HEALTH CONSULTATION

Air Exposure Pathway Assessment

FALLON LEUKEMIA CLUSTER INVESTIGATION

FALLON, CHURCHILL COUNTY, NEVADA

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1.0 Executive Summary

The Nevada State Health Division has been investigating a childhood leukemia cluster in the area of Fallon, Nevada, in Churchill County since late summer of 2000. The Nevada State Health Division requested technical assistance from the Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control and Prevention's National Center for Environmental Health to aid in the investigation. ATSDR was asked to help identify possible chemical releases, to evaluate environmental data, and determine whether environmental exposures are associated with the childhood leukemia cluster in Fallon, Nevada [1].

The area evaluated is larger than the city of Fallon, but smaller than Churchill County. Because of the extensive work involved in conducting an exposure pathway analysis for such an area, ATSDR divided its pathway analysis into segments according to environmental media. This report specifically addresses the exposure pathway analysis for air.

For this analysis, ATSDR reviewed the following data for Churchill County:

- Air quality permits of 37 companies in Churchill County
- Results of air modeling for Churchill County extracted from the U.S. Environmental Protection Agency (EPA) national air modeling results for 1990 and 1996 emissions
- Analytical results of indoor air samples collected in houses in which a person with acute lymphocytic leukemia resided (case houses) and from houses where no one in the house had leukemia (control houses)
- Analytical results of previously collected outdoor particulate samples
- Analytical results of air samples recently collected to detect volatile organic compounds and mercury vapor
- Facility-specific air modeling of particulate emissions in the Fallon area.

Agricultural and governmental use of pesticides is evaluated in a separate report [2]. Air emissions from the Fallon NAS Station are evaluated in the ATSDR Public Assessment-Naval Air Station Fallon [3].

The data evaluated in this report do not indicate an association between childhood leukemia and environmental exposure from industrial and commercial air emissions. The source and types of emissions and their fate and transport in the environment support this conclusion.

During this evaluation, ATSDR identified three contaminants of concern (arsenic, mercury, and tungsten) based on measured levels that exceeded one or more of ATSDR's comparison values or was elevated in biological samples. While these substances are not known to be linked with leukemia, they were evaluated for other potential health effects.

Arsenic became a contaminant of concern because levels in outdoor air exceeded ATSDR's **comparison values**. Upon additional review, ATSDR determined that measured values in air are not likely to cause adverse health effects because measured levels in Fallon are within the ranges of total arsenic levels measured in other remote and urban areas in the United States and arsenic (inorganic) in air is a carcinogen associated with cancer of the respiratory system [4]. These types of cancers were not among the list of community concerns provided to ATSDR.

Comparison values (CVs) are media-specific concentrations that are considered to be "safe" using default conditions of exposure. Default conditions are typically based on estimates of exposure in most (i.e., the 90th percentile or more) of the general population. Comparison values are not thresholds of toxicity, but levels at which ATSDR believes that even long-term exposure to sensitive populations would not result in an increase in the likelihood of developing adverse health effects. When a level is above a comparison value, it does not mean that health effects could be expected, but represents a point at which further evaluation is warranted.

Comparison values are based on a variety of toxicological and exposure assumptions that may not reflect actual exposure conditions and risk of adverse health outcomes. If warranted, ATSDR evaluates a number of parameters depending on the contaminant and site-specific exposure conditions. Such parameters may include biological plausibility, mechanisms of action, cumulative interactions, health outcome data, strength of epidemiological and animal studies, and toxicological and pharmacological characteristics.

A portion of the mercury vapor samples (collected every 5 minutes for one week) in outdoor air exceeded ATSDR's comparison values. These measurements were recorded using a screening instrument with potentially significant interferences from other chemicals that could produce incorrectly higher results. The measurements were not consistent from reading to reading. The measured average levels exceeded ATSDR's screening values but are within the screening value's 30-fold safety factor. Total mercury was below levels of concern in indoor dust samples and residential yard soils. Mercury levels in blood of case and control families were within "normal" ranges [5]. Based on these collective datasets, mercury in air is not likely to be a health hazard.

Tungsten was identified as a contaminant of concern because it was elevated in urine samples collected as part of the cross-sectional exposure assessment of environmental (household) and biologic specimens for case and control families. Tungsten is naturally present in soils and rocks in the area as indicated by historic tungsten mining in the area. Tungsten is also a major component of the materials handled at a manufacturing facility in Fallon. ATSDR evaluated the emissions from this facility and did not find a spatial relationship between the emissions and location of the leukemia cases. The drinking water, as a source of tungsten exposures, is evaluated in a separate report.

2.0 Background and Statement of Issues

In March 2001, the Nevada State Health Division (NSHD) requested that the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Center for Environmental Health (NCEH) evaluate whether environmental exposures are associated with the childhood leukemia cluster in Churchill County, Nevada. In August 2001, ATSDR and NCEH presented a joint work plan outlining their response [1].

The work plan specifies that ATSDR and NCEH will:

- Conduct a cross-sectional exposure assessment of selective contaminants using environmental (household) and biologic specimens for case families and compare with a reference population (control families)
- Investigate environmental exposure pathways for human exposure (pathway analysis)
- Inform and involve the community
- Coordinate with stakeholders to determine health education needs
- Assess whether completed exposure pathways existed for case families
- Prepare a literature review for JP-8, a jet fuel, and determine whether the toxicological profile on jet fuels JP-5 and JP-8 needs to be updated
- Provide community stress interventions.

The health effects of air pollution are identified by assessing an individual's exposure to air contaminants during the time frame for the development of disease. The ideal way to determine relevant exposures is to have continuous exposure data for a number of persons over the critical period of time for a disease to develop. The critical period of time could include the mother's exposure before and during pregnancy [6].

An individual's exposure can be measured directly or indirectly. In the direct method, an individual carries a personal monitor that registers concentrations of chemicals encountered continuously over specific periods of time [6]. The direct method is considered a **receptor-based approach** because it measures a person's exposures to all contaminants.

By contrast, the indirect method assesses concentrations of chemicals of concern in the air in each microenvironment over time and then uses estimates of the amount of time an individual spends in each microenvironment to calculate total exposure. A microenvironment could be an office, an automobile, a yard, or a single room. Chemical levels in different microenvironments can be determined from actual air samples or through air modeling of source emissions.

Modeling of source emissions is considered a **source-based approach** of evaluating environmental exposure pathways. An air model provides a mathematical formula for estimating the pattern of dispersion of contaminants from a given source and calculating the potential exposure in various locations.

Evaluating exposure pathways using air modeling involves

- Identifying contaminant sources
- Evaluating how substances might reach populations (fate and transport mechanisms)
- Identifying any exposure points or locations (microenvironments) where individuals are (or were in the past or could be in the future) actually or potentially exposed to air containing the contaminants of concern
- Evaluating total exposure from all exposure points or locations.

A pathway analysis is conducted for past, current and future potential exposure.

When past exposure is a concern and personal exposure data do not exist, air sampling data from the past and air modeling of source emissions can be used to estimate past exposure. Another method of estimating past exposure is to use human biomarkers (biologic indicators) and other “markers” that could identify historical air concentrations (for example, sampling soil in an area where chemicals in the air could have been deposited on the ground). Current air sampling identify exposures that could occur in the areas sampled.

This report evaluates exposure to air contaminants in Churchill County in two ways. First, it evaluates available data on past outdoor sampling and data on current indoor sampling. Second, the report estimates the concentrations of contaminants that persons in the area may have been exposed to based on the sources of contaminants in the area and the movement of the contaminants in the atmosphere.

Section 3 in this report provides a general discussion of air pollution. Following that is a discussion of the Fallon air sampling data and information on specific sources of air contaminant emissions in Fallon and Churchill County.

3.0 General Sources and Types of Air Pollution

The air we breathe consists of a wide variety of chemicals. Some of the chemicals, such as oxygen and carbon dioxide, are essential to life. Most of the chemicals in air are not essential to life. We refer to those chemicals in air that are not essential to life as pollutants or contaminants These chemicals have been in the environment since the formation of the earth and have entered the air through natural processes and through human activities. A contaminant can be present in the air both as a result of natural causes and from human activity. For example, carbon dioxide is a natural component of air, but it also enters the air as a result of human activity (predominately combustion activities). Similarly, particulates (minute separate particles of substances) in ambient air may have occurred naturally or may be by-products of human activity.

Because this evaluation is being conducted to determine whether environmental factors are related to cases of leukemia diagnosed in residents of the area, this report focuses on toxic air pollutants. Toxic air pollutants, also known as hazardous air pollutants (HAPs), are those pollutants that are known or suspected to cause adverse environmental effects or adverse human health effects such as cancer or adverse reproductive outcomes. Examples of toxic air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries.

Toxic air pollutants may exist as particulate matter (airborne dust) or in a gaseous form. Toxic air pollutants include metals and organic substances that are attached to small particles or in the vapor phase. Benzene, a component of gasoline, is one example of an organic compound that occurs in a vapor form [7, 8].

Outdoor Sources

There are numerous sources of pollution in outside air. In addition to natural sources in the environment, human activities involving industries, commercial establishments, agricultural enterprises, and transportation introduce contaminants into ambient air. Table 1 lists typical sources of outdoor air pollution.

Indoor Sources

In addition to being exposed to pollutants outdoors, people can be exposed to pollutants in indoor air. Often, levels of contaminants in indoor air are higher than levels of contaminants in outdoor air (ambient air). A recent paper on personal exposures in indoor air reported that the average level of z exposure was three times higher indoors than outdoors [9]. The chief source of benzene was cigarette smoke, which is typically the greatest source of indoor air pollution. Other sources of indoor air pollution are household deodorizers, air fresheners and cleaners, dry-cleaned clothing, insect repellents, treated and manufactured wood and wood products, and incomplete combustion from cooking and heating systems. Some of these sources emit polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds, some of which are known carcinogens [9]. Table 2 lists some common sources of indoor air pollution.

An individual's exposure to indoor air contaminants depends on the amount of time a person spends in an area (such as the individual's residence), the concentrations of contaminants present in the area, and the rate of air exchange between the inside and outside of the area.

Although the major part of this report addresses sources of outdoor air pollution, a small section discusses the results of the indoor air sampling that was conducted in 2002.

4.0 Determining Air Concentrations

ATSDR used the available, but limited, sampling data for outdoor and indoor air to determine the levels of contaminants to which persons could have been exposed (Section 4.1). To supplement that information, ATSDR identified all sources of emissions of air contaminants in Churchill County in an air emissions inventory (Section 4.2). ATSDR considered the fate and transport of the contaminants released, through limited facility-specific air dispersion modeling (Section 4.2) and a review of EPA's National Air Toxics Assessment for 1990 and 1996 (Section 4.3).

4.1 Air Monitoring

ATSDR used the following four sources of air monitoring data to provide information on potential exposure:

- Outdoor ambient air monitoring data collected by the Nevada Bureau of Air Quality under the Clean Air Act
- Meteorological observations reported by the National Weather Service
- Indoor air samples collected in 2001 and 2002 from approximately 100 case-family and control-family houses.
- Outdoor air samples collected in January and February 2002.

A significant consideration when reviewing the indoor and outdoor air sampling data is the time frame of the sampling. The data represent the time and date sampled and do not identify longer term averages or trends or past or future concentrations. The data do not necessarily provide information about past exposure that may be important in evaluating the possible links between environmental exposures and cancer. Sections 4.1.1 and 4.1.2 identify past air concentrations and Sections 4.1.3 and 4.1.4 present recent air sampling data collected in 2001 and 2002. Past air concentrations are reviewed again in Sections 4.2 and 4.3 through the use historical air emissions inventories and air modeling.

4.1.1 Outdoor Ambient Air Monitoring

The Nevada Bureau of Air Quality collected ambient air data from two monitoring stations in Fallon. The first station (Station 1) operated from January 1972 through June 1987 at 869 South Main Street and collected total suspended particulates (Table 3; samples were collected approximately every 6 days). The second station (Station 2) operated from May 1993 through May 1998 at 280 South Russell Street (West End Elementary School) and collected particulates 10 micrometers or less in diameter (PM_{10}) (Table 4).

> Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Total suspended particulates (TSP) refers to particulates of all sizes. PM_{10} refers to particulates that are 10 micrometers or less in diameter. Particulates greater than 10 micrometers in diameter are generally not inhaled into the lungs and therefore do not present a threat to public health from the air pathway.

The National Ambient Air Quality Standard (NAAQS) for total suspended particulates (TSP) prior to 1987 was 260 micrograms per cubic foot ($\mu g/m^{3)}$ during a 24-hour period. This standard was replaced in 1987 with a PM_{10} 24-hour standard of 150 $\mu g/m^3$ and an annual average of 50 $\mu g/m^3$.

During the sampling period for Station 1 (1972 through 1987), TSP exceeded the NAAQS six times. The PM_{10} samples collected at Station 2 from 1993 to 1998 never exceeded the 24-hour and annual average standards. Because only particulates 10 micrometers or less in diameter are respirable, PM_{10} is a better indicator of exposure than TSP (all particulates). For the 6 years that the samples were collected (May 1993 through June 1998), the PM_{10} results did not exceed the health-based standards.

4.1.2 Meteorological Observations

ATSDR obtained meteorological data from the Fallon Naval Auxiliary Air Station (Fallon NAAS, WBAN ID Number 93102) meteorological station through the National Climatic Data Center for the years 1991 through 2000.

There were 123 observations of smoke reported in the hourly observations collected from 1991 through 2000 (Table 5). These data are 76% complete for this time period. The majority of these missing observations occurred after March 1998. From January 1991 through February 1998, the data are 99% complete with 69 missing observations out of 70,156 possible observations.

Although the causes of the smoke incidents were not identified, they may have resulted from brush and forest fires, prescribed burns, or structure fires. The public health significance of these acute episodic smoke events cannot be determined without identifying the source and contents of the smoke or reviewing health outcome data from physicians and hospitals. "Fires produce particles, carbon monoxide, nitrogen oxides, aldehydes and other hydrocarbons, and many other potentially toxic substances."[10] The public health effects can range from death to effects that are unnoticeable. Community smoke exposures resulting from wildland forest fires have been associated with increased emergency department and hospital admissions for chronic obstructive pulmonary disease, bronchitis, asthma, and chest pain [11]. The acute health effects of exposure to smoke usually decline after smoke episodes end, as indicated by hospital and physician visits, but the period over which all excess health effects might be expected to end is not well known. Additionally, little is known about the extent or timing of future health effects from acute episodic smoke events [10]. If smoke incidents were a health issue in this community, we would expect to see increases in chronic obstructive pulmonary disease, bronchitis, asthma, and chest pain. These health issues are not among the list of community concerns provided to ATSDR.

The association of these acute episodic smoke events with leukemia cannot be determined because insufficient historic information exists.

4.1.3 Indoor Air Samples

In September and October 2001, the Nevada Department of Environmental Protection (NDEP) collected indoor air samples as part of the cross-sectional exposure assessment (discussed in Section 2.0). The cross-sectional study sampled current houses belonging to 14 case families and 55 control families. Some previous residences belonging to these families were also sampled.

Indoor air samples were collected and analyzed for volatile organic compound (VOC) and radon analysis. For the VOC analysis, NDEP collected one instantaneous grab sample of air from a frequently used room (such as a living room) in each of the 100 homes identified in the study. NDEP collected the VOC samples using SUMMA™ canisters placed 3 feet above the floor. Each SUMMA™ canister collected a 6-liter volume of air. The cannisters were then sent to an approved laboratory to be analyzed using EPA analysis method TO-15 [12].

NDEP collected radon samples from each case and control residence using prepackaged kits designed to capture radon and radon-decay products. After a 48- to 96-hour sampling period, NDEP collected the kits and sent them to a laboratory for analysis.

ATSDR evaluated the indoor air sampling results and determined that concentrations of volatile organic compounds and radon were not at levels that would be expected to cause adverse health effects. All radon levels were below the EPA guideline of 4 picocuries per liter. Levels of benzene ranged from 3.2 to 17.6 micrograms per cubic meter (µg/m3) exceeding ATSDR's most conservative screening value of 0.1 µg/m3 for cancer. However, the measured levels are not expected to pose an observable increased risk of cancer. The measured values are typical of indoor air for benzene. EPA reports that typical indoor air levels for benzene range from 2.2-17 µg/m3. The benzene screening value is based on an assumption of one additional case of cancer in a million persons exposed over a lifetime (1 in 1,000,000). Converting the ATSDR screening value to EPA's acceptable risk range (1 in 10,000 to 1 in 1,000,000) and taking into account the 3.5-fold uncertainty in the EPA cancer slope factor, the measured values generally fall into an acceptable range. The uncertainties in this slope factor reflect uncertainty in the extrapolation of cancer incidence data from occupational studies to low-level exposures. Based on this evaluation, even the highest benzene level found would not be expected to pose an observable increased risk of cancer.

The indoor air sample results discussed here provide information about the exposure conditions present at the specific times and at the specific locations the samples were collected. These sample results do not necessarily characterize past or future indoor air contaminant levels at these or other locations. The presence and amount of hazardous chemicals in air can vary significantly over time and space. The specific period of time where an environmental exposure could have been involved with the initiation or promotion of the cancer or other disease (including the leukemia in Fallon) occurred some time in the past. Therefore, these indoor air sampling results collected in 2002 do not provide sufficient information to identify if past air concentrations are linked to the childhood cancers in Fallon.

4.1.4 Outdoor Air Samples

From January 31, 2002 to February 7, 2002, personnel from Stone Lions Environmental Corporation, consultants for attorneys representing some of the case families, collected ambient air samples. They collected one set of samples from a residential location several miles outside of Fallon and a second set of samples in Fallon at an mixed residential-commercial location

(Figure 1). These ambient air samples were collected for 24-hour time periods using SUMMA™ canisters, polyurethane foam (PUF) samplers, and high volume (Hi-Vol) air samplers. The results are shown in Table 6. In addition, a separate mercury vapor meter was used to monitor ambient mercury levels at the both locations [13].

The SUMMA™ canister is a device that collects a 6-liter volume of air. The canister is then sent to a laboratory for analysis. In this case, the contents of the SUMMA™ canisters were analyzed for volatile organic compounds (VOCs) using EPA method TO-15 [14]. With the exception of benzene, all VOC measurements were well below screening values. Levels of benzene ranged from nondetect to 0.59 parts per billion (ppb) at the residential location and from 1.0 to 1.8 ppb at the commercial location. The ATSDR screening value is 0.031 ppb based on the cancer risk evaluation guide (CREG) with a risk range of no more than one additional case of cancer in a million persons exposed over a lifetime (1 in 1,000,000). However, EPA's acceptable risk ranges from 1 in 10,000 to 1 in 1,000,000. Converting ATSDR's 0.031 ppb to a range, the screening value becomes 0.031 ppb to 3.1 ppb. The benzene levels measured in Fallon are within this range. Furthermore, benzene is ubiquitous in the atmosphere, and the levels found in the Fallon area are consistent with those levels found nationally. The median benzene air concentrations in the United States as reported by the Volatile Organic Compound National Ambient Database (1975–1985) are 0.47 ppb for rural locations and 1.8 ppb for suburban and urban areas [8]. In 1995, benzene levels in the United States ranged from nondetect to 64 ppb [15]. Benzene in air at the levels measured in Churchill County would not be expected to cause adverse health effects.

The polyurethane foam sampler is designed to simultaneously collect airborne particulates as well as organic vapors. It contains a particulate filter and polyurethane foam and granular material to trap vapor. The filter, foam, and granular material in each sampler were analyzed for polycyclic aromatic hydrocarbons (PAHs). All reported PAH measurements were well below screening values.

A high volume air sampler is designed to collect airborne particulates by maintaining a preset air flow rate across a filter medium such as paper. These sampling devices compensate for any changes in the flow rate caused by temperature or barometric changes or pressure drops from dust loading on the filter media. The airborne particulates collected on the high volume filter media were analyzed for total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). These samples were not analyzed for tungsten. With the exception of arsenic for which a screening value of 0.0002 $\mu g/m^3$ is used, the metal levels reported were below the ATSDR screening comparison values. At the residential location, arsenic measurements ranged from 0.0005 $\mu g/m^3$ to 0.0011 $\mu g/m^3$, averaging 0.00087 $\mu g/m^3$. At the commercial location, the range of arsenic levels was 0.0011 $\mu g/m^3$ to 0.0023 $\mu g/m^3$, with an average of 0.0015 $\mu g/m^3$.

Although the levels of arsenic detected were above ATSDR's comparison values, arsenic in air is not a public health hazard for the following reasons:

- The arsenic levels measured in Fallon are within the acceptable risk range. The arsenic levels exceed ATSDR's lowest screening value of 0.0002 $\mu g/m^3$ based on the cancer risk evaluation guide (CREG) with a risk range of no more than one additional excess case of cancer in a million persons exposed over a lifetime (1 in 1,000,000). However, U.S. EPA's acceptable risk ranges from 1 in 10,000 to 1,000,000. Converting ATSDR's 0.0002 $\mu g/m^3$ to a risk range, the screening value becomes 0.0002 $\mu g/m^3$ to 0.02 $\mu g/m^3$. The arsenic levels measured in Fallon are within this range.

- Measured airborne levels of total arsenic in Fallon are below the mean levels of total arsenic in ambient air in the United States. These U.S. levels have been reported to range from <0.001 $\mu g/m^3$ to 0.003 $\mu g/m^3$ in remote areas and from 0.020 to 0.030 $\mu g/m^3$ in urban areas [16, 17].

- Arsenic (inorganic) in air is a carcinogen associated with cancer of the respiratory system (primarily lung cancer) based on studies of residences living near copper smelters and workers at these smelters. The estimated air concentrations of arsenic in these studies were 10,000 times greater that the highest concentration measured in Fallon [4]. Since cancers of the respiratory system were not among the list of community concerns provided to ATSDR and the arsenic air concentrations in Fallon are much lower than these studies, arsenic in air is not expected to cause adverse health effects.

From January 31, 2002 to February 6, 2002, air monitoring for mercury was conducted at a residential location at the outskirts of Fallon and at a commercial location near the center of Fallon using a Jerome Mercury Vapor Analyzer [12, 19]. The Jerome Mercury Vapor Analyzer, also called a Jerome meter, is a handheld device typically used to monitor ambient air at a site where mercury contamination is a known health concern. The readings of the Jerome meter must be reviewed with caution because the meter can give false positive readings if certain (lighter than mercury) chemicals are present at sufficiently high concentrations. Examples of these chemicals include hydrogen sulfide, mercaptans, chlorine, and ammonia (the burning of tobacco products produces ammonia) [18].

Also, proper operation of the equipment requires that the ambient temperature be above freezing (32°F). During the course of the sampling, ambient temperature was sampled 612 times, and the temperature was below freezing 55% of the time. Air samples confirming the meter readings were not collected. With the low temperature, the results may contain considerable uncertainty. The extreme variability of the readings discussed below (from above 0 to 100 $\mu g/m^3$) could also indicate unreliable values.

A total of 1,035 Jerome meter readings were recorded during a 7-day period (approximately every 5 minutes) at the commercial location in Fallon. These readings ranged from 0–136 $\mu g/m^3$ with almost 60% of the results reported as "0" and 99% of the results below 30 $\mu g/m^3$. The average reading was 3.76 $\mu g/m^3$. Three samples were above 100 $\mu g/m^3$, but similar values were not reported in subsequent samples on the same day. Consecutive readings were often not consistent.

For the residential location, a total of 631 Jerome meter readings was reported in the 7-day period (approximately every 5 minutes). Nearly 70% of the readings indicated a value of “0,” and the range of values was from 0 to 40 µg/m3. Two samples were above 30 µg/m^3. The average reported reading was 2.68 µg/m^3. Consecutive readings were often not consistent. Because confirmatory air samples were not collected, it is uncertain whether the elevated Jerome readings indicate actual mercury levels during the monitoring period [19]. EPA method I0-5 would be an appropriate method for confirming vapor and particle phase mercury in ambient air [20].

In addition to mercury samples in air, mercury was also measured in indoor dust samples, residential yard soils, and blood samples from case and control families. The dust and yard soils mercury levels were below levels of concern and the levels in blood were within “normal” ranges.

Inhaled vapor is almost completely absorbed by the lungs (75–80%). Mercury vapor generally exhibits noncarcinogenic effects with chronic continuous exposure resulting in accumulation of mercury in the body and permanent damage to the nervous system and kidneys [21]. Mercury has not been shown to be related to acute lymphocytic leukemia. ATSDR has a screening value of 0.2 µg/m^3 based on neurobehavioral effects. The average Jerome meter readings exceed this value. However, this screening value is neither a threshold for toxicity, nor a level beyond which toxicity is likely to occur. It exists solely as a screening tool to determine whether further evaluation of potential exposure at a hazardous waste site is warranted. The screening value is based on a lowest observed adverse effects level (LOAEL) of 26 µg/m^3 with a 30 times safety factor. The lowest LOAEL in exposure studies involving humans was 14 µg/m^3 with impaired performance on neurobehavioral tests. The average mercury readings were below these values and in the safety factor range.

Measured total mercury vapor concentrations in air in the United States and in Europe range from 0.002 µg/m^3 to 0.020 µg/m^3 with the higher values near industrialized areas and coal-fired power plants [22]. At Oak Ridge National Laboratories in Tennessee, mean mercury levels at a background site ranged from 5 µg/m^3 to 6 µg/m^3, while levels at the on-site stations ranged from 6 µg/m^3 to 174 µg/m^3. Elemental mercury was used in large quantities at nuclear weapons plants, such as Oak Ridge, between 1950 and 1963.

Based on the indoor dust, yard soils, and blood samples, mercury in air is not likely to be a health hazard.

4.2 Air Emissions Inventories

> Air emissions are gases and particles put into the air or emitted by various sources, natural or manmade. An air emissions inventory is a list of pollutants and the amounts released over time in a specific area from specific sources.

ATSDR collected information on sources of air pollution in the city of Fallon and in Churchill County. This information has been compiled into an air emissions inventory (presented in Section 4.2.1). The inventory can be used to predict air concentrations.

Basically, the inventory was compiled from two main sources: (1) permit records from the files at the Bureau of Air Quality, Department of Environmental Protection, State of Nevada and (2) existing databases available from EPA. The information sources and the methods used to compile the inventory are presented in Appendix A.

The inventory consists of two types of emission sources: **facility-specific sources** and **nonspecific sources**. Facility-specific sources are those for which ATSDR has specific location information. These sources are industrial facilities with air emission permits and construction sites larger than 5 acres that require permits for surface soil disturbances that create potential hazards from blowing dust. Table 7 provides list of the facilities with air emission permits, and Table 8 provides details about the facilities. Table 9 provides information on the construction sites. The locations of these sources are shown in Figure 2.

Each permit specifies a limit on the amount of a pollutant that can be released for a given time period. Often, these permits specify limits on contaminants defined by the Clean Air Act as criteria air pollutants: ammonia, carbon monoxide, nitrogen oxides, $PM_{2.5}$, PM_{10}, sulfur dioxide, and volatile organic compounds. Typically, limits on other chemical pollutants are not included unless a chemical is a significant part of the operation. In addition, certain activities (such as open burning for fire fighting training and specific industrial processes), along with mobile emissions, air conditioning units, and certain storage tanks, are excluded (see Appendix B). The permit limits specify maximum permissible emission limits, but actual emissions are often less. ATSDR therefore consulted NDEP tables used for calculating annual permit fees. These tables specify the total amount of each pollutant a specific facility emitted during a given year (Table 10).

Nonspecific sources are sources that do not have permits, but for which ATSDR may have specific location information from EPA databases or local telephone directories. Nonspecific mobile sources include automobiles, trucks, trains, or small portable engines such as leaf blowers or lawn mowers. Nonspecific, nonmobile sources include most commercial operations such as dry cleaners, automobile paint and body shops, and gas stations. Nonspecific, nonmobile sources also include emissions from houses such as the exhaust from heating units and fireplaces and emissions from house painting. A general list of nonspecific sources is provided in Table 11. Examples of nonspecific sources found in Fallon are listed in Table 12.

ATSDR reviewed three EPA databases for relevant information about air emissions in Churchill County.

- The Toxics Release Inventory (TRI) for Churchill County for 1987 through 2000 is shown in Table 13. The inventory is limited to specific types of manufacturing facilities and specific types of chemicals (see Appendix C). Three companies are listed: Kennecott Rawhide

Mining, Kennametal, Incorporated (an intown facility and a refinery 11 miles north of Fallon), and SMI Joist, Nevada. The TRI data are self reported with limited oversight by state or federal regulators on the quality of the data. The TRI data do provide some indication of the types and amounts of emissions for these three companies which was not available elsewhere.

- The National Emission Trends (NET) database identifies facilities that emit criteria air pollutants. The database is compiled every three years. Only data from 1996 and 1999 were available. Data from 1996 are reported in Table 14. Data were reported for the Standard Magnesia Company, the Moltan Company, and the U.S. Naval Air Station in Fallon. ATSDR identified many more sources in the NDEP permit files, which means that the information in the NET database for Churchill County is incomplete.

- The National Toxics Inventory (NTI) is compiled by EPA every three years. ATSDR extracted 1996 data for Churchill County. This information is presented in Table 15. The data consist of point, area, and mobile sources. Point sources are similar to **facility-specific sources**. Area and mobile sources are similar to **nonspecific sources**. In addition to information that states and local agencies provide to EPA for point, area, and mobile sources, the NTI also contains the following information:

  - EPA data on maximum achievable control technology programs used to reduce HAP emissions under the Clean Air Act
  - EPA Toxic Release Inventory data
  - EPA Office of Transportation and Air Quality estimates of mobile sources using mobile source methodology
  - Stationary nonpoint source emission estimates generated using emission factors and activity data.

  If area and mobile source data are not provided by state and local government agencies, EPA will calculate the area and mobile emissions at the census tract level based on extrapolations of activity data and emission factors from national, state, or regional levels [23]. For Churchill County, there were no NTI point sources noted. Area and mobile sources were based on extrapolations while ATSDR's emissions inventory identifies several point sources. Because the NTI point source database appears to be incomplete, ATSDR used its inventory for analysis. Although the area and mobile source emissions data are extrapolations, they provide insight into the types of pollutants emitted. Following are some notable observations about area and mobile source emissions data.

  - Aircraft emissions are not included in the NTI. However, emissions from the Fallon Naval Air Station are a community concern and are evaluated in ATSDR's public health assessment for the Fallon Naval Air Station.

- The category "Open Burning: Prescribed Burnings" is listed, but ATSDR cannot determine whether the extrapolation accounted for the prescribed burns of the Truckee-Carson Irrigation District canals.
- Agricultural applications of pesticides and herbicides are not listed.
- Applications of pesticides for mosquito control are not listed.
- Applications of herbicides for weed control alongside roads and irrigation canals are not listed.

The remainder of this section focuses on facility-specific point sources. Potential exposure to emissions from nonspecific sources is discussed in Section 4.3.

ATSDR used the EPA databases and NDEP permit files to gather more specific and detailed information on Kennametal, New America Tec, and SMI Joist because the community expressed concerns about these facilities.

Kennametal

Kennametal operates two facilities in Churchill County under the Advanced Materials Group Metallurgical Operations Division of the parent company. The Fallon facility is located in north-central Fallon and a refinery is located approximately 11 miles north of Fallon on U.S. Highway 95 (Figure 2).

Kennametal Fallon Facility

The Kennametal facility in Fallon is located at 347 North Taylor Street. Operations began in the 1960s. The facility houses offices, a laboratory, and a tungsten carbide processing operation and currently operates under NDEP Air Permit Number AP3399-0562.01. Operational processes at the facility include tungsten carbide and tungsten carbide/cobalt powder blending, milling/crushing, and final sizing, weighing, and packaging of the final product, which is the powder or pellet form of tungsten carbide. Tungsten carbide/cobalt alloy is manufactured at the facility using several sintering furnaces that operate at approximately 2,100ºF. The alloy is used as a filler in welding rods. In addition to warehouse operations, the facility also repackages nickel, copper, and iron powders [24].

Emissions from laboratory operations come from such sources as fume hoods, isle hoods, the laboratory furnace, hot press, spectrometer, and vacuum pumps. The emitted compounds are hydrofluoric acid (HF), hydrochloric acid (HCl), nitric acid (HNO_3), carbon dioxide (CO_2), nitrogen oxide (NO_3), argon, acetylene, sulfuric acid (H_2SO_4), methanol, tungsten carbide/cobalt alloy, nickel, copper, bronze, and hydrocarbons [25].

