] Both EPA and TCEQ used worst-case emission rates for the cement kilns that were based on trial burns where metals and hard-to-burn principle organic hazardous constituents were spiked into the waste derived fuel at greater than normal levels, and production rates were maximized.

Response to comment B.1.14.: We considered the findings from the previous modeling analyses when conducting our own. However, additional modeling was necessary to evaluate pollutants that were not considered in the previous modeling and for which no ambient air monitoring data are available (e.g., carbon monoxide). In addition, our modeling had the benefit of using newer generation dispersion models.

Comment B.1.15: With respect to the steel mill, which EPA addressed in its study, the emission rates described in EPA's first report were based on maximum possible permitted production levels, and concentrations of metals in the emitted PM were based on conservative estimates from an industry compilation of such data, not facility specific emissions. The steel mill sampled its baghouse dust and measured its metals emissions after the first EPA report was released and it was found that the actual emissions were, in some cases, over 100's of times *less* than the value used by EPA in its model (e.g. antimony), which resulted in EPA changing its original conclusion regarding theoretical risk to the following:

> *Neither available site data or conservative theoretical models show that there are cancer risk or the potential for non-cancer health effects above regulatory levels of concern.*

EPA's revised analysis is described in an Addendum to their first report which is attached to these comments for ATSDR's reference.

Response to comment B.1.15.: We considered the information provided when conducting our modeling.

Comment B.1.16.: Since the value and validity of any dispersion modeling results are dependent on the quality of the model inputs, we request the opportunity to comment on any modeling inputs used for the steel plant. This applies an opportunity to comment prior to any new modeling, as well as an opportunity to comment prior to the evaluation of the results from any past modeling.

Response to comment B.1.16.: All parties will be invited to comment on the modeling inputs when reviewing the public comment release versions of the additional health consultations.

B.1.17. Comment: Since the value and validity of any dispersion modeling results are dependent on the quality of the model inputs, we request the opportunity to comment on any modeling inputs used for the steel plant. This applies an opportunity to comment prior to any new modeling, as well as an opportunity to comment prior to the evaluation of the results from any past modeling.

Response to comment B.1.17.: All parties will be invited to comment on the modeling inputs when reviewing the public comment release versions of the additional health consultations.

Section C. Air Sampling

Subsection 1. General Considerations
C.1.1. Comment: ***Pages 5 and 40:*** In conclusion 3 on page 5, the first bullet states that for PM2.5 continuous data, the concentrations "are consistently lower than the measurements made by the more reliable non-continuous device." Similarly, the following sentence is excerpted from the "Main Findings" text box on page 40: "At the Old Fort Worth Road monitoring station, for instance, concentrations measured by the continuous device are consistently lower than those measured by the federal reference method monitor." For these statements, the following should be considered:

a. The Old Fort Worth Road site had exceedances of the PM2.5 24-hour standard from construction activity on an adjacent roadway in 2008, which was a highly localized and transient source that would not have significantly affected locations away from the roadway construction. This information may be useful for interpreting the data from that year.

Response to comment C.1.1a.: This point is taken into consideration in the criteria pollutant and hydrogen sulfide health consultation.

b. An adjustment was made to all TCEQ continuous PM2.5 measurements beginning in 2005 – the intercept in the instrument was increased from 0 to 2 $\mu g/m^3$, which increases the output values by 2 $\mu g/m^3$ and has a very significant effect on annual averages. This change should be taken into account in any usage of this data.

Response to comment C.1.1b.: ATSDR will adjust PM2.5 data from continuous monitors prior to 2005 and make note that TCEQ has already adjusted the data from 2005 forward for the continuous monitors they operate.

C.1.2. Comment:
In the last paragraph, it is stated that TCEQ published the evaluation of the monitoring data collected during the 2008-2009 Midlothian ambient air special study. Should ATSDR want to include it, the evaluation referred to here was completed and publicly released July 23, 2010.

Response to comment C.1.2.: ATSDR has obtained this document and incorporates its findings in this and additional health consultations.

C.1.3. Comment:
Most environmental scientists agree air monitoring (even at its best) is a very imprecise science. Air monitoring for regulatory compliance does not cover all aspects necessary for evaluating public health because everything that impacts public health is not regulated or monitored for.

Determining lowest level known to cause adverse health effects is also imprecise because testing is done one chemical at a time in a controlled environment that normally does not reflect real world exposure to and synergistic effects of aggregate exposure.

Precaution should be taken in making “very precise definitive” predictions (either way) regarding public health based on this imprecise science.

Response to comment C.1.3.: Our priority is to have our conclusions be scientifically sound, and as such, air experts are scheduled to provide independent peer review of this and all other documents evaluating health implications from emissions in the Midlothian community. We considered this comment as we have continued the investigation.

C.1.4. Comment:
Mention should be made that although the "consultation" referred to a lack of sampling for organics, TCEQ Region 4 did perform this testing at both the Old Ft. Worth Road site and a temporarily constructed site on a local resident's property across Hwy. 67 from Chaparral Steel. I was pleased to observe this testing and to work with the technicians. This can be confirmed and sampling results obtained from Mr. Stanley Ellis, TCEQ, Region 4.

Response to comment C.1.4.: The health consultation does mention the VOC sampling you describe. See Figure 6 and Table 4 of the document.

C.1.5. Comment:
I would respectfully suggest and strongly recommend that ATSDR collect all stack monitoring data (Continuous Emissions Monitors [CEMs) from each kiln and "emission point". This data would be more reliable and valuable than what you currently have. CEMs data includes "real-

time" readings and also the automatic calibration of these instruments which assures the data's accuracy. ATSDR must consider how much trust one could put on industry's self-reporting of such highly toxic emissions.

Response to comment C.1.5.: We accessed continuous emissions monitoring data for the facilities to evaluate the community's concerns regarding the representativeness of 1 in 6 day sampling, but note that those data only characterize emissions of certain pollutants.

Subsection 2. Frequency and Duration of sampling, analysis, and time averaging

C.2.1. Comment:
Pages 7, 39, and 51: A potential misunderstanding was identified with regards to references to 5-minute SO_2 data on pages 7, 39, and 51, in which the wording implies that SO_2 is the only monitoring data that had 5-minute data points. Regarding 5-minute data, the following should be considered:

- TCEQ provided ATSDR with 1-hour average data for the gaseous criteria pollutants (ozone, nitrogen oxides, hydrogen sulfide, and $PM_{2.5}$), which are the result of an average of the 5- minute data collected from the stations.

- TCEQ provided ATSDR 5-minute SO2 data upon their explicit request – TCEQ was not asked about 5-minute data for any of the other continuously collected criteria pollutants.

Response to comment C.2.1.: We added clarifying text to this section.

C.2.2. Comment:
Page 13: It is unclear to TCEQ why ATSDR summed the TRI data for all chemicals annually, when each chemical has emission values reported separately.

Response to comment C.2.2.: This summary was intended to provide a general indicator of total air toxics emissions.

C.2.3. Comment:
Page 45: In the first paragraph on this page it mentions that "monitoring stations in Midlothian continue to operate into 2011." Since this is still true, ATSDR may consider updating this statement to say 2012.

In the green discussion box at the top of the page, it mentions that the most important data gaps include lack of any monitoring data before 1981. However, given the amount of data routinely collected in Midlothian, and the fact that ATSDR is only using data from 1981 – 2001 with caution (page 66), this should not be considered a data gap, let alone an important one. To get a feel for how the nation compares on this subject, TCEQ contacted EPA and received AQS data on monitoring sites and parameter monitoring dates for the United States. While this may not include 100% of monitoring sites in other states, including Texas, it can provide insight into monitoring conducted by states across the nation. The following is from that data:

VOCs

Please note that routine monitoring for VOCs did not begin until 1993 with the establishment of the Community Air Toxics Monitoring Network in Texas, but some VOC monitoring did occur prior to this date.

- There are no VOC data available in AQS on monitoring sites prior to 1985.
- Texas AQS reporting of VOC measurements began in 1987 (using benzene as an indicator of VOC monitoring).
- Over the 27 years of data in AQS, Texas has reported VOC monitoring to AQS for 25 years.
- In 1993, the year the CATMN was established in Texas, the number of VOC monitoring sites Texas reported to AQS represented 20% ($1/5^{th}$) of the VOC monitoring sites reported to AQS for the entire country.

Semi-VOCs

- The only dioxin monitoring in AQS is for total pentachlorodibenzo-p-dioxins, total hexachlorodibenzo-p-dioxins, and total octachlorodibenzo-p-dioxins at one site in Michigan in 1995.

Non-Organic Compounds

- According to AQS, TSP particulate sampling for speciated metals (using arsenic as an indicator of TSP metals monitoring) date back to 1962, while monitoring for PM10 metals (using arsenic as an indicator of PM10 metals monitoring) date back to 1985.
- Texas AQS reporting of TSP and PM10 metals measurements began in 1972 and 1985, respectively.
- Over the 49 and 27 years of data in AQS for TSP and PM10 metals, respectively, Texas has reported to AQS for 39 and 27 years, respectively.
- Over those years, the number of TSP and PM10 metals monitoring sites Texas reported to AQS ranged from 2 – 86% and 3 – 50%, respectively, of the metals monitoring sites reported to AQS for the entire country.

Response to comment C.2.3.: We included this content to improve the historical context of how air sampling in Midlothian compares to that of the nation.

C.2.4. Comment:
Page 48: The second paragraph on this page discusses how there is virtually no difference between PM2.5 at the Old Forth Worth Road and Midlothian Tower monitors between 1-in-6 day samples and days other than 1-in-6 day sampling. This seems to be in contradiction with what was written on page 51 in which it is stated that 1-in-6 day sampling could understate the highest 24-hr average PM2.5. Rather, wouldn't this evaluation of monitoring data lend credence to the 1-in-6 day schedule accurately capturing ambient air levels, even on days when concentrations are higher?

Response to comment C.2.4.: We revised the text on page 51 to clarify.

C.2.5. Comment:
Page 51: The last bullet on this page indicates that all the compounds mentioned have federal or state air quality standards pertaining to durations shorter than 24 hrs. While this may be true for hydrogen sulfide, sulfur dioxide, ozone, and nitrogen oxides, it is not true for $PM_{2.5}$ and VOCs. The $PM_{2.5}$ NAAQS has averaging times of 24-hr and annual, which are not shorter than 24 hrs. VOC do not have either federal or state standards. In Texas, TCEQ uses Air Monitoring Comparison Values (AMCVs) for ambient air data and Effects Screening Levels (ESLs) for air permitting. These are screening levels, they are not standards. Screening levels can be updated more easily than a standard with up-to-date science, and are enforceable via the permitting process.

Response to comment C.2.5.: We revised the text accordingly.

C.2.6. Comment:
Page 59: The second paragraph on this page discusses how the monitoring data from the special study is not representative of the operating conditions during earlier years. It is true that operating conditions were different; it is also true that operating conditions have changed throughout the years. Therefore, no data is truly representative of any time frame except that for which it was taken. However, it is possible to compare data between years to see if there is a difference. This is something ATSDR should consider when interpreting the data for the other health consultations.

Response to comment C.2.6.: Comment noted. We considered this in additional health consultations.

C.2.7. Comment:
Page 66: Under "Monitoring methods" on this page it states that metals data before 2001 will be used with caution. If data prior to 2001 will be used with caution, it begs the question as to why not having data prior to 1981 is considered an important data gap? Considering data from 1981 – 2001 will be "used with caution," it does not make sense that data prior to 1981 would add value to the future health consultations. ATSDR should clarify specifically why not having data prior to 1981 is considered an important data gap. Also, ATSDR should consider population estimates for Midlothian when deciding if no available data is to be considered a data gap. According to the US Census Bureau, the population in Midlothian was 5,649 in 1990 and 18,037 in 2010, a growth of 219% (see figure below). ATSDR should consider how relevant data prior to 1981 is for a citizen who moved to the area in 2000 or later.

Response to comment C.2.7.: ATSDR assesses "data gaps" regardless of the size of the potentially exposed population.

C.2.8. Comment:
Page 90-92, Table 4: The eight special study monitors from the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Study are listed in this table (Tayman Drive Water Treatment Plant, Jaycee Park, J.A. Vitovsky Elementary School, Triangle Park, Old Fort Worth Road, Midlothian High School, Wyatt Road, and Mountain Peak Elementary School). However, under the "Time Frame" column for these monitors the range is given only in month and year. This is misleading as it implies these monitors were in operation for the full length of time presented. In

reality, these monitors were only in operation for either (1) 5 consecutive days, four separate times over the time frame resulting in 20 samples, or (2) 5 consecutive days resulting in 5 samples.

Of the eight special study monitors from the Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Study listed in this table, two of them are misrepresented. The data for Tayman Drive Water Treatment Plant and Old Fort Worth (OFW) Road should not be presented in the same row as the regulatory monitors that collected data in the same location. The special study monitors are not the same as the regulatory monitors and therefore do not have TCEQ site or EPA Site Numbers associated with them. It is misleading to associate them with such site numbers.

The last two sites listed in Table 4, Mountain Peak Elementary School (special study site) and Mountain Creek (TCEQ site), both have the same EPA Site Number Listed (48-139-0008). This EPA Site Number applies only to Mountain Creek (the TCEQ site) and does not apply to Mountain Peak Elementary School, which is a special study site that was only in operation for 5 consecutive days and does not have an EPA Site Number associated with it.

Response to comment C.2.8.: We revised the text in Table 4 to clarify and updated other sections of the health consultation.

C.2.9. Comment:
Validity of the 2009 Midlothian Ambient Air Monitoring for Assessing Public Health

It is puzzling why ATSDR would give much (if any) public health assessment credence to this study. The data does not reflect past ambient air exposures **nor** does it reflect future exposures. It is only a pixel in a snippet of time when all Midlothian industries were in hibernation.

As this report has pointed out, during this monitoring period, all four major industries severely curtailed production – HWI was suspended – four wet kilns were idled – shifts were eliminated – major layoffs took place, etc.

Data was monitored for and averaged over 24-hour periods when the industries were not running their normal 24-hour operations. TSP data does not exist.

Review of Table 3 Pollutant Emission Data Reported to TCEQ's Point Source Emission Inventory, 2008–2009 reflects a significant decline in emissions which substantiates a decline in production and other activities.

Monitoring for air emissions when these industries are barely operating will only tell you what emissions are when these industries are barely operating. It would be an insult to science and a discredit to ATSDR to infer it offers sufficient data to assess public health for any past or future time frames.

It is critical to look at the intent that embarked TCEQ on this "Analytical Analysis."

TCEQ was irate because ATSDR/TDSHS issued an indeterminate finding for the Midlothian public health consultation released for comment December, 2007. TCEQ's goal was to discredit this decision **– the arrow was shot.**

In 2008 the economy went into in a slump. Industries had stockpiles they had to move and most production activity was suspended. TXI's four wet kilns were idled. HWI was suspended. Shifts were reduced for all local industries. There were massive layoffs. TCEQ seized this moment using $349,000 of tax payer money to paint in their bulls-eye for that arrow.

When questioned by a reporter from the Dallas Morning News, TCEQ Director of Toxicology acknowledged chromium VI numbers and speciation might be skewed due to suspension of HWI and curtailed operations; however TCEQ still presented the speciation as a "gold standard" analysis and proof positive chromium VI was relatively nonexistent in the local environment.

It would be a discredit to science and an insult to public health to not put this data into proper perspective. The most this data can possibly offer for a public health assessment would be limited dispersion patterns.

From the beginning TCEQ has maintained air emissions released by the Midlothian industries do not, cannot and will never pose a public health risk. Furthermore, TCEQ granted permits to allow industries to release pollutants at certain levels. Thus TCEQ air monitoring "**must support their decisions**" – a conflict of interest.

This 2008-2009 monitoring activity and other examples (see below) give you insight into how TCEQ knowingly permits activities that clearly could have negative public health impact and engages in activities that mask collateral damage.

TCEQ collects **(or avoids collecting)** environmental data for very different purposes – one of which is not protecting public health. It would be a discredit to ATSDR and a detriment to public health to attempt to present this as something it is not.

Response to comment C.2.9.: When evaluating air quality issues, ATSDR first collects all available air quality monitoring studies and then evaluates them in context. We followed that approach at this site-the 2008-2009 study is a valid air monitoring investigation even though it has the shortcoming noted by the commenter and in the health consultations (example, see page 59). Any fluctuations in production and subsequent exposures will be noted in historical context when assessing potential impacts to public health.

C.2.10 Comment:

Sampling on a one in six day duty cycle only monitors for a maximum of 16.7% of the days for air pollutants and thus excludes for analysis at least 83.7% of the time period every year to arrive at an "average." **A living body, both human and animal, is not designed to process "averages."**

The team did a lot of analysis to arrive at a conclusion that there was no evidence that emissions were altered on sampling days. They should not have discredited this conclusion by comparing it to conclusion arrived at in the 2008-2009 Midlothian study since industries during that period were barely operating and had no reason to alter anything.

Response to comment C.2.10.: ATSDR acknowledged that 1-in-6 day sampling is representative of long-term averaging of ambient concentrations, but may underestimate peak concentrations compared to continuous data.

ATSDR's conclusion of the appropriateness of 1-in-6 day sampling was based on:

- Continuous ambient air monitoring data at Midlothian Tower for $PM_{2.5}$, H_2S, and SO_2 from May 2002-August 2005;
- Continuous ambient air monitoring data at Old Fort Worth Road for $PM_{2.5}$, H_2S, and SO_2 from April 2006-December 2008; and
- Continuous emissions monitoring data:
    - TXI: CO, NO_X, SO_2, and total hydrocarbons from September 2005-December 2008;
    - Ash Grove: CO, NO_X, and SO_2 from May 2002-December 2008
    - Holcim: CO, NO_X, and SO_2 from May 2002-December 2008

Our analysis of these datasets does not indicate any changes in operations around the national sampling schedule. We did not use the 2008-2009 study to determine the representativeness of the sampling schedule.

C.2.11. Comment:
Air monitoring data often only offers moving peepholes into what "might have been." It would be prudent to look behind the curtain to determine if there were any major emissions impacting public health that were not monitored.

A review of cement kiln dust records to determine whether asbestos and radioactive materials or other non-authorized HW were incinerated could be revealing. Same applies to Gerdau/Chaparral bag house dust records.

Response to comment C.2.11.: ATSDR has requested all available ambient monitoring data. We also attempted to characterize emissions as extensively as the data would allow. ATSDR requested information about any sampling of cement kiln dust for asbestos and radionuclides to include in additional health consultations.

C.2.12. Comment:
Please take into account that when TCEQ monitoring is scheduled in advance, the industry may alter their normal operations in order to get a clean bill of health. There is no way to prove they have done so, but there is also no way to prove they have not. By leaving out a hazardous fuel source on monitoring day, industry could positively affect the outcome.

Response to comment C.2.12.: Please see Section 4.6 for details on this issue. ATSDR found no evidence that Midlothian facilities altered operations on TCEQ sampling dates.

C.2.13. Comment:
Established monitoring methods are to say the least not capable of representing true toxic exposure. Sampling "every six days", hourly or even worse 24 hour averaging are examples. With the exception of long term exposures, the human body does not work on "averages". Lung damage by inhalation of hydrogen sulfide at 2:00PM will not be nullified at 2:30PM when the offending gas is no longer present.

Response to comment C.2.13.: Although we recognize the importance of evaluating short-term exposures and health, it is also important to evaluate longer-term averages to lower levels of air pollution to determine their health effects. Our subsequent documents evaluate both exposure durations.

C.2.14. Comment:
Verifying short term affects in correlation with specific medical conditions are difficult to affirm when the testing device only samples once in six days. The "consultation" remarks about these issues but does not openly criticize or condemn the method as Not Protective of Public Health.

Response to comment C.2.14.: The comment is correct that 1-in-6 day sampling may not capture the highest air pollution levels in a given area. We did not criticize or condemn this sampling schedule, because it is has been well established that such a schedule provides valuable insights on long-term average pollution levels.

Subsection 3. Sampling Methods

Comment C.3.1:
Page 36: The fourth paragraph discusses one of the methods presented in the previous paragraph. However, it is not clear which method is being discussed, XRF or ICP.

Response to comment C.3.1.: We revised the text accordingly.

Comment C.3.2.:
Page 38: This section discusses TCEQ's reporting of VOC data below the detection limit and down to the reporting limit, and that the detection limits are greater than the health-based comparison values used in the report. Please note that the reporting limit is the value below which the instrument is not capable of measuring and reporting a value, and would be considered a non-detect. A value that is below the detection limit but above the reporting limit represents a value in which there is less than 99% confidence that the value is greater than background (or zero), commonly called "j-flagged" values. For VOCs, values below the detection limit but above the reporting limit can and should be used without modification, but they should be qualified.

Response to comment C.3.2.: We revised the text accordingly.

Section D. Data Gaps

Subsection 1. Pollutant Data Gaps

D.1.1. Comment:
The Texas Commission on Environmental Quality (TCEQ) does a poor job of monitoring Midlothian's pollution caused by three cement plants and a steel mill. For instance, they do not monitor dioxins, furans, hydrochloric acid, sulfuric acid, vapor-phase mercury, or carbon monoxide. Without this information, the impact of pollution on Midlothian residents is not possible.

Response to comment D.1.1.: We agree that data are lacking for dioxins, furans, hydrochloric acid, sulfuric acid, vapor-phase mercury, and carbon monoxide. Our conclusions and recommendations for this document are that these data are lacking and our subsequent documents also include an analysis of other data sources and determine if health conclusions can be reached or if monitoring is necessary to draw a health conclusion.

D.1.2. Comment:
Please include these comments in the health consultation for Midlothian, Texas.
Bad science should never be tolerated when it comes to the health of citizens. An accurate determination cannot be made without good data. All toxic pollutants must be monitored and evaluated prior to making a determination and dioxins, furans, hydrochloric acid, sulfuric acid, vapor-phase mercury and carbon dioxide were not monitored.

Response to comment D.1.2.: We agree that data are lacking for dioxins, furans, hydrochloric acid, sulfuric acid, vapor-phase mercury, and carbon monoxide. Our conclusions and recommendations for this document are that these data are lacking and our subsequent documents also include an analysis of other data sources and determine if health conclusions can be reached or if monitoring is necessary.

D.1.3. Comment:
As you prepare your final determination of the public health burden to residents of Midlothian, caused by the pollution from three large cement plants and a steel mill, you should consider everything you don't know because of the inadequate monitoring of those facilities' emissions over the last two decades by the Texas Commission on Environmental Quality (TCEQ).

Response to comment D.1.3.: We address limitations in the dataset with regard to pollutants emitted from these types of facilities and those that have historically been measured in ambient air. We did our best to fill those data gaps with modeling or recommendations for future sampling (if warranted). This health consultation also recognizes that there are also much data that can be used for health assessment purposes.