Emissions from the processing facility include particulates containing tungsten, tungsten ore, tungsten carbide/cobalt alloy, nickel, carbon, hydrocarbons, wax, and chromium. Historical particulate emissions were originally partially controlled with baghouses (baghouses are air pollution control devices that filter the air emissions before discharge to the environment) [25, 26]. Starting in the 1990s, the baghouses were replaced one by one with high efficiency particulate air (HEPA) filters that vent inside the building. With the October 30, 2000, air permit, only two of the original seven systems have baghouses that vent to the outside. The remaining systems have HEPA filters that vent inside the building [27].

The original permit, NDEP Air Permit Number AP3399-0562, was issued for the Taylor Street Facility on April 11, 1995 (amended on September 15, 1999, expired April 11, 2000), and included the following pre-HEPA systems (information in parentheses indicates the permit limits for PM_{10}) [28]:

System 1: Six powder blending circuits (2.42 lbs/hr)
System 2: Powder blending final sizing/weighing unit and a powder mill and screen unit (0.48 lbs/hour)
System 3: Powder blending, north collector (classifying) (1.29 lbs/hour)
System 4: Powder blending, south collector (classifying/blending) (1.61 lbs/hour)
System 5: Powder blending circuit (1.61 lbs/hour)
System 6: Powder blending circuit (0.81 lbs/hour)
System 7: Warehouse bag cutting/vacuum furnace (2.42 lbs/hour)

The total PM_{10} permitted emissions were 10.64 lbs/hour (prior to inclusion of the HEPA filters) . In addition, the specified acreage for surface area disturbance was 5 acres. Three systems were exempt from permitting because they used (throughput) less than 50 lbs/hour of raw material. These systems included the powder blend (cleaning) system (throughput of 20 lbs/hour), powder blend vacuum system (20 lbs/hour), and the metallurgical laboratory pulverizer (40 lbs/hour). Based on these systems and emission rates, the predicted maximum 24-hour impact of 70.53 $\mu g/m^3$ PM_{10} occurred 500 feet north-northwest of the facility. The 24-hour ambient air quality standard is 150 $\mu g/m^3$. The predicted maximum annual average concentration was 7.38 $\mu g/m^3$ PM_{10} at a point 500 feet southwest of the facility. The annual average ambient air quality standard for PM_{10} is 50 $\mu g/m^3$. This indicates that emissions from the facility produce ambient air concentrations that are cleaner than the air quality standards.

This permit was renewed in September 2000 (NEPD Air Permit Number AP3399-0562.01) with revisions specifying replacement of three baghouse systems with HEPA filters discharging inside the building with total emissions at 4.625 lbs/hour for PM_{10} and total PM (the limit on both PM_{10} and PM is a result of state and federal regulations) [29]. In October 2000, two more baghouses were replaced with HEPA filters. HEPA filters are not required to have air permits because they do not exhaust to the outside.

ATSDR used an air dispersion model to determine the spatial distribution of particulate concentrations in ambient air from air emissions generated at Kennametal's Fallon facility because of elevated tungsten levels in urine in case and control families. The urine levels were reported by the National Center for Environmental Health as part of the cross-sectional exposure assessment referred to in Section 2.0 [32]. The air dispersion modeling methodology is discussed in Appendix D and the results summarized beginning on page 17.

Using the September 2000 permit limits, the model predicted a maximum 24-hour average air concentration of 95 $\mu g/m^3$. The modeled annual average concentration was 21 $\mu g/m^3$. These concentrations are higher than those predicted in the review of the 1995 permit application (70.53 $\mu g/m^3$ and 7.38 $\mu g/m^3$ for the 24-hour and annual averages, respectively [26]) even though lower emission rates were used. This inconsistency may be result of the different modeling methodology used. ATSDR used the EPA model Industrial Source Complex 3 with meteorological data from Fallon. The facility modeling most likely used EPA model Industrial Source Complex 2 and meteorological data from a different location (location not reported) and different years. Modeling of historical emissions is completed in a following section.

Although, no specific information about the constituents of the PM_{10} emissions is available, on the basis of the emissions inventory, the particulates are likely to contain tungsten, tungsten carbide/cobalt alloy, cobalt, nickel, copper, and possibly bronze (copper, tin, lead, and zinc). An environmental investigation of soil outside a closed tungsten carbide tool grinding plant in Syracuse, New York, found metal particles in soil that contained tungsten, cobalt, iron, titanium, calcium, silica, and smaller amounts of nickel, magnesium, and chromium [30, 31].

Kennametal Refinery

The Kennametal refinery is an active facility located 11 miles north of Fallon on U.S. Highway 95. Operations began in the 1950s and continued until late 1993 or early 1994 when production was temporarily stopped as a result of failure to meet new air emissions opacity limits. Prior to 1994, the facility generated a large volume of emissions with high opacity (for example, a 200-foot column of dark smoke) up to three times per month from operations involving a thermit reaction process (a chemical thermodynamic reaction). The facility installed air pollution control equipment and reduced the amount of material processed to produce a smaller reaction. Emission rates from the process were reduced, and NDEP issued a new operating permit in September 1994.

The operation involves a thermit kiln process, an exothermic reaction of aluminum, tungsten ore, iron oxide, and calcium carbide. The kiln is constructed of carbon black (Thermax) and carbon plates and is preheated with a propane burner. Tungsten carbide from the thermit reaction is crushed and cleaned using sulfuric and hydrochloric acid. The spent acid is later neutralized with lime at a wastewater treatment plant on the site.

Other operations at the facility include powder milling, grinding, crushing, screening, milling, and blending of tungsten carbide. The facility also produces Kenface™, a trademark product described as crushed, cemented, hard metal carbide. It is created by grinding tungsten carbide scrap and mixing it with cobalt, nickel, and titanium. An electrical/chemical leach process using hydrochloric acid, nitric acid, and sulfuric acid recovers (recycles) tungsten carbide from scrap well bits and other spent tungsten products.

The current permit specifies emissions limits for particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), acid mist, and volatile organic compounds. Metals associated with the particulate matter include antimony, arsenic, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and tungsten. Based on the different permit applications submitted over the years, the number of emission points ranged from 28 to 37 at any one time including those from the thermit kiln, mixing and crushing operations, boilers, acid tanks, electro-leaching system, and powder-weighing operations.

A 1994 report listed total PM_{10} emissions as 67.8 tons/year on the basis of a smaller thermit reaction with air pollution control (emissions after September 1994). Predicted maximum PM_{10} air concentrations were estimated at 100.6 $\mu g/m^3$ for a 24-hour maximum and 14 $\mu g/m^3$for an annual average maximum. These values were below the maximum levels specified in ambient air quality standards. No information about the content of the PM_{10} is available, but the matter probably consists of the metals mentioned previously as associated with particulate matter: antimony, arsenic, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and tungsten. On the basis of information on a revised permit application, PM_{10} total emissions increased in 1999 to 97.71 tons/year (including a different number of emission points and different emission rates). Emissions before September 1994 were higher because thermit reactions were higher.

Air Modeling of Emissions From the Kennametal Fallon Facility

ATSDR conducted air modeling of historical emissions from the Fallon facility for two reasons: (1) to evaluate why predicted air concentrations increased with the addition of the HEPA filters, and (2) to help determine the spatial distribution of particulate concentrations. Information on the spatial distribution of particulate concentrations was sought because the National Center for Environmental Health had detected elevated levels of tungsten in urine samples from both case and control families in the cross-sectional exposure assessment (referred to in Section 2.0) [32]. ATSDR used EPA's Industrial Source Complex Short Term Model Version 3 (ISC3ST) to perform the air modeling. Details of the modeling are presented in Appendix D. For the Fallon facility, ATSDR ran the model using the emission rates from the NDEP 1995 permit application review [26], ISC3ST, meteorological data from the Fallon NAAS meteorological station, and 30-meter digital elevation data from the U.S. Geological Survey. Air modeling results are shown in Figure 3 with predicted air concentrations from emissions of particulates for both annual averages and 24-hour maximum values. The spatial pattern of predicted PM_{10} concentrations from the Fallon facility radiates out from the facility in the shape of an oval with the long axis running from north to south. The highest concentrations are located adjacent to the facility to the south, east, and north. The location for the estimated maximum 24-hour average of 167 $\mu g/m^3$ is approximately 60 meters north of the main manufacturing building on the Kennametal property. An area approximately 65 meters southeast of the main manufacturing building on the property was estimated to have an annual average of 22 $\mu g/m^3$. The maximum 24-hour concentration estimated outside the Fallon facility property is 142 µg/m^3 for an area south of the facility on the railroad right-of-way. The estimated maximum annual concentration outside the Fallon facility property is 20 µg/m^3, for the area south of the facility on the railroad right-of-way.

The modeling for the Fallon refinery was conducted for the thermit process only, using pre-1994 emissions when the Fallon refinery was operating the thermit reaction at full scale without air pollution control equipment. Kennametal completed a thermit reaction three times per month, and each reaction lasted about 3 hours. Due to the limitation of the ISC3ST model, ATSDR ran the model with simulated emissions four times per month and with a conservative (worst case condition) 4 hours per event. The model emission rate was compiled by NDEP [27], and meteorological data from the Fallon NAAS meteorological station was used. Additional details are presented in Appendix D. The spatial pattern (Figure 4) of PM_{10} 24-hour air concentrations from the Fallon Refinery predicts low air concentrations adjacent to the facility and extending to the south with a maximum concentration of 56 µg/m^3 north of the facility. The unusual heterogenous plume shape is a result of the limited operations of the thermit reaction. The area of influence spatial pattern for annual averages shows a high area to the north because of the higher terrain (maximum concentration of 0.2 µg/m^3 located to the north). The medium area of influence extends in a lobe toward the south. The low area covers all of Fallon and areas 1- to 2-miles around the city. The predicted air concentrations of particulates and case houses (past and present residences for prenatal to 1-year old children which are the most sensitive times for exposure) are shown in Figures 3 and 4. From the pattern, there appears to be no association between the cases and the Kennametal Facilities.

New America Tec

The New America Tec company is an active facility located on Lovelock Highway about 12 miles north of Fallon. Operations at the facility involve the chemical vapor deposition (or plating) of nickel carbonyl. The first product batch reportedly occurred November 1996 [33].

NDEP issued an air permit on February 13, 1996, which was renewed on January 31, 2001 (NDEP Permit Number AP3544-0654). Permitted emissions for the chemical vapor deposition system are shown in the following table [34].

Pollutant	Permitted Emissions lb/hr	Permitted Emissions tons/yr	Maximum Modeled Level (μg/m^3)	Nevada Regulatory Limit (μg/m^3)
PM	0.01	0.03	Not applicable (NA)	NA
PM_{10}	0.01	0.03	9.99 (24-hour)	150
SO_2	0.003	0.008	1.09 (annual), 9.17 (24-hour), 22.12 (3-hour) 260 (1-hour)	80 (annual) 365 (24-hour) 1,300 (3-hour)
CO	0.06	0.18	53.8 (8-hour), 84.32 (1-hour)	10,000 (8-hour) 40,000 (1-hour)
NO_x	0.31	0.96	17.58 (annual)	100 (annual)
VOC	0.006	0.023	Not modeled	Permit specific
Nickel Compounds	0.000035	0.0022	NA	Permit specific

Emission rates for the facility were modeled by the facility and found to be within the regulatory limits for the state of Nevada.

SMI Joist, Nevada

SMI Joist is an active facility located on Trento Lane in Fallon. The facility began operations in 1997. The facility manufactures open web steel joists from stocked materials. On-site operations include welding, cutting, sandblasting, and solvent-based painting. There are ten painting dip tanks inside the building. Painted joists drip paint back into the tank and then are air dried outside. Airless spray painting is sometimes used on special order items. Vapors from the interior operations—including the dip tanks—are vented to the outside with exhaust fans and no air pollution control equipment.

There are seven closed storage tanks located outside adjacent to the main building. Four tanks are used for paint or solvent storage (5,300 gallon capacity each), two are used for storing diesel fuel, and one tank is used for storing gasoline. An emergency generator is also located outside the building. Air emissions come from surface-coating operations, paint and solvent storage, welding and sandblasting, diesel and gasoline storage, diesel combustion from an emergency generator, and from heaters that use natural gas.

SMI Joist operates under NDEP Permit Number AP3441-0811 with a VOC limit of 247.03 tons per year with a maximum HAP limit of 5% on a weight-to-weight basis. Hazardous air pollutants in the VOCs include isobutanol- and isopropylbenzenes, methylated benzenes, methyl ethyl ketoxime, methyl n-amyl ketone, and other nonspecified aromatic and aliphatic hydrocarbons.

Prescribed Burning of Irrigation Supply Canals

The Truckee-Carson Irrigation District (TCID) uses prescribed burns and herbicides to control weeds in the canals and laterals of the irrigation supply system. The main canals and laterals are supplied with water every year from approximately March 15 to November 15, with the actual dates depending on the weather. During the rest of the year, no water for irrigation is supplied to the system.

TCID conducts prescribed burns to clean the main canals and laterals of accumulated dead vegetation. Burning activities begin in early January or February, depending on the weather, and can continue until the beginning of the water season in mid-March. Of the nearly 350 miles of canals managed by the TCID, less than 150 miles (or 175 acres) are typically subjected to burning each year [35].

Starting in late May and continuing throughout the water season, herbicides are applied as spot treatments for noxious weeds along the banks and edges of the canals and laterals. Spot spraying typically occurs once or twice throughout the growing season at any single location. A herbicide and water mixture is used for spot spraying. The herbicides in the mixture are Rodeo,© a nonselective herbicide, and Weedone,® which is used for broadleaf control. Rodeo© (active ingredient n-phosphonomethylglycine glyphosate isopropylamine salt) is also used in September, October, and November to clear vegetation (principally willows) in the main canals and laterals [36]. The active ingredients in Weedone® are 2,4-dichlorophenoxyacetic acid and butoxyethyl ester.

Dominant weeds found in the canals [37]
Knapweeds (Spotted and Russian)
Short White Top
Kochia
Sweet Clover
Sunflower
Cocklebur
Salt Grass
Perennial Rye Grass
Kentucky Blue Grass
Water Grass
Cattails
Tullies
Curly Doc
Musk Thistle
Chickory
Marestail
Mallow
Tall White Top

During the irrigation season, acrolein is injected into the water to control submerged aquatic weeds, specifically sago pondweed. However, the injection occurs at only select locations to prevent the acrolein from impacting any lakes, rivers, or reservoirs [36].

Fire is often used in vegetation management. The resulting smoke has raised public health concerns about particulate matter emissions as well as inorganic and organic gaseous emissions [38]. These concerns may result, at least in part, from the use of herbicides on the vegetation being burned. Container labels on herbicide concentrates, for example, caution against using them near fire. However, these cautions do not apply to the diluted forms found after herbicide application. The vegetation itself is the predominant fuel in a prescribed fire. As a result, the vegetation, and not any applied herbicide, is the primary smoke risk factor [38].

The degree of potential herbicide volatilization in herbicide-treated vegetation depends on several factors. These factors include (1) the type of combustion (e.g. flaming, smoldering, or glowing), (2) the rate of temperature increase, (3) combustion efficiency, and (4) the maximum temperature reached during combustion. Flaming combustion is the most efficient at reducing a fuel to its elemental components [38, 39]. The combustion efficiency of open fires generally ranges from 60% to 95%.

The predominant gases from the combustion of vegetation are carbon monoxide, carbon dioxide, oxygen, and water vapor [40]. Other gases emitted include nitrogen oxides, aldehydes, organic acids, and ozone [38, 40].

A small fraction of the carbon contained in the fuel is released into the atmosphere in the form of particles. The particles are of concern because a high concentration of organic material is associated with the particles, and also because a high percentage of the particulate matter is less than 2.5 micrometers ($PM_{2.5}$) in diameter (and therefore respirable) [40].

The particles contain polycyclic aromatic hydrocarbons (PAHs), some of which are known carcinogens [40]. These PAHs form more frequently, but still at relatively low rates, in backing fires (fires moving into the wind) and smoldering fires. PAHs form less frequently in flaming fires [38].

There have been numerous studies examining exposure to pesticides in smoke from prescribed fires and wildfires. Several studies indicate that pesticide exposure from these fires does not approach levels sufficient to produce adverse human health effects [38]. Researchers have looked at a worst-case scenario in which there is complete volatilization of pesticide compounds found within or on the surface of vegetation. Even in these cases, human exposures in dense smoke have been shown to be trivial compared to exposure to natural combustion emissions [41,42].

Due to the climate at the time of year prescribed burning is conducted in the Churchill County area, the vegetation is extremely dry. As a result, combustion of the weeds is likely to be relatively efficient, burn hotter, and produce less PAHs from the natural combustion.

From 1989–1998, the U.S.Geological Survey collected sediment samples at several locations in the canals and drains. These samples were analyzed for various metals including arsenic and mercury. Based on only those areas where the prescribed burning occurs (canals, not including drains nor the final outflow areas of the Stillwater Wildlife Managment Area and Carson Lake/Sink area), the highest mercury level found was 1,370 ppm and the highest arsenic level found was 29 ppm. The arsenic levels are not likely to pose a public health threat, even assuming a worst case scenario. In this case, a worst case scenario is one in which the arsenic uptake by canal vegetation from the sediment is 100% and the vegetation is later burned.

In 1993, the U.S. Geological Survey published a study of irrigation drains in the Churchill County area. This study included analytical results for composite detritus samples collected from various drain locations. Detritus is most likely composed of accumulated debris from dead plants and associated microorganisms. Mercury concentrations found in 89 drain detritus samples ranged from <0.04 µg/g (< 40 ppb) to 38.6 µg/g (38,600 ppb or 38.6 ppm) [43].

Although the biomass quantities of the vegetation burned in the canal are not available, we estimated them. The average biomass yield for a variety of grasses grown in Fallon from 1995–1998, is 3.58 (air-dried) tons per acre [44]. Based on this biomass, we would expect to find no more than 16.48 pounds (7,476 grams) of dry weight vegetation in an area measuring 3 meters by 3 meters (or about 10' by 10').

At the maximum detritus mercury concentrations, an EPA SCREEN3 model of the downwind maximum concentrations produced a range of values depending on the burn time. The concentration ranged from 0.029 mg/m^3 to 0.574 mg/m^3 with burn times of 20 minutes to 1 minute, respectively. While inhalation of mercury levels above 0.2 mg/m^3 may be problematic on a long-term basis, we would expect any mercury releases from prescribed burning in the canals to be short-term and sporadic and not typically exceed 0.2 mg/m^3 (the burning occurs once per year and may not occur at the same place in subsequent years). As a result, individuals exposed directly to the burning of the most contaminated vegetation may potentially experience temporary eye and respiratory irritation from the smoke itself, but long-term effects are not expected.

4.3 National Scale Fate and Transport Modeling Applied to Churchill County

EPA conducted two national scale studies of air emissions and calculated the concentration levels of hazardous pollutants in air to which individuals could have been exposed. The first study, called the Cumulative Exposure Project (CEP), was completed using estimates of air emissions from 1990. The second study, called the National Air Toxics Assessment (NATA), used emissions from 1996. These studies, discussed in Sections 4.3.1 and 4.3.2, compiled a list of toxic air emissions from EPA's National Toxics Inventory (NTI) from outdoor sources, for 1990 and 1996, and used air dispersion models (mathematical equations that *predict* the movement of contaminants) to calculate the outdoor air concentrations in each census tract in the country. Specific information about these studies is presented in Appendix E for the 1990 data and Appendix F for the 1996 data. The results are most meaningful when viewed at the state or national level; for smaller areas such as the City of Fallon or Churchill County, the modeling results become less certain and must be interpreted carefully because the assessments focused on showing the variation in air concentration, exposure, and risk between geographic areas and not absolute concentrations within a specific geographic area [45, 46].

Nonetheless, ATSDR reviewed the national scale data for Fallon, Churchill County, and the State of Nevada because these studies predicted air concentrations from toxic air emissions generated primarily by commercial, residential, and mobile operations. ATSDR's emissions inventory only included industrial sources. By using the national scale data with ATSDR's inventory, this report evaluates all air emission sources in the County.

4.3.1 EPA's Cumulative Exposure Project

Cancer Risk: A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Non-cancer Hazard Index (HI): A comparison of a persons daily chemical exposure to the Minimum Risk Level (MRL) or Reference Air Concentrations (RfC). The value is used as an assessment of the associated cancer and noncancer toxic effects of chemicals, e.g., kidney or liver dysfunction. It is independent of a cancer *risk*, which is calculated only for those chemicals identified as carcinogens. A hazard index or quotient of 1 or less is generally considered safe. A ratio greater than 1 suggests further evaluation. The HI is used as a screening value and overestimates the potential hazard and evaluates exposure to multiple chemicals.

EPA conducted the Cumulative Exposure Project (CEP) for the continental United States to examine the toxic contamination to which Americans are exposed cumulatively through air, food, and drinking water. The study estimated exposure levels for different communities nationwide. The air component was the only portion of the study completed. The air toxic component of the CEP is an assessment of estimated 1990 outdoor concentrations of 147 air pollutants. Concentrations were reported as an average for each census tract. The concentration values for Fallon and adjoining census tracts are presented in Table 16. The census tracts are depicted in Figure 5. The air toxic component is presented here as an estimate of air contaminant concentrations that people could have been exposed to in Churchill County. The CEP emission sources included mobile sources (e.g., cars, trucks, boats, landscaping equipment), major stationary sources (e.g., large waste incinerators and factories), and area sources (e.g., dry cleaners, small manufacturers, consumer products). However, a significant limitation to the CEP data and these results in Churchill County is that most industrial sources in Churchill County were not included in the emissions inventory and the risk evaluation. This limitation is discussed in Section 4.2 with ATSDR's emissions inventory. This means that these CEP risk values predominantly represent air emissions from mobile sources.

ATSDR used the CEP air concentrations to evaluate the potential for exposure to toxic contaminants in air to cause cancer and other adverse health effects, to identify which pollutants are most significant in relation to health concerns, and to compare the potential health impact in Fallon to other areas in Nevada. This evaluation used EPA's risk assessment methodology, which is based on dose-response assessments from studies on humans and animals. Because of the assumptions and limitations of the dose-response assessments, the numbers presented here are considered semiqualitative relative numbers and not absolute numbers. These numbers are useful for comparing risks in different areas or between different air pollutants.

The CEP calculated cancer risk in Nevada, ranged from 2.7E-5 to 5.7E-4 with an average of 8.6E-5 (see Appendix G for an explanation of risk). The cancer risk for Churchill County of 5.5E-5 and for Fallon of 1.3E-4 is near the average for the state (Table 17). The noncancer hazard index of 11 in Fallon is comparable to the state averages and values in Carson City, Reno, and

Las Vegas. Figures 6 and 7 depict the spatial distribution of the cancer and noncancer values in Nevada and shows that mostly urban areas have higher values including Carson City, as Las Vegas, and Reno in addition to Fallon. Two census tracts near Las Vegas are also elevated.

The predominant contributors (drivers) to the CEP cancer risk in Fallon are butadiene and benzene, which contribute 50% and 15% of the risk, respectively. The main contributor to the hazard index or noncancer risk is acrolein, which contributes 77%. The main source of these chemicals is mobile on-road vehicles (such as cars, trucks, and buses). Butadiene, benzene, and acrolein are typical "drivers" of the cancer risk and the hazard index in urban areas throughout the United States. Again, these risks are based primarily on the mobile sources in Churchill County because most of the industrial sources were not included in the CEP emissions inventory.

In short, the CEP data shows that the air concentrations and health risks from 1990 commercial, residential, and mobile emissions in Fallon and Churchill County are similar to other communities in Nevada.

4.3.2 EPA's National Air Toxics Assessment

ATSDR also evaluated historical air concentrations using EPA's National Air Toxics Assessment (NATA). The NATA is a followup to the EPA Cumulative Exposure Project with many changes including modeling based on 1996 emissions and a more extensive inventory of sources of emissions. While 147 compounds were included in the CEP, only 33 compounds are used in the NATA model. Table 18 shows the concentrations for the census tract where the City of Fallon is predominantly located. Table 19 shows the average concentrations for the county. Details of the data are provided in Appendix H. A significant limitation to the NATA data and these results is that most industrial sources in Churchill County were not included in the emissions inventory and the risk evaluation. This limitation is discussed in Section 4.2 with ATSDR's emissions inventory. This means that these risk values predominantly represent air emissions from mobile sources.

From the calculated air concentrations, EPA calculated hypothetical health risks using the hazard index and cancer risk for each of the 33 air contaminants. The estimated cancer risk in Nevada ranged from 1.5E-5 to 1.6E-4 with an average of 3.9E-5. The cancer risk for Churchill County of 2.7E-5 and for Fallon of 3.7E-5 is near the average for the state (Table 17). Figures 8 and 9 depict the spatial distribution of the cancer and noncancer values.

The drivers for NATA cancer risk in Fallon are carbon tetrachloride, benzene, formaldehyde and butadiene (see Table 20). The main driver for the hazard index is acrolein, contributing 95%. The main source of acrolein is mobile on-road vehicles (such as cars, trucks, and buses). In short, the NATA data shows that the air concentrations and health risks from 1996 commercial, residential, and mobile emissions in Fallon and Churchill County are similar to other communities in Nevada.

The differences between the 1990 CEP and the 1996 NATA are plotted in Figure 10. There appears to be a reduction in risk for each county. While some of this reduction is probably real (for example, the amount of benzene in gasoline has been reduced over this time period), some of this effect is a result of the change in methods used for the calculations between the two years.

Figure 10 provides a good overview of the differences of cancer risk between counties and the range of risk in each of the census tracts. As the figure shows, the range of risk in Churchill County is similar to the lower range of the other counties. Since CEP and NATA did not include most of the industrial sources in Churchill County, these values for Nevada, represent cancer risk from commercial, residential and mobile air emissions. The largest contributor of toxic air emissions is mobile sources.

5.0 Conclusions

This report specifically addresses the air exposure pathway in relation to the occurrences of acute lymphocytic leukemia. This analysis evaluated indoor and outdoor air samples, air emission inventories, and historic modeled air concentrations together with the spatial and temporal distribution of houses where the children with acute lymphocytic leukemia resided.

- Based on air emissions and air quality data (excluding pesticide use and emissions from the Naval Air Station Fallon which are addressed in separate reports), likely exposure scenarios, and the available information on the toxicology and epidemiology of the contaminants, ATSDR has not identified an association between air pollutants and acute lymphocytic leukemia.

- In the process of reviewing the environmental data for links between air contaminants and acute lymphocytic leukemia, ATSDR found levels of arsenic, benzene, and mercury in air exceeding health based comparison values. These chemicals have not been shown to be associated with acute lymphocytic leukemia but could produce other health effects. Further evaluation of arsenic, benzene, and mercury levels determined that the concentrations present in air were not a health hazard because the concentration levels were within generally accepted risk ranges, were typical of concentrations seen in urban areas, or they were not seen in other environmental media or biological samples at levels of concern.

6.0 Recommendations

There are no recommendations at this time.

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8.0 References

1. ATSDR and NCEH, 2001. “Investigation of Childhood Leukemia in Fallon, Nevada, DRAFT, Public Health Action Plan” The Agency for Toxic Substances and Disease Registry (ATSDR) and Centers for Disease Control and Prevention, National Center for Environmental Health (NCEH), August 16, 2001.
2. Agency for Toxic Substances and Disease Registry. Health consultation for pesticide use in Churchill County, Nevada. Atlanta, GA: US Department of Health and Human Services. In preparation.
3. Agency for Toxic Substances and Disease Registry. Public health assessment for Naval Air Station Fallon. Atlanta, GA: US Department of Health and Human Services. In preparation.
4. Agency for Toxic Substances and Disease Registry. Arsenic, Toxicological Profile. Department of Health and Human Services. Update, September 2000.
5. NCEH, No Date. Report on Blood and Urine Samples, Fallon Neveda. In preparation.
6. Samet, Jonathean M. and Jouni J.K. Jaakkola, 1999. “The Epidemiologic Approach to Investigating Outdoor Air Pollution,” in Air Pollution and Health, eds. Stephen T. Holgate, Jonathan M. Samet, Hillel S. Koren, and Robert L. Maynard. Academic Press, San Diego, CA, 1999.
7. United States Environmental Protection Agency. 2000. Unified Air Toxic Fact Sheet. http://www.epa.gov/air/toxicair/index.html
8. Agency for Toxic Substances and Disease Registry. Benzene, Toxicological Profile. Department of Health and Human Services, September 1997.
9. Spaeth, KR. 2000. Don’t hold your breath: Personal exposures to volatile organic compounds and other toxins in indoor air and what’s (not) being done about it. Prev Med 31:631-637.
10. Anderson, Ross H. 1999. “Health Effects of Air Pollution Episodes,” in Air Pollution and Health, eds. Stephen T. Holgate, Jonathan M. Samet, Hillel S. Koren, and Robert L. Maynard. Academic Press, San Diego, CA, 1999.
11. Mott, Joshua A, Meyer, Pamela, Mannino, David, et al., 2002. Wildland forest fire smoke: health effects and intervention evaluation, Hoopa, California, 1999. West J Med 2002 176: 157-162.
12. NDEP, 2001. “Draft Environmental Field Sampling Plan: Prepared in Support of the CDC/NCEH Cross Sectional Assessment Study.” Nevada Department of Environmental Protection (NDEP), August 28, 2001.
13. Personal communication with Mr,. Jim Tarr, Stone Lions Environmental Corporation, August 12, 2002.
14. Personal communication with Mr,. Mark Gruber, Stone Lions Environmental Corporation, August 12, 2002.
15. EPA, 2000. ATSDR query of EPA’s Air Quality System query on October 23, 2002 for benzene [http://www.epa.gov/aqspubl1/select.html].
16. Davidson CI, Goold WD, Mathison TP, et al. 1985. Airborne trace elements in Great Smoky Mountains, Olympic, and Glacier National Parks. Environ Sci Technol 19:27-35.

17. NAS. 1977. Medical and biologic effects of environmental pollutants: Arsenic. Washington DC: National Academy of Sciences.
18. Bolton, Jimmie Ann, Bolton Laboratories, 2002. Report: Limited Environmental Assessment Of Mercury (Hg) Vapor, Rio Grande Campus, Austin, Texas for theAustin Community College, Austin, Texas. January 11, 2002. http://www2.austincc.edu/faoadmin/pdf/RGC%20Mercury%20Sampling/Bolton%20RGC%20Mercury%20Sampling%20Rpt%201_11_02.pdf [accessed January 15, 2003]. More information at this website is at http://www2.austincc.edu/faoadmin/risk_mgmt_ins/risk_mgmt_ins_sub/rgc_mercury.html
19. Stone Lions Environmental Corporation. Letter from Jim Tarr to Adrianne K. Holmes, CDC/NCEH/HSB. August 14, 2002.
21. ATSDR, 2001. Medical Management Guidelines (MMGs) for Acute Chemical Exposures, Version 2001: Mercury.
22. Agency for Toxic Substances and Disease Registry. Mercury, Toxicological Profile. Department of Health and Human Services. Update, March 1999.
20. U.S. Environmental Protection Agency, 2000. "Workshop on Source Emission and Ambient Air Monitoring of Mercury, September 13-14, 1999, Bloomington, MN. Office of Research and Development, Washington, DC. EPA/625/R-00/002. June 2000.
23. U.S. EPA, no date. "The Development of the 1996 National Toxics Inventory," Anne Pope and Laurel Driver Emission Factor and Inventory Group, U.S. Environmental Protection Agency, Mail Drop 14, Research Triangle Park, NC 27711 and Richard Billings and Darcy Wilson Eastern Research Group, Inc., P.O. Box 2010, 1600 Perimeter Park, Morrisville, NC 27560.
24. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance For Kennametal, Inc. September 14, 2000.
25. Kennametal Inc. Emissions inventory. No date [document found in the State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality files dates July 1992 through February 1994].
26. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review of Kennametal Fallon Facility, April 11, 1995.
27. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Notes on Kennametal, Fallon Facility and Fallon Refinery, August 2000.
28. Environmental Management Associates. Permit application for modification to the Class II Air Quality Operating Permit, Application for Renewal and Revision, Kennametal Fallon Facility (Permit No AP3399-0562). February 16, 2000.
29. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (No. AP3399-0562.01) issued to Kennametal, Inc., November 1, 2000.