D.1.4. Comment:
If the report wouldn't pass a peer review process, it has no business telling Midlothian citizens they are safe. Misinformation can give citizens a false sense of security that could be costly to their health. The truth is you cannot make a determination about the health hazards in

Midlothian without having accurate data on all the pollutants. We urge you to say so officially, and make recommendations towards providing a more systematic and complete monitoring system for the city's industries.

Response to comment D.1.4.: We agree that the best science should be used to evaluate your health concerns. We also agree that independent peer review is important to this process and was conducted on this and is schedule to be conducted with additional health consultations. This document is not intended to reach health conclusions, but presents information about the adequacy of all available data to assess potential health impacts in future documents. Subsequent health consultations that identify a specific data gap that can't be filled with modeling or other available data, recommend additional air sampling to assist in evaluating exposures.

D.1.5. Comment:

Page 3: In conclusion 1 on page 3, the third bullet states that "no ambient air monitoring has occurred for semi-volatile organic compounds including dioxins, furans, and polycyclic aromatic hydrocarbons (PAHs)." This was identified as a gap in the data by ATSDR. However, there are several important points that should be discussed in the document.

Dioxins

Typically, compounds reported to the Emissions Inventory are reported in pounds per year. Dioxins, however, are reported in grams per year due to the extremely small quantities that are emitted by facilities. One gram is approximately equivalent to 1 small paper clip while 1 pound is approximately equivalent to 1 bag of coffee beans; there are approximately 454 grams in 1 pound. From 2000 to 2010, cement manufacturing contributed less than 5% of the dioxin emissions for the entire state of Texas. The range was 1.57% - 4.96% over that time period. For the same time period, iron and steel mills contributed less than 2% of the dioxin emissions for the entire state of Texas, with the range being 0% - 1.52%. Alkalies and chlorine manufacturing and all other basic organic chemical manufacturing contributed the most at 6.68% - 57.41% and 3.63% - 43.80%, respectively. Pie charts showing the percent contributions for each year, 2000 – 2010, can be found in Attachment A.

Dioxins are ubiquitous across the environment, meaning that they are found everywhere. One reason for this is that not only are they a byproduct of some manufacturing processes involving combustion, they are also a byproduct of various other sources of combustion such as home heating systems, cigarette smoke, automobile exhaust, and wood burning. Exposure to dioxins via ambient air is not typically the pathway of concern, rather levels in food (i.e., meat, dairy products, fish, breast milk) are a major source (accounting for >90%) of exposure for the general population.

Analysis of dioxins is both extremely difficult and costly, with only a few analytical laboratories capable of conducting the analysis. For these reasons, including the small quantities detected in air and food being the major pathway of concern, dioxins are not typically routinely monitored by agencies.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are also ubiquitous across the environment. PAHs are released into the atmosphere from both natural and man-made sources, such as cigarette smoke, wood smoke, and automobile exhaust, with burning of wood in homes as the largest single source. For indoor exposure, gas cooking and heating appliances are likely an important source. The greatest sources of exposure for the general public are cigarette smoke, wood smoke, contaminated air, and food.

PAHs are also typically not found in ambient air at high concentrations. Across the US, in urban air, values of benzo(a)pyrene range between 0.2 – 19.3 ng/m^3. From 2000 – 2010, the range of benzo(a)pyrene measured in Texas was 0 – 9.41 ng/m^3. In 2010, the latest evaluation of the ambient air monitoring data in the state of Texas (http://www.tceq.texas.gov/toxicology/regmemo/AirMain.html), no PAHs exceeded their respective Texas Air Monitoring Comparison Value (AMCV) in the state, with the exception of phenanthrene in El Paso.

Response to comment D.1.5.: Thank you for this additional context. Our additional health consultations present modeling results for dioxins, furans, and PAHs. We clarified this in Section 4.2 of the health consultation.

D.1.6. Comment:
Monitoring PM10 is the EPA preferred method for measuring total **inhalable particulate matter**. When you factor your other conclusions that PM2.5 in Midlothian monitors understated air concentrations by 23 percent, etc., – what does it leave you? It will not provide complete data on inhalable PM. Without TSP monitoring, data for total heavy metals and other toxins that attach to particulate matter will be critically underestimated.

EPA recommends **TSP monitoring** "if you are interested in levels **other than only those that are inhalable**." **One would assume any one attempting to assess public health impact of a pollutant would be interested in total impact.**

Response to comment D.1.6.: We evaluated all three methods of measuring particulate matter in additional health consultations, as applicable.

D.1.7a. Comment:
How will nonexistent data such as (hydrochloric acid, sulfuric acid, vapor phase mercury, VOC's released in small quantities, **dioxins, furans, PAH's** carbon monoxide – pollutants dispersed via TSP (lead included) – incineration of radioactive material, etc.) be factored in? Will this data be available to the HC 2 team before they embark on their decision making?

Response for comment D.1.7a: Modeling was conducted for these pollutants in the additional health consultations on air pollutants.

D.1.7b. Comment:
Can a comprehensive definitive health assessment be made for any period without this data? Note absence of data for these pollutants spans the entire spectrum of time in question. Is it a

given that if this data must be created via air modeling no definitive conclusions can be derived for any time period in question? Or will absent data be a nonfactor since a-one-chemical-at-a-time approach will be taken?

Response for comment D.1.7.b: Modeling can be used to screen these pollutants using worst case assumptions, and determine whether or not they are a contaminant of concern. Recommendations for sampling may be made for contaminants of concern if the resulting data would assist ATSDR in determining exposures. Chemical mixtures were addressed as fully as possible in the individual health consultations that follow this one.

D.1.8. Comment:
As you prepare your final determination of the public health burden to residents of Midlothian, caused by the pollution from three large cement plants and a steel mill, you should consider data beyond the inadequate monitoring of those facilities' emissions over the last two decades by the Texas Commission on Environmental Quality (TCEQ).

TCEQ has repeatedly told the public that Midlothian is 'The most tested and monitored city in the state of Texas." TCEQ toxicologists have guaranteed Midlothian residents that it's safe to live downwind of the region's largest industrial polluters. Considering the many problems that ATSDR has identified with TCEQ's monitoring, those assurances ring hollow.

For example, there was, and is, no monitoring for dioxins and furans - pollutants that have no known safe exposure limits. There is also no monitoring for hydrochloric acid, sulfuric acid, vapor-phase mercury, or carbon monoxide. In several cases, the methods used to monitor are known to underestimate pollutants or are not capable of measuring concentrations near the health protective levels. Moreover; science now recognizes that there are synergistic effects of multiple pollutants, sometimes producing new compounds and different health effects. Current monitoring methods can't capture this phenomena.

Considering these and other substantial holes in the data available to A TSDR, an accurate health determination of Midlothian residents is impossible. We urge you to say so officially, and make recommendations towards providing a more systematic and complete monitoring system for the city's industries.

Response to comment D.1.8.: We recognize that there are data gaps, however we believe there are data available for certain timeframes and pollutants where data are useful for making health conclusions. If feasible, data gaps may be filled with air modeling and/or recommendations for additional air sampling. ATSDR acknowledges that multi-pollutant exposure evaluations are difficult given the current state of knowledge. ATSDR has done the best it can to determine what the implications are for exposure to mixtures of air pollutants to the extent that available science will allow.

D.1.9. Comment:
Page 14 of the ATSDR report under "Short-term estimated air emissions", states:

"All information provided by the facilities (including the pollutant emission rates" is self-reported and typically estimated. Appendix B lists the reported emissions events for the four Midlothian facilities of interest. It is possible that elevated short-term events have occurred at the facilities of interest but were never reported to TCEQ; however, the environmental impacts of these events would likely be detected by nearby offsite monitoring devices, especially those that operate continuously."

This is an erroneous statement in that **(1) if** the elevated short-term event was not reported, these remain undetected emissions unaccounted for, and **(2)** none of the monitoring devices in Midlothian or the DFW area would detect the environmental impact of these events because none of them monitor for the chemical constituents and/or dioxins formed by this mix of chemicals burned at the time. The health effects of very few of the chemicals that these plants were allowed to bum have been investigated and collected. ATSDR lists a total of 112 chemicals on page 93 of the *Health Consultation* that were listed on the facilities' Toxic Release Inventory Forms. Of these, only 38.4% had any available monitoring data. The other 61.6% of the chemicals shown to be released had no air monitoring data at all. How will ATSDR account for the effects of these emissions? Years ago, we had attained evidence that radioactive substances were part of a manifest. How can ATSDR account for this and what **kind** of impact would these types of emissions have when mixed with other chemical substances unknown to ATSDR, TCEQ, or the unsuspecting general population? ATSDR cannot replicate in its computer-generated models the actualities of the Midlothian air quality at any given time given so much missing information.

Response to comment D.1.9.: We agree that this section can be revised for accuracy. We made every effort to evaluate air data against citizen complaints and documented releases to determine impacts of acute releases to ambient air. The limitations of this analysis are clearly presented in our documents for air and other media. We understand the concerns regarding the lack of monitoring for radioactive pollutants, and discuss this more fully in our health consultation evaluating VOCs and metals.

D.1.10. Comment:

In other instances, there is no monitoring for certain pollutants. Of grave concern is a total lack of information on exposure to dioxins and furans. EPA has determined that cement plants are the second largest source of dioxin emissions in the U.S. with 117 to 1200 grams of dioxins emitted every year. In contrast, EPA recorded that U.S. hazardous waste incinerators emitted 11 to 110 grams of dioxin a year. TXI has estimated releasing over 12 grams a year when burning hazardous waste. 10 grams of Dioxin represents EPA's "acceptable" dose for one year for 69 billion people - over 13 times the entire population of earth in 1995. (Source: EPA, "Estimating Exposure to Dioxin-Like Compounds," 1994, TX! test burn data from 1991)

According to EPA: "Studies have shown that exposure to dioxins at high enough levels may cause a number of adverse health effects, including cancer. The health effects associated with dioxins depend on a variety of factors including: the level of exposure, when someone was exposed, and for how long and how often someone is exposed." And, "Non-cancer effects of exposure to large amounts of dioxin include chloracne, developmental and reproductive effects, damage to the immune system, interference with hormones, skin rashes, skin discoloration, excessive body hair, and possibly mild liver damage." (http://cfpub.epa.govincea/CFM/nceaQFind.cfm?keyword=Dioxin) TXI reported releasing up to 200 times more dioxin and twice as much Carbon Monoxide while burning hazardous waste compared to burning coal. TXI also reported a higher level of "Opacity" or smoke when it burned hazardous waste compared to coal. (Source: 1992 TXI test burn, Metco Environmental, Inc.) EPA has concluded that 99 percent of all known dioxin emissions originate in waste combustion. (Source: Dallas Morning News, September 12, 1994)

Dr. Cate Jenkins, former research scientist for EPA has written that "During EPA's April 28th, 1992 public meeting, Dr. Linda Birnbaum, a key scientist in EPA's dioxin reassessment, stated that doses of dioxin currently being received by the U.S. public, primarily through the diet (1 picogram per kilogram per day), are estimated to be capable of causing immunological and reproductive effects. Thus, any dioxin exposure through the presence of a cement kiln or other type of incinerator in any community is unacceptable, because it would increase the exposure to dioxins over those which are already too high." (Source: Letter from Dr. Jenkins to Dr. Mary Money, May 13, 1992.) Without monitoring and testing of soil, water and produce, ATSDR cannot determine the health effects of dioxin exposure in Midlothian, Texas.

Response to comment D.1.10.: We agree that data are lacking for dioxins, furans, hydrochloric acid, sulfuric acid, vapor-phase mercury, and carbon monoxide. In this document we conclude that these data are lacking. These pollutants (except for carbon monoxide) were modeled in the health consultation for VOCs and Metals. Carbon monoxide was modeled for the health consultation that evaluated the NAAQS and H_2S air pollutants. If we believe that current exposure to dioxins or furans are of concern we may recommend additional monitoring.

D.1.11. Comment:

On page 6 of the PHC #1, the conclusion states in the middle of the page,

> "Gaps in the available environmental monitoring data that are most important because they are cannot be reliably filled by estimates made using surrogate sources of information are:

- No ambient air monitoring data are available before 1981.
- No air monitoring data were collected in the vicinity of Ash Grove Cement during the years that the facility burned hazardous waste."

On the same page, on the last paragraph, the PHC #1 states that "ATSDR will consider deriving estimates of air pollution levels from other sources of information, such as facility specific fuel usage statistics, emission rates, efficiency of air pollution controls, and air models."As stated in the first block quote, gaps in air monitoring cannot be reliably filled by estimates using surrogate sources of information. Therefore if ATSDR proceeds with these estimates, the results of these estimates will not be reliable. As such, the results have no validity to answer the concerns of the community. ATSDR should not use estimates or assumptions to gap fill. They are unreliable or carry with them the caveat of the assumptions used to make the estimates.

Response to comment D.1.11.:
The comment addresses two different findings in ATSDR's first health consultation. First, the document explains that the first two gaps mentioned in this comment "cannot be reliably filled by estimates made using surrogate sources of information." Second, the document identifies other gaps (e.g., lack of monitoring data for certain pollutants) that we believe can be informed by evaluating other sources of information. We have continued with evaluating those gaps, which pertain to health concerns expressed by numerous community members. Our documents also include information on underlying assumptions, as recommended by this comment.

D.1.12. Comment:
Similarly, on page 11, the PHC #1 describes the operations of the facilities in Midlothian and states that "changing operations are important to consider when evaluating the air quality issues in the Midlothian area." But again if gaps in environmental monitoring cannot be filled by estimates made using surrogate sources of information, ATSDR should not use gap filling. Information about the types of fuels used at the facilities cannot reliably estimate gaps in the monitoring data.

Response to comment D.1.12.: ATSDR agrees with the final sentence in the comment, and we have no intention of filling data gaps based solely on evaluations of the fuels used during a given time frame. However, the facilities have submitted information to regulatory agencies (e.g., measured and estimated emissions data) that do allow us to look into the significance of data gaps, conduct dispersion modeling, and possibly make recommendations for further monitoring in cases where we think that is necessary.

D.1.13. Comment:
Mention should be made that although the "consultation" referred to a lack of sampling for organics, TCEQ Region 4 did perform this testing at both the Old Ft. Worth Road site and a temporarily constructed site on a local resident's property across Hwy. 67 from Chaparral Steel. I was pleased to observe this testing and to work with the technicians. This can be confirmed and sampling results obtained from Mr. Stanley Ellis, TCEQ, Region 4.

Response to comment D.1.13.: The health consultation does mention the VOC sampling that you describe. See Figure 6 and Table 4 of the document.

D.1.14. Comment:
Following the last renewal of TXI Operations Class III Hazardous Waste permit for the four (4) older "wet kilns" a test burn was mandatory (since chlorinated compounds were incinerated) and the results of this "burn" was published. Although I was never in possession of all written documents of the "burn", testing was done for dioxin-furans. To my knowledge stack emissions of the "bum" were tested for seven (7) congeners including 2,3,7,8-tetrachlorodibenzo-p-dioxins (which has a TEF of one (1) was detected.

ATSDR should expound upon the dangers of the release of just one Grams of this substance in a concentrated population. Lest we not forget "agent orange" a herbicide and defoliant developed and manufactured by Monsanto Chemical and Dow Chemical and used by the United States military during the Vietnam War. Hundreds of our military personnel along with thousands of the Vietnam population have been horribly afflicted by and continue to suffer from the ingredients which were later revealed as 2,3,7,8-tetrachlorodibenzo-p-dioxins.

On a personal note, I just lost a family member who served in the United States Air Force in Vietnam whose lung cancer and death is attributed to "agent orange". Vietnam estimates 400,000 people were killed or maimed, and 500,000 children born with birth defects caused by "agent orange".

Also, I understand there was additional testing for the dioxin-furan-polychlorinated biphenyl groups in the area, yet to date industries are still permitted to release these catastrophic compounds in areas of human inhabitance.

Response to comment D.1.14.: We are sorry to hear the news about your family member. The information you provide on the toxicity of dioxin is important, and our health consultation on VOCs and metals presents results of ambient modeling of dioxin levels in Midlothian.

D.1.15. Comment:
Hydrogen sulfide has been an ongoing problem in the Cement Valley community and occurring during the night time. The source is obviously TXI Operations and results from the failure of control devices such as scrubbers or regenerative thermal oxidizers which the latter may have been turned off (or bypassed) since TXI has complained of escalating operating costs (price of natural gas). TCEQ has hesitated to investigate TXI or require additional continuous monitoring of TXI's stack emissions.

TXI has a severe problem with sulfur compounds due to the fact they burn high sulfur coal, which incidentally, TCEQ allowed in their permit and against much opposition.

Residents have called TCEQ and reported the incidents, but it may take 12 hours for an investigator to respond. Naturally, the odor is gone by that time. However there have been instances when elevated levels of H_2S have registered on the monitor at the Old Ft. Worth Road Site. Had this been a continuous monitor the readings would have been in violation.

Response to comment D.1.15.: This comment pertains to emissions of sulfur compounds from TXI. Please note that the next health consultation that we issued evaluated the air pollution levels for both hydrogen sulfide and sulfur dioxide in the Midlothian area. That document considered the sulfur compound measurements that you reference at the Old Fort Worth Road site, which are collected using continuous monitoring instruments.

D.1.16. Comment:
The "consultation" has repeatedly stated the fact that substances such as acids, VOCs and PAHs were not monitored and data was not available. You must recognize the TCEQ philosophy that if you do not test for a substance there will be no records that substance is present. There are other issues that were not included such as the contamination of the Kemp Ranch and the presence of Cesium at Chaparral Steel.

Response to comment D.1.16.: We are aware of these issues and are evaluating them to the extent that data allow.

Subsection 2. Hazardous Waste Issues

D.2.1. Comment:
A prime example of how TCEQ will not permit public health to trump industrial prosperity was the incineration (then called recycling) of hazardous waste (HW) at Ash Grove cement and masking dangerous emissions for 6 years.

Dangers of burning HW in kilns not designed to burn HW and potential public health impact was fully known at that time; however under the guise of "recycling" TCEQ allowed Ash Grove to burn HW in kilns not designed for hazardous waste incineration (HWI) for 6 years before doing any stack testing. This was a critical period that should have warranted heavy monitoring (if public health was an issue). Instead monitors were pulled from this vicinity. (Note Ash Grove and Holcim are in close proximity which also means that there was no monitoring for either).

Stack testing was done (after six years of operation) only because federal regulations proposed for HWI in cement kilns surfaced in 1991 and EPA made them do it. Tests established HW could not be safely incinerated in Ash Grove's kilns.

If you look at history as to why many pollution controls currently exist, you will find it was not because TCEQ or industries deemed them necessary to protect public health – they were the result of pressure, battles and lawsuits brought about by small ragtag bands of citizens with TCEQ in full opposition.

We could go on and on, but we believe you have seen enough already to understand the point.

Response to comment D.2.1.: We agree that air monitoring is lacking near Ash Grove between 1985 and 1991 during the time when hazardous waste was being incinerated, and stated that this is an important data gap in the historical database (see Page 6, Conclusion 4).

D.2.2. Comment: A large volume of HW was incinerated at both TXI and Ash Grove. TXI alone incinerated approximately 1,000,000 tons of HW (as reported via EPA's BRS database) from 1991 to 2008. *(Note: tonnage of HW incinerated is reflected for TXI 1991 to 2008. This data is absent for 1987 – 1991 for TXI and all years for Ashgrove. Prior to 1991 HW incinerated in cement kilns was classified as "recycling" – same product, different name. It would not be reflected in this database.)* Is there a database that would reflect "recycled waste" incinerated in cement kilns?

What was the validation process to determine HW incinerated actually met the allowable HW criteria and who had the primary responsibility for validation?

Response to comment D.2.2.: The first question asked in this comment regards the amount of hazardous waste burned at the facilities. EPA's biennial reporting system (BRS) contains that information but did not exist prior to 1989. We are not aware of any information resource systems that contain such information for earlier years. The second question asks whose authority it is to oversee waste acceptance criteria. The Texas State Environmental Agency, at any given time, is responsible for overseeing these operations. ATSDR contacted TCEQ and here is their response:

The hazardous waste permit, Permit No. 50316, set forth the terms and conditions for hazardous waste acceptance and burning in the four cement kilns. The TCEQ Region Office performed periodic compliance inspections. Please note that the hazardous waste burning kilns have not actively burned hazardous waste since October 6, 2008. The hazardous waste facility was closed.

D.2.3. Comment:
One critical variable to be considered is exactly what constituted HW ("recycling") incinerated at Ashgrove and TXI. What validation process was used to assure only HW deemed acceptable for incineration went into the kilns? Who had verification responsibility?

Response to D.2.3.: See response above to comment D.2.2.

D.2.4. Comment:
In the "Foreword" under "Health Effects" of the *Midlothian Health Consultation,* a statement reads:

"The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed."

Too much critical data is missing for the ATSDR to evaluate the burning of hazardous waste on the health of the citizens of Midlothian with any reasonable assurance of accuracy. I disagree with the first part of the statement on page 1 in the "Summary Introduction" that states:

"This Health Consultation identifies pollutants, time frames, and locations for which the available data provide a sufficient basis for reaching health conclusions; it also identifies important gaps in the data."

At present, ATSDR does not have available data that will provide a "sufficient basis" for reaching any health conclusions. I agree there are very important gaps in the data, but the data that is available does not even begin to test for the hundreds of different chemicals that were burned and their accumulative and synergistic effects and the new chemicals like dioxins that were formed during the burning of these chemicals. Since the science of environmental health is still developing as ATSDR notes, the scientific community does not know, and here lies the problem of drawing any conclusions from the information ATSDR has to work with.

Response to comment D.2.4.: As you stated, we believe there are sufficient data for certain timeframes and pollutants. We agree that there are no data for the time period during Ash Grove burned hazardous waste. We have attempted to fill data gaps with modeling or requests for additional air monitoring for any pollutants that were not sampled for but were released by the facilities (identified either by their emissions inventories or by typical emissions of similar facilities).

D.2.5. Comment:
The monitoring data ATSDR has fails to evaluate the years when most of the hazardous waste burning at the cement plants was ongoing. To reconstruct this information ATSDR would need to access the manifest of every truck load of toxic waste that was delivered to each site and the data from the plants to see how and what was mixed together to form the "fuel," Then ATSDR would need to scrutinize the real-time operating data from the plants to see how many scheduled and unscheduled emission events (upsets and shutdowns) happened during the burning of this waste, keeping in mind that this information is self-reported and on page 14 of the ATSDR report, the statement of "Whether reporting is required depends on several factors, such as the nature of the release and the amount of pollutants emitted." Over the years tens of thousands of tons of hazardous emissions could have been released to the air in this manner. ATSDR would need to factor this in to realistically estimate the amount of air pollution emitted over the years. ATSDR would also need to evaluate and add the emissions emitted from upsets alleged from citizens' complaints to TCEQ over the many years that may have been confirmed or unconfirmed because of the time lag between the complaint and investigation.