30. Auchincloss JH; Abraham JL; Gilbert R; Lax M; Henneberger PK; Heitzman ER; Peppi DJ, 1992. "Health Hazard of Poorly Regulated Exposure During Manufacture of Cemented Tungsten Carbides and Cobalt," British Journal of Industrial Medicine, December, 1992. Vol 49 (12), pp. 832-6.
31. Abraham, Jerrold and Andrew Hunt, 1995. "Environmental Contamination by Cobalt in the Vicinity of a Cemented Tungsten Carbide Tool Grinding Plant," Environmental Research, April 1995. Vol 69 (1), pp. 67-74.
32. Scogin, Gail, 2002. Meeting notes with NCEH regarding tungsten urine results. August 2, 2002.
33. Mullen, Jr., Frank X. 2001. "Fallon Firm Houses Toxic Chemical," Reno Gazette-Journal, February 11, 2001, Reno, Nevada.
34. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for New America Tec. March 29, 2001.
35. TCID, 2002. Truckee-Carson Irrigation District. Record of communication between Brian Kaplan, ATSDR and Lyman F. McConnell. July 26, 2002.
36. TCID, 2002. Truckee-Carson Irrigation District. Record of communication between Brian Kaplan, ATSDR and Debbie Sherman. July 24, 2002.
37. TCID, 2002. Truckee-Carson Irrigation District Newlands Project. Memorandum to Mr. Brian Kaplan from Lyman F. McConnell. April 22, 2002.
38. Bush, P.B., D.G. Neary, C.K. McMahon. 2000. Fire and Pesticides: A Review of Air Quality Considerations. Pages 132-136 in W. Keith Moser and Cynthia F. Moser (eds.) Fire and Forest Ecology: Innovative Silviculture and Vegetation Management. Tall Timbers Fire Ecology Conference Proceedings, No. 21. Tall Timbers Research Station, Tallahassee, FL.
39. Pyne, S.J., PL. Andrews, and R.D. Laven, 1996. Introduction to wildland fire. John Wiley and Sons, New York.
40. Ward, D.E., Air toxics and fireline exposure, 10th Conference on Fire and Forest Meteorology, Ottawa, Canada, April 17-21, 1989.
41. Sandberg, D.V. and EN. Dost, 1990. Effects of prescribed fire on air quality and human health. Pages 191-218 in J.D. Walstad, S.R. Radosevich, and D.V. Sandberg (eds.). Natural and prescribed fires in Pacific Northwest forests. Oregon State University Press, Corvallis.
42. DeBano, LX, D.G. Neary, and P. Ffolliott, 1998. Fire's Effects on Ecosystems. John Wiley and Sons, New York.
43. USGS. U.S. Geological Survey. Water-Resources Investigations Report 92-4024B. Editors: Hallock RJ and Hallock LL. Detailed Study of Irrigation Drainage In and Near Wildlife Management Areas, West-Central Nevada, 1987-90: Part B. Effect on Biota in Stillwater and Fernley Wildlife Management Areas and Other Nearby Wetlands. 1993.
44. University of Nevada Cooperative Extension. Fact Sheet 99-65. Switchgrass Varieties for Western Nevada. Not dated.
45. U.S. EPA, 1999. "Cumulative Exposure Project" [http://www.epa.gov/cumulativeexposure/air/air.htm].

46. U.S. EPA, 2002. "The National-Air Toxics Assessment" [http://www.epa.gov/ttn/atw/nata/].
47. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (No. AP1611-0888) issued to A & K Earth Movers, Inc., July 28, 1999.
48. U.S. EPA. Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 11.1 Hot Asphalt Plants, December 2000. http://www.epa.gov/ttn/chief/ap42/index.html [accessed Spring 2002].
49. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review of A & K Earth Movers, Inc. of application for air quality permit to construct issued as permit to construct No. 1510, January 9, 1990.
50. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (AP1442-0797) issued to A & K Earth Movers, Inc., May 18, 1998.
51. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Change of Location (Location approval #1765 for AP1442-0797) issued to A & K Earth Movers, Inc., No date on records ATSDR had copied.
52. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (No. AP3295-0089) issued to American Colloid Co.,February 4, 1997.
53. U.S. EPA. Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 11.22 Diatomite Processing, November 1995. http://www.epa.gov/ttn/chief/ap42/index.html [accessed Spring 2002].
54. Nevada Operations, Inc. Stillwater Geothermal Project Description, August 8, 1997.
55. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review of Chevron Resources Company, Soda Lake Geothermal Power Plant. February 23, 1987.
56. Nevada Operations, Inc. Letter to Nevada Department of Environmental Protection, Air Quality Department regarding release of pentane from Soda Lake I Geothermal Power Plant on May 17, 1993. May 20, 1993.
57. Nevada Operations, Inc. Letter to Nevada Department of Environmental Protection, Air Quality Department regarding release of pentane from Soda Lake I Geothermal Power Plant on June 8, 1993. June 11, 1993.
58. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit for Soda Lakes 1 & 2 Geothermal Projects issued to Amor IX Corp. (AP4911-0464), September 17, 1999.
59. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit for Soda Lakes 1 & 2 Geothermal Projects issued to Amor IX Corp. (AP4911-0464), January 11, 2002.

60. Amor IX Corporation. Emissions and Emission Points for AMOR IX Corporation, Soda Lake Geothermal II Project. November 27, 1989.
61. AGRA Earth and Environmental. Letter to Nevada Division of Environmental Protection, Bureau of Air Quality regarding quarterly monitoring and sampling report for vapor extraction system, July 13, 1995.
62. Eagle-Picher Minerals, Inc. Letter to Nevada Division of Environmental Protection, Bureau of Air Quality regarding particulate control plan for the Popcorn Project, January 21, 1998.
63. Nevada Bureau of Mines and Geology, Special Publication MI-1994, the Nevada Mineral Industry–1994.
64. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for Eagle-Picher Minerals, Inc. Hazen Mine & Diatom Siding Project. September 6, 2001.
65. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for Glacier Construction, July 16, 1998.
66. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (AP1442-0570) issued to Glacier Construction Company, (No date on ATSDR portion of copied pernit).
67. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for Hiskett & Sons, July 3, 2000.
68. Nevada Bureau of Mines and Geology. Major Mines of Nevada 1996. [http://www.nbmg.unr.edu/mm/mm96.htm#churchill, accessed May 14, 2002].
69. Nevada Department of Conservation and Natural Resources. Administrative Order No. 97-01 in the matter of Jack N. Tedford, Inc. regarding processing of diesel contaminated soil at the Jack N. Tedford Inc.'s asphalt batch plant. 1997.
70. Jack N. Tedford, Inc. Fact Data Sheet regarding history of facility on Trento Lane. September 28, 1999.
71. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Environmental Evaluation on Renewal Permit Application of Jack N. Tedford, Inc. Asphaltic Concrete Batch Plant (AP1611-0342), December 16, 1999.
72. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit issued to Jack N. Tedford, Inc.(AP1611-0925), December 30, 1999.
73. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit issued to Jerome Moretto, December 6, 1995.

74. Environmental Management Associates. Letter and permit application for a Class II Air Quality Operating Permit, Application for Renewal and Revision, Kennametal Refinery Facility. September 22, 1999.
75. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection. Source Test Review of stack tests at Kennametal, Inc., April 13, 1994.
76. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for L. Mackedon & Sons, Inc. Union Lane. April 25, 2000.
77. Environmental Management Associates. Facsimile transmittal regarding emission source parameters for Moltan Company, November 21, 1995.
78. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit issued to Moltan Company (AP1499-0384), Amended July 7, 1997.
79. Moltan Co. Letter to Nevada Division of Environmental Protection, Bureau of Air Quality regarding construction and startup of rotary kiln and appurtences (Permit #AP1499-0398), February 7, 1997.
80. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for Moltan Company, February 1, 1999.
81. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit issued to Moltan Company (AP1499-0859), February 1, 1999.
81. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Air Quality Permit No. AP1499-0859 issued to Moltan Company, February 1, 1999.
83. Nevada Geothermal Power Partners. Application for Air Quality Permit to Construct Brady Hot Spring Geothermal Power Plant, October 1990.
84. Charles F. Kutscher, National Renewable Energy Laboratory. The Status and Future of Geothermal Electric Power, NREL/CP-550-28204. August 2000.
85. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Air Quality Permit to Construct (No. 3334) issued to Sierra Pacific Power Company, 1993.
86. Sierra Pacific Power Company. Letter from Dave Shepard to Nevada Division of Environmental Protection, Bureau of Air Quality regarding vapor extraction system for Sierra Pacific Power Company, November 12, 1993.
87. Simon Hydro-Search. Letter to Nevada Division of Environmental Protection, Bureau of Air Quality regarding vapor extraction system for Sierra Pacific Power Company, February 12, 1993.
88. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for SMI Joist - Nevada, Fallon Facility, March 10, 1997.

89. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit issued to SMI Joist-Nevada, Fallon Facility, March 10, 1997.
90. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for SMI Joist - Nevada Fallon Facility, March 11, 1999.
91. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit issued to SMI Joist-Nevada, Fallon Facility, March 11, 1999.
92. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Air Quality Permit to Construct (No. 3502) issued to Smitten Oil & Tire Company, July 27, 1993.
93. The Earth Technology Corporation. Letter to Nevada Division of Environmental Protection, Bureau of Air Quality regarding vapor extraction system, December 17, 1993.
94. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit (AP9999-0462) issued to Smitten Oil & Tire Company, June 28, 1995.
95. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Application Review and Determination of Preliminary Compliance for Specialty Clays Corporation, December 3, 1997.
96. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II Air Quality Operating Permit issued to Specialty Clays Corporation (AP1452-0738), December 3, 1997.
97. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Permit Amendment Review for Tenneco Minerals, Fondaway Canyon, March 15, 1990.
98. U.S. Environmental Protection Agency. Emissions and Air Quality Data, National Emissions Trends Inventory 1996. [http://www.epa.gov/ttnotag1/areas/plant/nv/pl34937x.htm, accessed May 7, 2002].
99. State of Nevada, Secretary of State. Secretary of State Corporation Database [http://sos.state.nv.us/corp_nme.asp, accessed May 10, 2002].
100. Advanced Scientific Solutions. Amended Air Quality Permit Application for Paragon Thermal/Catalytic Oxidizer and Vapor Phase Carbon Truckee-Carson Irrigation District Soil Remediation Project, July 1994.
101. Nevada Division of Environmental Protection, Bureau of Air Quality. Letter to Phillips Petroleum consisting of permit for open burning. May 14, 1985.
102. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit for Desert Peak Geothermal Project issued to Western States Geothermal Company. July 23, 1998.
103. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Operating Permit 1284 issued to Western States Geothermal Company. (No date on ATSDR portion of copied permit).

104. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Operating Permit for Temporary Sand and Gravel Processing, Asphaltic Concrete Plants, and Concrete Batch Plants issued to Zix, Inc., January 10, 1997.
105. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Class II General Change of Location Approval (Location Approval Number 1581) for Zix, Inc., July 18, 1997.
106. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Database extract of facilities with current or expired permits, January 2002.
107. State of Nevada, Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality. Air Quality Operating Permit (AP1629-0639 issued to Churchill County School District for surface area disturbance associated with the construction of the Numa Elementary School in Fallon. No date on ATSDR's incomplete copy.

FIGURES

Figure 1. Air Sampling Locations in Churchill County, January and February 2002

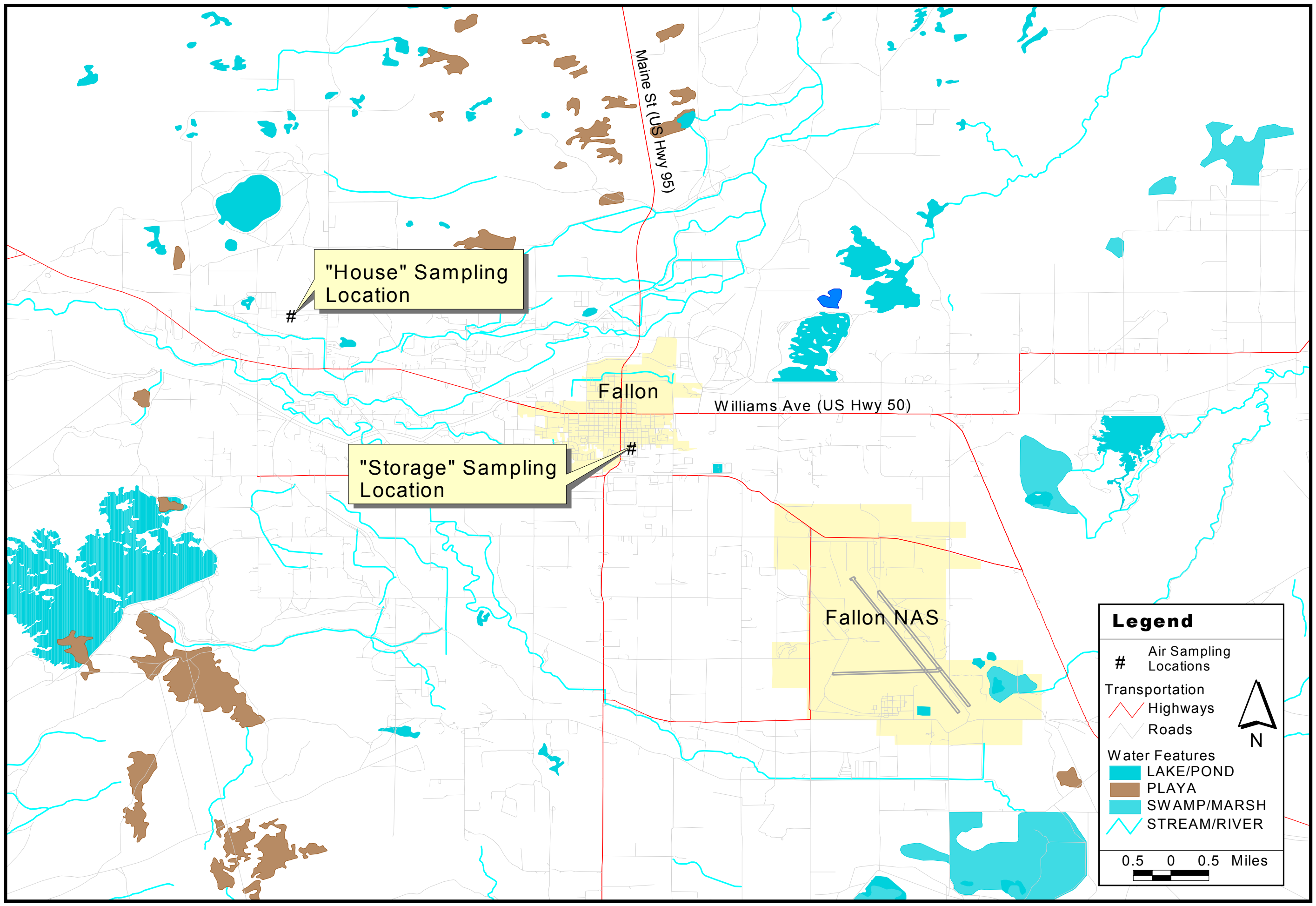
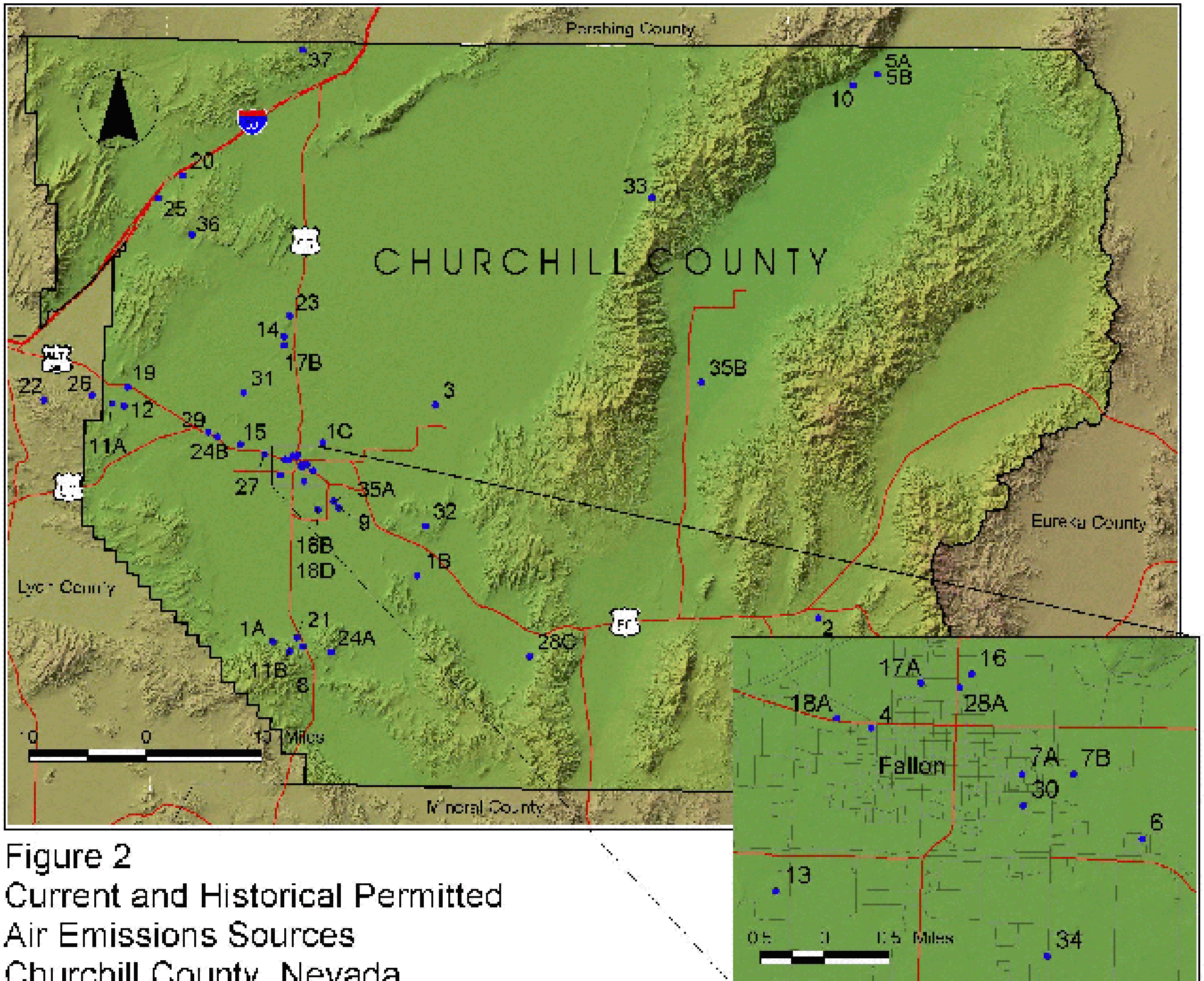


Figure 2. Current and Historical Permitted Air Emission Sources in Churchill County



Label	Company Name
1A	A & K Earth Movers Inc.
1B	A & K Earth Movers Inc.
1C	A & K Earth Movers Inc.
2	American Colloid Company
3	Amor IV Corp & Stillwater Geothermal
4	Bateman Hall Inc
5A	Caithness Dixie Valley
5B	Caithness Dixie Valley LLC
6	CDM Camp Dresser McKee, Inc.
7A	Churchill County School District
7B	Churchill County School District
8	City of Fallon - Russell Pass Landf
9	Coffman Construction Company
10	Dixie Valley Power Partnership
11A	Eagle Picher Minerals Inc
11B	Eagle Picher Minerals Inc
12	Glacier Construction
13	Haskett & Sons
14	ICM Corporation
15	Jack N Tedford Inc
16	Jerome Moretto
17A	Kennametal Inc
17B	Kennametal Inc
18A	L Meckedon & Sons Inc.
18B	L Meckedon & Sons Inc
18C	L Meckedon & Sons Inc.
18D	L Meckedon & Sons Inc.
19	Land Technologies Inc.
20	Mollar Company
21	Motor Sports Safety
22	Nevada Cement Company
23	New American Tec
24A	Noble Materials
24B	Noble Materials Inc.
25	Ormat Nevada Inc
26	Pacific West Builders
27	Pine Grove Farms
28A	Sierra Pacific Power Company
28B	Sierra Pacific Power Company
28C	Sierra Pacific Power Company
29	SMI Joist-Nevada
30	Smitten Oil & Tire Company
31	Soda Lake Limited Partnership & Amor IX
32	Specialty Clays
33	Tenneco Minerals
34	Truckee-Carson Irrigation District
35A	United States Naval Air Station Fallon
35B	United States Naval Air Station Fallon
36	Western States Geothermal Company
37	Zik Inc

Figure 3. Air Modeling of the Kennametal Fallon Facility, PM_{10} Air Concentrations