Response to comment D.2.5.: We agree that these issues are very important for exposure assessment. There are monitoring data downwind from TXI during periods of time when it was burning hazardous waste. Ambient data are a better indication of exposure for VOCs and metals as opposed to reconstructed emissions which will have uncertainties with regard to control and destruction efficiencies, inventory lists, etc.

D.2.6. Comment:
On page one of the Midlothian Health Consultation, Summary Introduction, ATSDR states "...available data provide a sufficient basis for reaching health conclusions;..." When you take into account the substantial holes in data available to ATSDR, an accurate health determination is impossible. Computer modeling cannot make up for this lack of accurate data. Computer modeling cannot determine what toxic substances were actually being incinerated at any given time. That would require inspecting every manifest of every truckload of hazardous waste delivered to each of the plants.

Response to comment D.2.6.: We recognize that there are data gaps, however we believe there are data available for certain timeframes and pollutants where data are useful for making health conclusions. Data gaps were filled with air modeling and/or recommendations for additional air sampling. ATSDR did its best to determine what the implications are for exposure to mixtures of air pollutants to the extent that available science will allow. As far as evaluating manifests, ATSDR feels that ambient data are a better indication of exposure for VOCs and metals as opposed to reconstructed emissions which will have uncertainties with regard to control and destruction efficiencies, inventory lists, etc.

D.2.7. Comment:
The second bullet point of the paragraph quoted from page 6 of the PHC #1 concerns the lack of air monitoring in the vicinity of the Ash Grove facility during the years the facility burned

hazardous waste. As indicated on page 15, the Ash Grove facility, under different ownership and management, was authorized to burn waste-derived fuel in its kilns between 1986 and 1991.

The PHC #1 does not indicate that the ATSDR analyzed or considered the historical growth and spread of neighborhoods and/or homes in the area during the proposed period of the study. The report spans air monitoring starting in the early 80s until a few years ago. During this period, and more notably since the Ash Grove facility was built in the late 60s, the population in the City of Midlothian has grown rapidly. A cursory review of the appraisal records for the homes located near the Ash Grove facility indicates that some of these homes were established after the so-called important air monitoring gap between the years 1986 and 1991.

The PHC #1 or subsequent reports must factor the historical development and construction of neighborhoods and homes during the periods of interest to determine how many homes may have actually *been* located in the vicinity of the Ash Grove facility. Census and aerial records are available for this work.

Response to comment D.2.7.: We updated the section on demographics to acknowledge how the population has changed over the years in Midlothian and around the facilities of interest. We still view the lack of monitoring data during the years when hazardous waste was burned as a data gap, even if the number of residents in closest proximity to the facility was not as high as it is today.

D.2.8. Comment:
ATSDR's draft states that Ash Grove's predecessor, North Texas Cement Company, ceased the *use* of waste derived fuels in 1992. According to the PHC #1, the reason was because the facility's emissions did not meet newly promulgated federal requirements (see page 15). That reason is not correct. The use of waste derived fuels, which actually decreases emissions as compared to coal, was discontinued because it was no longer economically viable. ATSDR must correct this statement and one way is to delete the last sentence of the middle paragraph. Further, around this time Governor Ann Richards implemented a moratorium on hazardous waste burning. That moratorium has since lifted, but the replacement of coal with hazardous waste imposed a large government expense that the cost savings of not burning coal could not justify. Simply the level of effort for a small company like North Texas Cement to keep track of all the requirements, implement them, and then report pursuant to the regulations made it undesirable, as was the political whim of that time.

Response to comment D.2.8.: We corrected the text in question.

D.2.9. Comment:
Collectively, monitoring was never performed to establish prominence for health affects determination. Recently, detailed area monitoring did not begin until after TXI Operations shut down operation of their four (4) wet kilns that were used to burn hazardous waste. Monitoring devices were never sited to capture Ash Grove emissions and the consultation does remark on this fact, however unless action follows this knowledge, nothing is gained.

Response to comment D.2.9.: We have concluded that sufficient monitoring data are available for making health determinations, but only for certain pollutants and time frames. We do agree with your statement about the lack of monitoring downwind from Ash Grove Cement. Our additional documents acknowledge this limitation and modeling may occur and recommendations for future sampling may be made to fill this data gap.

Subsection 3. Monitor Placement

D.3.1. Comment:
Page 53: In the third bullet of the discussion box on this page it states that data from the stations downwind of TXI Operations and Gerdau Ameristeel were placed in locations predicted to have the greatest off-site impacts from facility emissions, yet offer a reasonable indication of the highest air pollution levels south of Midlothian. These data actually indicate what the highest ambient levels would be north (with winds coming from the south, as is typical of winds in the area) of these industries, not south.

Response comment D.3.1.: We revised the text accordingly.

D.3.2. Comment:
Page 57: The second paragraph on this page discusses the differences in compounds measured at the Old Fort Worth Road monitoring site and the special study Wyatt Road monitoring site. To begin with, since there are two Wyatt Road monitoring sites, ATSDR should be more transparent in the text when referring to one over the other, so that the reader knows when ATSDR is referring to the former TCEQ stationary monitor (CAMS 302) or to the TCEQ special study monitor that only collected 20 samples. ATSDR should also be more transparent in the text when talking about the Old Fort Worth Road monitor; there are two separate monitoring sites here, one is the TCEQ CAMS 52 stationary monitoring site and the other is the special study collocated monitor that only collected 20 samples. It is not clear which set of data ATSDR is discussing here, as both monitoring sites were operating at the same time as the special study Wyatt Road monitoring site.

Response to comment D.3.2.: We revised the text accordingly.
Comment D.3.3.:
Most environmental scientists agree air monitoring (even at its best) is a very imprecise science. Air monitoring for regulatory compliance does not cover all aspects necessary for evaluating public health because everything that impacts public health is not regulated or monitored for.

Determining lowest level known to cause adverse health effects is also imprecise because testing is done one chemical at a time in a controlled environment that normally does not reflect real world exposure to and synergistic effects of aggregate exposure.

Precaution should be taken in making "very precise definitive" predictions (either way) regarding public health based on this imprecise science.

Response to comment D.3.3.: Thank you for your comment. Our priority is to have our conclusions be scientifically sound, and as such, air experts are scheduled to provide independent peer review of this and all other documents evaluating health implications from emissions in the Midlothian community. We have considered this comment as we move forward.

D.3.4. Comment:
The most notable gap in monitor placement is the lack of monitoring in the residential neighborhoods near the cement plants. Those would be the areas where you would expect the most health effects. Without monitoring where people actually live and spend time outdoors, ATSDR does not have the data necessary to determine health outcomes.

Response to comment D.3.4.: ATSDR agrees with this statement and identified residential sampling as a data gap in this health consultation. Available data in certain residential areas (for example, Cement Valley) is sufficient to make some health determinations. ATSDR made other specific recommendations for other residential neighborhoods where monitoring data is lacking.

D.3.5. Comment: *ATSDR states that the most notable gap in monitor placement is the lack of monitoring data for residential neighborhoods in immediate proximity to the four industrial facilities (p. 8). This entire paragraph should be amended to read as follows:*

> "The monitoring that has been conducted in Midlothian clearly does not characterize air pollution levels at every single residential location over the entire history, but monitors have been located in many of the neighborhoods located closest to the facilities, especially those neighborhoods located immediately north and south of the facilities. Monitoring at the facility property boundaries where fugitive emissions may have been detected, if at all, has generally not been performed; but, in general, residential neighborhoods are not present at these locations.

We note that there are not many residential neighborhoods located in the vicinity of the four industrial facilities, and where there are neighbors, monitors have been located in those areas at least once. For example, the neighborhood located on Cement Valley Road is the first residential neighborhood located north of TXI and Gerdau Ameristeel, and monitors 12, 13, and 14 were all placed in the vicinity of this neighborhood during their operation.

Response to comment D.3.5.: Your comment is correct that monitoring has occurred at some residential areas close to the industrial facilities. Most notably, extensive ambient air monitoring has occurred in the Cement Valley area north of TXI and Gerdau Ameristeel. In subsequent health consultations, ATSDR conducts air modeling to assist us in determining if past (or current) exposures are of potential concern where data gaps exist. If we determine that current exposures may be a concern, we may also make specific recommendations for other residential neighborhoods where monitoring data is lacking.

D.3.6. Comment:
Comment 2.7: ATSDR states that "Observations from site visitors and review of aerial photographs, however, confirm that numerous residents live just beyond the four facilities' property lines. For instance, several dozen homes are located along the eastern boundary of TXI Operations. Multiple homes along Ward Road, Wyatt Road, Cement Valley Road, and other streets are located across U.S. Highway 67 from TXI Operations and Gerdau Ameristeel.

Similarly, a residential area and Jaycee Park are located along the southeastern boundary of Ash Grove Cement, and another residential area is near the facility's northeastern boundary," (see page 24).

We generally concur with ATSDR's description of the closest neighbors and note further from review of Figure 6 of HC1 that monitors have been placed at or very close to each of these locations. The report should be consistent with regard to statements about where monitors have been located (see Comment 2.5 above).

Response to comment D.3.6.: The comment is correct that some monitoring has occurred in some of the residential neighborhoods along the perimeter of the industrial facilities. Extensive monitoring has occurred for areas immediately north of TXI and Gerdau Ameristeel. However, the monitoring is relatively limited in other areas. For instance, the monitoring at the Cedar Drive station to the east of TXI only occurred for a few days. Our subsequent health consultations comment on the extent to which we feel that additional monitoring in these areas might be warranted.

Subsection 4: Other media/deposition

4.1.1. Comment:
There are some soil and hay test samples that are indicators of ambient air lead deposition.

As part of the Chaparral Steel special study, hay, wheat, and other vegetation samples were collected from the fields surrounding the steel mill. A letter from Dr. Lund dated September 22, 1994, regarding this study states:

*"Soil samples collected from the hay field contained elevated **levels of cadmium, manganese, and lead**. Cadmium, manganese, and **lead levels** exceeded the human soil ingestion comparison values by up to 2.1, 1.1, and **6.2 times respectively**. Human ingestion of soil from the hay field with the measured metal concentrations may result in adverse health effects. In addition to exposure through hay and vegetation consumption, animal ingestion of soil during grazing may increase the total metal exposure in the animal."*

This letter also indicates eight additional hay-bale samples (four 0-3 inch depth samples and four 3-6 inch depth samples were collected from the rows of hay-bales stored at site #8. The results show iron, manganese, cadmium, lead and titanium levels in surface samples (0-3 inch depth) **were significantly greater** than samples collected from 3 to 6 inches within the hay bales. **These results suggest aerial deposition of the metals.**

Response to comment 4.1.1.: These data are evaluated in the "other media" health consultation that includes the hay study.

4.1.2. Comment:
After selling my home in 2008 I moved to Midlothian. The first 3 years I spent in a rent house on the northeast side of Midlothian. In March, 2011, I purchased a home in the Lakegrove area south of US Highway 287 off of Oak Tree Lane (Midlothian Parkway). I am a single woman

with no need for a large home on an acre of land except that I had two dogs who were like my children. Within 363 days of moving into my new home, both dogs passed away. One was in excellent health until 60 days before he died and was under constant vet care during this time.

The first five months I lived here we had no rain. Then in early spring, 2012, we had around 5 inches of rain within 24 hours. This is when I noticed that my lot is lower than all others and water was ankle deep 3 days after the rain.

I'm concerned that contaminants in Midlothian, although not from a nearby source, are infiltrating areas not considered by those who monitor for public health reasons. And, there is too much focus on air pollutants and very little on water. The 2011 annual report distributed by the Sardis-Lone Elm Water District, the agency who supplies household water service to this area, was so disturbing that I no longer drink the water or give the water to my animals. I sincerely believe the soil in my yard killed my babies and the contaminates were deposited by water.

Response to comment 4.1.2.: We are sorry about the loss of your dogs. ATSDR is preparing a health consultation on other media beyond air. This health consultation will address drinking water and surface water to the extent data are available. We will obtain the public water report you mention for review and inclusion in this report.

Section E. Data Quality

E.1. Comment:
Pages 5 and 40: In conclusion 3 on page 5, the first bullet states that for PM2.5 continuous data, the concentrations “are consistently lower than the measurements made by the more reliable non-continuous device.” Similarly, the following sentence is excerpted from the “Main Findings” text box on page 40: “At the Old Fort Worth Road monitoring station, for instance, concentrations measured by the continuous device are consistently lower than those measured by the federal reference method monitor.” For these statements, the following should be considered:

> The above use of "consistently” lower could be misleading because the continuous PM2.5 averages for concurrent samples are not "consistently" lower for all individual daily PM2.5 measurements. There are many days when the continuous measurements are higher than the non-continuous measurements. If "consistently" lower applies to longer averaging times, TCEQ feels that the statement should specify the applicable averaging period(s).

Response to comment E.1.: We agree that not every sample was consistently lower, but on average they were lower. We deleted the word “consistently” from the sentence and made other modifications as needed to clarify this point.

E.2. Comment:
Page 14: At the top of this page, it is stated that “Detailed quantitative analyses of these data are not included here for various reasons, one of which being that all TRI data are self-reported and many of the data points are estimated and cannot be readily validated.” Please note that EPA requires TRI release information be reported using the best readily available data, including monitoring data.

Response to comment E.2.: We added this suggestion to the text.

E.3. Comment:
Page 44: The first bullet on this page discusses the NELAP accreditation for the TCEQ Air Lab. It is also of note that the TCEQ is the NELAP-Recognized Accreditation Body for the state of Texas, and is responsible for providing NELAP accreditation to laboratories in the state of Texas.
In the third sentence on this page, the agency's standard operating procedure is listed as "#AMOR-06." This is not correct; it should be #AMOR-0**0**6.

Response to comment E.3.: We revised the text accordingly.

E.4. Comment:
Page 43: On page 43, the 2nd paragraph reads: "Table 8 compares the PM2.5 measurements generated by the two different methods. In general, the 24-hour average concentrations for the federal reference method and the continuous PM2.5 monitors were highly correlated; however, the federal reference method, on average, reported PM2.5 concentrations that were 13 percent and 23 percent higher than those reported by the continuous monitor; the two different percentages correspond to the data sets for the two different monitors shown in Table 8." For these statements, the following should be considered:

- The percent difference should be referenced relative to the non-continuous Federal Reference Method rather than the continuous method, which is not a Federal Reference or Equivalent Method.

- According to the averages presented in Table 8, the continuous method averaged 12% and 20% lower than the non-continuous Federal Reference Method monitor for the two sites and periods shown.

Response to comment E.4.: ATSDR agrees with your approach and calculations and revised the table accordingly.

E.5. Comment:
Page 57: It is true that concentrations for metals were observed to be higher at the special study Wyatt Road site when compared to the special study collocated monitoring site. However, the following should be considered:

a. While there is a measurable difference between the data at the two monitoring sites, the difference is not that great and all measurements are well below, if not orders of magnitude below, their short-term levels of concern. Take cadmium for example, the max values measured at the Wyatt Road and collocated sites were 0.00189 and 0.000331 $\mu g/m^3$, respectively. The Wyatt Road site is approximately 5 times greater than the collocated site; however, it is also approximately 74 times lower than the short-term air monitoring comparison value (AMCV) utilized by the TCEQ (0.1 $\mu g/m^3$).

Response to comment E.5a.: The implications of exposure to these levels of pollutants is not discussed in this document, but will is evaluated in other health consultations.

b. Distance to the source; the special study Wyatt Road monitor is located closer to industry than the special study co-located monitor. As such, it is not surprising there is a difference in monitored values due to location and proximity to industry, something ATSDR should take into consideration. This does not necessarily indicate that the Old Fort Worth Road monitor is understating the pollution levels.

Response to comment E.5b.: We discuss distance from the source in other health consultation documents.

E.6. Comment:
Shortcomings and deficiencies identified in the Midlothian air monitoring data as well as those not identified appear to be significant and to the extent that preclude a definitive public health impact analysis based **on this data alone**. This data may be adequate for regulatory purposes (maybe). But it is deficient of data necessary to evaluate potential impact on public health for all periods of community exposure.

It is our concern an inordinate amount of resources will be spent attempting to retrofit air monitoring data into a viable and reliable scientific format to independently render judgments regarding public health. This would still leave the community uninformed and unable to take the necessary preventative actions.

At best (maybe) – after all exposures are accounted for and factored in (if this is possible) it could and should serve only as an **adjunct to epidemiological studies.**

Response to comment E.6.: We believe that many data collected in the Midlothian area can be used for health evaluation purposes, but as stated in the health consultation Summary, some pollutants have little or no sampling data to evaluate. In these instances, we will perform modeling to determine whether an air pollutant is a contaminant of concern. While we have some limitations, we believe we have sufficient data to reach health conclusions on much of the data.

E.7. Comment:
Some methods used to analyze data are known to underestimate pollution levels. The report states that ATSDR will use that data "with caution" and that some of the measurements were not capable of measuring concentrations near the health protective levels. That data should be discarded as flawed and inaccurate.

Response to comment E.7.: The purpose of this document was to look at every measurement carefully to determine its utility for health assessment purposes. We do have concerns about certain methods used, and expressed those concerns in Conclusion 2. The measurements generated by these methods are still valid, but ATSDR discusses these known limitations and evaluates the data in context.

E.8. Comment:
Excepting the data provided from the TCEQ monitoring sites (CAMS), mention was not made to special testing employing Particulate Matter (PM) filters as the surrogate to capture speciated compounds. These required manual collection of filter pads and delivery to "contract" laboratories for substance determination. No mention was made about the existence of Chain of Custody documentation evidence where time and temperatures are critical for result of accuracy.

There can be no doubt sampling and testing has not followed Quality Assurance/Quality Control (QAIQC) principles, therefore producing scientific and credible conclusions upon which to base action for corrections must be questionable.

Response to comment E.8.: ATSDR considered a wide range of information when evaluating the quality of the ambient air monitoring data that has been collected in the Midlothian area, including reviews of field documentation where available (e.g., chain of custody forms, information on holding times), and we have concluded that most of the measurements are of a known and high quality and useful for health assessment purposes. We will gladly consider any specific information that indicates otherwise.

E.9. Comment:
The "consultation" has emphasized the fact that monitoring, sampling and testing methods of past years have resulted in "underestimated" results, make the case for pollution much worse than presently known. Was TNRCC/TCEQ aware of this and ignored that the data was flawed so as to alleviate a burden on industry which may have resulted?

Response to comment E.9.: There is a trade-off in the air sampling methods that TCEQ employed for particulate matter. Use of the 1-in-6 day method has the advantage of being the “gold standard” air sampling method in terms of carrying the Federal Reference Method designation [EPA, 2010e]. However, a limitation is that this sampling method does not characterize air pollution levels on other days. In contrast, the continuous sampling method generates continuous observations of particulate matter levels, but does have a problem with underestimating concentrations over the long term. This is a potential problem with all continuous monitoring, no matter what site or area. By applying both methods, TCEQ has generated a more extensive data set than we typically encounter in health evaluations, and one that accounts for the limitations of the individual methods.

Section F. Enforcement and Regulation

Subsection 1. Permits

F.1.1. Comment:
Pages 15-23: These sections discuss specific information regarding the three cement facilities located in the Midlothian area. The information about each cement facility may have been correct at the time the report was written; however, to-date the information is outdated and does not reflect the potential emissions from these sites. There has been a substantial reduction in emissions from the TXI site and there will be a substantial reduction in emissions from the Ash Grove site. The reduction in emissions will not simply include reductions of known criteria pollutants, but also other

pollutants of concern mentioned in the report. TXI no longer burns hazardous waste in their wet kilns; TXI committed to shutting down the wet kilns and the authority to operate these kilns has been removed from their permit. Permit 1360A (Attachment B) lists the authorized fuels that can be burned in the sole remaining and operating kiln (Kiln No. 5) at the site. Ash Grove will decommission Kiln 1 and 2 and will reconstruct Kiln 3. These changes have been reflected in their permit amended in May 2012 (Attachment C), which includes fuels that can be burned in Kiln 3. In Attachment D is Holcim's permit that lists approved fuels for that site.

Response to comment F.1.1.: We updated this information in the document.

F.1.2. Comment: TXI started HWI same time as Ashgrove. It was called "recycling" instead of HWI. Because HWI was being off-loaded directly from trucks, no federal RCRA permit was required. First federal air emissions regulations proposed for HWI in cement kilns didn't surface until 1991. Hence, only HWI data available starting 1991 were made available to ATSDR. Database reflecting recycled waste incineration should be reviewed.

Response to comment F.1.2.: Permitting negotiations between the facility and the environmental regulatory authority are beyond ATSDR's purview as a non-regulatory agency.

F.1.3. Comment:
ATSDR should evaluate the new TXI permit that TCEQ has approved to allow the burning of plastics, auto fluff, and construction remnants like synthetic carpet, which along with the permitted burning of tens of thousands of tons of tires and tire chips by the other two cement plants could add similar chemical constituents into the air that are just as bad as the chemical constituents from burning hazardous waste. It is basically the same, only the plastics and auto fluff are solid while the hazardous waste "fuel" is considered liquid.

Response to comment F.1.3.: We considered this information when we made recommendations for future sampling.

F.1.4. Comment:
Has the ATSDR considered the recent changes to TXI's air permit 1360A and PSDTX632M1 authorizing changes to TXI's fuels for Kiln #5? Could we be reverting back to conditions citizens faced in the late 80s when hazardous waste was being burned under the guise of "recycling"? TXI plans to incinerate seven new fuels including plastics. Attached ("2011 TXI change") is correspondence between Downwinders, EPA and TCEQ. TCEQ ultimately approved the permit change without any input from citizens or any opportunity for public comment. ATSDR must take into account the emissions that result from the permitted incineration of new fuels at the TXI facility and the potential for future health effects.

Response to comment F.1.4.: We considered this information when we made recommendations for future sampling.

F.1.5. Comment:
ATSDR states that TXI is currently permitted to burn hazardous waste in its kilns. This is not the case. The four (4) wet process kilns which were permitted to burn hazardous wastes have been

shut down permanently. The remaining kiln, referred to as Kiln 5, is only permitted to burn non-hazardous waste derived fuel in addition to traditional fuels. To be clear, all references to TXI's current permit allowing the use of hazardous waste derived fuels should be deleted.

In addition, ATSDR does not accurately describe controls for the emissions from all TXI kilns at the facility. For Kiln 5, all exhaust gases are controlled by a high efficiency fabric filter baghouse, followed by a wet scrubber, and finally passing through a regenerative thermal oxidizer (RTO). If any of these control devices stop operating, the entire kiln process shuts down. No gases can bypass these controls.

The four (4) wet process kilns' main stack emissions, when they were operating, were controlled by good combustion practices and electrostatic precipitators. When hazardous waste fuels (WDF) were used to fire the kilns Automatic Waste Feed Cut-Off (AWFCO) systems assured that the WDF did not exceed pre-established input limits which were established during compliance testing. (See Comment 2.2 above for specific reference). In addition to input parameters and implementation of the AWFCO system, total hydrocarbons and carbon monoxide emissions were monitored by continuous emissions monitoring systems (CEMS), further assuring appropriate compliance monitoring as well as ensuring adequate combustion of fuels.

Furthermore, beginning in 2001 as a result of bringing Kiln 5 online, TXI was limited to operating only two of the four wet kilns while Kiln 5 was operating. In addition, and as stated previously, Kiln 5 is not permitted to utilize hazardous waste fuels. As a result of this operating requirement, for this period of time, the hours of operations with wet kilns fueled with hazardous waste was actually reduced to approximately 50% compared to previous years.

Response to comment F.1.5.: We updated the document accordingly.

F.1.6. Comment:
On page 15, the PHC #1 summarizes the history of the Ash Grove facility and it states that the kilns were "originally fired with natural gas, coal, and petroleum coke." On page 16, the PHC #1 states that the Ash Grove facility may fire on its kilns the following fuels: coal, petroleum coke, new or used oil, wood chips, tire chips, and natural gas.

Please note that the list of fuels characterized as "originally" used at the kilns is misleading and incomplete. Over the years, the facility was authorized at different times to use various fuels. When the facility was built, the facility used only natural gas. In the 70s, fuel oil (known also as Bunker C Fuel Oil) handling equipment was added. This was followed by the installation of coal and coke handling equipment that can also handle wood chips. In addition to the waste-derived fuel handling equipment addition in the mid-80s, as mentioned on page 15 of the PHC #1, in the 90s the facility was permitted to fire its kilns with used oil and whole tires. The facility is currently not able to use tire chips and has never used tire chips. The facility has not extensively used wood chips or used oil in the last decade.

Currently, the facility employs a combination of coal, petroleum coke, and tires to fire its kilns; natural gas is typically used only for startup of the kilns. Recent abundance of natural gas and favorable prices, however, prompted the use of natural gas to fully replace coal and coke on one or more of the kilns for periods lasting from one to several weeks. Ash Grove burns fuel for the sole purpose of heating raw materials (limestone, sand, shale, etc.) to make cement, and fuel choice is based on lowering the cost of raw materials heating.

Response to comment F.1.6.: We modified the document based on the information provided.

F.1.7. Comment:
On page 16 of the PHC #1, there is no mention of the operation of SNCR at the Ash Grove facility but SNCR is mentioned on the discussion for Holcim's facility on page 19.

In 2007, Ash Grove Texas, L.P. installed and operated a Selective Non-catalytic Reduction (SNCR) unit on one of its kilns. By summer of 2008, all three kilns were retrofitted with an SNCR system. The SNCR system reduces emissions of nitrogen oxides from the combustion process in the kilns by injecting an aqueous solution of ammonia or urea into the kilns. The ammonia or the urea reacts with nitrogen oxides, reducing the emissions of this gas.

Response to comment F.1.7.: We modified the document based on the information provided.

F.1.8. Comment:
The "consultation" did not address the issue of violations and absence of enforcement. TCEQ files maintained on each industry contain all complaints, investigations and enforcement actions. The sad thing about this issue, there are practically no violations that receive more than a Notice of Violation (NOV) with no penalty assessed. Regional Investigators perform their jobs by issuing NOVs which should generate monetary penalties, but after review of some administrator in Austin fines are forgiven. There is no incentive for the facility to maintain the equipment properly.

TXI Operations has a long list of opacity violations resulting from busted bags because of neglected maintenance practices.

Events such as these represent excess and uncontrolled emissions above what the facility is allowed by the permit limits. Actual quantities cannot be verified. These emissions represent added health concerns and lowers the safety level of the area and should register negatively in your final conclusion.

Response to comment F.1.8.: ATSDR is not a regulatory agency and has no authority for enforcing environmental regulations. Your comments are noted.

F.1.9. Comment:
I would like to offer this correction. Reference was made that Holcim's release of ammonia (NH_3) was from SNCR operation to reduce their NO_X, which is incorrect. Holcim has a permit limit for emissions of ammonia; however this results primarily from the fuel and has always been listed in their MAERT. During SNCR operation the reagent (NH_3) volume is automatically injected based on the Mole Ratio to the NO and O_2 in the gas stream. Occasionally "ammonia slip" does occur, but is generally due to a kiln upset of a different nature.

Response to comment F.1.9.: We have deleted any reference to the release of ammonia by the SNCR operation to reduce nitrogen dioxide.

Subsection 2. Regulations

F.2.1. Comment
To Manager, This new standard is vital. I live downwind of Midlothian and the soot particles are a major problem. TCEQ is ineffective and I am trying to get a better Analysis.

Response to comment F.2.1.: We are assuming the commenter is referring to the new EPA $PM_{2.5}$ annual average standard. ATSDR takes this new standard into account in the health consultation on criteria pollutants and hydrogen sulfide.

F.2.2. Comment:
There appears to be a hesitance towards acknowledging differences between data needed to satisfy regulatory requirements and data necessary to evaluate public health. A regulatory agency (such as EPA) promulgates regulation aimed at protecting public health against man-made toxins and pollutants. Due to political and economic restraints, when establishing a protective regulation this agency has to settle on where it can get the "biggest bang for the taxpayer's dollar." Not all that affects public health is regulated. Not regulating a pollutant does not mean it has no impact on public health.

TCEQ air monitoring is targeted at meeting regulatory requirements and not focused on what is not regulated.

Response to comment F.2.2.: We agree that more data are available for regulated pollutants, particularly criteria pollutants. Please note that we are evaluating exposures to all pollutants, regardless of whether the pollutant is regulated.

F.2.3. Comment:
When regulating lead, EPA decided to focus on **inhalable particles** – not because this was all encompassing but it focused on the most dangerous smaller particles that can be taken deep into the lungs – had the broadest distribution – and greatest health impact on the broader populace. Since particles up to and including PM10 are determined to meet these criteria, lead in PM10 is the preferred method for monitoring total **inhalable lead**. It was not to dismiss public health impact of total lead in total suspended particles.

Office of Air Quality Planning and Standards (OAQPS) final staff paper released in December 2007 emphasizes a distinction in TSP, PM2.5 and PM10 and the adequacy of anything less than TSP to evaluate **total** lead in ambient air.

Refer to http://www.epa.gov/ttn/naaqs/standards/pb/data/20071101_pb_staff.pdf on page 17 (2.3) Air Monitoring. **2.3.1.1 Inlet Design** (last paragraph) reads:

"Sampling systems employing inlets other than the TSP inlet will not collect Pb contained in the PM larger than the size cutpoint. Therefore, they do not provide an estimate of the total Pb in the

ambient air. This is particularly important near sources which may emit Pb in the larger PM size fractions (e.g., fugitive dust from materials handling and storage)."

If statement above is correct and scientifically defensible, PM2.5 and PM10 data are not adequate for determining total amount of lead released into the air in Midlothian. The same applies to other metals and pollutants that attach to particulate matter. TSP monitoring is virtually nonexistent. This is a major factor when assessing local impact since these larger particles (that were screened out and hence no monitoring data exists for Midlothian) have a tendency to settle closer to a source and are subject to constant uptake and redistribution.

Production activities inherent to all four major industries in Midlothian are such that large particles of PM with a probability of high metal contact and other hazardous pollutants are consistently generated. Children are more susceptible to this contamination due to their hand-to-mouth activities. It appears TSP monitoring only existed for a sparse period in the early 80's.

Response to comment F.2.3.: Thanks for your comment. It is true that environmental regulations and conventions in ambient air monitoring affect the particle sizes that are typically measured, which is exactly why throughout the document we were careful to specify particle fractions. We more fully considered particle size when assessing exposures and potential health effects. Furthermore, deposition of particulate was assessed in the "Other Media" health consultation which included an evaluation of soil contamination, etc.

F.2.4. Comment:

Another data point that should be considered for TXI and Ash Grove for the pre-2000 time period is the requirements of the Boiler and Industrial Furnace (BIF) Regulations at 40 CFR Part 266.

Cement kilns that used fuels derived from hazardous waste were required to meet the requirements of 40 CFR Part 266 prior to the promulgation of the final CAA MACT EEE regulations promulgated at 40 CFR Part 63. These regulations required the cement kilns to meet ambient air quality standards that are specified at 40 CFR Part 266 in Appendices IV and V. Compliance with these air quality standards was demonstrated by the facilities through testing the emissions and measuring the feed rates of waste derived fuels and certain constituents of waste derived fuels during the test including: ash, chlorine, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, silver, and thallium. Assuming that the emissions test demonstrated compliance with the BIF standards (which was the case for both Ash Grove and TXI), a facility was not allowed to burn waste fuels at rates greater than the rates demonstrated during the compliance test. The facility was required to implement Automatic Waste Feed Cutoff limits in its process control logic such that the waste fuel feed to the kiln would be automatically cut-off if the rates ever exceeded the rates demonstrated during the test. The tests, known as Certifications of Compliance, were required to be performed every three (3) years. Thus, it can be stated conclusively that, at a minimum, the emissions from TXI and Ash Grove did not result in ambient air concentrations that exceeded the levels specified in Appendices IV and V of 40 CFR Part 266. Further, as shown in Table 1, the results of EPA's refined dispersion modeling shows that ambient air concentrations were even lower than the BIF regulatory standards, and below ATSDR's Health Based Comparison Values.

Response to comment F.2.4.: The regulatory background that you provide on hazardous waste combustion is useful, and some of this has been added to the introductory text in this health consultation. Regarding your comment about emissions not resulting in ambient air concentrations greater than certain regulatory limits, ATSDR prefers to base its health conclusions on the trends in the ambient air monitoring data collected at the time, which reflect the influence of all local sources and offer a better indication of what levels of pollution people were breathing.

F.2.5. Comment:
Industrial emissions releases, while trespassing upon the public by "dumping their wastes in our air" are responsible for the adverse health conditions but it is the corruption in our government by special interests that continue to allow this travesty.

The following is the "Conclusion" of an article "Ethics, Threshold Limit Values and Community Air Pollution Exposures" written by Mr. Jim Tarr and I quote-

> *"TLVs were developed for use in controlling health hazards in an industrial setting. They were not intended to be used in evaluating the potential harm of toxic chemical emissions into neighborhoods surrounding industrial facilities. There are reasons to doubt that TLVs are valid for any human health affects evaluation. In spite of those difficulties, the use of TLVs in air pollution control agencies has become widespread.*
>
> *The TNRCC (predecessor of TCEQ) relies heavily upon air pollution evaluations based on TL Vs. As implemented the system works primarily for the benefit of the agency, and to some extent, far the benefit of the corporations which the agency regulates. The TNRCC can point to a "health effects review system" and make exaggerated claims about its effectiveness. The corporations can receive their permits to emit toxic chemicals into the atmosphere and continue business as usual. In the meantime, the public is left to suffer the unknown consequences of a scientifically meaningless bureaucratic endeavor.*
>
> *Furthermore, for the reasons outlined above, the TNRCC health effects review system is unethical when viewed with regard to the principles of non-malfeasance, autonomy, justice, fidelity and veracity.*

The point I am making is simply that you can sample, monitor, test and compile reams of data that ultimately produce conclusions that basically reveal there are no significant issues that would suggest corrective action because the information is grossly contaminated.

A careless conclusion in this ease could provide a "step-up", a gift to industry.

Response to comment F.2.5.: We recognize that many residents have concerns about some aspects of this analysis, which is why we have decided to have all of our health consultations for this site go through external peer review and public comment before being finalized.

Subsection 3. Reporting Requirements

F.3.1. Comment:
Page 34: This section indicates that the use of TRI data has limitations "because facilities may emit pollutants that do not appear on the TRI forms." It is important to note that the use of TRI data does have various limitations and is not as good as using actual ambient monitoring data. However, it should also be noted that in Texas a company is required to be permitted for all chemicals they release. As long as a company is operating within the parameters of their permit, there should not be issues with their emissions.

Response to comment F.3.1.: We agree that basing these conclusions on ambient air data is important and, when available, have attempted to do so.

F.3.2. Comment:
Industry-Reported Events (Table B-1)

It is obvious by review of this data all reporting is not equal and reporting is not all-encompassing. Ash Grove was more in tune (maybe) with event reporting than others. It appears all emission events were not reported here – take for example the *incineration of radioactive material at Chaparral Steel. It has been acknowledged radioactive material (cesium-137) was incinerated on several occasions. Whether these are reportable events, or whether all events were reported is not readily evident. Review of cement kiln dust records and Chaparral bag house dust records could give you some insight to how extensively radioactive material (or other unauthorized HW such as asbestos) was burned, what was reported (or may not have been reported) and what probably could have transpired over the years.

******This may have be one of the emission events; however since some events are not described, it is unknown.*

Note also to reemphasize limitations of air monitoring for evaluating public health, **what air monitoring data did the team review that would have reflected incineration of radioactive material should it have occurred?**

It has been alleged that according to a federal report cataloging all disposal and treatment facilities nationwide that could have received mislabeled or unlabeled radioactive waste from a Colorado federal facility, Ash Grove may have received and burned radioactive waste in 1991.

Response to comment F.3.2.: This comment raises two issues. The first is whether reporting of the industry-reported emission events are complete. We acknowledge on page 14 that this may not be the case. Nonetheless, we feel it is important to investigate the events that were reported. The second is the extent to which this investigation will evaluate radioactive emissions. The historical events noted here were not reported because there was no reporting requirement for such events at the time. However, ATSDR attempted to locate and assess information about these events and any others we become aware of.

ATSDR contacted TCEQ regarding this issue and the following was their response:

The TCEQ and its predecessor agencies adopted rules regarding reporting of excess emissions, which apply state-wide, and these have changed periodically over the years. Excess emissions are those that exceed an air emission limitation in a rule, a permit or an order. Emissions events are a type of excess emissions. Certain excess emissions that include radioactive materials may have been subject to some type of reporting and/or recording requirements since December 1979. And during this span of time, the concept of "reportable quantity" (RQ) was incorporated in the reporting requirements. Thus, only emissions above the RQ would have triggered or required a report to the agency – depending on the time when the event had occurred.

Due to the various changes to reporting requirements occurring over a lengthy span of time – since 1979 – we will be able to provide a more precise answer including more details of the reporting requirements if you narrow the period of time, or be specific to the date of interest.

If you have further questions regarding this subject, please contact Joseph Janecka: Joseph.Janecka@tceq.texas.gov; 512-239-1353.

F.3.4. Comment:
How well documented and reported are accidental release events? There were at least 2 accidental releases of cesium 137 by Gerdeau (then Chaparral Steel) in the early 1990's. Are fugitive emissions such as these and others reflected in the air monitoring data? Could air modeling be applied to these events to determine which communities would have been most impacted?

Response to comment F.3.4.: There were no data collected in the area at the time when these two releases occurred. Modeling cannot be conducted to estimate exposure doses in the absence of emissions data.

F.3.5. Comment:
In addition to TCEQ data, ATSDR is relying on the Toxic Release Inventory (TRI). TRI numbers are based on industry's estimations of toxic emissions and not on any actual stack emissions or real monitoring. Among the TRI chemicals self-reported by industry is the category of chemicals called PBT or Persistent, Bioaccumulative and Toxic Chemicals. "PBT chemicals have lower reporting thresholds than other TRI chemicals. PBTs are of particular concern not only because they are toxic, but because they remain in the environment for long periods of time, are not readily destroyed and build up or accumulate in body tissue." (http://www.epa.gov/tri/trichemicals/index.htm) TRI also includes a category of chemicals classified as OSHA carcinogens. This is a critical gap in actual monitoring or testing for the very most toxic chemicals known to exist in a community like Midlothian, Texas. ATSDR must report with caution on these highly toxic and unmonitored chemicals being released into the air, water and soil in Midlothian, Texas. ATSDR must consider how much trust one could put on industry's self-reporting of such highly toxic emissions.

Response to comment F.3.5.: ATSDR included TRI data as one of many sources of information for what the area facilities are releasing. We are aware of and specifically acknowledged the limitations associated with TRI data in this health consultation. Our conclusions rely heavily on air monitoring data, which do not suffer from these limitations.

F.3.6. Comment:
Finally, ATSDR states that sulfuric acid aerosols have accounted for more than 97 percent of the total air emissions TXI has submitted to the TRI (see page 22). The estimation of these emissions from the wet kilns was a calculation of 10% of the SO2 emissions (SO2 emissions were measured by continuous emissions monitors). ATSDR has not accounted for the fact that because of stringency associated with incorrect TRI reporting, facilities as a result are typically much more conservative in reporting TRI emissions. In the case of sulfuric acid mist, TXI's emissions for the four wet kilns are vastly over-estimated because the method used does not account for the temperature of the stack gas. EPA recognizes that at stack temperatures greater than 300 degrees Fahrenheit it is unlikely for sulfuric acid mist to be formed because the temperature is above the dew point of sulfur trioxide (see EPA's Guidance for Reporting Sulfuric Acid, 1998). As such, TXI typically operated its wet kiln stacks above 300 degrees F, so in reality, little to no sulfuric acid mist was formed in the stacks. Further, any sulfuric acid mist that was formed was likely to be neutralized almost immediately by the minor amount of alkaline particular matter that is also emitted. These parameters are all well-established and based on sound operating and observational practices, and ATSDR should accordingly revise its conclusion regarding sulfuric acid aerosols from TXI.

Response to comment F.3.6.: The TRI data that we presented in this health consultation are the release estimates that the individual facilities disclosed to EPA In a the health consultation on VOCs and metals, ATSDR presents its modeling analysis for sulfuric acid aerosols, but acknowledges underlying technical issues associated with the reported emission rates based on the information presented in this comment.

F.3.7. Comment:
On pages 14 of the PHC #1, the report discusses short-term estimates of air emissions. Specifically the report states on page 14 that

> "[i]t is possible that elevated short-term events have occurred at the facilities of interest but never reported to TCEQ; however, the environmental impacts of these events would likely be detected by nearby offsite monitoring devices, especially those that operated continuously."

This statement and others like it failed to account for continuous monitors. The importance of the distinction is that if the pollutant of interest was monitored with a continuous emission monitor and emissions exceeded permit limits, there would have been a report to the TCEQ through the Air Emission event reporting system, in the quarterly air emissions report to TCEQ, in the semi-annual Title V deviation report to TCEQ, and/or in the annual air emissions inventory report to TCEQ. Whenever Ash Grove is aware of a reportable emissions event, Ash Grove reports the event and the emission levels as required. If emissions are within permit limits, emissions are still reported when required by permit conditions or other requirements.

Response to comment F.3.7.: We updated the text to indicate that continuous emissions monitoring data do indeed characterize how emissions of certain pollutants varied with time.

F.3.8. Comment:
On pages 14 and 17 of the PHC #1, the report discusses the TCEQ database of Air Emission Event Reports. The TCEQ's Air Emissions event reporting system does not contain exclusively events that always resulted in emissions over the permitted limits. Some reports made by Ash Grove were made prior to the review of the event history, based on an expectation that there was a chance that the type of event (i.e., startup, shutdown, or maintenance) could result in emissions of one or more pollutants over a permit limit. Ash Grove is required to report within a given timeframe that sometimes precludes completion of an investigation.

After all these reported events, Ash Grove's procedure was to review what actually happened during the event to determine if any permit limit was exceeded. Ash Grove then routinely amended some of the reports to include the actual duration and magnitude of any emissions over its permit limits. On numerous occasions there were no emissions over the limit during the event, but such notices still remain on the TCEQ data base.

In addition, another category of event may be reportable to the TCEQ using the Air Emission Event Reports: Immediately Reportable events. These are events that under the Texas rules must be reported within 24-hours of discovery. The regulations vary by specific pollutant; some pollutants can be emitted in larger quantities than others before the immediately reportable requirement applies. That means that not all events that resulted in emissions of some pollutants would be captured in the TCEQ Air Emissions Event database. Such events would be captured in other reports as indicated in the prior comment.

These are some of the reasons why the TCEQ Air Emission Event Reports database is not a reasonable indicator of actual emissions over a permitted limit (i.e., some events are advanced notifications only; some events did not actually result in excess emissions over a permitted limit; and some events completely miss the database because they do not qualify for immediate reporting). Therefore, conclusions about short-term estimated air emissions based on the number of air reports in the database must be supported by other sources of data that reflect short-term emissions. ATSDR should refrain from using the database alone for determining emissions.

Response to comment F.3.8.: We updated some of the text describing the short-term emissions events based on the information provided. ATSDR relied on the data in EPA and TCEQ databases to characterize emissions from the Midlothian facilities, and we used multiple databases for doing so (e.g., TRI, PSEI, Air Emission Event Reports).

F.3.9. Comment:
On page 16, near the bottom of the page, the PHC *41* states that "sulfuric acid aerosols have accounted for more than 98 percent of the total air emissions that Ash Grove Cement has reported to TRI." During the public meeting on May 24, 2012 at the Midlothian Conference Center to discuss the draft PHC #1, a representative of the ATSDR misstated this statistic when he said on more than one occasion that the lack of sulfuric acid monitoring is important in light

of the fact that "Ash Grove's air emissions are 98 percent sulfuric acid." Clearly, the speaker left out a significant part of the statistic since the TRI reporting regulations do not require the complete reporting of all air emissions from a facility.

If the definition of air emissions is restricted to pollutants only, a better source of information to characterize the emissions from the facility must include more than the relatively narrow and limited list in the TRI reporting system. Such a source of information could be the Emission Inventory Questionnaire (EIQ) required by the Texas rules. The Texas rules require facilities like Ash Grove to complete a more inclusive EIQ annually, detailing its air emissions from a larger list of chemicals.

Simply stated, the EIQ includes a more complete picture of the air emissions from a facility than what the TRI program could reflect. In the specific case of sulfuric acid, using the EIQ reports as the more comprehensive inventory of emissions, sulfuric acid emitted by the facility is less than 0.5 percent of the reportable emissions. This is a sharply different figure than what the statistic quoted in the PHC #1 gives. That is why we want to point out how misleading it can be in a public meeting to leave out the full description of the statistic that appears on the report and how even such statistics may be limited in scope and value.

Response to F.3.9.: In its upcoming health evaluations, ATSDR considered all pollutants emitted by the Midlothian facilities, regardless of whether they fall under TRI reporting requirements or other emissions reporting regulations. We indicated the basis for emissions data that we reported, especially when discussing the breakdown of facility-wide emissions, as noted in the first paragraph of the comment. We considered data that the facilities submitted to EPA and TCEQ in our subsequent assessments.