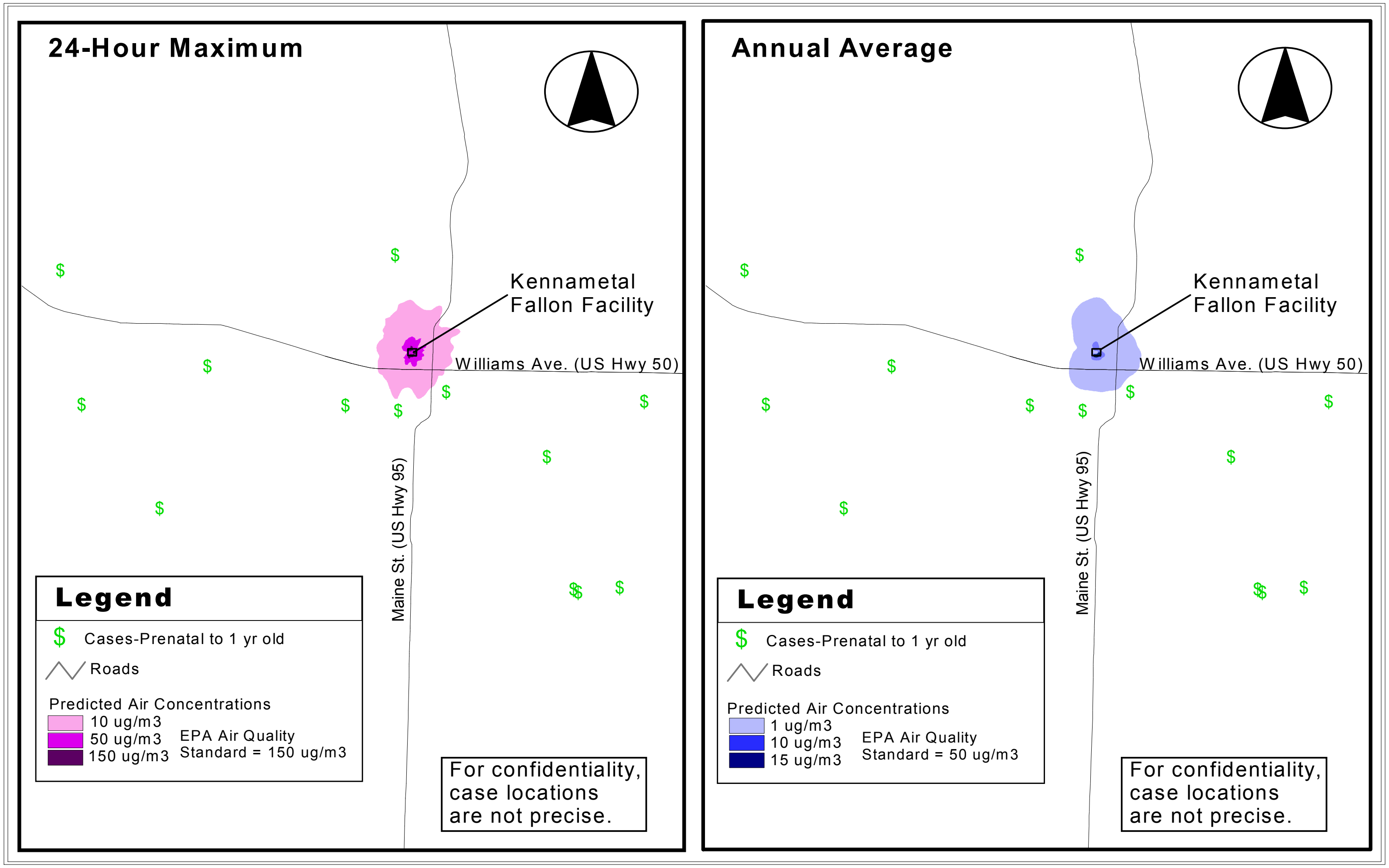


Figure 4. Air Modeling of the Kennametal Refinery, PM_{10} Air Concentrations

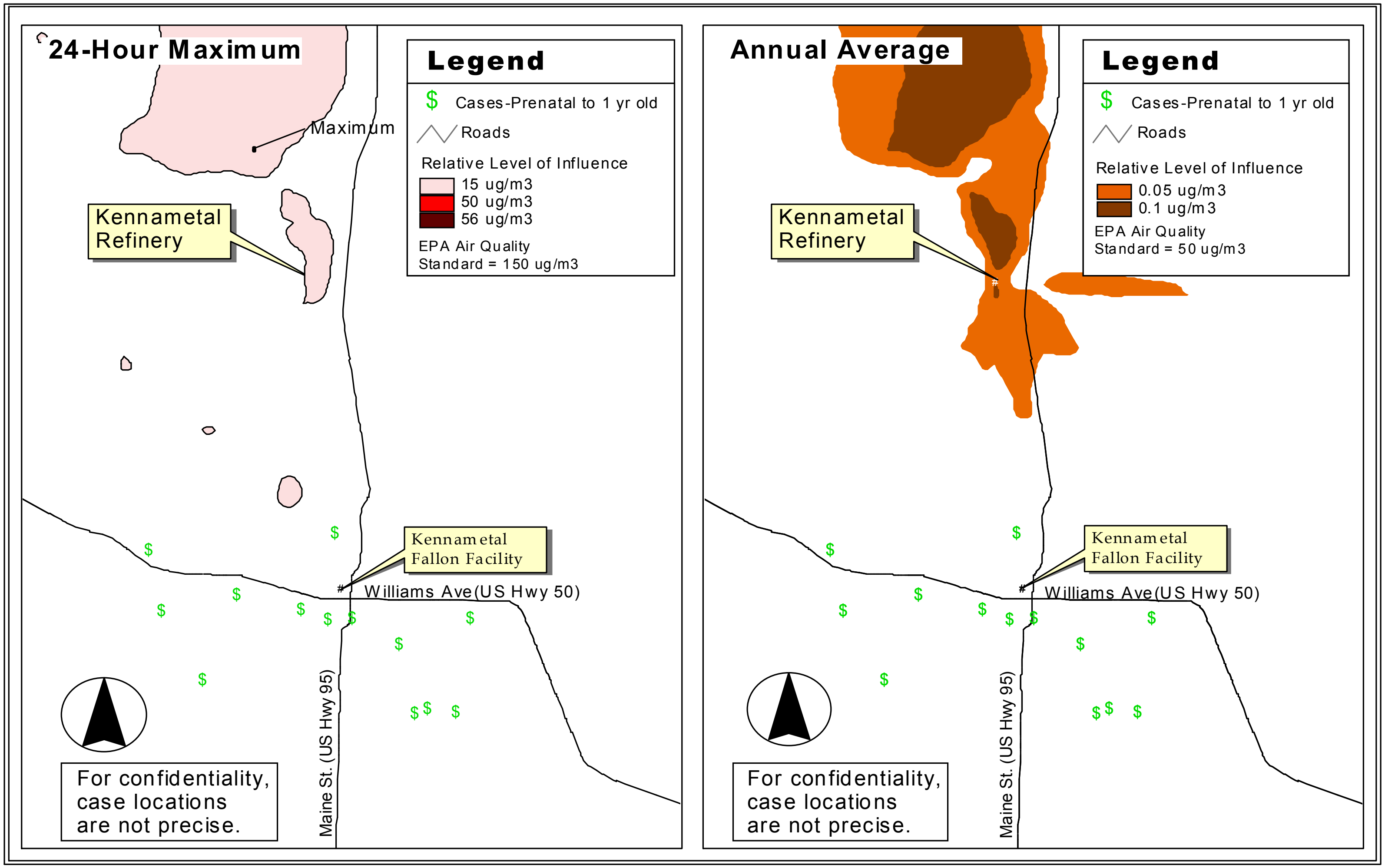


Figure 5. Census Tracts In and Adjacent to Fallon, Nevada

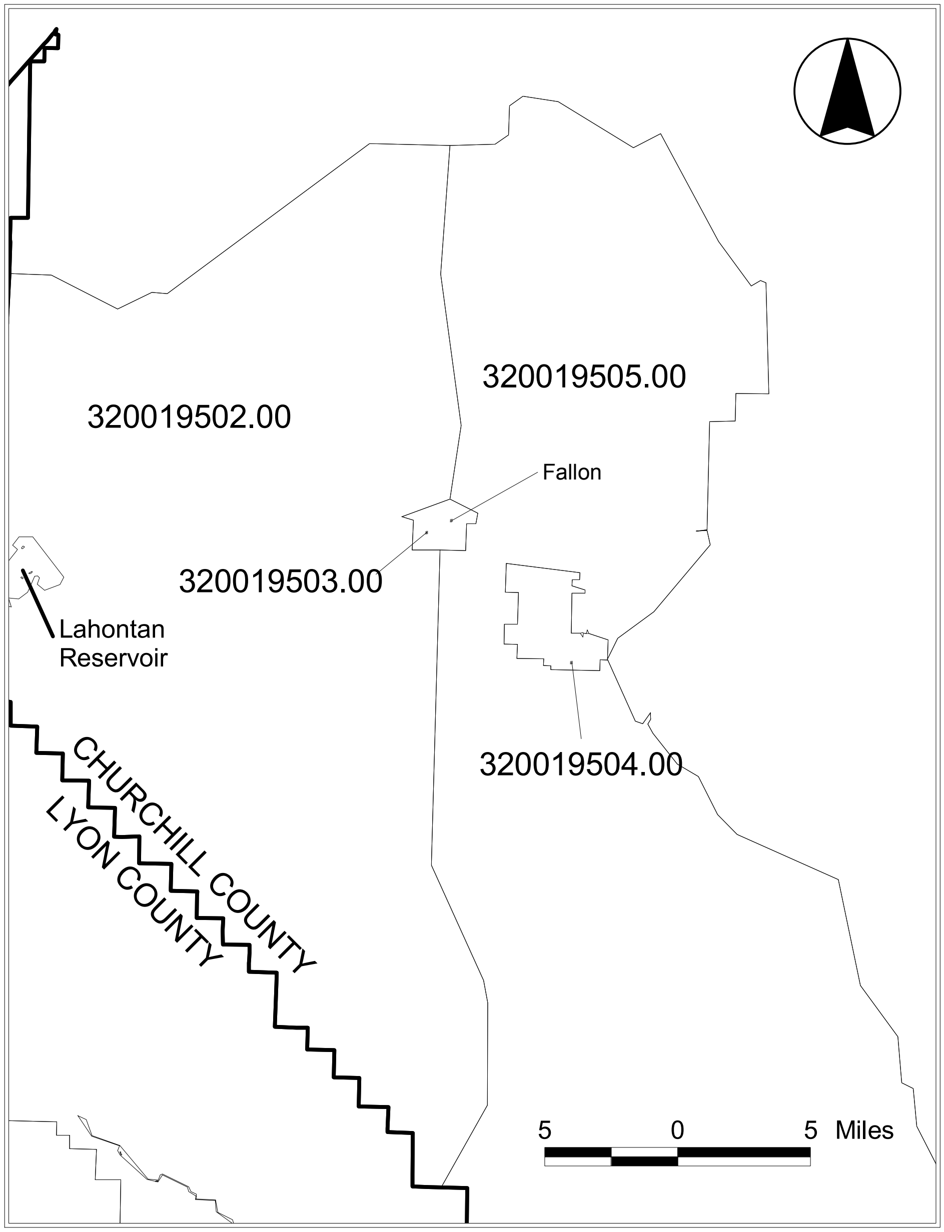
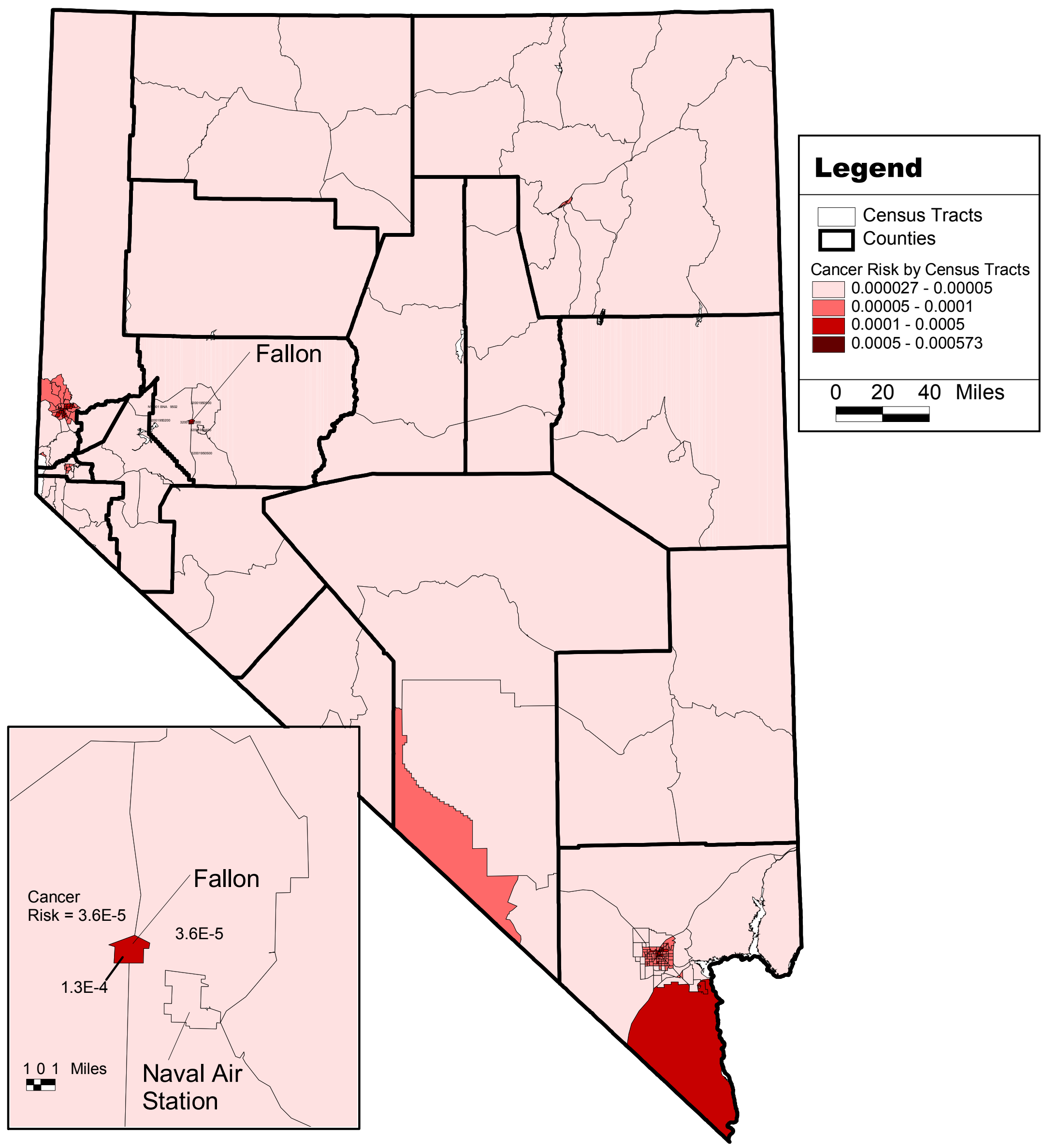
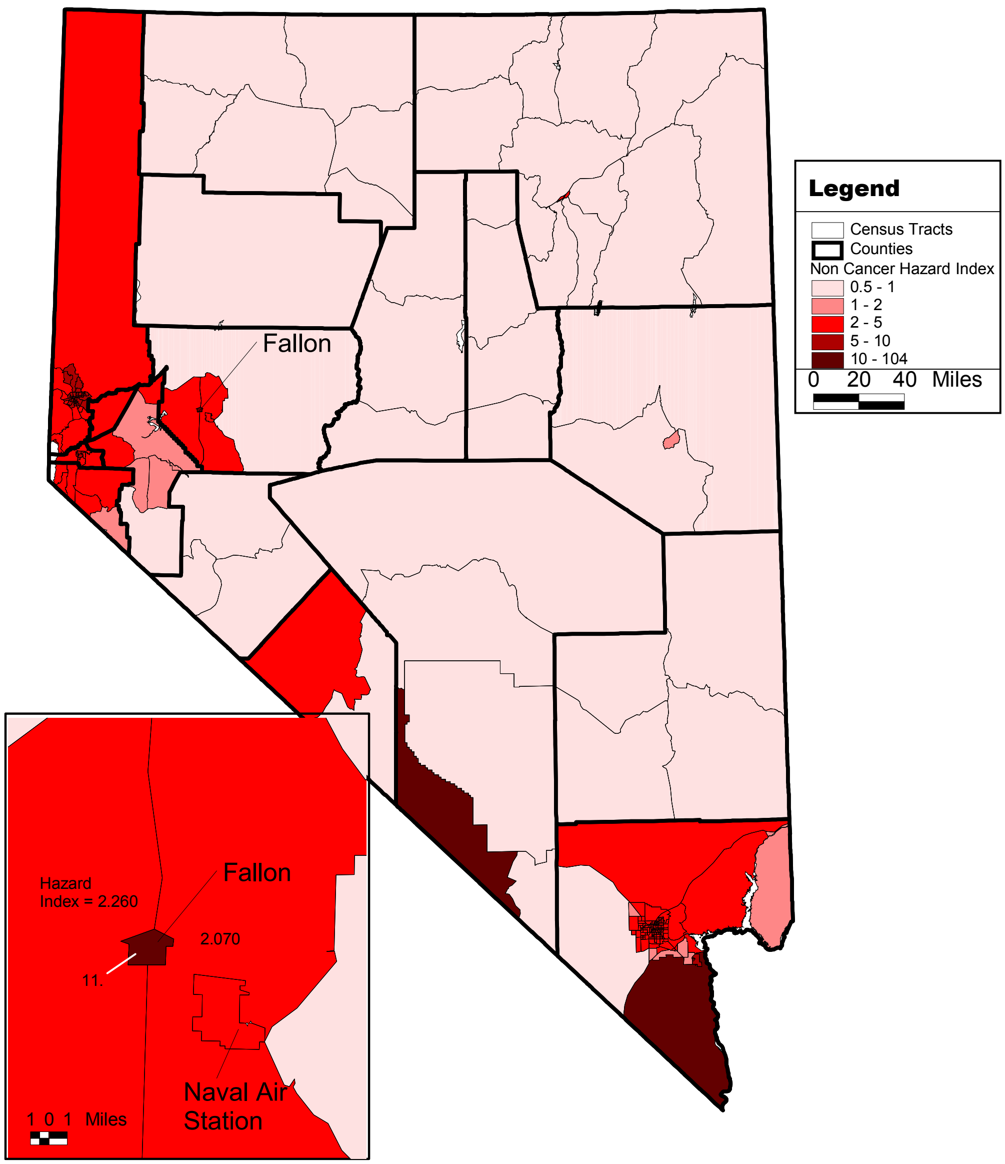


Figure 6. Cancer Risk by Census Tract Based on Air Dispersion Modeling Using 1990 Emissions Inventory



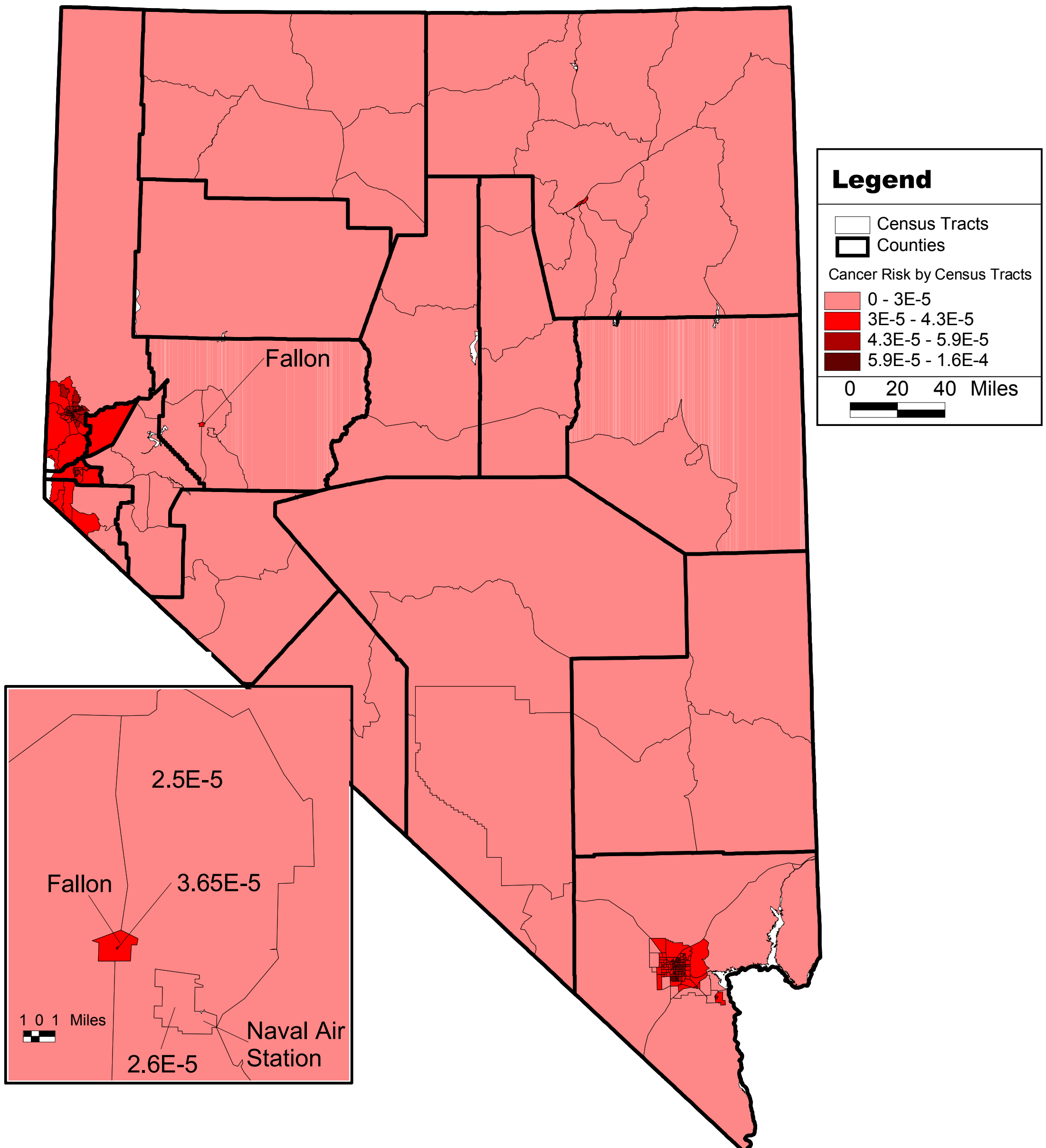
Sources of Data:
Air Concentrations from the U.S. EPA Cumulative Exposure Project,
Data Manipulation and Cancer Risk Calculations by ATSDR FFIMS.

Figure 7. Noncancer Hazard Index by Census Tract Based on Air Dispersion Modeling Using 1990 Emissions Inventory



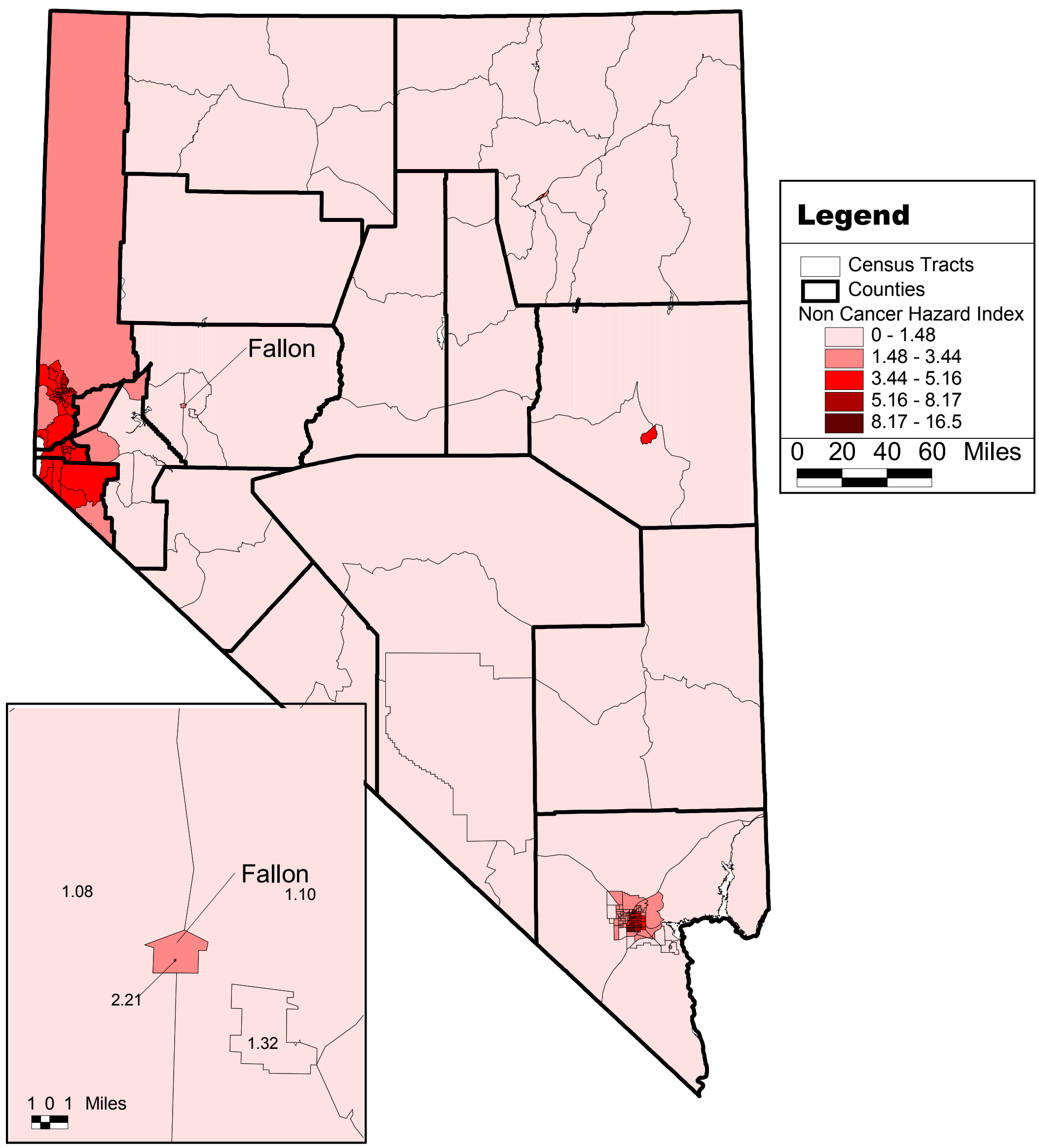
Sources of Data:
Air Concentrations from the U.S. EPA Cumulative Exposure Project,
Data Manipulation and Cancer Risk Calculations by ATSDR FFIMS.

Figure 8. Cancer Risk by Census Tract Based on Air Dispersion Modeling Using 1996 Emissions Inventory



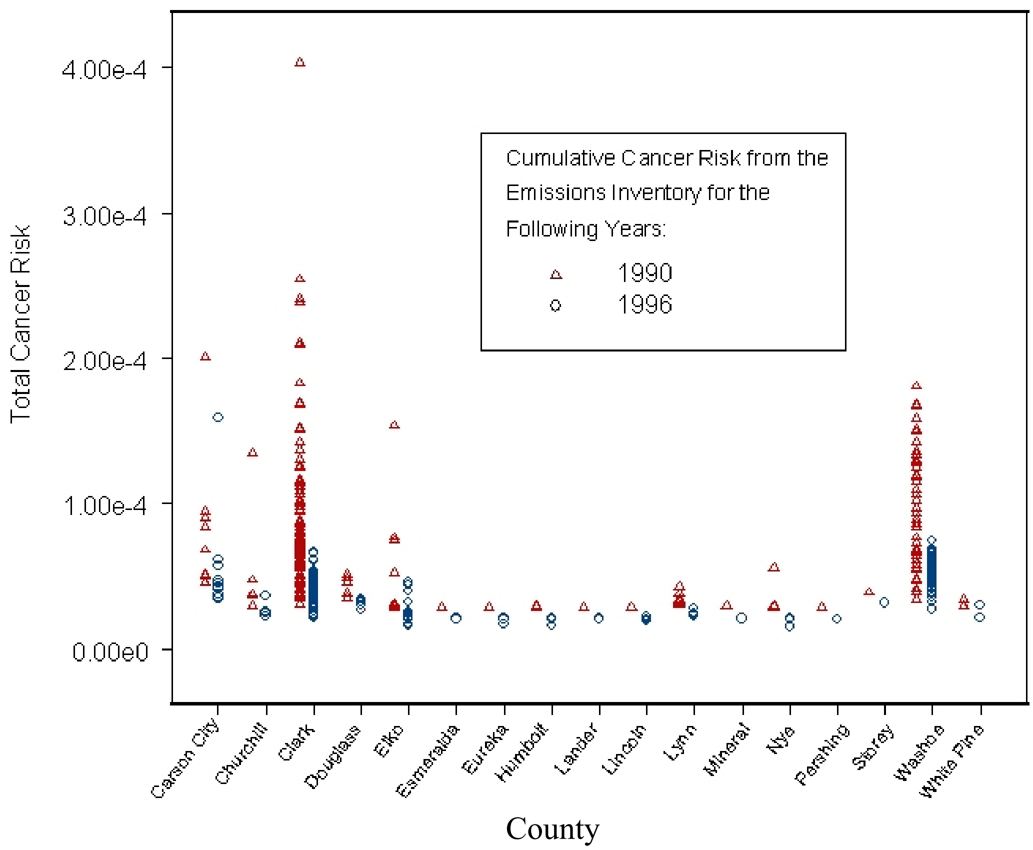
Sources of Data:
Air Concentrations from the U.S. EPA National Air Toxics Assessment,
Data Manipulation and Cancer Risk Calculations by ATSDR FFIMS.

Figure 9. Noncancer Hazard Index by Census Tract Based on Air Dispersion Modeling Using 1996 Emissions Inventory



Sources of Data:
Air Concentrations from the U.S. EPA Cumulative Exposure Project,
Data Manipulation and Cancer Risk Calculations by ATSDR FFIMS.

Figure 10. Total Cancer Risk by Census Tracts per County for Nevada Based on the U.S. EPA 1990 Cumulative Exposure Project and the 1996 National Air Toxics Assessment



* e: exponential (for example, 1.00e-4 is equal to 1 x 10^{-4}).
** Each circle or triangle represents the risk of a single census tract for the respective county.

TABLES

Table 1. Examples of Sources of Outdoor Pollution

Source	Examples
industrial	facility stack emissions and point emissions
commercial	dry cleaners, beauty parlors, auto shops, house painting, roofing, and asphalt paving
mobile	automobiles, airplanes, buses, construction equipment, lawn mowers, leaf blowers, trains
agricultural	pesticide spraying, plowing, windblown dusts
natural	radon gas, naturally occurring metals in air, methane gas

Table 2. Examples of Sources of Indoor Pollution

Source	Examples
combustion	smoking, cooking, fireplaces, home heating
particle resuspension	dusting, vacuuming, sweeping, rug beating
hobbies	model cars, woodworking, painting
consumer products	fumes from home cleaning agents, home pesticides, and particle board and glues used in furniture
building materials	fiberglass or asbestos insulation, carpet
heating	fireplaces, natural gas, gas dryers
natural	radon

Table 3. 24-Hour Samples Exceeding the National Ambient Air Quality Standard for Total Suspended Particles From 1972 to 1987 at Station 1*

Date	24-Hour Sample ($\mu g/m^3$)
May 24, 1975	385
April 5, 1973	348
March 22, 1972	327
November 2, 1984	313
February 28, 1974	296
November 21, 1977	263
Standard	**260**

* Samples collected approximately every sixth day.

Table 4. Summary of PM_{10} Sampling Results for Station 2

Year	Number of Samples	24-Hour Maximum for the Year ($\mu g/m^3$)	Annual Average (Arithmetic Mean) ($\mu g/m^3$)
1993*	35	111	40
1994	45	66	27
1995	470	74	28
1996	54	102	25
1997	53	53	26
1998†	25	79	19
	Standard	**150**	**50**

* Operation began in May 1993.
† Site discontinued after June 1998.

Table 5. Observations of Smoke, 1991 Through 2000

Number	Year	Month	Day	Time	First Observation	Second Observation
1	1994	8	18	700	smoke	-
2	1994	8	18	800	smoke	-
3	1994	8	18	900	smoke	-
4	1994	8	18	1000	smoke	-
5	1994	8	18	1100	smoke	-
6	1994	8	18	1200	smoke	-
7	1994	8	18	1300	smoke	-
8	1994	8	18	1400	smoke	-
9	1994	8	18	1500	smoke	-
10	1994	8	18	1900	haze	smoke
11	1994	8	18	2000	haze	smoke
12	1994	8	18	2100	haze	smoke
13	1994	8	18	2200	haze	smoke
14	1994	8	18	2300	haze	smoke
15	1994	8	19	0	haze	smoke
16	1994	8	19	700	smoke	-
17	1994	8	19	800	smoke	-
18	1994	8	19	900	smoke	-
19	1994	8	19	1000	smoke	-
20	1994	8	19	1100	smoke	-
21	1994	8	19	1200	smoke	-
22	1994	8	20	1000	smoke	-
23	1994	8	20	1100	smoke	-
24	1994	8	20	1200	smoke	-
25	1994	8	20	1300	smoke	-
26	1994	8	20	1400	smoke	-
27	1994	8	20	1900	smoke	-
28	1994	8	20	2000	smoke	-
29	1994	8	20	2100	smoke	-
30	1994	8	20	2200	smoke	-
31	1994	8	20	2300	smoke	-
32	1994	8	21	0	smoke	-
33	1994	8	21	100	smoke	-

Number	Year	Month	Day	Time	First Observation	Second Observation
34	1996	8	16	1700	smoke	-
35	1996	8	17	500	smoke	-
36	1996	8	17	600	smoke	-
37	1996	8	17	700	smoke	-
38	1996	8	17	800	smoke	-
39	1996	8	17	900	smoke	-
40	1996	8	17	1500	smoke	-
41	1996	8	17	1600	smoke	-
42	1996	8	17	1700	smoke	-
43	1996	8	17	1800	smoke	-
44	1996	8	17	1900	smoke	-
45	1996	8	17	2000	smoke	-
46	1996	8	17	2100	smoke	-
47	1996	8	19	1600	smoke	-
48	1996	8	19	1700	smoke	-
49	1996	8	20	1300	smoke	-
50	1996	8	20	1400	smoke	-
51	1996	8	20	1500	smoke	-
52	1996	8	20	1600	smoke	-
53	1996	8	20	1700	smoke	-
54	1996	8	20	1800	smoke	-
55	1996	8	20	1900	smoke	-
56	1996	8	20	2000	smoke	-
57	1996	8	26	600	smoke	-
58	1996	8	26	700	smoke	-
59	1996	8	26	800	smoke	-
60	1996	8	26	1300	smoke	-
61	1996	8	26	1400	smoke	-
62	1996	8	26	1500	smoke	-
63	1996	8	26	1600	smoke	-
64	1996	8	26	1700	smoke	-
65	1996	8	26	1800	smoke	-
66	1996	8	26	1900	smoke	-
67	1996	8	26	2000	smoke	-

Number	Year	Month	Day	Time	First Observation	Second Observation
68	1996	8	26	2100	smoke	-
69	1996	8	27	1100	smoke	-
70	1996	8	30	900	smoke	-
71	1997	8	9	2100	smoke	-
72	1997	8	9	2200	smoke	-
73	1997	8	29	900	smoke	-
74	1999	8	5	700	-	smoke
75	1999	8	5	800	-	smoke
76	1999	8	5	900	-	smoke
77	1999	8	5	1000	-	smoke
78	1999	8	5	1100	-	smoke
79	1999	8	5	1200	-	smoke
80	1999	8	5	1300	-	smoke
81	1999	8	5	1400	-	smoke
82	1999	8	5	1500	-	smoke
83	1999	8	5	1600	-	smoke
84	1999	8	26	700	-	smoke
85	1999	8	26	800	-	smoke
86	1999	8	26	900	-	smoke
87	1999	8	26	1000	-	smoke
88	1999	8	26	1200	-	smoke
89	1999	8	26	1300	-	smoke
90	1999	8	26	1400	-	smoke
91	1999	8	26	1500	-	smoke
92	1999	9	9	900	-	smoke
93	1999	9	9	1000	-	smoke
94	1999	9	9	1100	-	smoke
95	1999	9	9	1200	-	smoke
96	1999	9	9	1300	-	smoke
97	1999	9	9	1400	-	smoke
98	1999	9	9	1500	-	smoke
99	1999	9	9	1600	-	smoke
100	1999	9	9	1700	-	smoke
101	1999	10	1	1000	-	smoke

Number	Year	Month	Day	Time	First Observation	Second Observation
102	1999	10	1	1200	-	smoke
103	1999	10	1	1300	-	smoke
104	1999	10	1	1400	-	smoke
105	1999	10	1	1500	-	smoke
106	1999	10	1	1600	-	smoke
107	1999	10	1	1700	-	smoke
108	1999	10	1	1800	-	smoke
109	1999	10	1	1900	-	smoke
110	1999	10	1	2000	-	smoke
111	1999	10	1	2100	-	smoke
112	1999	10	1	2200	-	smoke
113	2000	8	20	900	-	smoke
114	2000	8	20	1000	-	smoke
115	2000	8	20	1100	-	smoke
116	2000	8	20	1200	-	smoke
117	2000	8	20	1300	-	smoke
118	2000	8	20	1400	-	smoke
119	2000	8	20	1500	-	smoke
120	2000	8	20	1600	-	smoke
121	2000	8	20	1700	-	smoke
122	2000	8	23	1000	-	smoke
123	2000	8	23	1100	-	smoke

Table 6. Stone Lions Environmental Sampling Data for Fallon, Nevada

Fallon Summa Canister Sampling Results															
24-hour samples taken 1/31/02–2/7/02															
		Storage 1/31-2/1	**House 1/31-2/1**	**Storage 2/1-2/2**	**House 2/1-2/2**	**Storage 2/2-2/3**	**House 2/2-2/3**	**Storage 2/3-2/4**	**House 2/3-2/4**	**Storage 2/4/-2/5**	**House 2/4-2/5**	**Storage 2/5-2/6**	**House 2/5-2/6**	**Storage 2/6-2/7**	**House 2/6-2/7**
		0900 - 0900	**0930 - 0930**	**0910 - 0910**	**0950 - 0950**	**0920 - 0920**	**1000 - 1000**	**0930 - 0930**	**1010 - 1010**	**0940 - 0940**	**1020 - 1020**	**0950 - 0950**	**1030 - 1030**	**1000 - 1000**	**1040 - 1040**
Compound	**MRL* µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**
Chloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	1.0	16	11	14	13	23	16	20	20	30	21	14	8.8	16	24
Trichlorofluoro-methane	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorotrifluorethane	3.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-Butyl Ether	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Acetate	1.0	ND	ND	ND	ND	ND	ND	ND	2.1	ND	2.9	ND	ND	ND	2.0
2-Butanone (MEK)	1.0	2.9	ND	2.1	2.7	4.3	2.9	2.7	2.9	4.7	3.4	2.3	ND	1.9	ND
cis-1,2-Dichloroethene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1.0	4.8	1.9	4.7	ND	4.1	ND	5.3	ND	4.8	ND	5.9	ND	3.2	ND
Carbon Tetrachloride	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Fallon Summa Canister Sampling Results

24-hour samples taken 1/31/02–2/7/02

		Storage 1/31-2/1	**House 1/31-2/1**	**Storage 2/1-2/2**	**House 2/1-2/2**	**Storage 2/2-2/3**	**House 2/2-2/3**	**Storage 2/3-2/4**	**House 2/3-2/4**	**Storage 2/4/-2/5**	**House 2/4-2/5**	**Storage 2/5-2/6**	**House 2/5-2/6**	**Storage 2/6-2/7**	**House 2/6-2/7**
		0900 - 0900	**0930 - 0930**	**0910 - 0910**	**0950 - 0950**	**0920 - 0920**	**1000 - 1000**	**0930 - 0930**	**1010 - 1010**	**0940 - 0940**	**1020 - 1020**	**0950 - 0950**	**1030 - 1030**	**1000 - 1000**	**1040 - 1040**
Compound	**MRL* µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**
1,2-Dichloropropane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.0	13	2.8	9.3	2.0	8.4	1.7	13	3.4	14	2.9	15	3.9	9.7	2.5
2-Hexanone	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1.0	ND	ND	ND	ND	2.9	ND	2.1	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	1.0	1.8	ND	1.8	ND	1.7	ND	2.6	ND	2.3	ND	3.2	ND	1.9	ND
m,p-Xylenes	1.0	6.3	3.1	6.6	ND	6.3	1.8	9.7	2.6	9.0	2.3	12	3.5	7.0	ND
Bromoform	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	1.0	2.2	ND	2.4	ND	2.3	ND	3.5	ND	3.3	ND	4.2	ND	2.5	ND
1,1,2,2-Tetrachloroethane	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Fallon Summa Canister Sampling Results

24-hour samples taken 1/31/02–2/7/02

		Storage 1/31-2/1	**House 1/31-2/1**	**Storage 2/1-2/2**	**House 2/1-2/2**	**Storage 2/2-2/3**	**House 2/2-2/3**	**Storage 2/3-2/4**	**House 2/3-2/4**	**Storage 2/4/-2/5**	**House 2/4-2/5**	**Storage 2/5-2/6**	**House 2/5-2/6**	**Storage 2/6-2/7**	**House 2/6-2/7**
		0900 - 0900	**0930 - 0930**	**0910 - 0910**	**0950 - 0950**	**0920 - 0920**	**1000 - 1000**	**0930 - 0930**	**1010 - 1010**	**0940 - 0940**	**1020 - 1020**	**0950 - 0950**	**1030 - 1030**	**1000 - 1000**	**1040 - 1040**
Compound	**MRL* µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**
Propene		10													
Dichlorodifluoromethane		4		4		4									
Isobutane		8	10	8		7		20		20		20		8	
C4H8 Compound		4						5		5		5			
Ethanol		10	20	200		50	20	30	5	20		40	5	10	
Butane		20	20	20		20		30		20		20			
Pentane		7	5	7		6		8		7		8			
2-Methylpentane		6		6		6		7		7		8		5	
Hexane		4					5								
Methylcyclopentane		4		4				5		6		8			
Propane			50					10	5	10	7		6	6	
C11H24 Branched Alkane			7				5								
Decane			5												
Propene + Propane				20	8	20	8					10			
Isopropanol				8		8									
Butanal							5		5	5					
Pentanal							6		5						
Hexanal							8								
Heptanal							9								
Octanal							6								
Undecane							5								
Unidentified Siloxane (possible artifact)							5								

Fallon Summa Canister Sampling Results

24-hour samples taken 1/31/02–2/7/02

		Storage 1/31-2/1	House 1/31-2/1	Storage 2/1-2/2	House 2/1-2/2	Storage 2/2-2/3	House 2/2-2/3	Storage 2/3-2/4	House 2/3-2/4	Storage 2/4/-2/5	House 2/4-2/5	Storage 2/5-2/6	House 2/5-2/6	Storage 2/6-2/7	House 2/6-2/7
		0900 - 0900	0930 - 0930	0910 - 0910	0950 - 0950	0920 - 0920	1000 - 1000	0930 - 0930	1010 - 1010	0940 - 0940	1020 - 1020	0950 - 0950	1030 - 1030	1000 - 1000	1040 - 1040
Compound	**MRL* µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**
2-Methylbutane								10				10	4	9	
3-Methylpentane								4				5			
3-Methylhexane								4				5			
C8H18 Branched Alkane								4		4		4			
2-Butoxyethanol								7							
3-Ethyltoluene								5		6		6			
Acetaldehyde									7		8				5
Pentanal + 3-Methylhexane										6					
Benzaldehyde										5					
n-Butane														10	
n-Pentane														4	
2-Methylhexane												4			

* MRL = Method reporting limit: the minimum quantity of a target analyte that can be confidently determined by the reference method.