F.3.10. Comment:
ATSDR appears to place a great deal of confidence on the Toxic Release Inventories (TRI). These are voluntary, self-reporting values and at the discretion of the reporting industry. Instead of requiring industry to report values from monitoring/recording devices the facility reports values based upon their estimates and calculations. Never the less, with caution, this data could be beneficial.

Among the TRI chemicals self-reported by industry is the category of chemicals called PBT or Persistent, Bioaccumulative and Toxic Chemicals. "PBT chemicals have lower reporting thresholds than other TRI chemicals. PBTs are of particular concern not only because they are toxic, but because they remain in the environment for long periods of time, are not readily destroyed and build up or accumulate in body tissue." (http://www.ere.gov/trittrichemicals/index.httn).

TRI also includes a category of chemicals classified as OSHA carcinogens. This is a critical gap in actual monitoring or testing for the very most toxic chemicals known to exist in a community like Midlothian, Texas. ATSDR must report with caution on these highly toxic and un-monitored chemicals being released into the air, water and soil in Midlothian, Texas.

Response to comment F.3.10.: ATSDR included TRI data as one of many sources of information for what the area facilities are releasing. We are aware of and specifically acknowledged the limitations associated with TRI data in this health consultation. Our conclusions rely heavily on air monitoring data, which do not have these limitations.

Subsection 4. Recordkeeping

F.4.1. Comment:
Although allegations that TCEQ has been fraudulent in monitoring and accuracy of records keeping, without proof the charges are unfounded. ATSDR should have been performing "side-by-side" testing 20 some odd years ago.

Response to F.4.1 Midlothian residents petitioned ATSDR to evaluate this site in 2005.ATSDR does not conduct long-term environmental sampling, and we typically rely on environmental agencies and other parties to conduct such work.

Section G. Health Issues and other Community Concerns

Subsection 1. General Health Concerns

G.1.1. Comment:
It is plain to see the deterioration in my wife and my own health as we lived in the Homesteads for over 28 years. My wife has been diagnosed with early onset Alzheimer's. I have memory lapses and have trouble learning new things. Many of the people in the Homesteads have these and various other health problems. I feel this is mostly due to the chemicals that have drifted into this area from the cement kilns. We have moved to Oklahoma and are happy with our decision. It is my hope that the truth will come out through your investigations. I would also hope that a check in the surrounding towns be checked for the percentage of health problems and disability as compared to the general population. I feel you will find unusual trends in our population as opposed to people that have not been exposed to the long term effects of the Midlothian plant. We are both on SSDI and while my wife is far worse off mentally, I have problems that are not common at my age of 57. My wife spent much more time outside with her garden and animals, while I was more an inside person. Please don't drop the ball on this as I feel more cases of sickness and disease will surface long after these kilns have shut down. I thank you for the opportunity to have my voice added in this urgent study.

Response to comment G.1.1.: Your health concerns are noted, and were evaluated along with health surveillance data in the communities around the facilities of interest in this assessment and in the immediate area around the study area in our subsequent health consultations, including our Health Outcomes Data Evaluation Health Consultation.

G.1.2. Comment:
We moved our new family to Midlothian 12 years ago when my daughter was 2 weeks old.

My daughter developed asthma before she was one year old. The doctor didn't believe me in the beginning because he thought I was putting my asthma symptoms on her. Then one day my daughter was in a full blown attack while my mother in law cared for her and she was taken to the doctor and he immediately placed her on a nebulizer and steroid meds. She is still on a nebulizer, steroid inhaler, and a rescue inhaler as needed.

My husband didn't have asthma until he moved to Midlothian. He now uses the nebulizer when needed at home, steroid inhaler, and a rescue inhaler at work.

I have had asthma since I was a child. It went away when I got older. I moved to Denton and attended UNT. My asthma flared up again but it was controllable with a rescue inhaler once in a while. After school I moved to Cedar Hill with my husband. We were very active and jogged often. We would use a rescue inhaler every so often. Then we moved to Midlothian.

My asthma symptoms now come more often. I got my first nebulizer. We are now on our 3rd or 4th nebulizer. So, I now have a nebulizer, steroid inhaler, allergy medication, rescue inhaler, and take Singular. There are many times when this limits my life.

Some other weird things we are learning is that I have some kind of inflammatory disease. I have tested positive twice for some sort of inflammatory disease. We are learning what helps when my symptoms flair up. There is yet to be a diagnosis. We are waiting for the next flair up. When I 'flair up' I have arthritis in my feet, ankles, knees, one hip, and neck. I also experience overwhelming exhaustion and I have a difficult time handling normal stress. Both of my wrists all of a sudden had a lot of inflammation, so much so that it hurt to hold my coffee mug. As sudden; as all of these symptoms appeared, they left. It took me 2 months to get to my new rheumatologist. The symptoms had left by this point. We have now added an anti-inflammatory medication, pain med, and sleep medication to my growing list.

I really wish we had known about all the issues before I moved here. I realize there is a potential for health issues everywhere, but I would NOT have moved to Midlothian if I had known what I know now. Much of the issues seem to be preventable. We can't afford to move at this point in our lives. We won't even mention how my extended family moved here to be closer.

Response to comment G.1.2.: Your health concerns are noted, and asthma and other inflammatory diseases were evaluated along with health surveillance data in the communities around the facilities of interest. This evaluation is conducted in our Health Outcome Data Evaluation Health Consultation.

G.1.3. Comment:
There are substantial gaps in monitoring data. For some periods of time, there is no monitoring data available at all. For instance, ATSDR has no ambient air monitoring data for any pollutants in the time period from 1987 to 1991. That is the period when all three cement plants were experimenting with hazardous waste burning. Immediately after that time from 1991 to 1994, a cluster of approximately 12 Downs Syndrome babies was born. Has ATSDR reviewed the manifests of wastes being delivered to each of the plants during those years? It would be extremely unlikely that computer modeling could fill in the data for a time period filled with uncertainty.

Response to comment G.1.3.: Birth defects, including Down syndrome, was evaluated in the Health Outcome Data Evaluation Health Consultation for the area we believe to be of maximum impact, Midlothian, Ellis County, Public Health Area 3 and Texas. Although it is correct to say that there are no ambient monitoring data for most of the sites when hazardous waste was being incinerated, there are monitoring data downwind from TXI during periods of time when it was burning hazardous waste. Ambient data are a better indication of exposure for VOCs and metals as opposed to reconstructed emissions which will have uncertainties with regard to control and destruction efficiencies, inventory lists, etc.

G.1.4. Comment:
Listed Community Concerns page 26 – bulleted items
The major concern regarding the air monitoring data in Midlothian we and most community members whom we have spoken with emphasized was:
"Is the scope of the air monitoring data broad enough to address the full impact of exposure to pollutants and could it stand alone and be the sole basis for making public health judgments?
This was emphasized at every opportunity we had to speak with or write to ATSDR. This is not reflected as an itemized concern, nor is it directly addressed.

Response to comment G.1.4.: We added this concern to the list on page 26.

G.1.5. Comment:
Documented Complaints for the Midlothian Facilities (Table B-1)

Care should be taken if factoring this data into emission events as if it were all encompassing and/or an indicator of absence of an event. The TCEQ complaint system was not user-friendly from several aspects. Factoring in these recorded complaints as the only "possible upsets" would be misrepresentation. Because:

- Public at large was **never** educated regarding option of contacting TCEQ with a complaint. With exception of a very few, the public did not know whom to call. Many called TDSHS, EPA, their local government – or each other.

- Events mostly took place at night when TCEQ offices were closed.

- Responses were slow and long after evidence/issue had dissipated. Example: Strong odor report – someone comes out several days later and states, "I don't smell anything."

- Calls were long distance and many chose not to invest their limited resources in what they perceived as a no-win situation.

- Reporting for most became an exercise in futility. Community became conditioned to just "suck it up" and go on.

Response to comment G.1.5.: We added language explaining the limitations of relying on citizen complaint information. ATSDR, routinely evaluates any collected citizen health complaints. To address residential concerns regarding whether or not complaint and emission event logs reflect a change in air quality, ATSDR evaluated the relationship between odor complaints, unplanned emission events, and measured air data. We added language in the text to explain the purpose and conclusions from this analysis and the details of the analysis were added to an appendix (Appendix D).

G.1.6. Comment:
There are substantial gaps in monitoring data. For some periods of time, there is no monitoring data available at all. For instance, ATSDR has no ambient air monitoring data for any pollutants in the time period from 1987 to 1991. That is the period when all three cement plants were experimenting with hazardous waste burning. Immediately after that time from 1991 to 1994, a cluster of approximately 12 Downs Syndrome babies was born. Has ATSDR reviewed the manifests of wastes being delivered to each of the plants during those years? It would be extremely unlikely that computer modeling could fill in the data for a time period filled with uncertainty.

Response to comment G.1.6.: Birth defects, including Down syndrome, was evaluated in the Health Outcome Data Evaluation Health Consultation for the area we believe to be of maximum impact, Midlothian, Ellis County, Public Health Area 3 and Texas. Although it is correct to say that there are no ambient monitoring data for most of the sites when hazardous waste was being incinerated, there are monitoring data downwind from TXI during periods of time when it was burning hazardous waste. Ambient data are a better indication of exposure for VOCs and metals as opposed to reconstructed emissions which will have uncertainties with regard to control and destruction efficiencies, inventory lists, etc.

G.1.7. Comment:
The PHRP objective stated in summary and presented to the public does not accurately reflect concerns stated by the community regarding animal health. The concern expressed over and over is whether there is a relationship between illnesses manifesting in animals and air emissions **and whether these illnesses parallel illnesses manifesting in humans in the community? Are these animals sentinels?** Can this be reframed to better reflect the communities concerns? It is our concern that the team responsible for HC6 may have been given the wrong message. If it will not be addressed in HC6 – where will it be addressed?

Response to comment G.1.7.: We reviewed the PHRP to ensure these concerns are adequately represented and provided this feedback to the veterinarian evaluating animal health outcomes. This health consultation does not address health outcomes in animals or humans.

G.1.8. Comment:
Does Anyone Read Comments Submitted to Documents Released for Public Comment?

This is an overarching concern that has prevailed throughout the history of this consultation.

It appears comments submitted in response to documents released for public comment Midlothian PHC released December 2007 and the PHRP released January 21, 2010 may not have been reviewed or shared with the current teams. We keep making the same points over and over. If these comments have no merit we need to be advised.

We ask that you look at our previous comments. Copies are attached. Much of what we are saying here was said previously. If what we are saying is incorrect or not applicable, tell us why. It is our concern authors of this report were not provided a copy of our comments. Perhaps they were given truncated statements that didn't fully represent community concerns. This concern was expressed in our comments to Public Health Response Plan (PHRP) released for public comment January 21, 2010 (copies attached).

We ask also that the teams read comments submitted by the following respected scientists (copies attached):

- Dr. Stuart Batterman of the University of Michigan
- Dr. Al Armendariz, recent EPA Region VI Administrator
- Dr. Neil Carmen, Sierra Club and prior employee of the TACB and TNRCC (now TCEQ)
- Dr. Peter deFur, Virginia Commonwealth University.

They each provide a very specialized and unique perspective on issues of air monitoring data and their critiques might provide useful insight on specific areas of the air monitoring system.

Response to comment G.1.8.: We have reviewed the public comments to both the 2007 health consultation and the PHRP. We will go through those comments again as well as the comments you have provided from other scientists to ensure ATSDR has reviewed all pertinent comments to this health consultation.

G.1.9. Comment:
In good faith to environmental science, ATSDR does not have the information it needs to adequately assess or address any health concerns of anyone in the Midlothian community. To come back and tell the people anything else would be intellectual dishonesty on ATSDR's part and a disservice to all the citizens of the Midlothian community, the millions of people living in the DFW metroplex, and the whole nation. ATSDR's Midlothian study will be used by the business industry to continue to pollute the air, soil, and water while the rates of asthma, respiratory disease, auto-immune diseases like autism, and different types of cancers continue to climb upward among the populace.

Response to comment G.1.9.: We agree that this assessment is a very important one in evaluating impacts from these types of facilities. To address concerns over the data quality, we will have outside air experts evaluate this document for scientific accuracy as well. Although there are data gaps, as identified throughout the document, we believe that much of the data are sufficient for evaluating health concerns. Furthermore, health surveillance data for outcomes potentially related to residential exposures to environmental emissions will be considered in our Health Outcomes Data Evaluation Health Consultation.

G.1.10. Comment:
During the legal "discovery process" leading up to the hearing on TXI's hazardous waste permit, Downwinders at Risk found documents related to a cancer cover-up. In the summer of 1991, TXI paid an engineering firm to do three, 3 hour ambient air samplings downwind of the Midlothian cement plant. TXI's Randy Jones then requested the company's primary scientific consultant, Dr. Kathryn Kelly of Environmental Toxicology Inc. in Seattle, to interpret the results of this monitoring so they could be used in an upcoming newspaper ad to counter opponents concerns about health harms.

Dr. Kelly sent TXI her conclusions a week or so later. She concluded that the plant's carcinogenic emissions were causing a 1 in 5000 chance of cancer. This is orders of magnitude beyond the EPA standard of 1 in 100,000. In her faxed memo she recommends that the company not present this information in the newspaper ad. She then goes on to suggest ways to compare the monitoring results so that TXI could still reassure local residents. For example, she suggests the numbers be compared to other urban areas, but then backs off because Midlothian is a town of only 5000. She then suggests the state's long-term "Effects Screening Levels" be used as a measuring stick, but they are also exceeded. Dr. Kelly finally concludes that the only comparison that makes TXI's air sampling numbers look good is a comparison to short-term Effects Screening Levels by the state. Then she tells TXI that these ESL's can be scientifically challenged because they're just arbitrary numbers derived from occupational exposure regulations. She ends by saying "But heck, I didn't make up the rules, and they are published state guidelines, so I'd say let's go with them." Two weeks later, TXI places an ad in the Midlothian papers that does exactly what Dr. Kelly suggests: it compares the results of the monitoring only to short-term ESLs without mentioning the cancer risk numbers or any of the rest of her conclusions, or her skepticism about the possible inadequacy of ESLs themselves to measure harm. When Randy Jones was confronted with Dr. Kelly's memo and his correspondence to her in his deposition, he admitted that TXI passed on to the public the one comparison from its air sampling results favorable to the company - the very comparison Dr. Kelly recommended. He also defended TXI's withholding the real significance of the monitoring results from local residents. (correspondence between Dr. Kathryn E. Kelly and Randy Jones is attached) ATSDR must consider the conclusions in the 1991 report from Dr. Kelly.

Response to comment G.1.10.: Thank you for bringing Dr. Kelly's report to our attention. Assessment of cancer and non-cancer health issues is standard in our evaluation of contaminants of concern. Health outcome surveillance data, including cancer, will be included in the Health Outcome Data Evaluation Health Consultation for this site. Cancer incidence and mortality data from Midlothian, Ellis County, Public Health Region 3 and Texas will be reviewed in that consultation.

G.1.11. Comment:
It appears that ATSDR is deviating from sound science based on its response to public comment and certain information included in HC1. For example, it was discovered from review of ATSDR's response to comments that it will require the Texas Department of State Health Services to manipulate the birth defects registry data to use geo-coding that aligns with the "exposure plume area." This approach was only generally described in the draft PHRP as "Obtain the most up-to-date health outcome data available and analyze the health statistics in

areas that receive emissions from the facility, as defined by the air modeling." During the PHRP public meeting, it was learned that this modeling would be conducted using SCREEN3 (to which we commented extensively as to the vagueness of the proposal), with no details on how the model would be deployed.

Response to comment G.1.11.: This comment pertains to analyses that ATSDR completed for a health consultation on health outcome data. A detailed description of the health outcome data evaluation methodology is presented in that health consultation. The area of concern as defined by the plume modeling is only one of the geographic areas being evaluated. This area of concern attempts to address some community member concerns that larger geographic areas 'dilute' the findings of some health outcomes. In all cases where the area of concern data is available (primarily adverse birth outcome data), the more typical geographic units of ZIP code, town, county, and state data are also provided.

G.1.12. Comment:
As another example, ATSDR representatives stated in the pre-public meetings with individual ATSDR Project Leaders that it would not use anecdotal data of self-reported health symptoms as a basis for reaching scientific conclusions on health outcomes. Rather, ATSDR would limit its evaluation to public health data contained in publically available databases. Then, in the response to public comments on the PHRP, ATSDR reversed its position by responding: "Self-reported health symptoms constitute community health concerns and will be addressed in the health consultation. For health concerns without a readily available data base, a literature review for the known causes of the disease/condition will be made. ATSDR states further in response to another comment that "Individual medical records will not be requested to verify the existence of immune diseases or other health effects," and "...we will consider both the known causes of the disease/condition and explore the chemicals of concern to determine the diseases associated with exposure."

This approach prompts a number of questions regarding objectivity and accurate data collection that should be addressed to maintain the validity of ATSDR's evaluation. Will ATSDR tell someone who has a self-reported health symptom that their condition was caused or may be related to chemicals emitted by the Midlothian industrial facilities? Without a review of medical records, medical tests, and ruling out other potential causes of the disease or condition, it is not clear how ATSDR can reach such a conclusion in a manner supported by sound science.

These inconsistencies create significant uncertainty and ultimately have the potential to result in outcomes that are not scientifically supportable or sound. To ensure that the public has adequate opportunity to understand and comment on how the health consultations will be performed, the commenter requests that ATSDR put a clear outline into place that specifically describes these proposed activities before they are implemented.

Response to comment G.1.12.: This comment addresses two separate issues. First, ATSDR is obligated to respond to community health concerns. Sometimes, those health concerns are based on anecdotal information that cannot be verified. We still make an effort to respond to these, recognizing the limitations of anecdotal information. Second, ATSDR has committed to develop a health consultation that presents evaluations of health outcome data. That assessment will be based on health outcome data available through state registries and other validated and well-maintained databases. Regardless of the type of database used, while the analyses may be used to demonstrate higher or lower rates of a certain disease or health risk factor in an area as compared to another area, they cannot be used to establish cause and effect.

G.1.13. Comment:
Comment 2.4: ATSDR states that the goal of the review is to determine if chemical releases from local industrial facilities could or have affected the health of people and animals in the area (p. 1). The "or" in this sentence between "could" and "have" should be removed.
How can ATSDR state that a goal of the study is to determine whether industrial emissions "...have affected the health of people..." if it has no plans to review medical records or directly examine individuals claiming to have experienced health effects? There are five (5) potential conclusions that ATSDR may arrive at as the result of its HC (see Table 9-1 of ATSDR's PHAGM). Two of those conclusions, Urgent Public Health Hazard and Public Health Hazard, state in their definitions that such findings only mean that site related exposures health effects."

Response to comment G.1.13.: ATSDR's health assessment process evaluates exposures and what health effects might result, which can be done without reviewing individual medical records. ATSDR will, however, eventually be evaluating health outcome data, which does involve routinely collected health data.

G.1.14. Comment:
Comment 2.8: We inquired during the May 24 public meeting whether or not ATSDR had reviewed the deposition of Dr. Jim Rook as part of its animal study. We learned that ATSDR did not have this document, which we are providing with these comments as Attachment C. Dr. Rook did not identify any animal diseases in the area related to industrial facility emissions.

Response to comment G.1.14.:
Thank you for providing this testimony by Dr. Rook. ATSDR scientists evaluated this testimony when preparing our additional documents.

G.1.15. Comment:
In addition to the operational time that TXI utilized hazardous waste derived fuel, it should also be noted that various odor complaints alleged from burning tires began when a permit for using tires as fuel was approved for the wet kilns. Interestingly, the complaints occurred well before the plant had the tire feed system constructed – i.e., when tires were not actually being used. When the facility actually began utilizing tires, few or no complaints were made. Ultimately, the facility used tires as a supplemental fuel on one wet kiln for approximately one year.

Response to G.1.15.:
The comment pertains to the utility of odor perception complaints in the health assessment process. Our additional documents will evaluate the timing of these complaints with respect to peaks in measured air pollution levels. That analysis will also acknowledge the limitations associated with evaluating self-reported odor complaints.

G.1.16. Comment:

The "consultation" statement "the modeled data cannot be used to definitively determine if the potential exposure was, or is, a public health hazard" is incompetent and irresponsible. Throughout this "consultation" ATSDR appears to ignore historic evidence of disease "pockets" (Down Syndrome, rare brain cancers, etc.) when these events are medically documented and may be associated with incineration of hazardous waste by all plants involved.

Response to comment G.1.16.:
ATSDR does not ignore historic evidence of disease "pockets." We are evaluating health outcome data for many health conditions of concern to community members (e.g., birth defects, cancer). These evaluations include both the use of current data for these health conditions as well as discussions on previous health reports. These evaluations will be included in the Health Outcome Data Evaluation Health Consultation.

G.1.17. Comment:
The "consultation" has repeatedly stated the fact that substances such as acids, VOCs and PAHs were not monitored and data was not available. You must recognize the TCEQ philosophy that if you do not test for a substance there will be no records that substance is present. There are other issues that were not included such as the contamination of the Kemp Ranch and the presence of Cesium at Chaparral Steel.

Response to comment G.1.17.: We are aware of these issues and evaluated them to the extent that data allow in additional health consultations.

Subsection 2. Risk and Exposure Evaluation

G.2.1. Comment:
In the fourth bullet of the discussion box on this page it discusses how actual exposure will depend on the locations where citizens travel during the day and their physical activity during those times. A considerable amount of research has been conducted to show that most people typically spend the majority of their day (~90%) inside, not outside, a finding quoted by the EPA when discussing indoor air issues. It has also been shown that indoor air quality is typically worse than that of outdoors. These are important factors that ATSDR should consider in the upcoming health consults.

Response to comment G.2.1.: Comment noted.

G.2.2. Comment:
Main Conclusion

ATSDR concludes, **"The available ambient air monitoring data for the Midlothian area are sufficient to support public health evaluation for numerous pollutants of concern and for many years that local facilities operated."** This appears to be indicating a one-chemical-at- a-time approach.

"One-chemical-at-a-time" approach to risk assessment does not allow assessment of real-world exposure. There should be thorough consideration of the mixture of compounds our community routinely faces. Assessing public health on anything less would not be scientifically defensible.

Response to comment G.2.2.: We understand that this is an important issue that is a concern for residents. For this health consultation, we did approach the data by individual pollutant to identify the adequacy of the database we have to evaluate exposures. ATSDR acknowledges that multi-pollutant exposure evaluations are difficult given the current state of knowledge. ATSDR will do its best to determine what the implications are for exposure to mixtures of air pollutants to the extent that available science will allow in additional health consultations.

G.2.3. Comment:
Reference on page 35 section 4.3 validating data collected during the 2008-2009 Midlothian air monitoring project and defense of sampling and analysis of metals in PM10 "as the method used in the Schools Monitoring Initiative."