Fallon PUF Sampling Results
24-hour samples taken 1/31/02 - 2/7/02

Compound	Storage 1/31-2/1 0900 - 0900 µg/m³	ppbv	House 1/31-2/1 0930 - 0930 µg/m³	ppbv	Storage 2/1-2/2 0910 - 0910 µg/m³	ppbv	House 2/1-2/2 0950 - 0950 µg/m³	ppbv	Storage 2/2-2/3 0920 - 0920 µg/m³	ppbv	House 2/2-2/3 1000 - 1000 µg/m³	ppbv	Storage 2/3-2/4 0930 - 0930 µg/m³	ppbv
Naphthalene	0.2000	0.03700	0.0840	0.01600	0.2300	0.04500	0.0540	0.01000	0.2100	0.04000	0.0610	0.01200	0.2300	0.04300
Acenaphthalene	0.0110	0.00180	0.0052	0.00083	0.0120	0.00190	0.0023	0.00036	0.0083	0.00130	0.0034	0.00055	0.0160	0.00250
Acenaphthene	0.0016	0.00025	ND	ND	0.0016	0.00025	ND	ND	0.0016	0.00025	ND	ND	0.0018	0.00029
Fluorene	0.0041	0.00061	0.0021	0.00031	0.0037	0.00054	0.0015	0.00022	0.0034	0.00050	0.0020	0.00030	0.0048	0.00071
Phenanthrene	0.0092	0.00130	0.0057	0.00079	0.0079	0.00109	0.0041	0.00056	0.0074	0.00100	0.0056	0.00077	0.0110	0.00150
Anthracene	0.0013	0.00018	ND	ND	0.0011	0.00015	ND	ND	0.00092	0.00013	ND	ND	0.0017	0.00024
Fluoranthene	0.0027	0.00032	0.0017	0.00020	0.0014	0.00017	0.0010	0.00012	0.0019	0.00023	0.0016	0.00019	0.0035	0.00042
Pyrene	0.0028	0.00034	0.0015	0.00018	0.0012	0.00015	ND	ND	0.0018	0.00022	0.0013	0.00016	0.0035	0.00042
Benzo(a)anthracene	0.0016	0.00017	ND	ND	ND	ND	ND	ND	0.0010	0.00011	ND	ND	0.0017	0.00018
Chrysene	0.0020	0.00022	0.0011	0.00012	ND	ND	ND	ND	0.0014	0.00015	0.00094	0.00010	0.0024	0.00025
Benzo(b)fluoranthene	0.0016	0.00016	ND	ND	ND	ND	ND	ND	0.0011	0.00011	ND	ND	0.0017	0.00017
Benzo(k)fluoranthene	0.0011	0.00010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	0.00012
Benzo(a)pyrene	0.0013	0.00013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0013	0.00013
Indeno(1,2,3-cd)pyrene	0.00087	0.00008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	0.00010
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	0.0010	0.00009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0012	0.00010

Fallon PUF Sampling Results
24-hour samples taken 1/31/02 - 2/7/02

	House 2/3-2/4 1010 - 1010		Storage 2/4/-2/5 0940 - 0940		House 2/4-2/5 1020 - 1020		Storage 2/5-2/6 0950 - 0950		House 2/5-2/6 1030 - 1030		Storage 2/6-2/7 1000 - 1000		House 2/6 1040 - 1725	
Compound	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**
Naphthalene	0.0500	0.00960	0.2200	0.04200	0.0730	0.01400	0.2200	0.04200	0.0540	0.01000	0.1500	0.03000	0.0300	0.0056
Acenaphthalene	0.0017	0.00027	0.0084	0.00140	0.0031	0.00049	0.0140	0.00230	0.0018	0.00030	0.0014	0.00022	ND	ND
Acenaphthene	ND	ND	0.0016	0.00020	ND	ND	0.0018	0.00029	ND	ND	0.0011	0.00017	ND	ND
Fluorene	0.0010	0.00015	0.0036	0.00054	0.0015	0.00022	0.0042	0.00061	0.0012	0.00018	0.0023	0.00034	ND	ND
Phenanthrene	0.0027	0.00037	0.0076	0.00100	0.0040	0.00054	0.0088	0.00120	0.0034	0.00047	0.0053	0.00072	0.0023	0.00031
Anthracene	ND	ND	0.0011	0.00015	ND	ND	0.0013	0.00017	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	0.0024	0.00029	0.0015	0.00018	0.0029	0.00035	0.0011	0.00013	0.0014	0.00016	ND	ND
Pyrene	ND	ND	0.0024	0.00029	0.0014	0.00017	0.0032	0.00038	0.0010	0.00012	0.0013	0.00016	ND	ND
Benzo(a)anthracene	ND	ND	0.0010	0.00011	ND	ND	0.0012	0.00013	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	0.0013	0.00014	ND	ND	0.0015	0.00016	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	0.00097	0.00009	ND	ND	0.0012	0.00012	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	0.00078	0.00008	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	0.00078	0.00007	ND	ND	ND	ND	ND	ND

Fallon High Volume Sampling Results

24-hour samples taken 1/31/02–2/7/02

Metal	MRL ng/m^3	Storage 1/31-2/1 Time 0900–0900 ng/m^3	House 1/31-2/1 Time 0930–0930 ng/m^3	Storage 2/1–2/2 Time 0910–0910 ng/m^3	House 2/1–2/2 Time 0950–0950 ng/m^3	Storage 2/2–2/3 Time 0920–0920 ng/m^3	House 2/2–2/3 Time 1000–1000 ng/m^3	Storage 2/3–2/4 Time 0930–0930 ng/m^3	House 2/3–2/4 Time 1010–1010 ng/m^3	Storage 2/4/-2/5 Time 0940–0940 ng/m^3	House 2/4–2/5 Time 1020–1020 ng/m^3	Storage 2/5–2/6 Time 0950–0950 ng/m^3	House 2/5–2/6 Time 1030–1030 ng/m^3	Storage 2/6–2/7 Time 1000–0315 ng/m^3	House 2/6–2/7 Time 1040–1040 ng/m^3
Aluminum	100	180	170	170	120	150	ND	230	210	280	270	370	230	260	ND
Antimony	0.01	0.34	0.22	0.32	0.15	0.29	0.19	0.58	0.26	1.75	0.30	0.50	0.24	0.46	0.27
Arsenic	0.1	1.1	0.8	1.3	0.9	2.0	0.6	1.1	1.1	1.5	1.1	2.3	1.1	1.5	0.5
Barium	20	ND	ND	ND	ND	ND	ND	ND	ND	22	ND	38	ND	ND	ND
Beryllium	0.01	0.013	0.006	0.014	0.005	0.009	ND	0.019	0.022	0.018	0.016	0.023	0.016	0.021	ND
Cadmium	0.01	0.22	0.16	0.23	0.09	0.42	0.14	0.32	0.16	0.36	3.13†	0.36	0.20	0.45	0.33
Chromium	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt	0.01	2.97	0.192	0.659	0.302	0.209	0.082	0.380	0.373	2.13	0.427	0.736	0.344	0.932	0.13
Copper	0.02	68.6	155	74.0	87.2	78.6	84.6	107	111	80.4	160	119	90.0	147	41.8
Lead	0.01	8.30	2.21	4.19	1.23	3.65	1.25	6.54	2.16	6.02	1.92	21.2	6.44	7.03	2.54
Manganese	0.2	16.3	26.1	21.5	17.7	16.6	7.4	27.2	32.0	21.8	30.9	33.5	34.0	34.6	14.2
Molybdenum	0.01	0.27	0.10	0.25	0.08	0.20	0.03	0.27	0.09	0.51	0.10	0.72	0.10	0.22	ND
Nickel	0.3	ND	ND	ND	ND	ND	ND	0.4	0.3	1.1	ND	0.7	ND	0.3	ND
Selenium	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	0.01	0.058	0.096	0.043	0.038	0.060	0.046	0.088	0.061	0.061	0.077	0.094	0.055	0.104	ND
Thallium	0.01	0.013	0.006	0.014	0.022	0.009	ND	0.014	0.011	0.018	0.011	0.023	0.011	0.014	ND
Thorium	0.01	0.170	0.124	0.153	0.132	0.126	0.056	0.209	0.279	0.338	0.279	0.324	0.267	0.299	0.11
Uranium	0.01	0.067	0.040	0.076	0.038	0.056	0.025	0.102	0.089	0.114	0.071	0.141	0.087	0.139	0.04
Vanadium	0.05	0.81	0.56	0.81	0.49	0.65	0.25	1.16	1.17	1.41	1.10	1.83	1.0	1.4	0.4
Zinc	3	26	8	26	5	20	4	25	8	42	8	50	15	21	ND

*MRL = Method reporting limit: the minimum quantity of a target analyte that can be confidently determined by the reference method.

† The laboratory considers this result to be an outlier.

Table 7. List of Facilities With Current or Past Air Quality Permits*

A & K Earth Movers, Inc.
- Asphaltic concrete plant
- Sand and gravel production (mining and processing)

American Colloid Company
Amor IV Corporation and Stillwater Geothermal
Amor IX Soda Lake 1 and 2 Geothermal Projects (aka Soda Lake Limited Partnership)
Bateman Hall, Inc. (surface area disturbance only)
CDM Camp Dresser McKee (wastewater treatment plant, surface area disturbance only)
Churchill County School District -bus lot adjacent to the Elbert C. Best Elementary School
Churchill County School District -Numa Elementary School (surface area disturbance only)
City of Fallon (surface area disturbance only)
Coffmann Construction Company
Dixie Valley Power Partnership, Dixie Valley Geothermal Power Project
Eagle Picher Minerals, Inc.
Eagle Picher Minerals, Inc., Popcorn Project
Glacier Construction
Hiskett & Sons
Huck Salt Mine
ICM Corporation (surface area disturbance only)
Jack N. Tedford, Inc.
Jerome Moretto
Kennametal Fallon Facility
Kennametal Refinery
L. Mackedon & Sons, Inc.
Land Technologies, Inc., Hazen Project
Moltan Company
Motor Sports Safety (surface area disturbance only)
New America Tec
Noble Materials (surface area disturbance only)
Ormat Nevada, Inc., Brady Power Partners/Brady Hot Springs
Oxbow Geothermal Dixie Valley Power Plant (Caithness Dixie Valley, LLC)
Pine Grove Farms (surface area disturbance only)
Sierra Pacific Power Company (surface area disturbance only)
SMI Joist - Nevada
Smitten Tire and Oil Co.
Specialty Clays/Fallon Bentonite Project
Tenneco Minerals/Fondaway Canyon Project
Truckee-Carson Irrigation District
U.S. Naval Air Station, Fallon
Western States Geothermal/Desert Peak Geothermal
Zix Inc.

* Data from NDEP, records go back to 1994.

Table 8. Permitted Point Source Emissions

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
A & K Earth Movers, Inc. • Portable asphalt concrete plant (AP1611-0888) Active	3 miles northeast of Fallon near eastern boundary of the Fallon Airport in Churchill County. Prior to 1999, the facility was located about 3 miles southeast of Fallon and west of the Fallon NAS.	Produces asphaltic concrete (hot asphalt mix) using bituminous and aggregate burners, a venturi wet scrubber for air pollution control, two diesel generators, and various conveyors and screens with water sprays to reduce emissions.	From air permit: PM, PM_{10} from plant operations; PM_{10}, SO_2, O_3, CO and VOCs from diesel generator. From AP-42 for plant operations include PAHs, aromatics, dioxin/furans, VOCs, and metals.	47, 48
• Sand & gravel production at various locations - Russell Pass Pit (AP1442-0797) Active - Salt Wells Pit (AP1442-0797) Active - Sand Canyon Area	13 miles S of Fallon, 3 miles W of 395 15 miles SE of Fallon along Hwy. 50 E Sand Canyon area, next to Lahontan Reservoir; moved to Russell Pass Pit before 1990	Sand and gravel production consisting of conveyors, hoppers, crushers, screens, and a diesel generator.	From air permit: PM and PM_{10} from aggregate production; PM_{10}, SO_2, NO_2, CO, VOCs and HAPs from the diesel generator. Fugitive emissions controlled with water sprays which may use or may have used surfactants. Metals would be associated with the particulate matter.	49, 50, 51
American Colloid Company (AP3295-0089) Active	US Hwy. 50 and 722, 47 miles east/southeast of Fallon	Mines and processes diatamaceous earth using conveyors, hoppers, cutters, hammermills, cyclones, dryer furnace, and screens.	From air permit: PM_{10}, NO_x, SO_x, CO, TOC, VOC. Metals would be associated with the particulate matter. Content of TOC or VOC dependent on fuel used in furnace and dryer.	52, 53
Amor IV Corporation and Stillwater Geothermal (AP4911-0197) Active	About 13 miles northeast of Fallon	11-megawatt modular, binary, air-cooled electrical generation facility and geothermal wellfield. Heated groundwater is used in a noncontact manner to heat isopentane. Isopentane is cooled via induced draft air-cooled condensers. The water is then injected into the ground. There are 14 of these individual binary cycle Ormat Energy Converters. Operation began in 1989.	• Nonroutine isopentane emissions due to accidents and gasket and value failures. Isopentane is contaminated with small amounts of methane, ethane, propane, and butane (<=3% of isopentane). • Routine isopentane emissions from mechanical seals, loading/unloading of storage tanks, and generator optimization procedures. • Emissions of VOCs from fuel tanks, parts washer solvent, cooling water mixed with water treatment chemicals and ethylene glycol. • H_2S from wells • Diesel fuel emissions from equipment and vehicles • Fugitive dust from traffic	54

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
AMOR IX Corporation/Soda Lake 1 and 2 Geothermal Projects (aka Soda Lake Limited Partnership) (AP4911-0464) Active	5500 Soda Lake Road, about 7 miles northwest of Fallon	44-megawatt geothermal power plant using pentane as the binary motive fluid in a closed loop system. Other equipment include tanks for storage of pentane, diesel emergency generator backups, and turbines. Operation began in 1987.	Permit: PM and PM_{10}, VOCs Diesel generator emissions include PM, PM_{10}, SO_x, NO_x, VOCs, CO, and HAPS; VOCs from fugitive releases (n-pentane and a much smaller amount of isopentane) from seals and flanges in the energy converters (power plants); and H_2S from production wells. Miscellaneous additional VOCs that could be released from solvent parts cleaning are not included in the permit because NDEP and AMOR considered it an insignificant source. After heat is extracted from the geothermal fluid, the fluid is reinjected into the ground. During startup of the extraction wells, a large amount of fluid is discharged at the surface (650,000 lbs/hr) for up to 10 hours. During this time, noncondensible gases are emitted to the atmosphere. These gases include carbon dioxide, hydrogen sulfide, ammonia, argon, nitrogen, methane, and hydrogen.	55, 56, 57, 58, 59, 60

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
			The production zone for the wells is between 2,500 to 4,000 feet below ground surface in basalt units. The fluid is then reinjected into a shallow geothermal aquifer (800 to 1,200 feet below ground surface). Theoretical maximum accidental release from system is 1,500 gallons of pentane. Upset conditions: 2,860 pounds released on May 17, 1993, and 26 lbs on June 8, 1993. Fugitive emission dust from construction and daily operation.	
Churchill County School District Numa Elementary School Surface Area Disturbance (AP1629-0639) Inactive		Surface area disturbance associated with the construction of the school. Permit concluded August 1, 1996.		
Churchill County School District Bus lot adjacent to the Elbert C. Best Elementary School (AP9999-0097) Inactive	290 Sherman Street Fallon, Nevada 89406	Underground storage tank removal with a soil gas extraction system. Soil gas was gas treated using a thermal oxidizer	Constitutents of diesel fuel consisting predominantly of benzene, toluene, ethylbenzene, and xylenes, but may consist of other constituents in total petroleum hydrocarbons.	61

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Coffmann Construction Company (AP3273-0615) Inactive	Naval Air Station, Fallon	Concrete batch plant	Particulates from conveyors, loading, and transfering. Fly-ash could contain metals and SVOCs. Cement could contain metals.	
Dixie Valley Power Partnership (AP4911-0010) Inactive	About 60 miles northeast of Fallon	Not known. May be part of the Oxbow Geothermal Corporation's Dixie Valley Power Plant		
Eagle Picher Minerals, Inc. Popcorn Project Surface area disturbance (AP1499-0280) Active	Approximately 18 miles south of Fallon west of Hwy. 95	Open pit mining for perlite. Permit is for surface area disturbance. The material is transported to Eagle Picher Minerals' Colado diatomaecous earth facility in Pershing County near Lovelock for processing. Operations began in 1994 or earlier.	PM and PM_{10}. Fugitive dust could include metals and trace elements.	62, 63
Eagle Picher Minerals, Inc. Hazen Mine and Diatom Siding Project (AP1499-0273.01) Active	16 miles west/northwest of Fallon	Diatomaceous earth open pit mining, storage of material, crushing, and screening. Material is hauled off the site by trucks for direct sale or to their Diatom siding railcar loading facility about 4 miles away using a private road. Operation includes a diesel generator	PM and PM_{10}; diesel generator: PM, PM_{10}, SO_2, NO_x, CO, and VOCs. Metals and trace elements associated with the particulates.	525364

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Glacier Construction (AP1442-0570) Active	About 15 miles west/northwest of Fallon	Production of aggregate using crushing and screening operations	PM and PM_{10}. Metals and trace elements associated with the particulate matter and emissions from the diesel generator.	65, 66
Hiskett & Sons (AP1442-0995; previously 0324) Active	2120 Allen Road Fallon, NV 89406 and Russell Pass Pit about 14 miles south of Fallon	Concrete batch plant on Allen Road; screening and crushing operation at the batch plant or at the Russel Pass gravel pit. Operations include crushing and screening gravel; mixing sand, gravel, and cement; associated conveyors and weigh hoppers. First permit issued in 1987.	PM and PM_{10} from plant operations. Diesel generator: PM, PM_{10}, SO_2, NO_x, CO, and VOCs. Metals and trace elements associated with the particulates.	67
Huck Salt Mine	23 miles southeast of Fallon along U.S. Hwy. 50	No information. Operated by Elmer and John Huckaby.		68
Jack N. Tedford, Inc. (AP1611-0925 and 0342)	2050 Trento Lane, Fallon	Asphalt concrete plant with conveyors, mixers, screens, pug mill, weigh hopper material supply silos, aggregate dryers, a diesel generator, a wet scrubber, and four underground storage tanks (tanks of asphalt oil and asphalt storage tanks with heaters). Piles of raw materials or off-specification product are located around the facility. Began operation in 1964.	Air permit for PM, PM10, NO_x, SO_2, CO, VOCs. AP-42 lists emission factors for PAHs, aromatics, dioxin/furans, VOCs, and metals. 75 tons of diesel-contaminated soil from 235 Williams Avenue was processed with plant mix fines and made into asphalt mix and applied to the the facility property in approximately 1997.	48, 69, 70, 71, 72

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Jerome Moretto (AP9999-0648) Inactive	16 North Maine Street, Fallon, NV 89406 located at the northeast corner of US 50 and US 95	Remediation project for gasoline-contaminated soils and ground water at a location called Bootlegger's Station. Remediation was conducted using a patented process called Geo-Cleanse that uses iron and hydrogen peroxide oxidation of the organic pollutants. Permit issued December 6, 1995; expired December 6, 2000.	VOCs	73
Kennametal, Inc. Refinery, Advanced Materials Group (AP3399-0120) Active	11 miles north of Fallon on Highway 95	• Thermit kiln process (an exothermic reaction consisting of aluminum, tungsten ore, iron oxide and calcium carbide). Kiln is preheated with a propane burner. Carbon black (Thermax) and carbon plates are used to construct the temporary kiln. • Tungsten carbide from the thermit reaction is crushed and cleaned using H_2SO_4 and HCl. Spent acid is neutralized with lime at an on-site wastewater treatment plant. • Powder milling, grinding, crushing, screening, milling, and blending of tungsten carbide.	PM, CO, NO_x, SO_2, acid mist, and VOCs. Metals are associated with the particulate matter and include antimony, arsenic, cadmium, chromium, cobalt, lead, manganese, mercury, and nickel. There are approximately 28 to 37 emission points including the thermit kiln, mixing and crushing operations, boilers, acid tanks, electroleaching system, and powder weighing. Prior to 1994, the thermit kiln batch process produced a large amount of opacity emissions (200-foot column of smoke) one or two times per week.	25, 74, 75

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
		• Production of Kenface™ from tungsten carbide scrap produced by grinding the scrap and mixing with cobalt, nickel, and titanium. Kenface™ is a trademarked product described as crushed cemented hard metal carbide. • An electrical/chemical leach process recovering (recycling) tungsten carbide from scrap well bits and other spent tungsten products using HCl, HNO_3, and H_2SO_4. Permit issued in September 1994. Operated from 1950s; stopped in 1993 or 1994 due to new opacity limits. Started up at smaller emission rates.		

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Kennametal, Inc. (AP3399-0562.01) Active	347 N. Taylor St. Fallon, NV 89406	Offices, laboratory, and tungsten carbide processing. Processing includes powder blending, milling/crushing, final sizing, weighing, and packaging. Final product is a powder or pellet form of tungsten carbide. Also manufactures tungsten welding rods. Several 2100°F furnaces sinters tungsten carbide and cobalt together. Repackaging of nickel, copper, and iron powders, including warehouse operations.	***Laboratory*** Emissions through fume hoods, isle hoods, lab furnace, spectrometer, hot press and vacuum pumps. Compounds included HF, HCl, HNO_3, CO_2, NO_3, argon, acetylene, sulfuric acid, methanol, tungsten carbide cobalt alloy, nickel, copper, bronze, and hydrocarbons. ***Processing facility*** Particulates containing tungsten, tungsten ore, tungsten carbide cobalt alloy, nickel, carbon, hydrocarbons, wax, and chromium. Particulate emissions including metals from the processing facility in the past were first partially controlled with dust collectors and later baghouses on the main processing operations (25). Since the 1990s, baghouses have been replaced with high efficiency particulate air (HEPA) filters that vent inside the building. Two baghouses remain. While particulate emissions are still possible with indoor/outdoor air exchanges, the amount is much smaller.	25, 29

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
L. Mackedon & Sons (AP1611-0920; previously AP1611-0068 or AP1771-0068) Active	2490 Union Lane in Fallon (about 4.5 miles from center of Fallon)	Concrete batch plant. Sand, aggregate, fly-ash, and cement are delivered via truck and dumped into stockpiles. The materials are mixed with water and loaded onto trucks.	Particulates from conveyors, loading, and transfering. Fly-ash could contain metals and SVOCs. Cement could contain metals.	76
L. Mackedon & Sons (AP1611-0919; previously AP1611-0067 or AP1771-0067) Active	1550 Auction Road Fallon, NV 89406	Concrete batch plant	Particulates from conveyors, loading, and transfering. Fly-ash could contain metals and SVOCs. Cement could contain metals.	
Land Technologies, Inc./Hazen Project (AP9999-0359) Inactive	About 16 miles west/northwest of Fallon	May have been soil vapor extraction based on SIC code 9999.		

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Moltan Company (AP1499-0384) Inactive	• 27 miles north/northwest of Fallon near I-80 and Exit 65	Mining and processing operations for production of diatomaceous earth, zeolite, and clay. Operations consist of crushers, screens, a rotary kiln, radial stacker, cooling barn, conveyors, and baghouse. Kiln started operation in 1996 and uses waste oil. Diesel generator used.	PM and PM_{10}. Metals and trace elements associated with the particulate matter. Emissions from generator.	77, 78, 79,
(AP1499-0859) Active	• Trinity Mine (38 miles north of Fallon) • Hazen Mine (about 8 miles northwest of Fallon)	Mining and processing operations for production of diatomaceous earth, zeolite, and clay. Operations consist of crushers, screens, conveyors, and a diesel generator. Diesel generator used.	PM and PM_{10}. Metals and trace elements associated with the particulate matter. Emissions from generator.	80, 81
New America Tec (AP3544-0654) Active	11555 Lovelock Highway, about 12 miles north of Fallon	Chemical vapor deposition using nickel carbonyl. Air permit issued February 13, 1996. First batch by November 1996 (Mullen 2001)	Permit limits: PM and PM_{10} at 0.01 lb/hr SO_2 at 0.003 lb/hr CO at 0.06 lb/hr NO_x at 0.31 lb/hr VOCs at 0.006 lb/hr nickel at 0.000035 lb/hr	1434

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Ormat Nevada, Inc./ Hot Spring Project (AP4911-0229) Active	10750 Interstate 80 Fallon, NV 89406 (about 25 miles northwest of Fallon)	20-megawatt geothermal power plant using dual flash steam technology consisting of steam separation vessels, turbine-generators, steam condensers, cooling tower, rock mufflers, water pumps, injection pumps, mechanical and steam jet ejectors, heat exchangers, and generator air cooler. Began operation in 1992.	PM, PM_{10}, and H_2S and CO_2. Other emissions could include other noncondensible gases from cooler.	83, 84

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
Oxbow Geothermal Corporation-Dixie Valley Power Plant (AP4911-0414) Inactive (AP4911-0756) Active	About 56 to 60 miles northeast of Fallon	A 55- to 65-megawatt geothermal power plant consisting of steam separation vessels, turbine generators, steam condensers, cooling tower, rock mufflers, water pumps, injection pumps, mechanical and steam jet ejectors, heat exchangers and generator air cooler, two diesel generators, a lube waste oil-fired heater, and an electrical substation.	PM, PM_{10}, and H_2S and CO_2. Diesel fuel tanks: VOCs. Diesel generators and emergency fire pump: PM, PM_{10}, sulfur, SO_2, No_x, CO, VOCs, and lead. Other emissions could include other noncondensible gases from the cooler; VOCs from the waste oil heater, portable incinerator, solvent parts cleaner, and gasoline and lube oil tanks. Among the noncondensible gases analyzed were H_2S, NH_3, Ar, N, CH_4, & H. Particulates and VOCs from opening burning of vegetation (Permit 92-22, March 1992). Waste oil heater exempt (NAC).	
Sierra Pacific Power Company (AP9999-0456) Inactive	346 N. Maine St, Fallon, NV 89406	Contaminated soil air sparging/vapor extract system for hydrocarbon fuel cleanup. Offgas was treated with carbon cannisters during testing and then thermal oxidizers during regular operation. Startup in February 1993 and completed (closed) in 1997.	Constitutents of hydrocarbon fuel consisting predominately of benzene, toluene, ethylbenzene, and xylenes, but may consist of other constituents in total petroleum hydrocarbons.	85, 86, 87
SMI Joist-Nevada (AP3441-0718) Expired (AP3441-0811) Active	2121 Trento Lane Fallon, NV 89406	Facility manufactures open web steel joists from stock material. Processes include welding, cutting, and solvent-based	Emissions are from surface coating, paint and solvent storage, welding and sandblasting, diesel and gasoline storage, diesel	88, 89, 90, 91

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
		painting. Painting is completed with 10 dip tanks inside the building. Excess paint is dripped back into the tank inside and then air dried outside. Some airless spray painting is used on special order items. Four paint/solvent closed storage tanks (5,300-gallon capacity) are located outside Operation also includes 2 diesel fuel storage tanks, 1 gasoline fuel storage tank, welding, sandblasting, and an 150 hp emergency generator.	combustion from emergency generator, and natural gas heaters. VOC permit limit of 247.03 tons per year with maximum HAP limit of 5% wt/wt.	
Smitten Tire & Oil Co. (AP9999-0462) Inactive	984 E. Stillwater Ave. Fallon, NV 89406	Vapor extract/air sparging system for the remediation of gasoline-contaminated soil/groundwater. Operated from 1993 through May 26, 1999.	Constitutents of hydrocarbon fuel consisting predominantly of benzene, toluene, ethylbenzene, and xylenes, but may consist of other constituents in total petroleum hydrocarbons. Permit limit of 0.15 lb/hour VOCs.	92, 93, 94
Specialty Clays Corporation/ Fallon Bentonite Project (AP1452-0738) Active	About 8.5 miles southeast of Fallon	Open pit mining for bentonite clay and processing. Processing includes conveyors, pugmills, shredders, a dryer, and diesel generators. Material is then trucked to a railcar loading facility in Hazen or Fallon.	Plant operations: PM and PM_{10} Rotary dryer burner and diesel generator: PM_{10}, NO_2, SO_2, NO_2, CO, VOC and HAPs. Metals and trace elements would be associated with the particulate	95, 96

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
		Operations began in 1997.	matter.	
Tenneco Minerals/Fondaway Canyon Project (AP1041-1477) Inactive	36 miles northeast of Fallon	Open pit mining with crushing, screening, conveying, crucible furnace, and heap leach facility to recover gold ore. Began operation in 1989 and ceased in 1990.	Particulates. Process of removing gold was not reported, but could include hydrogen cyanide. VOCs from heating of the crucible furnace and diesel generators if used.	106397
The Standard Magnesia Company (P & S Barite Mine) Inactive Company merged or has dissolved.	About 1.8 miles west of Fallon along US Highway 50	Barite mining and production. The common name for barite is barium sulfate. It is chiefly used as an industrial raw material.		98, 99
Truckee-Carson Irrigation District (AP9999-0079) Inactive	2666 Harrigan Road Fallon, Nevada	About 1,400 cubic yards of contaminated soil from a gasoline underground storage tank was stockpiled at 2666 Harrigan Road. The soil was processed with a vacuum pulling gas from the soil pile through an array of perforated pipes. The gas is treated using a thermal-catalytic oxidizer during the first phase of the project. In the second phase, an activated carbon filter is used in place of the oxidizer. Treatment started sometime near the end of 1994 and continued for up to 6 months.	Components of gasoline, consisting predominantly of benzene, toluene, ethylbenzene, and xylenes	100

Name	Plant Location	Operation	Permitted Emissions and Other Possible Pollutants	References
U.S. Naval Air Station (See ATSDR public health assessment, summer 2002)	4755 Pasture Road Fallon, NV 89496	(See ATSDR public health assessment, summer 2002)	--	3
Western States Geothermal Company/Desert Peak Geothermal Project (AP4911-0503) Active	21 miles northwest of Fallon near Brady Hot Springs, Nevada	Geothermal power plant consisting of a production circuit and cooling tower and reinjection circuit. The production circuit consists of a production well, high and low pressure separators, an evaporation pond, a turbine and associated equipment, a generator, and an eductor system. The reinjection circuit consists of a cooling tower, a cooling water supply pump, and a brine reinjection pump and well. Operating since 1985.	Permit: H_2S, hydrocarbons, PM_{10}, and SO_2. Other constituents in condensate offgas include water vapor, CO_2, ammonia, argon, helium, nitrogen, methane, hydrogen, VOCs, and radon. Radon concentration in one sample is 25,014 picocuries/liter with 112 actual CFM. Some of the hydrocarbons are methane, ethane, propane, and butane. Particulates and VOCs from opening burning of debris from construction. (Permit 69, March May 14, 1985).	101, 102, 103
ix, Inc. (AP1499-0752) Inactive	About 35 miles north of Fallon near I-80 and Exit 65	Temporary operations from January 10, 1997, through May 13, 1998. Sand and gravel processing using crushing and conveyors with a diesel generator. Process also includes an asphaltic concrete plant and a concrete batch plant.	PM_{10}, NO_x, SO_2, CO, VOCs, HAPs	104, 105

Table 8. Permitted Point Source Emissions (continued)

AP: air permit
AP-42: Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, http://www.epa.gov/ttn/chief/ap42/index.html. US. EPA. Washington D.C.
CO: carbon monoxide
NO_x: nitrogen oxides
O_3: ozone
PM_{10}: particulate matter of 10 microns in diameter or less
SO_2: sulfur dioxides
SO_x: sulfur oxides

Table 9. Surface Area Disturbance Permits Issued in Churchill County*

Company	**Facility Name**	**Plant Location**
Bateman Hall, Inc. (AP1629-0636)	Fallon Wal-Mart	920 W. Williams Ave. Fallon, Nevada 89406
CDM Camp Dresser McKee, Inc. (AP1629-926)	Surface area disturbance during construction of a 2.2 million-gallon per day waste treatment plant surface area disturbance	1575 Wood Drive Fallon, Nevada; about 1.7 miles southeast of Fallon.
Churchill County School District (AP1629-0639)	Surface area disturbance associated with the construction of the Numa Elementary School. Permit concluded August 1, 1996.	601 Discovery Drive Fallon, Nevada
City of Fallon (AP1629-157)	Russell Pass Landfill	About 16 miles south of Fallon off of US Hwy 95
ICM Corporation (AP1041-0876)	Sunshine Industrial Park	About 10 miles north of Fallon off of US Hwy 95
Motor Sports Safety (AP1629-0616)	Top Gun Raceway	About 15 miles north of Fallon off of US Hwy 95
Noble Materials (AP1629-1007)	Noble Perlite - surface area disturbance (SAD) project(Fallon)/SAD	About 17 miles south of Fallon off of US Highway 95
Pine Grove Farms (AP1629-0423)	Pine Grove Subdivision	About 3 miles west of Fallon off of US Hwy 95
Sierra Pacific Power Company (AP1629-1006)	Frenchman and Springs Substation/SAD	About 26 miles southeast of Fallon

***Surface Area Disturbance**: Nevada has a program to reduce fugitive emissions from land disturbances (Nevada Administrative Code 445B.22037). The code specifies that no person may cause or permit the handling, transporting, or storing of any material in a manner which allows or may allow controllable particulate matter to become airborne or may cause or permit the construction, repair, demolition, or use of unpaved or untreated areas without first putting into effect an ongoing program using the best practical methods to prevent particulate matter from becoming airborne. As used in this subsection, best practical methods include, but are not limited to, paving, chemical stabilization, watering, phased construction, and revegetation. Persons seeking to disturb or cover 5 acres or more of land or its topsoil (agricultural activities occurring on agricultural land are exempt) must obtain an operating permit for surface area disturbance to clear, excavate, or level the land or to deposit any foreign material to fill or cover the land.