EPA says: http://www.epa.gov/schoolair/pollutants.html

"Metals are suspended in the air as tiny particles. EPA is using two different methods to sample for metals in the air around schools. The first method "PM10" captures only smaller particles that can be inhaled and enter the lungs – those that are 10 micrometers in diameter or smaller. The other method collects total suspended particles (TSP).

The choice of method depends on the key pollutants we expect to find around a school.
- *At schools where we are interested in levels of metals other than lead, we are measuring the concentrations of metals in PM10 samples. Our assessment of potential health concerns from these metals in the air is focused on inhalation. PM10 samples provide a better estimate for that than the larger TSP samples.*
- *At schools where we are interested in levels of lead in the air, we are measuring the concentrations of lead in TSP samples. Our assessment of potential health concerns for airborne lead includes non-inhalation exposure pathways, such as incidental ingestion of dust from the air that can be picked up onto children's hands. Particles collected in the larger TSP samples can play an important role in these exposures. EPA's National Ambient Air Quality Standards, which are the sample screening levels for lead used in this initiative, are based on lead in TSP samples.*
- *At schools where we are interested in levels of lead and other metals, we are collecting both PM10 and TSP samples."*

Hexavalent chromium is another example. (Refer to 4.3 Monitoring, Sampling, and Analytical Methods Used – Inorganics. This report deemed method used in the 2008-2009 study adequate for assessing levels of hexavalent chromium.

Rationale was ".. it was used by the California Air Resource Board (CARB) and the National Air Toxics Trend Stations (NAATS)."

NAATS' objective is to monitor long term trends to assess the effectiveness of specific emission reduction activities. Nonetheless, it is important to note NAATS' **mandated criteria for measuring hexavalent chromium be nothing less than TSP**. See http://www.epa.gov/ttnamti1/files/ambient/airtox/nattsworkplantemplate.pdf (under 2.3 measured pollutants)

In a further effort to validate adequacy of hexavalent chromium data from the 2008-2009 study this report states:

"The 2008-2009 study also included monitoring for hexavalent chromium, which was conducted using a modified form of California Air Resource Board (CARB) Method 039[URS 2009a]. While the CARB method involves collection of TSP on filters, this program ***collected a smaller fraction (PM10)…"***

Herein lies the problem – TCEQ altered the CARB method to detect a smaller amount.

TSP data is essentially absent from all data analyzed in this "analytical assessment."

Response to comment G.2.3.: We recognize the importance of particle size for inhalation dosimetry and deposition of particles to other environmental media. This will be a very important consideration in all health consultations that will follow this one. PM10 analysis is appropriate for the evaluation of inhalation exposure of respirable particles (see EPA document at: **[http://www.epa.gov/raf/metalsframework/pdfs/metals-risk-assessment-final.pdf).** Also, note that ingestion exposures will be evaluated in the health consultation from? other media beyond air data.

G.2.4. Comment:
ATSDR states in Issue 2, health protection assumptions will be made when assessing data.

What health protection standards will be utilized and which are deemed to be the most protective of public health---MRLS, RFD, IRIS, HAL, HAC, CREG, etc.? How will ATSDR deal with contaminants that have no health-based standards for health evaluation?

Response to comment G.2.4.: ATSDR will use conservative health based comparison values for our assessment, whether it be from ATSDR, EPA, TCEQ, or WHO. For contaminants where there are no health based comparison values, it is ATSDR's policy to consider the pollutant a contaminant of concern to be further evaluated using other toxicological and epidemiologic studies.

G.2.5. Comment:
With all deficiencies in available data it appears sufficient data does not exist to make a definitive statement that there is no public health hazard for any period.

As Dr. John Wargo, Professor of Environmental Policy, Risk Analysis and Political Science at Yale states

"the definition of acceptable or legally compliant air quality depends on what is measured, where and when it is measured and how the data are interpreted. …readings are taken from fixed monitoring stations and considered chemical by chemical. In addition, the EPA permits states to average levels of some pollutants over extended periods of time and across both urban and rural area when determining their compliance with Federal Standards. The effect is that high pollution episodes are often hidden in the data…

…Indeed what we know from the government about air quality in the United States has little relationship to the mixture of pollutants we breathe as we move among indoor and outdoor environments in our daily lives. <u>Perhaps the most important lesson is that little relation exists between the quality of air that governments monitor and report and the quality of the air you breathe as you move through daily life.</u>"

We should turn to other avenues to determine public health impact. ATSDR is working nobly (and we appreciate this) at attempting to retro-fit regulatory data that was not designed to provide a complete public health picture into a tool for assessing public health. Where there are gaps and voids of data ATSDR turns to air modeling. **The bottom line is that we still end up with data that cannot definitively evaluate public health impact – we just need to be up front with the public.**

Dr. Barry Johnson, onetime ATSDR Director, stated that there is a critical need to conduct epidemiological studies in communities where incineration is conducted – especially incineration of HW. We have had two major cement industries incinerating HW in kilns not designed for this purpose for many years in the past.

Epidemiology has been the primary tool for making public health judgments throughout the history of public health. Why not use this valuable tool in our community?

Response to comment G.2.5.: ATSDR believes that there are numerous studies that identify the association between environmental exposures and health outcomes (one such example is elevated particulates in ambient air and cardiopulmonary disease incidence). The process we are undertaking in Midlothian is based on ATSDR's standard approach to evaluate public health impacts using air monitoring data and public health outcome data to determine whether some other public health actions are needed at the site. Furthermore, health outcome data will be evaluated to identify anomalies in surveillance data that may indicate unusual levels of adverse health outcomes.

G.2.6. Comment:
Individuals are not exposed to individual pollutants. "One-chemical-at-a-time" approach to risk reduction is not realistic. Do you have adequate data necessary to evaluate "real-world" scenarios faced by residents of this community?

What data will you use to determine impact of exposure to multiple chemicals over a period of many years on the same people and on the same physiological systems? Will the body burden build up (over a lifetime for many) be factored in?

Do you have sufficient data to effectively apply EPA's Cumulative Risk Assessment that incorporates health status, community infrastructure evaluation and an examination of the history of the release of the source contaminants? EPA recognized there were many sources of uncertainty and variability inherent in the inputs to this assessment and that there was a high degree of uncertainty in the resulting conclusions.

Incomplete data will elevate the degree of uncertainty.

Response to comment G.2.6.: As previously indicated, ATSDR will evaluate the public health implication of one pollutant at a time, and then to the extent possible, will evaluate the implications of exposures to mixtures. This document has and our subsequent documents acknowledge and describe uncertainties in the evaluation, including incomplete or missing data.

G.2.7. Comment:
What is ATSDR's position on the precautionary principal?

ATSDR's mission statement: "Serve the public through responsive public health actions to promote health and safe environments and **prevent** harmful exposures."

Preventing harmful exposures means incorporating the Precautionary Principle.

The "Precautionary Principle," stemming from the German word "Vorsorgeprinzip," which literally means "fore-caring" reads

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

You will constantly be challenged by those who defend against public health trumping industrial prosperity. They will demand 100% proof-positive and then some that their collateral damage creates a public health problem.

The reverse should also be demanded from them when **the preponderance of evidence raises numbers of red flags** suggesting that it does.

It is a willingness to take action in advance of scientific proof or hard evidence on the grounds that further delay would prove to be too costly to society, nature and future generations.

I give as an example the **link between smoking and lung cancer**. There was approximately a 20 year gap between the time scientists began to suspect smoking as a cause of lung cancer and when they were finally able to positively link it scientifically.

In the meantime millions of healthy people developed cancer and died prematurely. A strong and powerful lobby with a lot of money did all they could to create and manufacture doubt about this potential link and thus made it extremely difficult for science to prevail.

Policymakers **assume** ecosystems can absorb a certain amount of contamination and allow polluters free rein to pollute until scientists prove that damage is done and protective action needs to be taken.

We need to ask ourselves, "Are we being short-sighted defending and relying upon data that has so many deficiencies and limitations as a panacea for evaluating public health?"

Will this be a signal to industry that they have not reached the limit?

Shortcomings in air monitoring data should be critically analyzed from **all health based perspectives** and they should be clearly and unequivocally stated. Not doing so will only jeopardize and risk the public health of the community and will diminish the efforts and tie the hands of those who are trying to protect it.

The ATSDR Mission Statement and the Precautionary Principle should be totally compatible.

Response to comment G.2.7.: It is our priority to give the people of Midlothian a scientifically sound evaluation of environmental data. We are faced with these issues on a day to day basis. It is our practice to err on the side of caution using conservative assumptions and estimating worst case conditions for evaluating exposures in communities.

G.2.8. Comment: One chemical alone may not be dangerous at the level detected but hundreds of different chemicals coming out at the same time could result in new and dangerous compounds. Synergism applies when the damage caused by two or more pollutants, either to human health or property, is greater than the effect or damage caused by each individual pollutant acting alone. How will ATSDR determine the synergistic effects of the multitude of hazardous chemicals emitted in Midlothian, Texas?

Response to comment G.2.8.: We understand that this is an important issue that is a concern for residents. For this health consultation, we did approach the data by individual pollutant to identify the adequacy of the database we have to evaluate exposures. ATSDR acknowledges that multi-pollutant exposure evaluations are difficult given the current state of knowledge. ATSDR will do its best to determine what the implications are for exposure to mixtures of air pollutants to the extent that available science will allow in subsequent health consultations.

Comment G.2.9.: ATSDR should align its health-based screening criteria with the health-based standards upon which the state and federal regulatory programs are already based.

Response to comment G.2.9.: In this health consultation, ATSDR used the most conservative health-based screening criteria available (regardless of whether it is the regulatory standard or a health-based guidance value issued by states, federal health or regulatory agencies, or the World Health Organization) to screen available data and select contaminants of concern for further evaluation. Toxicological and epidemiologic research is then evaluated in greater detail for individual pollutants in the context of measured or modeled residential exposures.

G.2.10. Comment:
ATSDR should align its health based screening criteria with the health based standards upon which the state and federal regulatory programs are based.

It appears that ATSDR will use screening values that are more conservative than federal and state agency risk assessment guidelines and policies. The comparison of data and air dispersion modeling results to overly conservative screening criteria, which is then discounted due to the uncertainties in the risk assessment process by the environmental regulatory agencies, will not contribute to the resolution of citizen concerns; rather, it will only exacerbate the level of distrust that already exist for a small group of citizens.

For example, the ATSDR's health-based comparison value for Arsenic (0.0002 ug/m^3) cited in HC1 is based on a 1E-6 cancer risk, whereas EPA routinely uses risk levels of 1E-4 (0.02 ug/m^3) and 1E-5 (0.002 ug/m^3) as the basis for its regulatory decisions. Further, the TCEQ has established a long-term Effects Screening Level for inorganic Arsenic of 0.01 ug/m^3 based on its review of the toxicological literature. It is not clear what purpose will be served by ATSDR reaching a conclusion based on a 1E-6 risk target, when neither TCEQ nor EPA will agree that potential health issues exists above levels of regulatory concern at that target risk level. In order to appropriately address risk, ATSDR should align its screening criteria with those that have been established through rigorous methods and employed by state and federal agencies.

Response to comment G.2.10.: In this health consultation, ATSDR used the most conservative health-based screening criteria available (regardless of whether it is the regulatory standard or a health-based guidance value issued by states, federal health or regulatory agencies, or the World Health Organization) to screen available data and select contaminants of concern for further evaluation. Toxicological and epidemiologic research is then evaluated in greater detail for individual pollutants in the context of measured or modeled residential exposures.

G.2.11. Comment:
ATSDR's failure to communicate what it has learned about the quality of the public's health is a public concern. ATSDR has taken its time to propose methodologies that in many ways duplicates the work of the past. It appears that the intent of ATSDR's proposal is simply to press people's risk-perception buttons, while the data to date supports the opposite conclusion-there is no cause of fear, as Midlothian is a safe place to live.

1. Nothing ATSDR has learned or been told creates a risk of a single event impacting members of the public.

2. The type of risks posed by the industries in Midlothian Texas are familiar. ATSDR has examined these types of common industrial risks before, as has the other Agencies who have examined them at Midlothian, in the past. Characterization takes time and is expensive, but the types of factors present in Midlothian are not unique, and can be characterized.

3. Cement and Steel manufacturing is common worldwide and the methods employed at Midlothian are standard for the industry. In fact there tends to be more use of more modem designs at Midlothian that emits less per ton of product.

4. Members of the plants work force are members of the community and they are a part of the study.

5. ATSDR's core goals include the collection, analysis, and summarization of data on environmental exposures and health. ATSDR should speak to the reason for the work proposed. ATSDR is not addressing an emergency but it is responding to inquiries on environmental health

topics. ATSDR proposes more work because select members of the community have requested the information. The data that ATSDR reviewed alone would not justify further data collection.

6. Cement produced in Midlothian is used in Midlothian and the surrounding community, all of Ash Grove's cement is typically sold in the surrounding communities.

7. New regulations can only reduce the risk about the facilities, because they reduce the emissions. Looking at the past has less value in areas where the future already has embraced improvement.

   "From terror attacks to bursting real estate bubbles, from crystal meth epidemics to online sexual predators and poisonous toys from China, our list of fears seems to be exploding. Yet we are the safest and healthiest humans in history. ... Understanding our irrational fears frees us from political and corporate manipulation, and makes our choices better."[15]

   ATSDR should respond to all comments by proposing actions that provide perspective on risk and allow for limited resources to be used in the best manner to promote healthy and safe environments, and prevent harmful exposures.

Response to comment G.2.11.:
ATSDR is conducting this independent assessment to respond to community health concerns and the result of a Congressional inquiry regarding the health status of the Midlothian community. ATSDR always strives to place perspectives on the risks associated with chemicals in the environment.

G.2.12. Comment:
In order to protect public health it is necessary to know what substances and exposure levels are resulting in health problems. Attempts began a long time ago. Progress has been made to establish limits of these substances based upon their relation to specific health conditions, (TLVs, ESLs PELs); however these limits were never established for the protection of human health, but for the impact or burden upon the surrounding industrial sites.

In a 1994 commentary, American Conference of Government Hygienists: Low Threshold of Credibility" by Dr Castleman wherein he criticized the TLV (threshold limit values) Committee for "having corporate employees, retirees and consultants take the primary role of drafting the documentary bases of TLVs for chemicals made by their corporate employers and clients".

Dow Chemical is credited for establishing the majority of the Effects Screening Levels (ESLs) used for setting allowable emission rates. Reminds me of an old saying about the "fox guarding the hen house".

Response to comment G.2.12.: In this health consultation, ATSDR used the most conservative health-based screening criteria available (regardless of whether it is the regulatory standard or a health-

[15] Gardner, The Science of Fear, cover.

based guidance value derived by states, federal health or regulatory agencies, or the World Health Organization) to screen available data and select contaminants of concern for further evaluation. Toxicological and epidemiologic research is then evaluated in greater detail for individual pollutants in the context of measured or modeled residential exposures. Please note that we rarely use occupational screening levels when evaluating residential exposures.

Section H. Report Generation and Review

Subsection 1. Process

H.1.1. Comment:
The commenter emphasizes that ATSDR specify in a Protocol or in the Public Health Response Plan (PHRP) exactly how it plans to perform the health consultations so as to provide the public a meaningful opportunity to comment and participate in the process. This will result in the health consultation being completed with the best available science.

Response to comment H.1.1.: The commenter and the community are referred to ATSDR's readily available "Public Health Assessment Guidance Manual" for information regarding the science used in our health assessments and health consultations: http://www.atsdr.cdc.gov/hac/PHAManual/PDFs/PHAGM_final1-27-05.pdf. Please note that all health consultations drafted by ATSDR will be issued for public comment and subject to external peer review prior to being issued as final.

H.1.2. Comment:
Comment 1.1: ATSDR should specify in a Protocol or in the Public Health Response Plan (PHRP) exactly how it plans to perform the health consultations so as to provide the public a meaningful opportunity to comment and participate in the process, and allow the health consultation to be completed with the best available science.

Response to comment H.1.2.: The commenter and the community are referred to ATSDR's readily available "Public Health Assessment Guidance Manual" for information regarding the science used in our health assessments and health consultations: http://www.atsdr.cdc.gov/hac/PHAManual/PDFs/PHAGM_final1-27-05.pdf. Please note that all health consultations drafted by ATSDR will be issued for public comment and subject to independent peer review prior to being issued as final.

Subsection 2. Review

H.2.1. Comment:
HC1 is the most critical step in this entire series of consultations. The framework established at this step will determine the quality of all the health consultations that will ensue.

We are assuming HC 1 will be peer reviewed before proceeding to HC 2. We recommend at least one peer reviewer be a PhD. level epidemiologist from a reputable school of public health who has experience assessing health impact of aggregate exposures to pollutants from industrial sources.

Response to comment H.2.1.: ATSDR is committed to performing an external peer review on this health consultation and all additional health consultations. These health consultations will consider all peer review comments from this health consultation before they are finalized. However, in the interest of staying on schedule, we might issue some health consultations for public comment before the external peer review of this health consultation is finished. We will consider your recommendation and we will attempt to get as wide a range of expertise as external peer reviewers.

H.2.2. Comment:
In keeping with the large volume of data that has already been developed on this area, it remains highly important that ATSDR objectively demonstrate to the citizens of Midlothian, the scientific community and other key stakeholders that all analyses that it performs (HC1 and other projected evaluations) are being prepared based on appropriate and sound scientific procedures.

Response to H.2.2.: ATSDR assures the community and industries in the area that we will use sound objective science in our assessment. Furthermore, internal and external peer review will be conducted to ensure that scientific validity is confirmed outside the site team.

H.2.3. Comment: The commenter urges ATSDR to provide a response to these comments prior to conducting the work so that substantive technical input can be provided to the process.

Response to comment H.2.3.: This appendix provides our written responses to all public comments received for this health consultation.

Appendix F: Peer Reviewer Comments and Responses

Midlothian Area Air Quality: Assessing the Adequacy of Ambient Air Monitoring Database for Evaluating Community Health Concerns

HEALTH CONSULTATION

FEBRUARY 2013

GUIDE TO REVIEWERS:

The objective of peer review conducted by the Office of Science is to ensure the highest quality of science for NCEH/ATSDR studies and results of research; therefore, your comments should be provided with this goal in mind. Unlike other peer review processes in which you may have participated, the questions to be addressed for NCEH/ATSDR are broadly based so that each reviewer may have a wide latitude in providing his/her comments. Any remarks you wish to make that have not been specifically covered by the General Questions Section may be included under question # 2 in the Additional Questions Section. Please note that your unaltered comments will be sent to the investigator for a response. You should receive a copy of the response to the peer review comments when they are available.

Reviewer #1

This report presents an evaluation of the utility of the ambient air monitoring data currently available for making public health assessments in the Midlothian area. This purpose emanates from residents' concern that the air pollutants emitted from the industrial facilities may be affecting their health.

The authors of and contributors to this report are commended for presenting complex sets of information and data in a lucid and concise manner. Presenting information in steps of increasing complexity is an excellent and effective strategy. It made a wealth of information easily comprehensible.

Response: Comments noted.

GENERAL QUESTIONS:

1. **In general, does the health consultation achieve its purpose of taking a very careful look at available air monitoring data and determining which measurements are---and are not—suitable for use in future ATSDR health evaluations? That is, are they suitable to help estimate what current and past exposures from the four major industries in Midlothian (three cement plants and one steel mill)?**

Reviewer Answer: The effort reflected in this report does make a careful examination of the available information and for the most part, partitions it correctly between acceptable and unacceptable uses. The strengths and weaknesses or shortcomings of each piece of information are fairly and accurately presented. However, the primary concern is whether the data representing emissions the three cement and one steel plant will be sufficiently robust or of the "best type" to perform definitive exposure and health evaluations, and for addressing community complaints.

The available ambient air data is unlikely to be sufficient to make accurate exposure estimates of the nearby community residents. There is a need for better estimates of actual exposures. This can be achieved by comparing ambient, neighborhood and personal air samples. It has been clearly shown over the past three decades that there is a low correlation between ambient air at stationary sites near point sources, ambient air outside of homes and personal air (breathing zone) samples (1-12), the latter actually representing pollutants that people are breathing into their bodies. Invariably, measured levels of all pollutants – air particulates (PM10 and PM2.5), elements/metals, volatile organic chemicals (VOCs), and semi-volatile organics (PAHs, pesticides) – have followed the trend of Personal air>Indoor air>outdoor air (outside homes)>monitoring sites (1-12). This exposure measurement (also known as misclassification) error (13) needs to be determined to understand the true uncertainty of exposure estimations from ambient air samples from monitoring locations that have been set-up primarily to characterize source emissions from industrial activities. The literature is replete with articles that have discussed these issues.

Several studies have shown that personal air levels for VOCs, particulates, metals, and SVOCs are higher than in ambient air taken near stationary sources. This complicates understanding the proportional contribution from point sources vs. all other sources for pollutants to people's exposure. Instituting control measures on point sources may or may not always significantly reduce the total exposure to pollutants and associated risks. Such circumstances can unwittingly lead to a false sense of security. Source apportionment permits the allocation of the proportion of point source pollution to the total exposure to a pollutant (or class of pollutants) for a population.

Thus, the main conclusion may not be supportable, i.e., there is insufficient data to give reasonable exposure estimates with accurate and acceptable uncertainties. The issue is not measurement quality but quality of data to represent actual exposure to people which is a function of not only their proximity to sources but also is a function of their activity patterns. In addition, studies have shown that data obtained from stationary source sites for small geographical areas by themselves doesn't have sufficient power for showing health effects, and that risk estimates can have very large uncertainty associated with them, due partly to exposure measurement error (15). Since personal air exposure measurements have not been made, true measurement error will be an unknown for the Midlothian case.

ATSDR Response: ***ATSDR public health assessments and consultations rely on the best available monitoring data to make our health determinations. ATSDR is tasked with evaluating the public health implications of exposures from releases of hazardous substances from various sources. It is our mission to review all available data to evaluate potential risks to the health of communities. In this health consultation, ATSDR evaluated the placement of the monitors to determine if data from these monitors could provide a reasonable estimate of what***

exposures might be in the Midlothian community. In some cases, like in Cement Valley, we generally believe that the monitors are appropriately placed to provide a good estimate (for some timeframes and air pollutants) of exposures to people living, working, or going to school in that area. In other cases, we believe that monitoring data may be lacking for health assessment purposes and we will be evaluating any gaps in environmental data and making appropriate recommendations for additional data, as needed, in subsequent health consultations.