†**Reference 106**
Reference 107

Table 10. Nevada Department of Environmental Protection Fee-Based Inventory

Facility	ID*	Year	Pollutant	Emissions (tons per year)
A & K Earth Movers Inc Asphalt Hot Plant	888	1999	CO	1.5729
			NO_x	2.9084
			PM_{10}	167.7715
			SO_2	2.2256
			TOC	2.6758
			VOC	0.067
A & K Earth Movers Inc Asphalt Hot Plant	888	2000	CO	1.1856
			NO_x	2.1465
			PM_{10}	123.8752
			SO_2	1.6501
			TOC	1.9748
			VOC	0.0588
A & K Earth Moves Inc Russell Pass Pit	797	1998	CO	9.0338
			HAPS	0.0142
			NO_x	34.0096
			PM_{10}	0.9269
			SO_2	21.4686
			TOC	0.9565
A & K Earth Moves Inc Russell Pass Pit	797	1999	CO	1.9197
			HAPS	0.0027
			NO_x	8.9476
			PM_{10}	4.8498
			SO_2	0.5796
			VOC	0.7245

Facility	ID*	Year	Pollutant	Emissions (tons per year)
A & K Earth Moves Inc Russell Pass Pit	797	2000	CO	1.5848
			HAPS	0.002
			NOx	7.2499
			PM_{10}	3.4561
			SO_2	0.5228
			VOC	0.5408
American Colloid Company, Eastgate Processing Facility	89	1994	CO	5.9913
			NO_x	27.5129
			PM_{10}	10.7565
			SO_2	2.2744
			VOC	0.8385
American Colloid Company, Eastgate Processing Facility	89	1995	CO	2.1786
			NO_x	9.9852
			PM_{10}	0.2922
			SO_2	0.8297
			VOC	0.2988
American Colloid Company, Eastgate Processing Facility	89	1996	CO	3.4892
			NO_x	16.0012
			PM_{10}	0.9704
			SO_2	1.3275
			VOC	0.4815
American Colloid Company, Eastgate Processing Facility	89	1997	CO	4.2248
			NO_x	15.9628
			PM_{10}	0.7223
			SO_2	5.0007
			TOC	0.0045
			VOC	0.4456

Facility	ID*	Year	Pollutant	Emissions (tons per year)
American Colloid Company, Eastgate Processing Facility	89	1998	CO	1.8019
			NO_x	6.8096
			PM_{10}	0.3106
			SO_2	2.1321
			TOC	0.0022
			VOC	0.19
Amor IV Corp & Stillwater Geothermal Stillwater Geothermal	197	1997	PM_{10}	0
Amor IV Corp & Stillwater Geothermal Stillwater Geothermal	197	1999	CO	0.5116
			NO_x	5.7458
			PM_{10}	0.0394
			SO_2	0.1181
			VOC	34.5419
Amor IV Corp & Stillwater Geothermal Stillwater Geothermal	197	2000	CO	0.1722
			NO_x	1.9327
			PM_{10}	0.0129
			S	0.0199
			SO_2	0.0395
			VOC	42.0767
Caithness Dixie Valley Dixie Valley	756	1999	CO	4.3787
			NO_x	5.5957
			Lead	0.0002
			PM_{10}	0.4639
			S	0.376
			SO_2	0.7522
			VOC	0.1389
Caithness Dixie Valley Dixie Valley	756	2000	CO	2.1715
			NO_x	2.7751
			Lead	0.0001
			PM_{10}	0.2301

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			S	0.1865
			SO_2	0.373
			VOC	0.0689
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1994	CO	1.369
			H_2S	88.004
			NO_x	5.2132
			PT	0.052
			SO_2	0.6133
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1995	H_2S	0.019
			CO	0.0936
			NO_x	0.3566
			PT	0.0349
			SO_2	0.0419
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1996	H_2S	142.7374
			CO	0.383
			NO_x	1.4584
			PT	0.1457
			SO_2	0.1716
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1997	H_2S	126.732
			CO	1.3016
			NO_x	4.9327
			PT	0.4932
			SO_2	0.5834
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1998	CO	3.7099
			H_2S	122.6994
			NO_x	5.2121
			PM_{10}	0.17
			PT	0.22
			SO_2	0.64

Facility	ID*	Year	Pollutant	Emissions (tons per year)
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	1999	H_2S	111.8466
Caithness Dixie Valley LLC Oxbow Geothermal Plant	414	2000	H_2S	116.1093
Churchill County School District Bus Lot	97	1995	VOC	0.3521
Coffman Construction Company	615	1995	PT	0
Dixie Valley Power Partnerships, Dixie Valley Geothermal Power	10	1994	H_2S	97.8457
Dixie Valley Power Partnerships, Dixie Valley Geothermal Power	10	1995	H_2S	0
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1994	PT	1.176
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1995	PT	1.9178
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1996	PM_{10}	0.0033
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1997	PM_{10}	0.003
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1998	PM_{10}	0.1067
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	1999	PM_{10}	0.1286
Eagle Picher Minerals Inc Diatom (Hazen Loading)	273	2000	PM_{10}	0.5238
Hiskett & Sons	324	1994	PM_{10}	0.6016
Hiskett & Sons	324	1995	PM_{10}	0.5011
Hiskett & Sons	324	1996	PM_{10}	0.5286
Hiskett & Sons	324	1997	PM_{10}	0.4401
Hiskett & Sons	324	1998	PM_{10}	0.434
Hiskett & Sons	324	1999	PM_{10}	0.3505
Jack N Tedford Inc Asphalt Plant	342	1994	PM_{10}	0.233
Jack N Tedford Inc Asphalt Plant	342	1995	PM_{10}	0.4774
Jack N Tedford Inc Asphalt Plant	342	1996	PM_{10}	0.3265
Jack N Tedford Inc Asphalt Plant	342	1997	PM_{10}	0.2364
Jack N Tedford Inc Asphalt Plant	342	1998	PM_{10}	0.2035
Jack N Tedford Inc Asphalt Plant	342	1999	PM_{10}	0.2584
Jack N Tedford Inc Asphalt Plant	925	1999	PM_{10}	0
Jack N Tedford Inc Asphalt Plant	925	2000	CO	0.7046
			NO_x	1.851

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			PM_{10}	0.26891
			SO_2	2.1984
			VOC	0.42
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1994	CO	4.6701
			HNO_3	4.0823
			NO_x	2.18e+00
			PM_{10}	12.1396
			PT	0.1023
			SO_2	1.6737
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1995	CO	6.0051
			HNO_3	2.9511
			NO_x	9.004
			PM_{10}	12.9348
			PM_{10}(D)	0.0204
			PT	0.1063
			SO_2	2.175
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1995	CO	5.8943
			HNO_3	3.613
			NO_x	9.0051
			PM_{10}	12.9082
			PM_{10} (D)	0.0312
			PT	0.1038
			SO_2	2.1355
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1997	CO	6.4265
			$HN0_3$	2.2846
			NO_x	9.1024
			PM_{10}	15.6128
			SO_2	2.3257
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1998	CO	5.4802

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			HNO_3	4.0892
			NO_x	7.4036
			PM_{10}	14.6037
			SO_2	1.9822
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	1999	CO	4.5788
			NO_x	7.2445
			PM_{10}	20.4421
			SO_2	1.66
Kennametal Inc., Advanced Materials Group Mining & Metallurgical Group	120	2000	CO	3.2933
			HNO_3	5.5603
			NO_x	0.5709
			PM_{10}	10.8513
			SO_2	1.1771
Kennametal Inc Fallon Plant	562	1995	PM_{10}	1.2649
			PT	0.3315
Kennametal Inc Fallon Plant	562	1996	PM_{10}	1.2481
			PT	0.4855
Kennametal Inc Fallon Plant	562	1997	PM_{10}	1.6246
			PT	0.5432
Kennametal Inc Fallon Plant	562	1998	PM_{10}	1.6515
Kennametal Inc Fallon Plant	562	1999	PM_{10}	1.9315
Kennametal Inc Fallon Plant	562	2000	PM_{10}	0.9062
L. Mackedon & Sons Inc., Mackedon Concrete	68	1994	PM_{10}	2.7418
L. Mackedon & Sons Inc., Mackedon Concrete	68	1995	PM_{10}	0.0504
L. Mackedon & Sons Inc., Mackedon Concrete	68	1996	PM_{10}	0.0694
L. Mackedon & Sons Inc., Mackedon Concrete	68	1997	PM_{10}	0.053
L. Mackedon & Sons Inc., Mackedon Concrete	68	1998	PM_{10}	0.0681
L. Mackedon & Sons Inc., Mackedon Concrete	68	1999	PM_{10}	0.0459
L. Mackedon & Sons Inc., Mackedon Concrete	68	2000	PM_{10}	0.0257

Facility	ID*	Year	Pollutant	Emissions (tons per year)
L. Mackedon & Sons Inc., Mackedon Concrete	67	1994	PM_{10}	2.7418
L. Mackedon & Sons Inc., Mackedon Concrete	67	1995	PM_{10}	0.0683
L. Mackedon & Sons Inc., Mackedon Concrete	67	1996	PM_{10}	0.0068
L. Mackedon & Sons Inc., Mackedon Concrete	67	1997	PM_{10}	0.032
L. Mackedon & Sons Inc., Mackedon Concrete	67	1998	PM_{10}	0.0731
L. Mackedon & Sons Inc., Mackedon Concrete	67	1999	PM_{10}	0.0964
L. Mackedon & Sons Inc., Mackedon Concrete	67	2000	PM_{10}	0.0119
L Mackedon & Sons Inc Mackedon Concrete	919	2000	PM_{10}	0.6978
L Mackedon & Sons Inc	920	2000	PM_{10}	0.316
Land Technologies Inc Hazen Project	359	1994	VOC	0.0024
Moltan Company Class II	384	1994	PM_{10}	28.0297
			PT	2.2627
Moltan Company Class II	384	1995	PM_{10}	43.9192
			PT	2.6257
Moltan Company Class II	384	1996	PM_{10}	3.0447
			PT	4.1289
Moltan Company Class II	384	1997	NO_x	6.0329
			PM_{10}	21.1477
			SO_2	1.9756
			VOC	0.7807
Moltan Company Class II	384	1998	NO_x	6.6806
			PM_{10}	30.625
			SO_2	2.1877
			VOC	0.8645
Moltan Company Class II	384	1999	NO_x	8.7401
			PM_{10}	40.8339
			SO_2	2.8621
			VOC	1.1311
Moltan Company Class II	384	2000	NO_x	6.7874

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			PM_{10}	31.4837
			SO_2	2.2227
			VOC	0.8784
New America Tec Fallon Plating Operation	654	1996	CO	0.0028
			Ni	0.0006
			NO_x	0.0003
New America Tec Fallon Plating Operation	654	1997	CO	0.0227
			Ni	0.0091
			NO_x	0.0021
New America Tec Fallon Plating Operation	654	1998	CO	0.0418
			Ni	0.0167
			NO_x	0.004
New America Tec Fallon Plating Operation	654	1999	CO	0.0561
			Ni	0.0367
			NO_x	0.005
New America Tec Fallon Plating Operation	654	2000	CO	0.0373
			Ni	0.0146
			NO_x	0.0035
Ormat Nevada Inc Brady Hot Spring Project	229	1994	H_2S	96.5413
Ormat Nevada Inc Brady Hot Spring Project	229	1995	H_2S	18.148
Ormat Nevada Inc Brady Hot Spring Project	229	1996	H_2S	11.076
Ormat Nevada Inc Brady Hot Spring Project	229	1997	H_2S	4.6524
			CO	3.7095
			NO_x	71.1194
			PM_{10}	0.4886
			SO_2	3.4619
			VOC	1.0338
Ormat Nevada Inc Brady Hot Spring Project	229	1998	H_2S	4.7681
			CO	4.7967

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			NO_x	91.9658
			PM_{10}	0.6319
			SO_2	4.4767
			VOC	1.3368
Ormat Nevada Inc Brady Hot Spring Project	229	1999	H_2S	3.1698
Ormat Nevada Inc Brady Hot Spring Project	229	2000	H_2S	3.2956
Sierra Pacific Power Company	456	1994	VOC	17.368
Sierra Pacific Power Company	456	1995	VOC	11.4108
Sierra Pacific Power Company	456	1996	VOC	11.3999
Sierra Pacific Power Company	456	1997	VOC	0.0217
SMI Joist-Nevada	718	1997	HAP	0.72
			VOC	68.6964
SMI Joist-Nevada	718	1998	HAP	1.4899
			VOC	136.3286
SMI Joist-Nevada	811	1999	VOC	140.6663
SMI Joist-Nevada	811	2000	VOC	140.5952
Smitten Oil & Tire Company, Courtesy Corners, Fallon	462	1998	VOC	0.0226
Soda Lake Limited Partnership & Amor IX Soda Lake Geothermal	464	1999	CO	0.0896
			NO_x	0.3384
			PM_{10}	2.1004
			S	0.0267
			SO_2	0.0534
			VOC	71.9948
Soda Lake Limited Partnership & Amor IX Soda Lake Geothermal	464	2000	CO	1.124
			NO_x	4.2314
			PM_{10}	0.6607
			S	0.3341
			SO_2	0.6678
			VOC	0.1428

Facility	ID*	Year	Pollutant	Emissions (tons per year)
Specialty Clays Fallon Bentonite Project	738	1997	PM_{10}	0
Specialty Clays Fallon Bentonite Project	738	1998	CO	0
			NO_x	0
			PM_{10}	0
			SO_2	0
			VOC	0
Tenneco Minerals Fondaway Canyon Project	1477	1994	PM_{10}	0.0078
Truckee-Carson Irrigation District, TCID Facility	79	1994	VOC	0.0869
U.S. Naval Air Station, Fallon Dixie Valley Radar Site	721	1997	CO	0.1197
			NO_x	0.5571
			PM_{10}	0.0399
			SO_2	0.0368
			VOC	0.0445
U.S. Naval Air Station Fallon, Dixie Valley Radar Site	721	1998	CO	0.8225
			NO_x	3.8278
			PM10	0.274
			SO_2	0.2531
			VOC	0.3056
U.S. Naval Air Station Fallon, Dixie Valley Radar Site	721	1999	CO	0.6922
U.S. Naval Air Station Fallon, Dixie Valley Radar Site	721	2000	CO	0.8837
			NO_x	4.1128
			PM_{10}	0.2944
			SO_2	0.2719
			VOC	0.3283
U.S. Naval Air Station Fallon, NAS Fallon	293	1994	CO	1.9276
			NO_x	6.6651
			PM_{10}	0.775
			SO_2	0.0492
			SO_x	0.0057

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			VOC	24.625
U.S. Naval Air Station Fallon, NAS Fallon	293	1995	CO	1.3597
			NO_x	3.6071
			PM_{10}	0.2973
			SO_2	0.0287
			TPH	0
			VOC	0.0554
U.S. Naval Air Station Fallon, NAS Fallon	293	1996	CO	1.2741
			NO_x	5.1539
			PM_{10}	0.3237
			SO_2	0.0268
			TPH	0.4389
			VOC	0.0002
U.S. Naval Air Station Fallon, NAS Fallon	293	1997	CO	0.0016
			NO_x	0.0066
			PM_{10}	0.0212
			SO_2	0
			VOC	0.1744
U.S. Naval Air Station Fallon, NAS Fallon	293	1998	CO	1.987
			NO_x	8.3071
			PM_{10}	0.9113
			SO_2	0.0375
			VOC	0.0002
U.S. Naval Air Station Fallon, NAS Fallon	293	1999	CO	2.3038
			NO_x	9.7278
			PM_{10}	0.7706
			SO_2	0.0383
			VOC	0.4252
U.S. Naval Air Station Fallon, NAS Fallon	293	2000	CO	0.8935

Facility	ID*	Year	Pollutant	Emissions (tons per year)
			NO_x	3.6554
			PM_{10}	0.2798
			SO_2	0.0242
			VOC	0.5352
Western States Geothermal Company, Desert Peak Geothermal	503	1994	H_2S	0
Western States Geothermal Company, Desert Peak Geothermal	503	1995	H_2S	0.0002
Western States Geothermal Company, Desert Peak Geothermal	503	1996	H_2S	0.0002
Western States Geothermal Company, Desert Peak Geothermal	503	1997	H_2S	0.0002
Western States Geothermal Company, Desert Peak Geothermal	503	1998	H_2S	21.18
			HC	2.2189
			PM_{10}	0.1661
			SO_4	0.0475
Western States Geothermal Company, Desert Peak Geothermal	503	1999	H_2S	5.5874
			HC	0.5853
			PM_{10}	0.0438
			SO_4	0.0125
Western States Geothermal Company, Desert Peak Geothermal	503	2000	H_2S	19.0664
			HC	1.9974
			PM_{10}	0.1495
			SO_4	0.0427
Zix, Inc.	752	1997	PM_{10}	0.0204
Zix, Inc.	752	1998	PM_{10}	0.0053

*ID-The ID or identification is the last four digits of the NDEP permit number. This number is unique. The full ID consists of "AP" followed by a four digit standard industrial classification code and then a four digit permit number. For brevity, this table only uses the last four digits of the permit number as the ID.

Table 11. Generic List of Activities That Are Nonspecific Sources of Air Emissions*

Animal Cremation
Asphalt Paving: Cutback Asphalt
Autobody Refinishing Paint Application
Aviation Gasoline Distribution: Stage I & II
Consumer Products Usage
Dry Cleaning (Petroleum Solvent)
Fluorescent Lamp Recycling
Gasoline Distribution Stage I
Gasoline Distribution Stage II
General Laboratory Activities
Geothermal Power
Halogenated Solvent Cleaners
Hospital Sterilizers
Human Cremation
Industrial Boilers: Distillate Oil
Industrial Boilers: Natural Gas
Industrial Boilers: Residual Oil
Industrial Boilers: Waste Oil
Institutional/Commercial Heating: Anthracite Coal
Institutional/Commercial Heating: Bituminous and Lignite Coal
Institutional/Commercial Heating: Distillate Oil
Institutional/Commercial Heating: Natural Gas
Institutional/Commercial Heating: POTW Digester Gas
Institutional/Commercial Heating: Residual Oil
Lamp Breakage
Medical Waste Incineration
Municipal Landfills
Natural Gas Transmissions and Storage
Oil and Natural Gas Production
Open Burning: Forest and Wildfires
Open Burning: Prescribed Burnings
Open Burning: Scrap Tires
Paint Stripping Operations
Perchloroethylene Dry Cleaning
Pesticide Application
Publicly Owned Treatment Works (POTWs)
Residential Heating: Anthracite Coal
Residential Heating: Bituminous and Lignite Coal
Residential Heating: Distillate Oil
Residential Heating: Natural Gas
Residential Heating: Wood/Wood Residue
Stationary Internal Combustion Engines - Diesel
Structure Fires
Surface Coatings: Architectural
Surface Coatings: Industrial Maintenance
Surface Coatings: Traffic Markings

*** Reference: 46**

Table 12. Sample of Nonspecific Sources in 2002–Body Shops, Dry Cleaners, Gasoline Stations, and Cremetoriums in Fallon

Body Shops

A-1 Auto Body
45 N Laverne St

Body Shop
161 Industrial Way

C/P Powder Coating
111 Freeport Cir

Crown Collision Ctr
730 S Taylor St

Curtis Paint & Body Works
1085 Taylor Pl

H & L Auto & Truck Repair
1405 S. Maine Fallon

Dry Cleaners

Crystal Cleaners
1050 Allen Rd

Pennies Dry Cleaning & Laundry
37 Whitaker Lane

Silver Sage Cleaners
2183 W Williams Ave

Gasoline Stations

Fallon Speedway market
1000 West Williams Ave

Fox Peak Station
615 E Williams Avenue

Fallon Speedway Market
1000 W Williams Ave

Gas Store
5180 Reno Hwy

Gas Store
787 W Williams Ave

Shell Of Fallon
3945 Keyes Way

Smedley's Chevron
1755 W Williams Ave

Neals Texaco
16 N Main St

Others

Fallon Pesticide Container Disposal Site
off Hwy 95, 8 Miles North of Fallon

Gardens Funeral Home Crematory
2949 Austin Hwy

Smith Family Funeral Home & Crematory
505 Rio Vista Road

Helena Chemical Company
3030 Schurz Highway

Note: This table was compiled from the CC Communications Fallon Telephone Directory for 2001/2002 and is not meant to be a complete list.

Table 13. Toxics Release Inventory Sites 1987–2000 for Churchill County, Nevada*

Facility Name			
Year	Chemical	Fugitive Air or Nonpoint Air Emissions	Stack or Point Air Emissions
KENNECOTT RAWHIDE MINING CO. (89406KNNCT55MIL)			
1998	Cyanide Compounds	16000	0
1999	Cyanide Compounds	<500 total	
2000	Cyanide Compounds	<500 total	
NEVADA REFINERY OF KENNAMETAL, INC. (89406NVDRF11MIL)			
1987	Sulfuric acid (1994 and after: “acid aerosols” only)	1 - 499 lbs	1 - 499 lbs
	Manganese	1 - 499 lbs	500-999 lbs
	Hydrogen fluoride	1 - 499 lbs	1 - 499 lbs
	Hydrochloric acid (1995 and after: "acid aerosols” only)	1 - 499 lbs	500-999 lbs
1988	Sulfuric acid (1994 and after: “acid aerosols” only)	1 - 499 lbs	1 - 499 lbs
	Manganese	1 - 499 lbs	500-999 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	1 - 499 lbs	500-999 lbs
1989	Sulfuric acid (1994 and after: “acid aerosols” only)	1 - 499 lbs	1 - 499 lbs
	Manganese	1 - 499 lbs	500-999 lbs
	Hydrogen fluoride	1 - 499 lbs	1 - 499 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	1 - 499 lbs	500-999 lbs
1990	Sulfuric acid (1994 and after: “acid aerosols” only)	11 - 499 lbs	11 - 499 lbs
	Manganese	11 - 499 lbs	500-999 lbs
	Hydrogen fluoride	11 - 499 lbs	11 - 499 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	11 - 499 lbs	500-999 lbs
1991	Sulfuric acid (1994 and after: “acid aerosols” only)	1 -10 lbs	11 - 499 lbs
	Manganese	11 - 499 lbs	500-999 lbs
	Hydrogen fluoride	1 -10 lbs	11 - 499 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	11 - 499 lbs	500-999 lbs
	Cobalt	1 -10 lbs	1 -10 lbs
1992	Sulfuric acid (1994 and after: “acid aerosols” only)	1 -10 lbs	11 - 499 lbs
	Manganese	11 - 499 lbs	500-999 lbs

Facility Name			
Year	Chemical	Fugitive Air or Nonpoint Air Emissions	Stack or Point Air Emissions
	Toluene	11 - 499 lbs	12,000 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	11 - 499 lbs	11 - 499 lbs
	Cobalt	1 -10 lbs	11 - 499 lbs
1993	Sulfuric acid (1994 and after: “acid aerosols” only)	1 -10 lbs	1 -10 lbs
	Manganese	1 -10 lbs	3,709 lbs
	Cobalt	11 - 499 lbs	11 - 499 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	1 -10 lbs	1 -10 lbs
1994	Sulfuric acid (1994 and after: “acid aerosols” only)	1 -10 lbs	1 -10 lbs
	Manganese	Not Applicable	0
	Nitric acid	1 -10 lbs	1 -10 lbs
	Hydrochloric acid (1995 and after: “acid aerosols” only)	1 -10 lbs	1 -10 lbs
	Cobalt	1 -10 lbs	11 - 499 lbs
1995	Manganese	Not Applicable	0
	Nitric Acid	<500 lbs*	
	Cobalt	<500 lbs	
1996	Manganese	Not Applicable	0
	Nitric Acid	<500 lbs	
	Cobalt	<500 lbs	
1997	Manganese	Not Applicable	0
	Nitric Acid	<500 lbs	
	Cobalt	<500 lbs	
1998	Manganese	Not Applicable	0
	Nitric acid	<500 lbs	
	Cobalt	<500 lbs	
1999	Manganese	Not Applicable	0
	Cobalt	<500 lbs	
2000	Manganese	Not Applicable	0
	Cobalt	<500 lbs	
KENNAMETAL INC., FALLON PLANT (89406NVDRF347NT)			
1987	Cobalt	1 - 499 lbs	1 - 499 lbs
1988	Cobalt	1 - 499 lbs	1 - 499 lbs
1989	Cobalt	1 - 499 lbs	1 - 499 lbs
1990	Cobalt	11 - 499 lbs	11 - 499 lbs

Facility Name			
Year	Chemical	Fugitive Air or Nonpoint Air Emissions	Stack or Point Air Emissions
1991	Cobalt	11 - 499 lbs	11 - 499 lbs
1992	Cobalt	11 - 499 lbs	11 - 499 lbs
1993	Cobalt	11 - 499 lbs	11 - 499 lbs
1994	Cobalt	1 - 10 lbs	11 - 499 lbs
1995	Cobalt	<500 total	
1996	Cobalt	<500 total	
1997	Cobalt	<500 total	
1998	Cobalt	<500 total	
1999	Cobalt	<500 total	
2000	Cobalt	<500 total	
SMI JOIST-NEVADA (89406SMJST2121T)			
1997	Nickel Compounds	<500 total	
1998	Nickel Compounds	<500 total	
1999	Nickel Compounds	<500 total	
2000	Nickel Compounds	<500 total	

* A Certification Statement (that releases and waste for this chemical were less than 500 pounds) was filed. No other information is available.
Sources :www.rtk.net, www.epa.gov [accessed July 2, 2002]

Table 14. EPA National Emission Trends in Tons per Year.

	CO Emissions	NO_X Emissions	PM_{10} Emissions	SO_2 Emissions	VOC Emissions	$PM_{2.5}$ Emissions	NH_3 Emissions
1996							
The Standard Magnesia Company	0	0	208	0	0	61	0
Moltan Company	0	0	91	0	0	27	0
Usn Fallon - Air Station	0	0	34	0	0	32	0
1999							
The Standard Magnesia Company	0	0	207	0	0	60	0
Moltan Company	0	0	90	0	0	26	0
Usn Fallon - Air Station	0	0	31	0	0	29	0

Table 15. 1996 National Emissions Inventory for Area Sources.

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Animal Cremation	Industrial Processes	Arsenic Compounds	3.22e-06
1996	Animal Cremation	Industrial Processes	Beryllium Compounds	1.48e-07
1996	Animal Cremation	Industrial Processes	Cadmium Compounds	1.19e-06
1996	Animal Cremation	Industrial Processes	Chromium Compounds	3.22e-06
1996	Animal Cremation	Industrial Processes	Formaldehyde	2.33e-11
1996	Animal Cremation	Industrial Processes	Nickel Compounds	4.11e-06
1996	Animal Cremation	Industrial Processes	Polycyclic Organic Matter as 16-PAH	7.74e-06
1996	Animal Cremation	Industrial Processes	Polycyclic Organic Matter as 7-PAH	8.29e-12
1996	Asphalt Paving: Cutback Asphalt	Solvent Utilization	Ethylbenzene	1.42e-01
1996	Asphalt Paving: Cutback Asphalt	Solvent Utilization	Toluene	3.94e-01
1996	Asphalt Paving: Cutback Asphalt	Solvent Utilization	Xylenes (includes o, m, and p)	7.49e-01
1996	Autobody Refinishing Paint Application	Solvent Utilization	Ethylbenzene	7.00e-02
1996	Autobody Refinishing Paint Application	Solvent Utilization	Lead Compounds	7.59e-03
1996	Autobody Refinishing Paint Application	Solvent Utilization	Methyl Ethyl Ketone (2-Butanone)	7.00e-02
1996	Autobody Refinishing Paint Application	Solvent Utilization	Methyl Isobutyl Ketone (Hexone)	4.00e-02
1996	Autobody Refinishing Paint Application	Solvent Utilization	Toluene	5.80e+00
1996	Autobody Refinishing Paint Application	Solvent Utilization	Xylenes (includes o, m, and p)	1.24e+00
1996	Aviation Gasoline Distribution: Stage I & II	Storage and Transport	Lead Compounds	9.81e-06
1996	Consumer Products Usage	Solvent Utilization	1,3-Dichloropropene	1.73e+00
1996	Consumer Products Usage	Solvent Utilization	1,4-Dichlorobenzene	8.90e-01
1996	Consumer Products Usage	Solvent Utilization	1,4-Dioxane (1,4-Diethyleneoxide)	1.19e-04
1996	Consumer Products Usage	Solvent Utilization	2-Nitropropane	2.30e-05
1996	Consumer Products Usage	Solvent Utilization	Acetamide	1.50e-06
1996	Consumer Products Usage	Solvent Utilization	Acetophenone	9.24e-05
1996	Consumer Products Usage	Solvent Utilization	Acrylic Acid	4.27e-08
1996	Consumer Products Usage	Solvent Utilization	Benzene	5.12e-05
1996	Consumer Products Usage	Solvent Utilization	Carbon Tetrachloride	4.45e-09
1996	Consumer Products Usage	Solvent Utilization	Chlorobenzene	7.70e-01
1996	Consumer Products Usage	Solvent Utilization	Chloroform	1.00e-02
1996	Consumer Products Usage	Solvent Utilization	Dibenzofuran	8.75e-05
1996	Consumer Products Usage	Solvent Utilization	Ethylbenzene	2.00e-02
1996	Consumer Products Usage	Solvent Utilization	Ethylene Dichloride	5.05e-05
1996	Consumer Products Usage	Solvent Utilization	Formaldehyde	1.00e-02
1996	Consumer Products Usage	Solvent Utilization	Glycol Ethers	4.30e-01
1996	Consumer Products Usage	Solvent Utilization	Hexane	9.30e-01
1996	Consumer Products Usage	Solvent Utilization	Hydrochloric Acid (Hydrogen Chloride [gas only])	1.90e-05
1996	Consumer Products Usage	Solvent Utilization	Hydrogen Fluoride (Hydrofluoric Acid)	1.54e-04
1996	Consumer Products Usage	Solvent Utilization	Isophorone	1.00e-02
1996	Consumer Products Usage	Solvent Utilization	Methanol	7.56e+00

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Consumer Products Usage	Solvent Utilization	Methyl Bromide (Bromomethane)	2.40e+00
1996	Consumer Products Usage	Solvent Utilization	Methyl Chloroform (1,1,1-Trichloroethane)	4.20e+00
1996	Consumer Products Usage	Solvent Utilization	Methyl Ethyl Ketone (2-Butanone)	5.40e-01
1996	Consumer Products Usage	Solvent Utilization	Methyl Isobutyl Ketone (Hexone)	8.00e-02
1996	Consumer Products Usage	Solvent Utilization	Methyl tert-Butyl Ether	2.56e-04
1996	Consumer Products Usage	Solvent Utilization	Methylene Chloride	3.90e-01
1996	Consumer Products Usage	Solvent Utilization	N,N-Dimethylformamide	3.77e-04
1996	Consumer Products Usage	Solvent Utilization	Polycyclic Organic Matter as 16-PAH	4.90e-01
1996	Consumer Products Usage	Solvent Utilization	Tetrachloroethylene	3.00e-01
1996	Consumer Products Usage	Solvent Utilization	Toluene	4.65e+00
1996	Consumer Products Usage	Solvent Utilization	Trichloroethylene	5.27e-03
1996	Consumer Products Usage	Solvent Utilization	Triethylamine	9.08e-03
1996	Consumer Products Usage	Solvent Utilization	Vinyl Acetate	5.36e-07
1996	Consumer Products Usage	Solvent Utilization	Xylenes (includes o, m, and p)	2.19e+00
1998	Dry Cleaning (Petroleum Solvent)	Solvent Utilization	Cumene	1.75e-03
1998	Dry Cleaning (Petroleum Solvent)	Solvent Utilization	Ethylbenzene	3.36e-04
1998	Dry Cleaning (Petroleum Solvent)	Solvent Utilization	Polycyclic Organic Matter as 16-PAH	2.02e-04
1998	Dry Cleaning (Petroleum Solvent)	Solvent Utilization	Xylenes (includes o, m, and p)	6.86e-03
1990	Fluorescent Lamp Recycling	Industrial Processes	Mercury Compounds	3.93e-07
1998	Gasoline Distribution Stage I	Storage and Transport	2,2,4-Trimethylpentane	4.10e-01
1998	Gasoline Distribution Stage I	Storage and Transport	Alkylated Lead	3.46e-06
1998	Gasoline Distribution Stage I	Storage and Transport	Benzene	3.90e-01
1998	Gasoline Distribution Stage I	Storage and Transport	Cumene	5.39e-03
1998	Gasoline Distribution Stage I	Storage and Transport	Ethylbenzene	5.00e-02
1998	Gasoline Distribution Stage I	Storage and Transport	Ethylene Dichloride	1.85e-04
1998	Gasoline Distribution Stage I	Storage and Transport	Hexane	8.30e-01
1998	Gasoline Distribution Stage I	Storage and Transport	Methyl tert-Butyl Ether	7.20e-01
1998	Gasoline Distribution Stage I	Storage and Transport	Polycyclic Organic Matter as 16-PAH	2.00e-02
1998	Gasoline Distribution Stage I	Storage and Transport	Toluene	6.60e-01
1998	Gasoline Distribution Stage I	Storage and Transport	Xylenes (includes o, m, and p)	2.50e-01
1996	Gasoline Distribution Stage II	Storage and Transport	2,2,4-Trimethylpentane	7.00e-02