ATSDR is aware that some studies have indicated that the total exposures from indoor pollutants can exceed those from exposure to outdoor pollutants, and that ideally, an assessment of total exposures from all sources/microenvironments (school, work, home) would yield a complete understanding of residential exposure. However, that type of analysis is considerably expensive and rare, and when conducted occurs during the process of health studies where an excessive exposure is known or suspected, or the etiology of a given health outcome is being researched. Indoor sampling is not typically used for source apportionment given the confounding nature of the sheer volume of pollutants that result from the use of indoor products (such as cleaners, odorants, soaps and detergents, etc.), or that emanate from other indoor materials (such as carpets, adhesives, wallpaper, furniture finishes, etc.).

2. Does the health consultation appropriately address the following six key issues related to understanding whether the air database is adequate to evaluate past and current exposures in Midlothian?

Key Issues (please comment on each):

- **the pollutants monitored**
- **the methods used to measure air pollution**
- **the quality of these measurements**
- **the time frames that monitoring occurred**
- **the frequency and duration of monitoring**
- **the monitoring locations**

<u>Reviewer Answer:</u>

- Pollutants monitored:

The monitoring data available for inorganic pollutants are the most robust of all data collected. The exceptions noted in the report are HCl, H_2SO_4, and vapor-phase Hg. Thus, the report correctly indicates that monitoring for acids (sulfuric, HCl and nitric) in air should be instituted. These pollutants potentially are important for ascribing acute pulmonary problems, e.g., respiratory irritants that are reported as complaints by residents. Except for particulate and ozone levels, most all of the other pollutants that have been monitored Midlothian area are not likely to be important root causes leading to the complaints received.

The report indicates that some monitoring data exists for several criteria pollutants, including some odorous pollutants and irritants. However, it was not clear whether there is data with a sufficient dynamic range to make health assessments for the criteria pollutants. Limitations in ambient data for small geographical areas have been discussed for other health assessment studies (15).

VOC data exists for nine out ten pollutants cited in the RTI emission reports, while many other VOCs are not measured, e.g., formaldehyde. Data available are from monitoring stations as well as at a few neighborhood locations. Never-the-less, there does not appear to be sufficient ambient air samples strategically taken outside of homes throughout the neighborhoods. More importantly, there are no VOC data for personal samples. Given the issues about exposure measurement error discussed above, the magnitude of the uncertainty likely will not be accurately known.

The report indicates that there are no monitoring data for sVOCs, e.g., dioxins, furans, PAHs. Since dioxins, furans, and PAHs are known to be produced as combustion products during the use of hazardous waste in cement kilns, the lack of these measurement data represents a major deficiency in the health assessment for chronic illnesses for pollution from these sources. It should also be noted that the same issue of exposure measurement error exists for these pollutants when using ambient air samples from monitoring sites near sources vs. outside homes and personal air samples.

This reviewer agrees that mercury, dioxins, furans, and CO should be monitored, at monitoring sites for sources, but the monitoring should also include neighborhoods. PAHs should have a lower monitoring priority, unless in the future petroleum-based fuels are used to heat the kilns. Since mobile sources will contribute to PAH levels in the ambient samples, the question is how much is actually contributed by the point sources to people's exposures. Because phenolics have been and could be burned again in the future, dioxins and furans could be present in the air particulates emitted.

Specific elements, if they don't already exist, that permit source apportionment should be included in the monitoring strategy so that one can ascribe the contribution of sources to the health impacts. Because other sources can blur this association it is important to tease out other source contributions.

Even though ATSDR proposes to model cases where the monitoring data is limited or absent, it is not clear what models would be used and how the uncertainty would be determined or estimated, especially since exposure measurement error for even the measured data will be unknown.

ATSDR Response: ***Please see response to Question #1 above regarding the use of personal samples by ATSDR and the issue of exposure measurement error. Source apportionment studies are typically conducted by state and federal environmental regulatory agencies, but are not within the purview of ATSDR. However, ATSDR does attempt to qualitatively determine if other sources, besides the primary ones being evaluated, are contributing to the ambient levels. Regarding modeling, ATSDR prefers to use quality ambient air monitoring data to evaluate exposures. However, if that is not possible, ATSDR will perform modeling using well-accepted models (e.g., AERMOD) and we will provide justification for the choice of model inputs and outputs.***

Reviewer Answer:
- Monitoring methods:

The methods employed are excellent. Data quality for analytical measurements are very good. The report duly notes the issues regarding the higher than desired detection limits for arsenic, cadmium, 1, 2- dibromoethane, and hydrogen sulfide. Also, problems regarding background levels for barium, total chromium, copper, manganese, molybdenum, and silver in filter blank samples are noted, and plans for handling the blank levels are believed to be appropriate.

Unacceptable data for metals collected in 1981 and between 1991 and 1993 are noted. Also, methods used to measure inorganics underestimated concentrations of nitrates; plans for handling these cases are satisfactory.

Detection limits for the methods used to measure the majority of pollutants seem to be adequate for making health assessments. Some important exceptions are As, Cd, certain VOCs, hydrogen sulfide where the detection limits were too high.

***ATSDR Response*: Comments noted.**

Reviewer Answer:
- Data quality:

The rationale for accepting data for further use in health evaluations is satisfactory. Under estimations of $PM_{2.5}$ levels is believed to have occurred for the Old Fort Worth Road site. The observation that the method precision for inorganics decreases as measurements approach the detection limits is a commonly observed phenomenon for most all analytical measurements. Field blanks were not blank for some metals, an issue that has been experienced in many studies. The data quality of acrolein is suspect and thus should not be used in making health assessments.

***ATSDR Response*: Comments noted.**

Reviewer Answer:
- Time Frames Covered by Monitoring Programs

The question is whether there is sufficient data with an adequate dynamic range of pollutant concentrations is of concern. Whether this will be an issue will be evident when making the health assessments. Backfilling with modeling is proposed; however, as a result the uncertainties could be very large and thus perhaps makes the overall the exercise futile.

***ATSDR Response*: ATSDR believes that modeling, in some cases, can provide worst-case exposure estimates to determine if additional monitoring is needed and to assist in helping to determine if a potential hazard exists.**

Reviewer Answer:

- Frequency and Duration:

The report does an excellent job of examining the frequency and duration of monitoring. For the most part they are appropriate with a few noted limitations. Although appropriate, because of its disassociation with personal exposure, the data will inherently have measurement error as discussed above (13).

***ATSDR Response*: Please see response above for Question #1 in relation to exposure measurement error.**

Reviewer Answer:

- Monitoring Locations:

Please refer to Question 1 above regarding the reservations about the monitoring locations that were available for the health assessment. The location of monitoring stations that produced ambient air data available to this health assessment was not intended to be optimal for estimating population exposure to air pollutants from the sources of interest. Instead they were strategically located to assess source emissions. Current monitoring needs to be augmented with more extensive neighborhood monitoring and with personal monitoring.

***ATSDR Response*: Please see response to Question #1 above.**

3. Given the six key issues in question 2, does the health consultation adequately identify the gaps in available air data set and address community concerns specific to the air monitoring network?

Reviewer Answer:

Even though the data gaps and limitations of the data available for making a health assessment are covered in the report, the magnitude of the weaknesses/limitations of the data are not fully discussed/appreciated. Most notably is the exposure measurement error due to the lack of appropriate locations used for collecting monitoring data (e.g., outside of homes and personal measurements).

***ATSDR Response*: Please see response to Question #1 above relating to the issue of measurement error and personal measurements.**

Reviewer Answer:

Relating community concerns/complaints with specific "air pollution events" was not as successful as one would have hoped for. However, the absence of measurement data for pollutants that are generally attributed to acute pulmonary or nasal (odor) irritations may account for not finding any associations. Acidic pollutants were not measured. Also, examination of criteria pollutant events vs. timing of complaints should be examined more closely. For example, the literature indicates that there is a lag time (24 to 72 hrs) between exposure to pollutant levels and onset of irritation and acute health effect for criteria pollutants and air particulates (14). Thus, if possible, it is suggested that a re-analysis of the data and complaints should be done using lag models.

***ATSDR Response**: ATSDR is aware of the lag observed between exposure and the possible on-set of an acute health outcome in the air pollution epidemiological literature. However, the analysis performed in this health consultation is not a study of exposure and health outcome. Our intent was to see if there was a correlation between a citizen non-health complaint (odor or visual increase in emissions) or emission event and elevated short-term levels of PM2.5 or sulfur dioxide. Therefore, evaluating a lag is not appropriate here since we did not evaluate any health outcomes for this analysis.*

4. Are the conclusions and recommendations appropriate in view of the purpose of the health consultation?

Reviewer Answer:

The ambient air monitoring data currently available for making public health assessments in the Midlothian area is believed to be inadequate. This concern stems from an absence of information on exposure measurement error that is associated with modeling stationary site ambient air monitors to estimate exposures of populations and making health assessments. Furthermore, the available data may not be sufficient robust to make assessments with acceptable uncertainties. Thus, the main conclusion may not be supportable, i.e., there is insufficient data to give reasonable exposure estimates with accurate and acceptable uncertainties. Given these concerns, achieving the objectives of the health consultation may not be possible.

***ATSDR Response**: With the notable exceptions and limitations that have been discussed in the health consultation, ATSDR believes that much data are available for our purposes. Please see responses to Question #1 above in relation to measurement error and personal exposures.*

5. Are ATSDR's responses to public comments appropriate and reasonable?

Reviewer Answer:

Odors and complaints are generally associated with acute effects, i.e., the exposure – effect relationship is a near real time event. In addition, complaints are correctly viewed as primarily acute health events.

Questions remain in regard to the examination of available data and the public complaints. Was the frequency of complaints analyzed relative to a) distance from plants, b) age of subjects, and c) sensitive populations (e.g., children, elderly, etc.)?

Were locations of monitoring stations appropriate for estimating exposures to a) children at schools, and b) persons living in assisted living facilities relative to point sources of pollution of interest in this study?

The analysis of odor complaints and emission event logs led to the major conclusion that no appreciable difference in levels of SO_2, NO_2, and $PM_{2.5}$ on the event/complaint days as compared to the days with no event or complaint. As indicated above a lag (24, 48, 72 hrs) analysis should be done to determine if there is an association between complaints and pollutant levels (14). Excluding complaints of odors, those complaints that have pulmonary-based effects don't necessarily exhibit immediate effects.

***<u>ATSDR Response</u>*: Given that our analysis of the correlation of odors/complaints and emission events is not in relation to acute health outcomes but whether these events represent an increase in exposures to PM2.5 and sulfur dioxide, the age of subjects and specifics relating to sensitive persons will not affect the approach to this analysis even if such data were available to ATSDR (which it is not). An evaluation of the distance to the plants might be fruitful but, again, such data are not available. Regarding the placement of monitors to evaluate exposures to school children and people in assisted living facilities, ATSDR will specifically evaluate children's exposure while in school and other potentially sensitive populations in future Health consultations.**

6. Are there any other comments about the health consultation that you would like to make?

<u>Reviewer Answer:</u>

It is recommended that dust samples be collected from homes (in undisturbed locations such as attics) and schools that are predominantly downwind and at various distances from the sources. Such dust samples represent an integrated deposition of pollution that occurred over time that the source of pollution existed and since when the home was built. For environmentally stable pollutants (e.g., metals, inorganics, dioxins, furans, PAHs) dust samples are a useful medium for determining long-term exposures.

Dust samples should be analyzed for inorganics and metals measured in ambient air samples from the monitoring sites near sources. Since PDF, Dioxins, and PAHs were not analyzed in ambient air samples, alternatively they can be measured in house dust. These measurement data would represent source emissions occurring anytime when biomass, hazardous waste, and tires were used as fuels for the kilns. By collecting and analyzing samples from homes at increasing distances from the presumed sources and if pollutants were emitted, the pollutant levels in dust nearer plants will be higher than those farther from the plants. In addition the data would be evidence that the pollutants were coming from these sources and present in indoor air leading to population exposure. As such, house dust measurements can serve as an index of exposure, and can provide an estimate of pica exposure in a sensitive population – young children.

It is recommended that elemental analysis of ambient particulate and house dust be conducted to permit development of source apportionment signatures for cement and steel factories. A comparison of signatures found in ambient particulate from source monitoring locations and house dust samples should be performed using models such as Chemical Mass Balance (CMB) and Positive Matrix Factorization (PMF). Such source signature analyses provide a link back to the source – cement kiln and steel plant – and forward to exposure (via house dust). Using these tools the contribution of pollution from the point sources of interest to the total exposure for each pollutant type (inorganics, metals, SVOCs) can be ascertained.

***ATSDR Response*: ATSDR's purview does not include identification of source or regulatory authority to regulate sources; that is a more sophisticated forensic analysis that requires source sampling and fingerprinting before any residential samples can be taken. Indoor dust, but not attic dust, sampling is generally used by ATSDR to evaluate residential exposure potential inside a home to pollutants known to be elevated outdoors, not to identify industrial sources outside the residence. Deposition will be evaluated in this community through the review of soil data to determine whether or not elevated pollutants in air are also elevated in soil.**

Reviewer Answer:
Modeling of exposures should include personal activities of high risk persons – children, elderly – since they will have different personal activities and thus exposure profiles as compared to other adults.

***ATSDR Response*: ATSDR models worst case conditions, and compares estimated worst case exposures to health based comparison values that are derived to be protective of the most sensitive members of a populations, including children and the elderly.**

Reviewer Answer:
The report should include more statistical data to depict distribution levels. For example, in addition to the mean, the median, geometric mean and percentiles should be included.

***ATSDR Response*: The purpose of this health consultation was not to evaluate exposure point concentrations which would be based on the appropriate estimate of central tendency or upper bound estimate of exposures. ATSDR evaluations use appropriate statistical metrics to determine reasonable exposure point concentrations.**

Reviewer Answer:
Additional discussion of other local potential sources of pollution should be included for the immediate geographical area. For example, what are the local sources of VOCs (refineries, mobile sources, traffic densities)? Other sources of VOCs complicate attributing emissions and exposure to the four plants.

***ATSDR Response*: Other ATSDR Health consultations will discuss qualitatively other sources of air pollutants in the area beyond what might be emitted by the four facilities of concern to the community.**

References

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ADDITIONAL QUESTIONS:

Are there any comments on ATSDR's peer review process?

Reviewer Answer:
I am not sufficiently knowledgeable on the process to comment on this question.

Are there any other comments?

Reviewer Answer:
No.

***ATSDR Response*: None needed.**

Reviewer #2

GENERAL QUESTIONS:

1. In general, does the health consultation achieve its purpose of taking a very careful look at available air monitoring data and determining which measurements are---and are not—suitable for use in future ATSDR health evaluations? That is, are they suitable to help estimate what current and past exposures from the four major industries in Midlothian (three cement plants and one steel mill)?

Reviewer Answer:
In general this consultation makes a careful and detailed examination of the available air monitoring data and its limits with regard to our health evaluations.

ATSDR Response**:** ***Comment noted.***

Reviewer Answer:
However, I find the document to be fuzzy with regard to how the data would actually be used (or limited) in conducting health assessments. For example, what health effects and risks have been linked to the specific pollutants emitted? For example is their sufficient information to examine the potential impact PM2.5 exposures (emissions and concentrations) on respiratory and cardiovascular disease? What are the limits of the data to do so?

ATSDR Response**: *This health consultation is not intended to provide a defined set of acute and chronic health effects of exposure to air pollutants in Midlothian. Future ATSDR evaluations (including the release of the draft for public comment evaluation of exposures to the NAAQS air pollutants and H2S in December 2012) will evaluate specific exposures and will determine, as the data allow, whether acute or chronic health effects are possible from past and current exposures. We agree that modeling is a reasonable screening tool and that actual measure air measurements directed at exposed populations are preferable. The findings from this health consultation will inform our future assessments as to what data are usable for ATSDR to make health determinations.***

Reviewer Answer:
The report, though aimed at evaluating monitoring, should give some information on the presence of apparent problems, for example, a record of exceedances of NAAQS standards for criteria pollutants. The report mentions an exceedance associated with construction (transient) but doesn't say whether there are additional exceedances that should be considered in a health assessment.

ATSDR Response**: *ATSDR has already released a health consultation that evaluates the public health implications of exposures to the NAAQS air pollutants and hydrogen sulfide (ATSDR, 2012b), where we discuss exceedences of the NAAQS standards.***

Reviewer Answer:
I also believe that the consultation could do a more thorough job in assessing the value of emissions data and the adequacy of such data for air modeling to fill in the gaps created by the absence of monitors for key pollutants.

There is clearly a paucity of information on the specific chemical concentrations associated with the burning of hazardous waste, plastics and tires at the three area cement kilns. ATSDR should include a literature review to determine what is known about the chemicals emitted when such fuels are burned including PAHs; the HCl present suggests that dioxin/furans would be emitted and the consultation states that dioxins/furans were reported by all four facilities. The consultation states the following:

"For pollutants with little or no available environmental monitoring data, ATSDR believes there is utility in modeling worst-case air quality impacts to determine if additional sampling is warranted"

It also specifically states (p. 37)

"dioxin and dioxin-like compounds" to TRI at least once since reporting year 2000. This TRI listing, by definition, is comprised of 17 individual pollutants that include both dioxins and furans [EPA 200b]."

To what extent is the emissions data on dioxins from the facilities or other information sufficient to conduct dispersion modeling? What is the basis for estimating emission rates?

***ATSDR Response*: ATSDR used dioxin/furan model emission derived from Toxic Release Inventory (TRI) Data. EPA conducts data quality reviews and provides extensive reporting guidance and reporting software/databases to ensure that TRI submissions are supported with reliable and defensible information (http://trisupportportal.com).**

2. Does the health consultation appropriately address the following six key issues related to understanding whether the air database is adequate to evaluate past and current exposures in Midlothian? Key Issues (please comment on each):

Reviewer Answer:

· the pollutants monitored (*YES)*
· the methods used to measure air pollution *(YES)*
· the quality of these measurements *(YES)*
· the time frames that monitoring occurred *(YES)*
· the frequency and duration of monitoring *(YES)*
· the monitoring locations (*see comment below)*

Further comment on monitoring locations: The consultation's section on monitoring locations should be strengthened, especially for PM2.5. The diagrams, shown below (from consultation Fig. 13) demonstrate a distinct lack of data on PM2.5 north (generally downwind) of the Ash Grove and Holcim cement plants. This is a significant gap because PM 2.5 is a much better measure of the respirable and ultrafine particulates than PM10 or TSP. PM2.5 including ultrafine particle size range is likely to have greatest adverse health effects according to the published literature. The consultation should say more about this; i.e. the PM10 may dominate the mass measurements (ug/m3) but is a poor indicator of number concentrations (N/m3) which studies indicate may have a greater impact than mass. I agree with following statement found on p. 9 of the Consultation, which an especially serious gap with regard to PM2.5.

Three monitors were located south of the TXI Operations facility: the Midlothian Tower station, the Mountain Creek station, and the Mountain Peak Elementary School station. These locations are typically upwind from the main sources of air pollution in Midlothian. While measurements from these monitors are valid, they are not reasonable indicators of the worst-case air pollution levels.

Will ATSDR conduct or recommend additional monitoring to fill in this gap? Moreover, I would strongly recommend that sampling be conducted to establish the size distribution of particulates from coarse to ultra-fine. Note also that sulfur dioxide, emitted in substantial quantities from the facilities, will form very fine, aerosol sized particles when exposed to oxidizing atmospheres (high ozone).

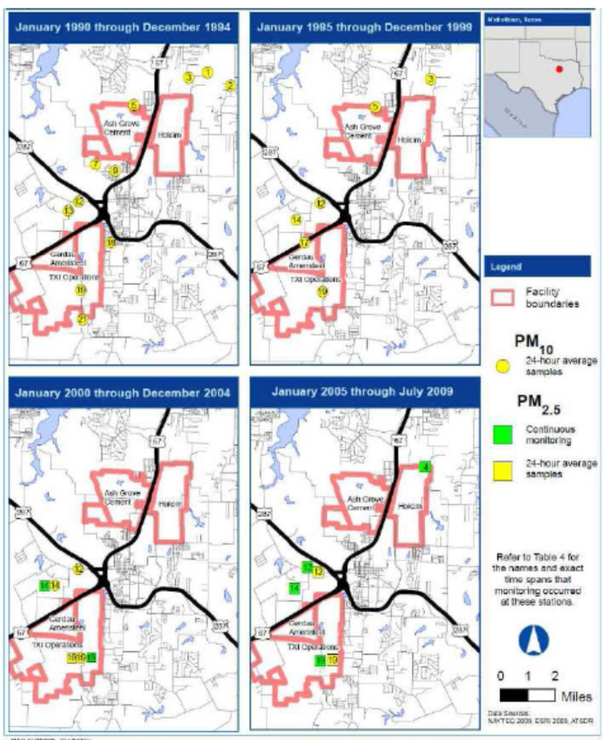
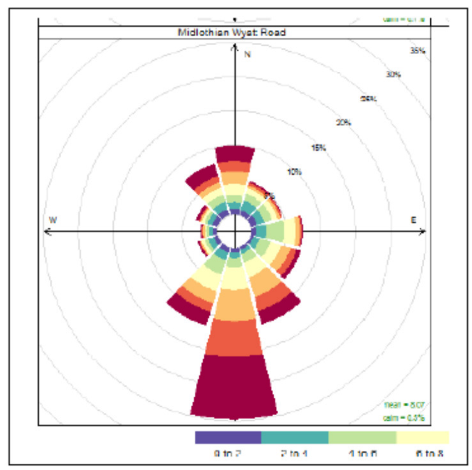


Figure 13. Inorganics (Metals) Monitoring Locations within Area of Interest



ATSDR Response**:* ***Thank you for your comments related to the first five key issues. Regarding your comments on the monitoring locations, PM2.5 monitoring data are available downwind of the Holcim facility for the years 2006 to the beginning of 2010 and these data along with any identified PM2.5 gaps in the environmental data, are evaluated in the ATSDR NAAQS Air Pollutant and H2S health consultation that was released for public comment in December 2012 (ATSDR, 2012b). We also agree that PM2.5 is a good measure of respirable particulate matter that should be evaluated to determine the health implications of inhalation exposure. ATSDR estimated what past PM2.5 levels might have been by calculating a PM2.5 to PM10 ratio which we based on data available from two nearby monitors that reported

several years of concurrent PM10 and PM2.5 data. ATSDR does not believe that requesting an analysis of the particle size distribution will assist in determining if there is a health concern for current particulate matter exposures since PM2.5 is considered a good measure of respirable particulate matter. ATSDR will be evaluating acid aerosol exposures in a future HC.

It is important to note that exposures south of TXI are not likely to be the worst-case exposures from this facility. The likely worst-case exposures from emissions from Gerdau Ameristeel and TXI are likely in Cement Valley which is in the predominant downwind direction (north). ATSDR has a fairly robust dataset from the several monitoring stations that have been located in Cement Valley to use to evaluate the public health implications of exposures from these facilities.