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Gasoline Distribution Stage II	Storage and Transport	Benzene	7.00e-02
1996	Gasoline Distribution Stage II	Storage and Transport	Ethylbenzene	9.60e-03
1996	Gasoline Distribution Stage II	Storage and Transport	Hexane	1.40e-01
1996	Gasoline Distribution Stage II	Storage and Transport	Methyl tert-Butyl Ether	2.10e-01
1996	Gasoline Distribution Stage II	Storage and Transport	Polycyclic Organic Matter as 16-PAH	4.80e-03
1996	Gasoline Distribution Stage II	Storage and Transport	Toluene	1.10e-01
1996	Gasoline Distribution Stage II	Storage and Transport	Xylenes (includes o, m, and p)	4.00e-02
1990	General Laboratory Activities	Industrial Processes	Mercury Compounds	5.25e-05
1995	Geothermal Power	External Combustion Boilers	Mercury Compounds	4.00e-02
1994	Halogenated Solvent Cleaners	Solvent Utilization	Methyl Chloroform (1,1,1-Trichloroethane)	3.10e-01
1994	Halogenated Solvent Cleaners	Solvent Utilization	Methylene Chloride	3.10e-01
1994	Halogenated Solvent Cleaners	Solvent Utilization	Tetrachloroethylene	3.10e-01
1994	Halogenated Solvent Cleaners	Solvent Utilization	Trichloroethylene	3.10e-01
1996	Hospital Sterilizers	Miscellaneous Area Sources	Ethylene Oxide	2.35e-02
1996	Human Cremation	Industrial Processes	Arsenic Compounds	6.02e-07
1996	Human Cremation	Industrial Processes	Beryllium Compounds	2.77e-08
1996	Human Cremation	Industrial Processes	Cadmium Compounds	2.22e-07
1996	Human Cremation	Industrial Processes	Chromium Compounds	6.00e-07
1996	Human Cremation	Industrial Processes	Formaldehyde	4.35e-12
1996	Human Cremation	Industrial Processes	Mercury Compounds	6.60e-05
1996	Human Cremation	Industrial Processes	Nickel Compounds	7.66e-07
1996	Human Cremation	Industrial Processes	Polycyclic Organic Matter as 16-PAH	1.45e-06
1996	Human Cremation	Industrial Processes	Polycyclic Organic Matter as 7-PAH	1.55e-12
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Acetaldehyde	6.47e-06
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Arsenic Compounds	7.39e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Benzene	2.77e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Beryllium Compounds	5.54e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Cadmium Compounds	5.54e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Chromium Compounds	5.54e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Formaldehyde	4.43e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Lead Compounds	1.66e-06
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Manganese Compounds	1.11e-06
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Mercury Compounds	5.54e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Nickel Compounds	5.54e-07
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter	1.55e-06
1994	Industrial Boilers: Distillate Oil	Stationary Source Fuel Combustion	Selenium Compounds	2.77e-06
1994	Industrial Boilers: Natural Gas	Stationary Source Fuel Combustion	Acetaldehyde	1.37e-07
1994	Industrial Boilers: Natural Gas	Stationary Source Fuel Combustion	Benzene	2.22e-05
1994	Industrial Boilers: Natural Gas	Stationary Source Fuel Combustion	Formaldehyde	7.91e-04
1994	Industrial Boilers: Natural Gas	Stationary Source Fuel Combustion	Polycyclic Organic Matter	6.75e-06
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Acetaldehyde	4.82e-05
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Arsenic Compounds	1.29e-05
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Benzene	2.07e-06
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Beryllium Compounds	2.75e-07
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Cadmium Compounds	3.85e-06
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Chromium Compounds	7.38e-06
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Formaldehyde	3.31e-04
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Lead Compounds	1.51e-05
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Manganese Compounds	2.89e-05
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Mercury Compounds	1.12e-06
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Nickel Compounds	8.26e-04
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter	1.15e-05
1994	Industrial Boilers: Residual Oil	Stationary Source Fuel Combustion	Selenium Compounds	6.75e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Acetaldehyde	1.31e-05
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Arsenic Compounds	1.50e-06

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Benzene	5.60e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Beryllium Compounds	1.12e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Cadmium Compounds	1.12e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Chromium Compounds	1.12e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Formaldehyde	8.97e-05
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Lead Compounds	3.36e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Manganese Compounds	2.24e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Mercury Compounds	1.12e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Nickel Compounds	1.12e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter	3.14e-06
1994	Industrial Boilers: Waste Oil	Stationary Source Fuel Combustion	Selenium Compounds	5.60e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acetaldehyde	4.60e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acetophenone	1.21e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acrolein	2.34e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Antimony & Compounds	1.45e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Arsenic Compounds	3.31e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Benzene	1.05e-05
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Beryllium Compounds	1.70e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	bis(2-Ethylhexyl)phthalate	5.91e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Cadmium Compounds	4.11e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Carbon Disulfide	1.05e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Chlorobenzene	1.78e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Chromium Compounds	2.10e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Cobalt Compounds	8.06e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Dioxins/Furans total, non-TEQ	2.82e-14

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Ethylbenzene	7.60e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Ethylene Dichloride	3.23e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Formaldehyde	1.94e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hexane	5.41e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hydrochloric Acid (Hydrogen Chloride [gas only])	9.71e-03
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hydrogen Fluoride (Hydrofluoric Acid)	1.21e-03
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Isophorone	4.68e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Lead Compounds	3.39e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Manganese Compounds	3.95e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Mercury Compounds	6.71e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Bromide (Bromomethane)	1.29e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Chloride	4.30e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Ethyl Ketone (2-Butanone)	3.15e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methylene Chloride	2.34e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Nickel Compounds	2.26e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Phenol	1.29e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter	1.53e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Propionaldehyde	3.07e-06
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Selenium Compounds	1.05e-05
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Styrene	2.02e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Tetrachloroethylene	3.47e-07
1995	Institutional/Commercial Heating: Anthracite Coal	Stationary Source Fuel Combustion	Toluene	1.94e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Acetaldehyde	3.28e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Acetophenone	8.63e-07
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Acrolein	1.67e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Antimony & Compounds	1.04e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Arsenic Compounds	2.36e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Benzene	7.48e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Beryllium Compounds	1.21e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	bis(2-Ethylhexyl)phthalate	4.22e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Cadmium Compounds	2.94e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Carbon Disulfide	7.48e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Chlorobenzene	1.27e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Chromium Compounds	1.50e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Cobalt Compounds	5.75e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Dioxins/Furans total, non-TEQ	2.01e-13
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Ethylbenzene	5.41e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Ethylene Dichloride	2.30e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Formaldehyde	1.38e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Hexane	3.88e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Hydrochloric Acid (Hydrogen Chloride [gas only])	6.00e-02
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Hydrogen Fluoride (Hydrofluoric Acid)	8.63e-03
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Isophorone	3.34e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Lead Compounds	2.42e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Manganese Compounds	2.82e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Mercury Compounds	4.80e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Methyl Bromide (Bromomethane)	9.21e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Methyl Chloride	3.05e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Methyl Ethyl Ketone (2-Butanone)	2.24e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Methylene Chloride	1.67e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Nickel Compounds	1.61e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Phenol	9.21e-07
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Polycyclic Organic Matter	1.09e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Propionaldehyde	2.19e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Selenium Compounds	7.48e-05
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Styrene	1.44e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Tetrachloroethylene	2.47e-06
1995	Institutional/Commercial Heating: Bituminous and Lignite	Stationary Source Fuel Combustion	Toluene	1.38e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Acetaldehyde	3.86e-04
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Arsenic Compounds	4.41e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Benzene	1.65e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Beryllium Compounds	3.31e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Cadmium Compounds	3.31e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Chromium Compounds	3.31e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Formaldehyde	2.65e-03
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Lead Compounds	9.93e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Manganese Compounds	6.62e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Mercury Compounds	3.31e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Nickel Compounds	3.31e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	9.40e-05
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	9.20e-07
1995	Institutional/Commercial Heating: Distillate Oil	Stationary Source Fuel Combustion	Selenium Compounds	1.65e-04
1995	Institutional/Commercial Heating: Natural Gas	Stationary Source Fuel Combustion	Acetaldehyde	9.74e-07
1995	Institutional/Commercial Heating: Natural Gas	Stationary Source Fuel Combustion	Benzene	1.57e-04
1995	Institutional/Commercial Heating: Natural Gas	Stationary Source Fuel Combustion	Formaldehyde	5.61e-03

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Institutional/Commercial Heating: Natural Gas	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	4.77e-05
1996	Institutional/Commercial Heating: POTW Digester Gas	Stationary Source Fuel Combustion	Acetaldehyde	4.99e-09
1996	Institutional/Commercial Heating: POTW Digester Gas	Stationary Source Fuel Combustion	Benzene	8.05e-07
1996	Institutional/Commercial Heating: POTW Digester Gas	Stationary Source Fuel Combustion	Formaldehyde	2.88e-05
1996	Institutional/Commercial Heating: POTW Digester Gas	Stationary Source Fuel Combustion	Polycyclic Organic Matter	2.45e-07
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Acetaldehyde	1.21e-04
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Arsenic Compounds	3.25e-05
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Benzene	5.18e-06
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Beryllium Compounds	6.91e-07
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Cadmium Compounds	9.69e-06
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Chromium Compounds	2.07e-05
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Formaldehyde	8.30e-04
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Lead Compounds	3.80e-05
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Manganese Compounds	7.24e-05
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Mercury Compounds	2.80e-06
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Nickel Compounds	2.07e-03
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	2.94e-05
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	2.88e-07
1995	Institutional/Commercial Heating: Residual Oil	Stationary Source Fuel Combustion	Selenium Compounds	1.69e-05
1990	Lamp Breakage	Miscellaneous Area Sources	Mercury Compounds	9.84e-05
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Arsenic Compounds	6.93e-06
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Cadmium Compounds	1.57e-04
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Chromium Compounds	2.32e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Dioxins/Furans as 2,3,7,8-TCDD TEQ	2.14e-08
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Formaldehyde	4.55e-05
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Hydrochloric Acid (Hydrogen Chloride [gas only])	9.70e-01
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Lead Compounds	2.08e-03
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Manganese Compounds	1.62e-05
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Mercury Compounds	1.66e-03
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Nickel Compounds	1.77e-05
1993	Medical Waste Incineration	Waste Disposal, Treatment, and Recovery	Polycyclic Organic Matter as 16-PAH	2.64e-05
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	1,1,2,2-Tetrachloroethane	9.69e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	1,2-Dichloropropane	1.06e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	1,4-Dichlorobenzene	1.61e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Acrylonitrile	1.75e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Benzene	4.51e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Carbon Disulfide	2.30e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Carbon Tetrachloride	3.20e-05
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Carbonyl Sulfide	1.53e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Chlorobenzene	1.46e-03

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Chloroform	1.86e-04
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Ethyl Chloride	4.20e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Ethylbenzene	2.55e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Ethylene Dibromide	9.78e-06
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Ethylene Dichloride	2.11e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Ethylidene Dichloride	1.21e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Hexane	2.95e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Mercury Compounds	4.82e-06
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Methyl Chloroform (1,1,1-Trichloroethane)	3.33e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Methyl Ethyl Ketone (2-Butanone)	2.66e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Methyl Isobutyl Ketone (Hexone)	9.75e-03
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Methylene Chloride	6.32e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Tetrachloroethylene	3.22e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Toluene	7.91e-01
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Trichloroethylene	1.93e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Vinyl Chloride	2.39e-02
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Vinylidene Chloride	1.01e-03

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Municipal Landfills	Waste Disposal, Treatment, and Recovery	Xylenes (includes o, m, and p)	6.68e-02
1998	Natural Gas Transmissions and Storage	Solvent Utilization	2,2,4-Trimethylpentane	1.19e-03
1998	Natural Gas Transmissions and Storage	Solvent Utilization	Benzene	3.00e-02
1998	Natural Gas Transmissions and Storage	Solvent Utilization	Ethylbenzene	6.13e-03
1998	Natural Gas Transmissions and Storage	Solvent Utilization	Hexane	3.95e-03
1998	Natural Gas Transmissions and Storage	Solvent Utilization	Toluene	3.00e-02
1998	Natural Gas Transmissions and Storage	Solvent Utilization	Xylenes (includes o, m, and p)	3.00e-02
1993	Oil and Natural Gas Production	Industrial Processes	2,2,4-Trimethylpentane	3.00e-02
1993	Oil and Natural Gas Production	Industrial Processes	Benzene	9.20e-01
1993	Oil and Natural Gas Production	Industrial Processes	Ethylbenzene	1.50e-01
1993	Oil and Natural Gas Production	Industrial Processes	Hexane	1.00e-01
1993	Oil and Natural Gas Production	Industrial Processes	Toluene	8.50e-01
1993	Oil and Natural Gas Production	Industrial Processes	Xylenes (includes o, m, and p)	9.60e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	1,3-Butadiene	2.78e+00
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Acetaldehyde	2.80e+00
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Acrolein	2.91e+00
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Benzene	7.72e+00
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Carbonyl Sulfide	3.66e-03
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Dioxins/Furans as 2,3,7,8-TCDD TEQ	1.37e-08
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Formaldehyde	1.77e+01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Hexane	1.10e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Methyl Chloride	8.80e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Polycyclic Organic Matter	2.56e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Polycyclic Organic Matter as 16-PAH	3.10e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Polycyclic Organic Matter as 7-PAH	1.10e-01
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Toluene	3.90e+00
1996	Open Burning: Forest and Wildfires	Miscellaneous Area Sources	Xylenes (includes o, m, and p)	1.65e+00
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	1,3-Butadiene	7.71e+00
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Acetaldehyde	7.77e+00
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Acrolein	8.08e+00

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Benzene	2.14e+01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Carbonyl Sulfide	1.00e-02
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Dioxins/Furans as 2,3,7,8-TCDD TEQ	3.81e-08
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Formaldehyde	4.91e+01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Hexane	3.10e-01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Methyl Chloride	2.44e+00
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Polycyclic Organic Matter	7.80e-01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Polycyclic Organic Matter as 16-PAH	9.00e-01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Polycyclic Organic Matter as 7-PAH	3.00e-01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Toluene	1.08e+01
1996	Open Burning: Prescribed Burnings	Miscellaneous Area Sources	Xylenes (includes o, m, and p)	4.60e+00
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	1,3-Butadiene	7.85e-04
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Antimony & Compounds	1.64e-05
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Arsenic Compounds	8.18e-07
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Benzene	1.00e-02
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Biphenyl	1.59e-03
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Chromium Compounds	1.14e-05
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Ethylbenzene	3.47e-03
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Lead Compounds	1.64e-06
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Nickel Compounds	1.06e-05
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Phenol	3.20e-03
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Polycyclic Organic Matter as 16-PAH	2.41e-02
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Polycyclic Organic Matter as 7-PAH	3.11e-03
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Selenium Compounds	8.18e-07
1996	Open Burning: Scrap Tires	Miscellaneous Area Sources	Styrene	3.89e-03
1998	Paint Stripping Operations	Solvent Utilization	Methylene Chloride	1.51e+00

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Perchloroethylene Dry Cleaning	Solvent Utilization	Tetrachloroethylene	1.24e+00
1996	Pesticide Application	Solvent Utilization	Hexachlorobenzene	1.94e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,1,2,2-Tetrachloroethane	9.81e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,1,2-Trichloroethane	6.54e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,2,4-Trichlorobenzene	4.84e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,2-Dichloropropane	6.46e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,3-Butadiene	1.41e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,4-Dichlorobenzene	1.21e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	1,4-Dioxane (1,4-Diethyleneoxide)	1.01e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	2,4-Dinitrotoluene	2.70e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	2-Nitropropane	1.64e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Acetaldehyde	1.74e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Acetonitrile	1.94e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Acrolein	2.15e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Acrylonitrile	2.16e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Allyl Chloride	1.09e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Benzene	3.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Benzyl Chloride	4.58e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Biphenyl	4.22e-04

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Carbon Disulfide	2.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Carbon Tetrachloride	6.32e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Chlorobenzene	2.71e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Chloroform	3.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Chloroprene	1.33e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Cresols (includes o,m,p)	8.99e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Dimethyl Sulfate	7.36e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Epichlorohydrin (l-Chloro-2,3-epoxypropane)	2.53e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Ethyl Acrylate	9.81e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Ethylbenzene	4.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Ethylene Oxide	1.24e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Formaldehyde	1.10e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Glycol Ethers	6.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Hexachlorobutadiene	4.09e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Hexachlorocyclopentadiene	3.27e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methanol	6.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methyl Chloroform (1,1,1-Trichloroethane)	3.16e-03

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methyl Ethyl Ketone (2-Butanone)	1.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methyl Isobutyl Ketone (Hexone)	1.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methyl Methacrylate	1.74e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methyl tert-Butyl Ether	3.57e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Methylene Chloride	5.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	N,N-Dimethylaniline	1.81e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Nitrobenzene	3.68e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	o-Toluidine	9.81e-06
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Polycyclic Organic Matter as 16-PAH	7.36e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Propionaldehyde	1.96e-05
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Propylene Oxide	4.11e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Styrene	1.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Tetrachloroethylene	2.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Toluene	6.00e-02
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Trichloroethylene	1.72e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Vinyl Acetate	4.29e-04
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Vinyl Chloride	3.76e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Vinylidene Chloride	2.37e-03
1996	Publicly Owned Treatment Works (POTWs)	Waste Disposal, Treatment, and Recovery	Xylenes (includes o, m, and p)	3.30e-01
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acetaldehyde	1.48e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acetophenone	3.90e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Acrolein	7.54e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Antimony & Compounds	4.68e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Arsenic Compounds	1.06e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Benzene	3.38e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Beryllium Compounds	5.46e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	bis(2-Ethylhexyl)phthalate	1.90e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Cadmium Compounds	1.32e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Carbon Disulfide	3.38e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Chlorobenzene	5.72e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Chromium Compounds	6.76e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Cobalt Compounds	2.60e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Dioxins/Furans as 2,3,7,8-TCDD TEQ	9.08e-14
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Ethylbenzene	2.44e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Ethylene Dichloride	1.04e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Formaldehyde	6.24e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hexane	1.74e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hydrochloric Acid (Hydrogen Chloride [gas only])	3.00e-02
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Hydrogen Fluoride (Hydrofluoric Acid)	3.90e-03
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Isophorone	1.50e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Lead Compounds	1.10e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Manganese Compounds	1.28e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Mercury Compounds	2.16e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Bromide (Bromomethane)	4.16e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Chloride	1.38e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methyl Ethyl Ketone (2-Butanone)	1.01e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Methylene Chloride	7.54e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Nickel Compounds	7.28e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Phenol	4.16e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter	2.86e-09
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	4.92e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	7.25e-09
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Propionaldehyde	9.89e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Selenium Compounds	3.38e-05
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Styrene	6.50e-07
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Tetrachloroethylene	1.12e-06
1995	Residential Heating: Anthracite Coal	Stationary Source Fuel Combustion	Toluene	6.24e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Acetaldehyde	3.92e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Acetophenone	1.03e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Acrolein	2.00e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Antimony & Compounds	1.24e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Arsenic Compounds	2.81e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Benzene	8.91e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Beryllium Compounds	1.44e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	bis(2-Ethylhexyl)phthalate	5.01e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Cadmium Compounds	3.50e-06

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Carbon Disulfide	8.91e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Chlorobenzene	1.51e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Chromium Compounds	1.78e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Cobalt Compounds	6.88e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Dioxins/Furans as 2,3,7,8-TCDD TEQ	2.40e-13
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Ethylbenzene	6.48e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Ethylene Dichloride	2.75e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Formaldehyde	1.65e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Hexane	4.61e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Hydrochloric Acid (Hydrogen Chloride [gas only])	8.00e-02
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Hydrogen Fluoride (Hydrofluoric Acid)	1.00e-02
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Isophorone	3.99e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Lead Compounds	2.89e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Manganese Compounds	3.37e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Mercury Compounds	5.70e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Methyl Bromide (Bromomethane)	1.10e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Methyl Chloride	3.64e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Methyl Ethyl Ketone (2-Butanone)	2.68e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Methylene Chloride	2.00e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Nickel Compounds	1.92e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Phenol	1.10e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter	7.57e-09
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	1.30e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	1.92e-08
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Propionaldehyde	2.62e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Selenium Compounds	8.91e-05
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Styrene	1.72e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Tetrachloroethylene	2.95e-06
1995	Residential Heating: Bituminous and Lignite Coal	Stationary Source Fuel Combustion	Toluene	1.65e-05
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Acetaldehyde	1.27e-03
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Arsenic Compounds	1.45e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Benzene	5.41e-05
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Beryllium Compounds	1.08e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Cadmium Compounds	1.08e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Chromium Compounds	1.08e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Formaldehyde	8.67e-03
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Lead Compounds	3.25e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Manganese Compounds	2.17e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Mercury Compounds	1.08e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Nickel Compounds	1.08e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter	3.82e-07
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	3.06e-04
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	2.63e-06
1995	Residential Heating: Distillate Oil	Stationary Source Fuel Combustion	Selenium Compounds	5.41e-04
1995	Residential Heating: Natural Gas	Stationary Source Fuel Combustion	Acetaldehyde	2.65e-06
1995	Residential Heating: Natural Gas	Stationary Source Fuel Combustion	Benzene	4.28e-04
1995	Residential Heating: Natural Gas	Stationary Source Fuel Combustion	Formaldehyde	1.00e-02
1995	Residential Heating: Natural Gas	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	1.30e-04
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Arsenic Compounds	1.23e-04
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Cadmium Compounds	3.05e-05

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Chromium Compounds	2.32e-04
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Dioxins/Furans as 2,3,7,8-TCDD TEQ	2.90e-09
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Formaldehyde	1.05e-02
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Hydrochloric Acid (Hydrogen Chloride [gas only])	1.05e-02
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Lead Compounds	6.54e-04
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Manganese Compounds	1.57e-02
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Mercury Compounds	7.55e-06
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Nickel Compounds	3.05e-05
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Polycyclic Organic Matter	4.20e-05
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 16-PAH	6.39e-01
1996	Residential Heating: Wood/Wood Residue	Stationary Source Fuel Combustion	Polycyclic Organic Matter as 7-PAH	5.63e-02
1996	Stationary Internal Combustion Engines - Diesel	--	Acetaldehyde	3.18e-04
1996	Stationary Internal Combustion Engines - Diesel	--	Arsenic Compounds	5.08e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Benzene	1.09e-03
1996	Stationary Internal Combustion Engines - Diesel	--	Beryllium Compounds	3.81e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Cadmium Compounds	3.81e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Chromium Compounds	3.81e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Formaldehyde	1.27e-04
1996	Stationary Internal Combustion Engines - Diesel	--	Lead Compounds	1.14e-05
1996	Stationary Internal Combustion Engines - Diesel	--	Manganese Compounds	7.61e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Mercury Compounds	3.81e-06
1996	Stationary Internal Combustion Engines - Diesel	--	Polycyclic Organic Matter	5.08e-04
1996	Structure Fires	Miscellaneous Area Sources	Acrolein	1.10e-01
1996	Structure Fires	Miscellaneous Area Sources	Cyanide Compounds	9.60e-01
1996	Structure Fires	Miscellaneous Area Sources	Formaldehyde	2.00e-02

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Structure Fires	Miscellaneous Area Sources	Hydrochloric Acid (Hydrogen Chloride [gas only])	4.10e-01
1996	Surface Coatings: Architectural	Solvent Utilization	Benzene	4.00e-02
1996	Surface Coatings: Architectural	Solvent Utilization	Ethyl Chloride	8.00e-02
1996	Surface Coatings: Architectural	Solvent Utilization	Ethylbenzene	8.50e-01
1996	Surface Coatings: Architectural	Solvent Utilization	Ethylene Glycol	1.90e-01
1996	Surface Coatings: Architectural	Solvent Utilization	Hexane	4.09e+00
1996	Surface Coatings: Architectural	Solvent Utilization	Methyl Chloride	7.00e-02
1996	Surface Coatings: Architectural	Solvent Utilization	Methyl Ethyl Ketone (2-Butanone)	1.10e+00
1996	Surface Coatings: Architectural	Solvent Utilization	Methyl Isobutyl Ketone (Hexone)	1.10e-01
1996	Surface Coatings: Architectural	Solvent Utilization	Methylene Chloride	8.10e-01
1996	Surface Coatings: Architectural	Solvent Utilization	N,N-Dimethylformamide	9.00e-02
1996	Surface Coatings: Architectural	Solvent Utilization	Toluene	1.02e+00
1996	Surface Coatings: Architectural	Solvent Utilization	Xylenes (includes o, m, and p)	5.10e-01
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Acetophenone	5.49e-04
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Cumene	1.10e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Dibutyl Phthalate	6.18e-05
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Ethylbenzene	5.68e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Ethylene Glycol	6.93e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Glycol Ethers	3.00e-02
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Isophorone	4.85e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Methanol	1.00e-02
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Methyl Ethyl Ketone (2-Butanone)	5.95e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Methyl Isobutyl Ketone (Hexone)	1.00e-02
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Polycyclic Organic Matter as 16-PAH	2.01e-03
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Toluene	1.00e-02
1996	Surface Coatings: Industrial Maintenance	Solvent Utilization	Xylenes (includes o, m, and p)	3.00e-02
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Carbon Tetrachloride	4.42e-04
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Cumene	9.81e-05
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Ethylbenzene	4.42e-04
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Ethylene Glycol	4.22e-03
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Glycol Ethers	1.96e-03
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Methyl Ethyl Ketone (2-Butanone)	7.00e-02
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Methyl Isobutyl Ketone (Hexone)	9.81e-05
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Methyl Methacrylate	2.16e-03
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Polycyclic Organic Matter as 16-PAH	9.81e-05
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Propylene Oxide	5.64e-03
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Styrene	1.00e-02

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Toluene	3.30e-01
1996	Surface Coatings: Traffic Markings	Solvent Utilization	Xylenes (includes o, m, and p)	2.00e-02
1996	All Off-highway Vehicle: Diesel	Mobile	7-PAH	6.38e-05
1996	All Off-highway Vehicle: Diesel	Mobile	16-PAH	2.25e-04
1996	All Off-highway Vehicle: Diesel	Mobile	Mercury & Compounds	4.96e-04
1996	All Off-highway Vehicle: Diesel	Mobile	Nickel & Compounds	7.43e-04
1996	All Off-highway Vehicle: Diesel	Mobile	Chromium & Compounds	1.73e-03
1996	All Off-highway Vehicle: Diesel	Mobile	Manganese & Compounds	1.73e-03
1996	All Off-highway Vehicle: Diesel	Mobile	Styrene	2.13e-02
1996	All Off-highway Vehicle: Diesel	Mobile	Hexane	5.70e-02
1996	All Off-highway Vehicle: Diesel	Mobile	1,3-Butadiene	6.67e-02
1996	All Off-highway Vehicle: Diesel	Mobile	Ethyl Benzene	1.11e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Propionaldehyde	3.53e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Xylenes (mixture of o, m, and p isomers)	3.79e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Acrolein	4.12e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Toluene	5.36e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Benzene	7.29e-01
1996	All Off-highway Vehicle: Diesel	Mobile	Acetaldehyde	2.66e+00
1996	All Off-highway Vehicle: Diesel	Mobile	Formaldehyde	5.36e+00
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Mercury & Compounds	2.21e-05
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Chromium & Compounds	1.30e-04
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Nickel & Compounds	1.52e-04
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Manganese & Compounds	2.60e-04
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	7-PAH	2.00e-03
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	16-PAH	3.86e-03
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Propionaldehyde	5.75e-02
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Acrolein	6.98e-02
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Styrene	3.02e-01
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Acetaldehyde	3.83e-01
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	1,3-Butadiene	4.89e-01
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Formaldehyde	5.91e-01
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Hexane	4.78e+00
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Ethyl Benzene	6.07e+00
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Benzene	7.25e+00
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Toluene	2.54e+01
1996	All Off-highway Vehicle: Gasoline, 2-Stroke	Mobile	Xylenes (mixture of o, m, and p isomers)	2.64e+01
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Mercury & Compounds	1.96e-05
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Chromium & Compounds	1.20e-04
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Nickel & Compounds	1.40e-04
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Manganese & Compounds	2.40e-04
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	7-PAH	2.86e-04
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	16-PAH	5.50e-04

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Acrolein	2.55e-02
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Styrene	2.76e-02
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Propionaldehyde	6.86e-02
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Acetaldehyde	1.49e-01
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	1,3-Butadiene	3.46e-01
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Formaldehyde	4.27e-01
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Ethyl Benzene	1.19e+00
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Hexane	1.79e+00
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Benzene	3.14e+00
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Xylenes (mixture of o, m, and p isomers)	3.83e+00
1996	All Off-highway Vehicle: Gasoline, 4-Stroke	Mobile	Toluene	5.14e+00
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Dioxins/Furans	2.90e-08
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Arsenic & Compounds (inorganic including arsine)	1.27e-05
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Manganese & Compounds	6.99e-05
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Chromium & Compounds	1.12e-04
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Nickel & Compounds	2.24e-04
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	7-PAH	5.44e-04
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	16-PAH	1.23e-03
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Ethyl Benzene	1.25e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Styrene	1.31e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Toluene	1.99e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Acrolein	2.18e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Xylenes (mixture of o, m, and p isomers)	2.99e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Hexane	3.43e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Propionaldehyde	3.80e-01
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	1,3-Butadiene	1.45e+00
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Benzene	2.49e+00
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Acetaldehyde	6.83e+00
1996	Heavy Duty Diesel Vehicles (HDDV)	Mobile	Formaldehyde	1.85e+01
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Dioxins/Furans	1.04e-11
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Mercury & Compounds	1.91e-05
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Chromium & Compounds	1.16e-04
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Nickel & Compounds	1.35e-04
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Manganese & Compounds	2.33e-04
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	7-PAH	2.73e-04
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	16-PAH	6.14e-04
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Propionaldehyde	3.19e-02
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Acrolein	2.34e-01
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Methyl tert-butyl ether	3.05e-01
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	1,3-Butadiene	6.46e-01
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Acetaldehyde	9.77e-01