3. **Given the six key issues in question 2, does the health consultation adequately identify the gaps in available air data set and address community concerns specific to the air monitoring network?**

Reviewer Answer:
See previous comments.

ATSDR Response: See the previous response.

4. **Are the conclusions and recommendations appropriate in view of the purpose of the health consultation?**

Reviewer Answer:
As stated previously, I believe that the document does an overall excellent job in assessing the quality / adequacy of the data (exception noted under point 2). However, the consultation could provide more information on the ways that specific kinds of data would be used in a health assessment. (See previous discussion of PM2.5). Note citizen comments on asthma, known to be associated with PM2.5 exposure. One way to do this might be to construct a table or flow chart showing the ways that links between specific pollutant exposures and health outcomes would be evaluated. This information may be available in other documents; however, having such a section would contribute to the assessment of data adequacy for specific uses and would certainly help the reader.

ATSDR Response: ATSDR added a statement in this health consultation regarding how the data deemed to be adequate for health assessment purposes will be used in future health consultations. The focus of this health consultation (as requested by the community) was to evaluate the adequacy of the air data base to evaluate the public health implications of exposures in Midlothian from the four facilities of concern. Currently released (ATSDR, 2012b) and future ATSDR health consultations will clearly explain the exposure levels and discuss any possible harmful effects that might occur from these exposures.

Reviewer Answer:

The consultation states that a future study will include AERMOD modeling to help fill in the gaps inherent in the monitoring data. To what extent is the emissions data required necessary to conduct such modeling?

ATSDR Response*: *Emissions data are a necessary model input in every air modeling program.

5. **Are ATSDR's responses to public comments appropriate and reasonable?** ***In general yes. However a few specifics:***

Reviewer Answer:

I recommend that in summarizing community concerns at the front of the document that you summarize concerns regarding potential health impacts; this lies at the heart of community concern and should be mentioned even though the this particular consultation focuses on the adequacy of monitoring data.

ATSDR Response*: *Community concerns were gathered during several meeting with the public and are captured in ATSDR's Public Health Response Plan (ATSDR, 2011). Each of these concerns has or will be evaluated at least once in the other health consultations being conducted by ATSDR.

Reviewer Answer:

Note the following exchange:

> **G.1.3. Comment:** There are substantial gaps in monitoring data. For some periods of time, there is no monitoring data available at all. For instance, ATSDR has no ambient air monitoring data for any pollutants in the time period from 1987 to 1991. That is the period when all three cement plants were experimenting with hazardous waste burning. Immediately after that time from 1991 to 1994, a cluster of approximately 12 Downs Syndrome babies was born. Has ATSDR reviewed the manifests of wastes being delivered to each of the plants during those years? It would be extremely unlikely that computer modeling could fill in the data for a time period filled with uncertainty.
>
> **Response to comment G.1.3.**: Birth defects, including Down syndrome, will be evaluated in the Health Outcome Data Evaluation Health Consultation for the area we believe to be of maximum impact, Midlothian, Ellis County, Public Health Area 3 and Texas. Although it is correct to say that there are no ambient monitoring data for most of the sites when hazardous waste was being incinerated, there are monitoring data downwind from TXI during periods of time when it was burning hazardous waste. Ambient data are a better indication of exposure for VOCs and metals as opposed to reconstructed emissions which will have uncertainties with regard to control and destruction efficiencies, inventory lists, etc.

In my judgment, the response should go further and state how the health assessment will address the absence of monitors downwind of the other two cement plants during the period mentioned.

Moreover, what monitoring sites for which pollutants does ATSDR consider to be downwind of TXI? Are there likely to be interferences from the steel plant? Also in my judgment, PM2.5 is another pollutant that should be considered, especially if an analysis of size distribution shows that the bulk of the number of particulates is below a micrometer or 0.5 um in diameter.

<u>ATSDR Response</u>: The Old Fort Worth Road and Wyatt Road monitors are considered to be in the general primary downwind direction of TXI and, secondarily, the Midlothian Tower monitor would be considered downwind when the wind is blowing from the north. Certain common air pollutants from TXI and Gerdau may be captured by these monitoring sites and it will be difficult to distinguish between which facility emitted it except for certain pollutants where we know that one plant released them in larger quantities (e.g., SO_2 is emitted in much larger quantities from TXI than for Gerdau).

Our modeling inputs for the pollutants emitted collectively in greatest quantity from the four facilities reflect all years when emissions data are available, including the years Ash Grove burned hazardous waste. The year with the largest reported volume of the pollutant was selected for modeling a "worst case" annual average for each of the pollutants modeled. However, only two of the 12 pollutants/pollutant classes modeled for Ash Grove included emission rates between 1986-1991 (7/12 of the highest emission years fell outside this time range; of the 5 other pollutants, 2 fell within this time range, and three were not reported at Ash Grove, but were reported at one of the other three facilities).

***6.* Are there any other comments about the health consultation that you would like to make?**

<u>Reviewer Answer:</u>
Clearly a great deal of research and thought has gone into the document; however I found it difficult to read. I would suggest putting the conclusions and recommendations (last section) at the very beginning along with footnotes sending the reader to specific sections, comments and responses. The readers will be discouraged by the amount of detail required to get to the main points. Once readers have the overall picture they can go to the details based on their particular interests or concerns. The current format (6 questions) doesn't reflect this need. The conclusions such as those provided at the end are clearer and should be placed up front.

<u>ATSDR Response</u>: ATSDR's Summary in Info Mapping format has been tested by community focus groups and we believe it to be easy for the general public to read (the primary audience for this health consultation). The reason we have a Summary in this format is for those who may not want to read the entire document. The main conclusions, decision criteria and next steps (which combine recommendations and public health actions) are placed at the beginning of the document for the reader to get an overall understanding of the main findings. Besides the first two sections of the document, the body of the document is separated into sections based on the six primary questions that we address that relate to the adequacy of the database to make public health determinations. The Summary section is based on what is found in the Conclusions, Recommendations, and Public Health Action plan and, as stated above, has been found by ATSDR to better convey messages to the general public (Ulirsch, et al. 2011).

Reviewer Answer:
The introduction should also include a discussion of all of the studies on Midlothian currently underway or planned for the future including brief descriptions and the use of monitors and modeling to estimate exposures.

ATSDR Response: The health consultation refers to the previously published ATSDR Public Health Response Plan (ATSDR, 2011) which lists all of the agreed upon assessments that ATSDR is planning. We do not see the need to repeat them in this document.

Reviewer Answer:
I recommend that Section 3 on community concerns should include health- related concerns—the principal area of concern for the community. Although the consultation focuses on monitoring, it is essential that the document identify the health concerns of residents and provide more discussion on the relationship between this consultation and future assessments.

ATSDR Response: As previously stated, the focus of this health consultation was to evaluate the adequacy of the air database in Midlothian for use by ATSDR to evaluate the public health implications of exposures from the four facilities of concern to the community. All health-related and other concerns by the community were captured in the Public Health Response Plan and each will be specifically addressed in the other ATSDR health consultations.

ADDITIONAL QUESTIONS:

1. Are there any comments on ATSDR's peer review process?

Reviewer Answer:
None

ATSDR Response: None needed.

2. Are there any other comments?

Reviewer Answer:
The agency plans future studies that will attempt to evaluate potential relationships between emissions and health impacts in affected communities. Such studies are bound to contain large uncertainties including those associated with data gaps, and those associated with the difficulties in reconstructing past exposures. Although a finding of “inconclusive” doesn’t rule out the potential for risk, “inconclusive” has been used as a rationale to negate the need for preventive actions, such as modernization of a facility that would lower emissions.

One commenter raised this issue, and urged ATSDR to take a precautionary approach. I concur and encourage the agency to follow its mission statement, “To serve the public through responsive public health actions to promote healthy and safe environments and prevent harmful exposures.” And to adhere to ATSDR’s response to the commenter: “It is our practice to err on the side of caution using conservative assumptions and estimating worst case conditions for evaluating exposures in communities."

<u>ATSDR Response</u>: Thank you for your comments. ATSDR will adhere to our mission statement to serve the Midlothian community though responsive public health actions, to promote a safe and healthy environment, and to prevent harmful exposures.   We will do this by using what we learned in this health consultation to inform our other assessments. All subsequent evaluations will be conducted in accordance with the ATSDR Public Health Assessment Guidance Manual (ATSDR, 2005).

<u>Reviewer Answer:</u>
I would recommend that ATSDR engage in a discussion with stakeholders regarding this key issue—how much evidence is needed to warrant that measures are needed to eliminate, prevent or control emissions and associated risks/impacts? In my opinion that best time to do this before an assessment is conducted, to allow stakeholder input into ATSDR's evaluation. Moreover, ATSDS should be clear with stakeholders in advance how ATSDR will evaluate apparent clusters and their potential relationship to emissions and whether the population apparently affected as well as the adequacy of monitoring and modeling data is sufficient to draw any conclusions.

<u>ATSDR Response</u>: ATSDR has had several discussions with the community on these issues. Our primary reason for this health consultation, and its release before our other assessments, was to provide the community (at their request) with some perspective on the adequacy of the database for use in other health consultations to determine exposure levels and possible public health implications of these exposures.

<u>Reviewer Answer:</u>
The need for this discussion is clearly reflected in the following comment; I share the commenter's concern that an enormous study (one that generates great expectations) may well lead to an inconclusive result.

> "ATSDR does not have the information it needs to adequately assess or address any health concerns of anyone in the Midlothian community. To come back and tell the people anything else would be intellectual dishonesty on ATSDR's part and a disservice to all the citizens of the Midlothian community, the millions of people living in the DFW metroplex, and the whole nation. ATSDR's Midlothian study will be used by the business industry to continue to pollute the air, soil, and water while the rates of asthma, respiratory disease, auto-immune diseases like autism, and different types of cancers continue to climb upward among the populace." (From Comment G.1.11)

ATSDR's response includes "To address concerns over the data quality, we will have outside air experts evaluate this document for scientific accuracy as well." As one of those outside reviewers, I want to be clear that my review deals principally with issues related to the quality of the monitoring data. However, the Consultation does not shed light on the commenter's concern. I would rephrase the question as follows:

Even if the monitoring data were of the highest quality and had no substantial gaps, would the data enable ATSDR or others to determine whether there are potential links between the area's emissions and the health impact of community concern?

***ATSDR Response**: ATSDR will only draw conclusions where there is some adequate basis to do so. ATSDR believes that there is adequate data for some air pollutants, at some locations, and for some timeframes in Midlothian to be able to support health determinations. In areas or during timeframes where such data are not available or of good quality, subsequent ATSDR health consultations will perform worst-case air modeling to evaluate past and current exposures if adequate emissions and other data are available or we will make recommendations to fill gaps in the environmental data to help evaluate current or future exposures. For some exposures, there will be some locations and timeframes that ATSDR will not be able to reconstruct exposures and make any health determinations.*

Reviewer #3

GENERAL QUESTIONS:

1. **In general, does the health consultation achieve its purpose of taking a very careful look at available air monitoring data and determining which measurements are---and are not—suitable for use in future ATSDR health evaluations? That is, are they suitable to help estimate what current and past exposures from the four major industries in Midlothian (three cement plants and one steel mill)?**

Reviewer Answer:
The Health consultation document provides a comprehensive summary of the databases available for the area since the 1980's. These data were not taken to conduct any specific health related investigation, but were primarily associated with compliance monitoring and achieving the NAAQS. The suitability for future health evaluations is dependent upon the pollutant of concern and the health outcome under evaluation. For example, a number of the pollutants, e.g. ozone, SO_2, are known to cause asthma attacks. The data base is strong enough to apply the data to records for hospital admissions to ER visits to examine for increases in each during days of high exposure levels, with the correct averaging times, for such pollutants. Further, the wind rose data will be very useful in that assessment.

The ambient carcinogens present a major challenge. There is a long latency period, between exposure and the onset of most cancers. Further, 1 in 4 Americans contract a cancer over their lifetime, for multiple reasons, e.g. smoking, and diet. Thus, is there enough power in the data collected on carcinogens, e.g. arsenic and specific VOCs, to find an increased risk due to exposures to these pollutants? It is doubtful since for the VOC's alone, no measurements were made prior to 1993 and they were completed at a limited number of locations.

As stated clearly by the ATSDR, the emissions data are a useful screening tool, since modeling of these data can yield large uncertainties in the results. I would suggest using a portion of the monitoring data for selected pollutants (ones with the most data) to test the performance of any modeling exercises prior use in a specific health effects exposure – response or exposure – risk evaluation.

The monitoring data will be of use in health evaluations for the period post 1980 for individual pollutants, and very specific health outcomes. These must be outlined clearly for the community prior to the investment of time and effort to complete such analyses, and the results and conclusions must include an estimate of the level of uncertainty.

The historical data base cannot be changed, but efforts should be made to obtain data for what I would consider to be the more likely pollutants and health outcomes of concern for the sources of concern, i.e. cement manufacturing, in this community.

PM presents a particular challenge because the form of PM measurements made over the years has changed from TSP to PM10 to PM2.5. Each has its own health effects of concern, especially in the case of emissions from cement production facilities. The reason for the variety of forms of PM standards has been the change in focus of the size range of interest for health effects. Here again the ATSDR must be clear about the effects of interest, and the limitation of the data. For long term health effects I am not too concerned about the every 6^{th} versus daily sampling. However, for acute health outcomes, e.g. heart attacks, this gap in daily concentrations of PM2.5 presents an epidemiological problem. Conversely, the availability of continuous PM2.5 data can help resolve this problem since it is the variability in PM that is concern for acute PM related health effects.

However, my primary concern is the current lack of sampling for PM10 and TSP. There are fugitive emissions from cement facilities and these can contain highly irritating levels of cement particles (high pH), and will not track with the PM2.5 levels. PM10-2.5, and TSP-PM10-PM2.5 have much shorter lifetimes in the atmosphere before deposition, and the deposited material (available for re-suspension) will affect individuals living closer to the plant. This lack of data needs to be thoroughly reviewed and the current measurement strategy for PM augmented to reflect human exposures, not just air quality.

Conclusion: there is good data taken for a variety of purposes, but it must be used wisely in health evaluations. The uncertainties much be identified and recommendations made to fill data gaps necessary to answer questions specifically related to acute health outcomes.

ATSDR Response: ***ATSDR will keep these comments in mind as we conduct our future evaluations. Regarding your concern for the degree of sampling for PM10 and TSP and fugitive dusts, we share that concern. In ATSDR's evaluation of the public health implications of exposures to the NAAQS air pollutants and H2S (ATSDR 2012b) we discuss issues related to cement kiln dust and ATSDR will further evaluate these issues in two future health consultations.***

2. Does the health consultation appropriately address the following six key issues related to understanding whether the air database is adequate to evaluate past and current exposures in Midlothian?

Key Issues (please comment on each):

- **The pollutants monitored.**

Reviewer Answer:

Yes, it provides background on the pollutants and some degree of information on the reasons why they were measured, e.g. NAAQS and compliance

- **the methods used to measure air pollution**

Reviewer Answer:

Yes, the section of the methods was comprehensive for each pollutant or pollutant class measured in the area.

- **the quality of these measurements**

Reviewer Answer:

Yes, the report provides detailed information and analysis about the detection limits, differences in methods used for the same pollutants.

- **the time frames that monitoring occurred**

Reviewer Answer:

Yes, the document provides very good information on the time frame for sampling. However, the ATSDR do not place this information into a context for utility in addressing important health outcomes. This is left for another report, which just extends the time between information gathering and feed back to the community on issues of concern.

- **the frequency and duration of monitoring**

Reviewer Answer:

Yes, but again the ATSDR does not place this information into a context for utility in addressing important health outcomes, and what would need to change.

- **the monitoring locations**

Reviewer Answer:

Yes, but again the ATSDR does not place this information into a context for utility in addressing important health outcomes, and what would need to change.

Notes: As taxonomy of the available monitoring information I find that the ATSDR did an excellent analysis. However I do not agree with the main conclusion. The ATSDR has not provided sufficient evidence that the data support public health evaluations. Without identifying the health outcomes that ATSDR considers to be important, there are substantial uncertainties in the ability of the dataset or sub-portions of the data set to effectively address exposure- response relationships. Further, for acute effects caused by fugitive emissions of PM from the cement facilities the dataset is inadequate, and the inadequacy cannot be overcome by modeling. Thus, the conclusions must be more specific to the pollutants and health conditions that can be addressed by the data, and the limitations. These are not associated with any deficiencies in the ATSDR analyses, but limitations in the data available now and for the foreseeable future.

***ATSDR Response*: Thank you for your comments on the first five key issues. Regarding your comment on monitoring locations, ATSDR does believe we have adequate data to evaluate exposure to certain air pollutants, during certain timeframes, and in certain areas. ATSDR's overall conclusion was not meant to imply that we have perfect knowledge for all air pollutants, timeframes and locations; however, there have been a lot of quality air sampling**

conducted in Midlothian and we plan on using these data to make as many health determinations as possible. We agree that monitoring in some areas near the facilities may be inadequate to evaluate fugitive dust acute exposures and that modeling may not overcome these inadequacies. We agree that our future evaluation conclusions should be tailored to individual air pollutants for specific timeframes and locations in Midlothian.

3. Given the six key issues in question 2, does the health consultation adequately identify the gaps in available air data set and address community concerns specific to the air monitoring network?

Reviewer Answer:
No. The analysis and report lacks a defined set of acute and chronic health effects of potential concern. Such an anchor would allow for placement of the measurements, in time and space, and the pollutants measured into a scientifically sound context for conducting future exposure response analyses. Air quality modeling is a reasonable screening tool for addressing the need for particular types of future monitoring. However, *it cannot replace actual measurements* directed at population exposures.

ATSDR Response**:** ***This health consultation is not intended to provide a defined set of acute and chronic health effects of exposure to air pollutants in Midlothian. Future ATSDR evaluations (including the release of the draft for public comment evaluation of exposures to the NAAQS air pollutants and H2S in December 2012) will evaluate specific exposures and will determine, as the data allow, whether acute or chronic health effects are possible from past and current exposures. We agree that modeling is a reasonable screening tool and that actual air measurements directed at exposed populations are preferable.***

Reviewer Answer:
Further, I think there is enough information to ask for more measurement sites in areas where the population lives close to the fence line. Based upon the comments made by the public there are adequate reasons to request the measurements of PM greater than PM10, defines as *super coarse particles*, to assess the impact of fugitive emissions on acute inhalation health impact and the deposition of such materials on surfaces, e.g. outdoor picnic tables etc.

ATSDR Response**:** ***ATSDR has already made a recommendation to perform additional sampling in areas where fugitive dusts may be a problem (ATSDR, 2012b). ATSDR is further evaluating this recommendation during the peer review process for this document. ATSDR is planning to evaluate "other media" downwind of TXI and Gerdau Ameristeel which will attempt to see if soil, sediment or surface water samples may provide some evidence of the deposition of chemicals from particulate matter emissions from these facilities.***

4. Are the conclusions and recommendations appropriate in view of the purpose of the health consultation?

Reviewer Answer:
No, because the lack of information that can provide the public with a context for the reasons for the next level of analysis. The process is valid, but there is a disconnect between the focus of the

report and the purpose of the report "Adequacy … of database for addressing community health concerns." The report does not achieve this goal because of the lack of context. Years of quality assured data is a very important start, but there needs to be an exposure-hazard context. For instance, asthma is an important health outcome which can be assessed with this database for a number of pollutants. Cancers in general will be difficult to address with this dataset, but individual cancers may be screened for specific compound, e.g. VOC.s.

My recommendation, ATSDR provide a table in the report which can point the measured pollutants and measured concentrations to the types of health outcomes associated with exposure to be considered in the next set of the evaluation. Such a table can be provided as part of the concluding discussion and significantly enhance the overall conclusions.

ATSDR Response**:* ***As stated above, this health consultation, by design and agreed upon by the community, focused on evaluating the air monitoring database to determine its adequacy for use by ATDSR to determine the possible health impacts of past, current and future exposures. Other ATSDR evaluations will provide the community with the health context you suggest. Specific health outcomes (e.g., asthma, cancer, etc.) will evaluated to determine if there is an increased risk of these based on exposure levels and whether the rates of these health outcomes are elevated as compared to other areas in Texas.

Reviewer Answer:
Most of the specific recommendations on monitoring are reasonable, I strongly support the idea of modeling dioxins etc., these are very expensive measurements and unless there is a strong potential –exposure-health outcome issue resources are better applied to other measurements. For instance, I strongly support adding a recommendation about the current need for monitoring for fugitive emissions of Total PM, PM2.5+PM10-PM2.5+PMsupercoarse, in and around neighborhoods near the facilities.

ATSDR Response**:* ***Thank you for your support for the idea of modeling for dioxins and other compounds.

5. Are ATSDR's responses to public comments appropriate and reasonable?

Reviewer Answer:
In most circumstance, yes. However, in some instances, especially related to health outcomes, the ATSDR defers to the next analysis. The inadequacy of the current answer can be overcome with the Table that I requested in my answer to question #4. Some of the health effects issues will be impossible to answer given the specific nature of the effects of concern. I think the ATSDR needs to be transparent on this issue.

For instance, multi-pollutant exposure and response issues are difficult to address, especially in a dataset that does not have the same pollutants measured at the same site, over the same overall duration in time, and with a sampling frequency that can be linked to a specific acute or chronic health outcome of concern. In addition, some of the multi-pollutant and single pollutant exposure-health effects issues will have confounders, e.g. indoor emissions of the same pollutant, and other causes (genetics) of the same health outcomes.

ATSDR Response*:** ***Please see response to your comment for question #4 above. ATSDR will provide the transparency that you suggest in our other evaluations. ATSDR agrees that multi-pollutant exposure evaluations are difficult given the current state of knowledge; however, we have promised the community that we would attempt to perform such an evaluation in other ATSDR health consultations.

6. Are there any other comments about the health consultation that you would like to make?

Reviewer Answer:
My concerns are not related to the adequacy of the time and effort put in to gathering the information on the air monitoring database. This was a major undertaking and the ATSDR did a very good job. My major problem was the lack of a contextual framework linking the current efforts to the eventual design of the health evaluation. The public and other stakeholders need to know what are the major exposure- health outcome issues can be evaluated in the next level of analysis. I think my suggested Table addresses that issue directly.

ATSDR Response: **Thank you for your comments. Before beginning our work in Midlothian, ATSDR developed, in conjunction with the community, a Public Health Response Plan (PHRP) that provides a transparent and agreed upon approach to evaluating the concerns of the public (ATSDR, 2011). We do not believe that having a discussion of specific health outcomes in this health consultation will add to the transparency that we have already established with the community through our PHRP and public interaction.**

ADDITIONAL QUESTIONS:

Are there any comments on ATSDR's peer review process?

Reviewer Answer:
No

Are there any other comments?

Reviewer Answer:
No

ATSDR Response*: *No response needed.