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Ethyl Benzene	9.92e-01
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Hexane	1.01e+00
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Formaldehyde	3.12e+00
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Benzene	3.56e+00
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Xylenes (mixture of o, m, and p isomers)	3.72e+00
1996	Heavy Duty Gasoline Vehicles (HDGV)	Mobile	Toluene	6.66e+00
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Dioxins/Furans	9.32e-10
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Mercury & Compounds	4.23e-06
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Nickel & Compounds	4.23e-06
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Chromium & Compounds	8.47e-06
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Arsenic & Compounds (inorganic including arsine)	8.47e-06
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Manganese & Compounds	1.27e-05
1996	Light Duty Diesel Trucks (LDDT)	Mobile	7-PAH	1.69e-05
1996	Light Duty Diesel Trucks (LDDT)	Mobile	16-PAH	5.93e-05
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Ethyl Benzene	1.70e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Styrene	1.78e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Toluene	2.72e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Acrolein	2.97e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Xylenes (mixture of o, m, and p isomers)	4.08e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Hexane	4.67e-03
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Propionaldehyde	1.59e-02
1996	Light Duty Diesel Trucks (LDDT)	Mobile	1,3-Butadiene	1.80e-02
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Acetaldehyde	2.50e-02
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Benzene	4.00e-02
1996	Light Duty Diesel Trucks (LDDT)	Mobile	Formaldehyde	7.80e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Dioxins/Furans	1.40e-09
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Mercury & Compounds	1.69e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Nickel & Compounds	1.69e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	7-PAH	2.54e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Chromium & Compounds	3.18e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Arsenic & Compounds (inorganic including arsine)	3.18e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	16-PAH	4.02e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Manganese & Compounds	4.87e-05
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Ethyl Benzene	5.81e-03
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Styrene	6.10e-03
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Toluene	9.29e-03
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Acrolein	1.02e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Xylenes (mixture of o, m, and p isomers)	1.39e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Hexane	1.60e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	1,3-Butadiene	3.40e-02

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Acetaldehyde	4.60e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Propionaldehyde	5.43e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Benzene	7.50e-02
1996	Light Duty Diesel Vehicles (LDDV)	Mobile	Formaldehyde	1.45e-01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Dioxins/Furans	8.93e-11
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Manganese & Compounds	2.60e-04
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Nickel & Compounds	5.63e-04
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Chromium & Compounds	7.75e-04
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Lead & Compounds	1.06e-03
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	7-PAH	2.34e-03
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	16-PAH	5.26e-03
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Acrolein	1.48e-01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Propionaldehyde	1.48e-01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Styrene	8.40e-01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Methyl tert-butyl ether	1.01e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	1,3-Butadiene	2.65e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Hexane	3.18e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Acetaldehyde	3.86e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Ethyl Benzene	4.11e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Formaldehyde	6.29e+00
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Xylenes (mixture of o, m, and p isomers)	1.59e+01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Benzene	2.02e+01
1996	Light Duty Gasoline Trucks 1 & 2 (LDGT)	Mobile	Toluene	2.83e+01
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Dioxins/Furans	2.11e-10
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Manganese & Compounds	6.05e-04
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Nickel & Compounds	1.31e-03
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Chromium & Compounds	1.81e-03
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Lead & Compounds	2.96e-03
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	7-PAH	5.53e-03
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	16-PAH	1.24e-02
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Acrolein	2.70e-01
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Propionaldehyde	2.70e-01
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Methyl tert-butyl ether	1.18e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Styrene	1.53e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	1,3-Butadiene	3.47e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Acetaldehyde	4.68e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Hexane	6.48e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Formaldehyde	6.71e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Ethyl Benzene	7.71e+00
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Benzene	2.81e+01
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Xylenes (mixture of o, m, and p isomers)	2.96e+01
1996	Light Duty Gasoline Vehicles (LDGV)	Mobile	Toluene	5.27e+01

Inventory Year	Area Source	Process Description	Compound	Emissions (tons/year)
1996	Motorcycles (MC)	Mobile	Dioxins/Furans	2.35e-12
1996	Motorcycles (MC)	Mobile	7-PAH	6.14e-05
1996	Motorcycles (MC)	Mobile	16-PAH	1.38e-04
1996	Motorcycles (MC)	Mobile	Methyl tert-butyl ether	3.30e-02
1996	Motorcycles (MC)	Mobile	1,3-Butadiene	6.30e-02
1996	Motorcycles (MC)	Mobile	Acetaldehyde	6.30e-02
1996	Motorcycles (MC)	Mobile	Formaldehyde	1.53e-01
1996	Motorcycles (MC)	Mobile	Benzene	2.42e-01
1996	Railroads-Diesel	Mobile	Arsenic & Compounds (inorganic including arsine)	2.71e-07
1996	Railroads-Diesel	Mobile	Manganese & Compounds	1.76e-06
1996	Railroads-Diesel	Mobile	Chromium & Compounds	2.84e-06
1996	Railroads-Diesel	Mobile	Nickel & Compounds	5.69e-06
1996	Railroads-Diesel	Mobile	Ethyl Benzene	3.13e-03
1996	Railroads-Diesel	Mobile	Styrene	3.28e-03
1996	Railroads-Diesel	Mobile	Toluene	5.00e-03
1996	Railroads-Diesel	Mobile	Acrolein	5.47e-03
1996	Railroads-Diesel	Mobile	Xylenes (mixture of o, m, and p isomers)	7.50e-03
1996	Railroads-Diesel	Mobile	Hexane	8.59e-03
1996	**Railroads-Diesel**	**Mobile**	**Propionaldehyde**	**9.53e-03**

Table 16. EPA's Cumulative Exposure Project (CEP) Modeling Results for Census Tracts In and Adjacent to the City of Fallon and Churchill County

Substance	Census Tracts and Concentration (µg/m^3)				
	320019502.00	320019503.00	320019504.00	320019505.00	Churchill County Average
1,1,1-Trichloroethane	1.1	1.6	1.2	1.1	1.15
1,1,2-Trichloroethane	0.000022	0.00022	0.000034	0.000022	0.0000204
1,2-Dibromoethane	0.0077	0.0077	0.0077	0.0077	0.0077
1,2-Dichloroethane	0.061	0.061	0.061	0.061	0.061
1,3-Butadiene	0.013	0.23	0.035	0.015	0.288
1,3-Dichloropropene	0.0033	0.049	0.007	0.0039	0.004
1,4-Dichlorobenzene	0.0027	0.028	0.0043	0.0027	0.002
2-butanone	0.034	0.25	0.042	0.032	0.0409
Acetaldehyde	0.11	0.38	0.11	0.096	0.961
Acrolein	0.031	0.17	0.036	0.027	0.51
Antimony	0.00001	0.00011	0.000017	0.000009	0.0000241
Arsenic	0.000073	0.00073	0.00027	0.00008	0.00015936
Benzene	0.68	2.2	0.82	0.67	1.56
Beryllium	0.000002	0.000009	0.000001	0.000002	0.000003
Biphenyl	0	0	0	0	0
Bromoform	0.021	0.021	0.021	0.021	0.021
Bromomethane	0.039	0.039	0.039	0.039	0.039
Cadmium	0.00027	0.0029	0.00059	0.00027	0.00024842
Carbon Disulfide	0.047	0.047	0.047	0.047	0.047
Carbon Tetrachloride	0.88	0.88	0.88	0.88	0.88
Carbonyl Sulfide	1.2	1.2	1.2	1.2	1.2
Chlordane	0.00001	0.00001	0.00001	0.00001	0.00001
Chlorobenzene	0.0018	0.025	0.0036	0.0021	0.00215
Chloroethane	0.001	0.011	0.0017	0.001	0.0008963
Chloroform	0.088	0.13	0.091	0.088	0.0869
Chloromethane	1.3	1.3	1.3	1.3	1.22
Chromium	0.00031	0.0035	0.003	0.00046	0.00057182
Cobalt	0.00096	0.0055	0.0012	0.00074	0.00053388
Cresols	0.012	0.2	0.029	0.013	0.0216
Cumene	0.01	0.097	0.016	0.01	0.015
Cyanide	0.0092	0.073	0.016	0.0093	0.0157
Di-n-butyl Phthalate	0.001	0.0013	0.001	0.001	0.0010176
Di(2-ethylhexyl)phthalate	0.0014	0.0014	0.0014	0.0014	0.0014
Diphenylmethane diisocyanate	0	0	0	0	0.000001
Ethyl Benzene	0.042	0.37	0.078	0.042	0.181
Ethylene Glycol	0.015	0.18	0.026	0.016	0.0165
Ethylene Oxide	0.000036	0.00053	0.000075	0.000042	0.0000453

Substance	Census Tracts and Concentration (µg/m³)				
	320019502.00	320019503.00	320019504.00	320019505.00	Churchill County Average
Formaldehyde	0.41	1.2	0.45	0.39	2.87
Glycol Ether	0.01	0.12	0.014	0.0099	0.0188
Hexachlorobenzene	0.000093	0.000093	0.000093	0.000093	0.000093
Hexachlorobutadiene	0.0018	0.0018	0.0018	0.0018	0.0018
Hexachlorocyclohexane, G amma-	0.00025	0.00025	0.00025	0.00025	0.00025
Hexachloroethane	0.0048	0.0048	0.0048	0.0048	0.0048
Hexane	0.056	0.52	0.094	0.055	0.161
Hydrochloric Acid	1.7	17	2.7	1.7	1.429
Hydrogen Fluoride	0.013	0.13	0.02	0.012	0.0111
Iodomethane	0.012	0.012	0.012	0.012	0.012
Isooctane	0.085	0.71	0.15	0.086	0.214
Lead	0.004	0.042	0.0071	0.004	0.00437
Manganese	0.0033	0.036	0.023	0.0043	0.00637
Mercury	0.0021	0.0073	0.0025	0.0021	0.00201
Methanol	0.037	0.38	0.061	0.036	0.0629
Methyl Isobutyl Ketone	0.0012	0.019	0.0016	0.0013	0.00328
Methyl-t-butyl Ether	0.036	0.34	0.071	0.037	0.168
Methylene Chloride	0.16	0.22	0.16	0.16	0.164
m,p-Xylene or Total Xylenes	0.34	1.8	0.48	0.34	0.867
Naphthalene	0.022	0.18	0.035	0.021	0.122
Nickel	0.00037	0.0039	0.0013	0.00038	0.000726
PCDD/PCDF	0	0	0	0	0
Phenol	0.04	0.38	0.063	0.038	0.0731
Phosgene	0.061	0.061	0.061	0.061	0.061
Phthalic Anhydride	0.000006	0.000062	0.000009	0.000006	0.000006
Polychlorinated Biphenyls	0.00038	0.00038	0.00038	0.00038	0.00038
Polycyclic Organic Matter	0.027	0.22	0.043	0.027	0.12
Propionaldehyde	0.024	0.067	0.022	0.02	0.185
Selenium	0.000036	0.00035	0.00013	0.000038	0.0000478
Styrene	0.0031	0.046	0.0081	0.0035	0.0533
Tetrachloroethylene	0.15	0.26	0.23	0.16	0.161
Toluene	0.28	2.5	0.49	0.28	0.841
Trichloroethylene	0.087	0.16	0.089	0.087	0.0935
Vinyl Chloride	0.0043	0.044	0.0069	0.0042	0.00363

Table 17. Summary of Cancer Risk and Hazard Index

	Cumulative Exposure Project		National Air Toxics Assessment	
Location	**Cancer Risk**	**Hazard Index**	**Cancer Risk**	**Hazard Index**
Nevada–Range	2.7E-5 to 4.0E-4*	0.5 to 13*	1.5E-5 to 1.6E-4	0.04 to 16.5
Nevada–Average	0.000086	7.9	0.000039	3.22
Churchill County–Average	0.000056	3.8	0.000027	1.27
Fallon	0.00013	11	0.000037	2.2
Carson City	0.0002	12	0.00016	5.74
Las Vegas	0.00025	13	0.000066	16.5
Reno	1.7 E-4	12.6	0.000074	6.37

* Census tracts with zero population contained large errors in the cancer risk and hazard index values because population was used to interpolate air concentrations. Therefore, census tracts with zero population were excluded from the ranges shown in this table. The NATA results did not have this problem.

Table 18. 1996 National Air Toxics Assessment for the Census Tract 320010950300

Chemical	Concentrations (µg/m³) Due To Emissions From					
	Point Sources	Area Sources	Mobile On-Road Sources	Mobile Non-Road Sources	Background	All Sources
1,1,2,2-Tetrachloroethane	8.6e-06	8.4e-06	0	0	0	1.7e-05
1,3-Dichloropropene	0	5.9e-02	0	0	0	5.9e-02
7-PAH	0	2.6e-03	9.0e-05	3.2e-06	0	2.7e-03
Acetaldehyde	0	4.9e-02	2.1e-01	1.5e-01	0	4.1e-01
Acrolein	0	1.7e-02	2.2e-02	1.0e-02	0	4.9e-02
Acrylonitrile	1.6e-05	1.8e-05	0	0	0	3.4e-05
Arsenic	0	1.4e-05	4.0e-07	1.5e-09	0	1.4e-05
Benzene	4.0e-05	3.0e-02	5.9e-01	2.5e-02	0	6.4e-01
Beryllium	0	4.8e-06	0	0	0	4.8e-06
Butadiene	0	3.6e-03	6.6e-02	1.8e-03	0	7.1e-02
Cadmium	0	6.7e-06	0	0	0	6.7e-06
Carbon Tetrachloride	2.8e-08	1.1e-05	0	0	0	1.1e-05
Chloroform	1.7e-07	4.0e-04	0	0	0	4.0e-04
Chromium	0	1.6e-05	2.9e-05	3.9e-05	0	8.5e-05
Coke Oven Emissions	0	0	0	0	0	0
Ethyl Benzene	2.1e-05	3.0e-02	1.4e-01	8.1e-03	0	1.8e-01
Ethylene Dichloride	1.9e-06	5.5e-06	0	0	0	7.3e-06
Ethylene Dibromide	8.7e-09	8.6e-09	0	0	0	1.7e-08
Ethylene Oxide	0	2.5e-04	0	0	0	2.5e-04
Formaldehyde	0	1.2e-01	2.4e-01	1.7e-01	0	5.4e-01
Hexachlorobenzene	0	2.5e-07	0	0	0	2.5e-07
Hexane	2.5e-05	1.7e-01	1.2e-01	6.5e-03	0	3.0e-01
Hydrazine	0	5.1e-12	0	0	0	5.1e-12
Lead	0	9.7e-05	4.2e-05	3.2e-08	0	1.4e-04
Manganese	0	6.3e-04	1.2e-05	4.0e-05	0	6.8e-04
Mercury	4.3e-09	4.8e-05	4.0e-07	1.1e-05	0	6.0e-05
Methylene Chloride	5.4e-05	8.0e-02	0	0	0	8.0e-02
MTBEther	0	8.7e-03	2.8e-02	0	0	3.7e-02
Nickel	0	6.0e-05	2.2e-05	1.7e-05	0	9.9e-05
Polychlorinated Biphenyls	0	0	0	0	0	0
Polycyclic Organic Matter, total	0	4.4e-02	2.0e-04	8.5e-06	0.0e+00	4.5e-02
Propionaldehyde	0	3.7e-02	3.2e-02	3.7e-02	0	1.1e-01
Propylene Dichloride	9.4e-07	1.0e-06	0	0	0	2.0e-06
Quinoline	0	1.8e-10	0	0	0	1.8e-10
Styrene	0	2.3e-05	2.2e-02	6.3e-04	0	2.3e-02
Tetrachloroethylene (Perchloroethylene)	2.7e-05	5.3e-02	0	0	0	5.3e-02

Toluene	6.5e-04	2.5e-01	9.7e-01	3.6e-02	0	1.3e+00
Trichloroethylene	1.6e-05	7.0e-03	0	0	0	7.0e-03
Vinyl Chloride	2.1e-05	2.1e-05	0	0	0	4.2e-05
Xylenes (o, m, p, and mixed isomers)	5.1e-05	1.1e-01	5.4e-01	3.1e-02	0	6.8e-01

Diesel Particulate Matter (µg/m^3)

Concentrations due to Mobile On-road Sources: 0.1
Background Concentrations from Mobile On-road Sources: 0.052
Concentrations due to Mobile Non-road Sources: 0.16
Background Concentrations from Mobile Non-road Sources: 0.0067
Total concentrations due to Mobile On- and Off-road Sources (mobile road and non road): 0.26
Total background sources from mobile sources: 0.12

Table 19. Concentrations from U.S. EPA National Air Toxics Assessment Modeling, Churchill County

Chemical	Concentrations (µg/m³) Due To Emissions From					Total
	Major	Area and	Onroad	Nonroad	Estimated	
Acetaldehyde	0.00e+00	1.58e-02	1.29e-01	4.63e-02	0.00e+00	1.91e-01
Acrolein	0.00e+00	1.15e-02	1.65e-02	3.44e-03	0.00e+00	3.15e-02
Acrylonitrile	1.59e-03	1.32e-04	0.00e+00	0.00e+00	0.00e+00	1.72e-03
Arsenic Compounds	0.00e+00	2.96e-06	8.33e-08	1.48e-09	0.00e+00	3.05e-06
Benzene	4.10e-03	3.41e-02	1.79e-01	1.96e-02	4.80e-01	7.17e-01
Beryllium Compounds	0.00e+00	6.74e-07	0.00e+00	0.00e+00	0.00e+00	6.74e-07
1,3-Butadiene	0.00e+00	3.14e-03	1.16e-02	7.26e-04	0.00e+00	1.54e-02
Cadmium Compounds	0.00e+00	2.24e-05	0.00e+00	0.00e+00	0.00e+00	2.24e-05
Carbon Tetrachloride	2.91e-06	4.36e-04	0.00e+00	0.00e+00	8.80e-01	8.80e-01
Chloroform	1.69e-05	2.67e-03	0.00e+00	0.00e+00	8.30e-02	8.57e-02
Chromium Compounds	0.00e+00	2.47e-05	6.12e-06	1.20e-05	0.00e+00	4.28e-05
Coke Oven Emissions	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
1,3-Dichloropropene	0.00e+00	5.59e-03	0.00e+00	0.00e+00	0.00e+00	5.59e-03
Diesel Particulate Matter	0.00e+00	0.00e+00	1.30e-01	2.73e-01	0	4.03e-01
Ethylene Dibromide	8.88e-07	1.69e-08	0.00e+00	0.00e+00	7.70e-03	7.70e-03
Ethylene Dichloride	1.92e-04	3.88e-06	0.00e+00	0.00e+00	6.10e-02	6.12e-02
Ethylene Oxide	0.00e+00	1.96e-04	0.00e+00	0.00e+00	0.00e+00	1.96e-04
Formaldehyde	0.00e+00	5.33e-02	1.06e-01	5.45e-02	2.50e-01	4.63e-01
Hexachlorobenzene	0.00e+00	3.84e-07	0.00e+00	0.00e+00	9.30e-05	9.34e-05
Hydrazine	0.00e+00	6.30e-10	0.00e+00	0.00e+00	0.00e+00	6.30e-10
Lead Compounds	0.00e+00	3.67e-04	8.52e-06	2.33e-07	0.00e+00	3.76e-04
Manganese Compounds	0.00e+00	6.87e-05	2.41e-06	1.25e-05	0.00e+00	8.36e-05
Mercury Compounds	4.38e-07	3.46e-04	7.94e-08	3.50e-06	1.50e-03	1.85e-03
Methylene Chloride	5.71e-03	1.85e-02	0.00e+00	0.00e+00	1.50e-01	1.74e-01
Nickel Compounds	0.00e+00	2.75e-05	4.69e-06	5.18e-06	0.00e+00	3.73e-05
Perchloroethylene	2.91e-03	7.46e-03	0.00e+00	0.00e+00	1.40e-01	1.50e-01
Polychlorinated Biphenyls	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.80e-04	3.80e-04
Polycyclic Organic Matter	0.00e+00	8.02e-03	4.41e-05	6.63e-06	0.00e+00	8.07e-03
7-PAH	0.00e+00	7.09e-04	1.96e-05	3.07e-06	0.00e+00	7.32e-04
Propylene Dichloride	9.61e-05	6.23e-06	0.00e+00	0.00e+00	0.00e+00	1.02e-04
Quinoline	0.00e+00	5.05e-09	0.00e+00	0.00e+00	0.00e+00	5.05e-09
1,1,2,2-Tetrachloroethane	8.81e-04	1.33e-05	0.00e+00	0.00e+00	0.00e+00	8.94e-04
Trichloroethylene	1.74e-03	2.02e-03	0.00e+00	0.00e+00	8.10e-02	8.48e-02
Vinyl Chloride	2.17e-03	3.51e-05	0.00e+00	0.00e+00	0.00e+00	2.20e-03

* Background levels included in the on-road and nonroad averages.

Table 20. Theoretical Cancer Risk Drivers (Chemicals Contributing the Most Risk)

Chemical	Cancer Risk	Percent of Total	Predominant Source
Carbon Tetrachloride	0.00001	26%	Area Sources/Background
Benzene	0.000009	24%	On-Road Mobile
Formaldehyde	0.000008	21%	On-Road Mobile
1,3-Butadiene	0.000002	5.2%	On-Road Mobile

APPENDICES

APPENDIX A

METHOD USED TO COMPILE THE AIR EMISSIONS INVENTORY FOR CHURCHILL COUNTY

APPENDIX A

METHOD USED TO COMPILE THE AIR EMISSIONS INVENTORY FOR CHURCHILL COUNTY

ATSDR compiled the emissions inventory from two main sources: (1) permit records from the files at the Bureau of Air Quality, Department of Environmental Protection, State of Nevada (NDEP) and (2) existing databases at the U.S. EPA. The NDEP permit records include data on facilities required to obtain air control permits under the Clean Air Act and include industrial operations and surface area disturbances. As part of the NDEP Air Program, permitted facilities are required to submit annual fees based on emissions. The facilities subject to the Clean Air Act in Churchill County are summarized here along with annual emission amounts submited for determining the annual permit fees.

The EPA databases include:

- The National Emission Trends (NET) database which provides estimates of annual emissions of criteria air pollutants from point, area, and mobile sources. These pollutants include sulfur dioxide, nitrogen oxides, and ozone.
- The National Toxics Inventory (NTI) database which provides estimates of annual emissions of hazardous air pollutants from point, area, and mobile sources. There are 188 EPA-designated hazardous air pollutants including benzene and toluene
- The Toxics Release Inventory (TRI) database which provides estimates of annual emissions of approximately 650 chemicals from selected manufacturing and waste management facilities subject to the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and Pollution Prevention Act of 1990.
- The Cumulative Exposure Project (CEP) which consists of a 1990 emissions inventory. In addition, this project included modeling of the emissions to predict ambient air quality. This inventory does not specify specific industries, but groups emission sources into categories such as point sources and mobile emissions.
- The National Air Toxics Assessment (NATA) of 1996 which consists of a 1996 emissions inventory. The NATA also included air modeling. Similar to the CEP, NATA reports emissions sources based on emission categories.

These datasets overlap in the information they contain. For instance, the CEP and NATA emission inventories often included data from the NET, NTI, and TRI.

The NDEP records, permit files, and submitted fees are considered the most accurate since this is considered primary data. The data collected from the EPA databases is considered secondary data and is less accurate because someone else besides ATSDR collected the data and entered it into the database.

The permit files from NDEP contains information of facilities that are required to obtain an air emissions permit (see sidebar). Smaller emission sources such as dry cleaners and residential heating units are not included in these files. These permits also do not include units that are considered trivial activities or insignificant (See Appendix B).

The Bureau of Air Quality issues air permits for any activity that has the potential to emit a regulated pollutant unless that activity is specifically exempted. Examples of activities that may need a permit include: boilers over four million BTUs, incinerators, mining operations, asphalt plants, cement plants, portable internal combustion engines greater than 500 HP, stationary internal combustion engines greater than 500 HP, surface area disturbances five acres or greater in size, various industrial processes and groundwater remediation using air stripping units.

APPENDIX B
STATE OF NEVADA
BUREAU OF AIR POLLUTION CONTROL
LIST OF TRIVIAL ACTIVITIES
AND
APPROVED INSIGNIFICANT ACTIVITIES

STATE OF NEVADA
BUREAU OF AIR POLLUTION CONTROL
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AND
APPROVED INSIGNIFICANT ACTIVITIES

LIST OF TRIVIAL ACTIVITIES

The following types of activities and emission units may be presumptively omitted from Class I applications. Certain of these listed activities include qualifying statements intended to exclude many similar activities. Trivial activities are emission units without specific applicable requirements under Title V of the Clean Air Act Amendments of 1990 and with extremely small emissions. There are also no applicable State Implementation Plan requirements for these activities. As of June 12, 1998, cooling towers have been removed from this list and must be treated as a permitted item or insignificant activity.

- Combustion emissions from propulsion of mobile sources, except for vessel emissions from Outer Continental Shelf sources
- Air-conditioning units used for human comfort that do not have applicable requirements under Title VI of the CAA

  Ventilating units used for human comfort that do not exhaust air pollutants into the ambient air from any manufacturing/industrial or commercial process
- Non-commercial food preparation
- Consumer use of office equipment and products, not including printers or businesses primarily involved in photographic reproduction
- Janitorial services and consumer use of janitorial products
- Internal combustion engines used for landscaping purposes
- Laundry activities, except for dry-cleaning and steam boilers
- Bathroom/toilet vent emissions
- Emergency (backup) electrical generators at residential locations
- Tobacco smoking rooms and areas
- Blacksmith forges

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- Facility maintenance and upkeep activities (e.g., groundskeeping, general repairs, cleaning, painting, welding, plumbing, re-tarring roofs, installing insulation, and paving parking lots) provided these activities are not conducted as part of a manufacturing process, are not related to the source's primary business activity, and not otherwise triggering a permit modification[1]

- Repair or maintenance shop activities not related to the source's primary business activity, not including emissions from surface coating or degreasing (solvent metal cleaning) activities, and not otherwise triggering a permit modification

- Portable electrical generators that can be moved by hand from one location to another. (NOTE: “Moved by hand” means that it can be moved without the assistance of any motorized or non-motorized vehicle, conveyance, or device)

- Hand-held equipment for buffing, polishing, cutting, drilling, sawing, grinding, turning or machining wood, metal or plastic

- Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that do not result in emission of HAP metals[1]

- Air compressors and pneumatically operated equipment, including hand tools

- Batteries and battery charging stations, except at battery manufacturing plants

- Storage tanks, reservoirs, and pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized

- Equipment used to mix and package, soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized

- Drop hammers or hydraulic presses for forging or metalworking

- Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment

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[1]Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that emit HAP metals are more appropriate for treatment as insignificant activities based on size or production level thresholds.

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- Vents from continuous emissions monitors and other analyzers
- Natural gas pressure regulator vents, excluding venting at oil and gas production facilities
- Hand-held applicator equipment for hot melt adhesives with no VOC in the adhesive formulation
- Equipment used for surface coating, painting, dipping or spraying operations, except those that will emit VOC or HAP
- CO_2 lasers, used only on metals and other materials which do not emit HAP in the process
- Consumer use of paper trimmers/binders
- Drying ovens and autoclaves, electric or steam heated, but not the emissions from the articles or substances being processed in the ovens or autoclaves or the boilers delivering the steam
- Salt baths using nonvolatile salts that do not result in emissions of any regulated air pollutants
- Laser trimmers using dust collection to prevent fugitive emissions
- Bench-scale laboratory equipment used for physical or chemical analysis, but not lab fume hoods or vents[2]
- Routine calibration and maintenance of laboratory equipment or other analytical instruments
- Equipment used for quality control/assurance or inspection purposes, including sampling equipment used to withdraw materials for analysis
- Hydraulic and hydrostatic testing equipment
- Environmental chambers not using hazardous air pollutant (HAP) gases
- Shock chambers
- Humidity chambers

[2]Many lab fume hoods or vents might qualify for treatment as insignificant or be grouped together for purposes of description.

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- Solar simulators
- Fugitive emissions related to movement of passenger vehicles, provided the emissions are not counted for applicability purposes and any required fugitive dust control plan or its equivalent is submitted
- Process water filtration systems and demineralizers
- Demineralized water tanks and demineralizer vents
- Boiler water treatment operations, not including cooling towers
- Oxygen scavenging (de-aeration) of water
- Ozone generators
- Fire suppression systems
- Emergency road flares
- Steam vents and safety relief valves
- Steam leaks
- Steam cleaning operations
- Steam sterilizers
- Oxygen plant, not including fuel burning equipment
- Lime slakers
- Ro-taps (bench scale)
- Riffles
- Ventilated benches (sample preparation area)
- Underground mining activities (including ventilation shafts)

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- Aspirating devices for, and venting of, aerosol cans, butane or natural gas cylinders, propane gas cylinders and ether cylinders with a capacity of less than 1 gallon

- Vacuum truck related activities

- Non-commercial experimental and analytical laboratory equipment which are bench scale in nature

- Use of pesticides, fumigants and herbicides

- Equipment using water, soap, detergents, or a suspension of abrasives in water for purposes of cleaning or finishing

- Pump or motor oil reservoirs

- Electric motors

- Soil gas sampling

- Continuous emissions monitoring system calibration gases

- Water treatment or storage or cooling systems for process water (specify any water additives), not including cooling towers

- Chemical storage associated with water and wastewater treatment

- Aerosol can usage

- Plastic pipe and liner welding

- Acetylene, butane and propane torches

- Equipment used exclusively for portable steam cleaning

- Caulking operations which are not part of a production process

- High voltage induced corona

- Production of hot/chilled water for on-site use not related to an industrial process

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- Filter draining

- General vehicle maintenance and servicing activities at the source

- Station transformers

- Circuit breakers (non-PCB oil filled)

- Storage cabinets for flammable products

- Fugitive emissions from landfill operations (provided the landfill is not subject to any federal applicable requirement)

- Automotive repair shop activities

- Stormwater ponds

- Blast cleaning equipment using a suspension of abrasive in water and any exhaust system or collector serving them exclusively

- Motor vehicle wash areas, etc.

- Open burning (provided all reporting and permitting requirements which apply are followed)
    1. Fire fighting activities and training conducted at the source in preparation for fighting fires
    2. Open burning activities in accordance with the NAC
    3. Flares used to indicate danger

- Pressure relief valves

- Natural gas pressure regulator vents, excluding venting at oil and gas production facilities

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Approved Insignificant Activities

The following insignificant activities have been approved by the director in accordance with NAC 445B.288.3(m):

- Crematory Incinerators processing <175 tons per year(1/24/96)
- Autoclave re-bricking (3/1/96)
- Prill silos <100,000 tons/year (3/1/96)
- Parts cleaners - cold cleaning only (3/1/96)
- Storage tanks, as follows: (3/1/96)

Emission Unit	Tank size (gallons)	and	Vapor Pressure (PSIA)
non-HAP VIL*	<40,000		<0.60
non HAP VIL	<200,000		<0.13
HAP VIL	<40,000		<0.15
HAP VIL	<200,000		<0.03
Liquid NaCN	any size		N/A

*VIL - volatile inorganic liquid

- Portable screening plant, processing ≤100,000 tons of metallic mineral, in less than 6 months, with ≥4% moisture content (3/5/96)
- Carbon strip/electrowinning circuit, with a total liquid surface area of less than 610 square feet and a solution flow rate less than 400 gallons per minute (6/12/96)
- Mine analytical laboratory fume hoods (6/12/96)
- Mine metallurgical laboratory fume hoods (6/12/96)
- Landfarming of not more than 270,000 tons per year of diesel-based hydrocarbon contaminated soil, with a concentration of less than 50,000 ppm Total Petroleum Hydrocarbons (6/12/96)

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- Landfarming of not more than 338 tons per year of gasoline-based hydrocarbon contaminated soil, with a concentration of less than 50,000 ppm Total Petroleum Hydrocarbons (6/12/96)

- Sand washing operations, consisting of material unloading by continuous drop feed on a feed conveyor, double deck screen/wash with two feed conveyors to the materials stockpile, processing the following: (1) less than 765,000 tons per year at the following moisture contents: material unloading and conveyor belt at least 1.5% moisture, screen and tow conveyor belts at least 7.0% moisture; (2) less than 805,000 tons per year at the following moisture contents: material unloading and conveyor belt at least 1.5% moisture, screen and tow conveyor belts at least 7.5% moisture; (3) less than 844,000 tons per year at the following moisture contents: material unloading and conveyor belt at least 1.5% moisture, screen and two conveyor belts at least 8.5% moisture (6/12/96)

- Draining of 155mm M687 Projectile OPA (Isopropyl Alcohol/Isopropylamine) canisters, containing 71.7 weight percent isopropyl alcohol and 28.3 weight percent isopropylamine, not to exceed 2,400 canisters per week (7/2/97)

- Lime silo, located at Newmont Gold Company's Rain Project, 127 ton storage capacity, equipped with silo discharge auger which is physically limited to 1.50 tons per hour of discharge of lime (13,140 tons per year) (7/13/98)

- Chemistry laboratory at the HWAD Main Base (8/24/98)

- Transloading facility for lime, consisting of railcar transfer to screw conveyor, screw conveyor to belt conveyor, belt conveyor to truck, transferring 80 tons per hour, for Continental Lime Inc.'s Dunphy Transloading facility (1/13/99)

- Newmont Gold Company - Shotcrete Plant described as follows: two (2) cement silo augers, cement metering bin, mix box containing washed pea gravel and sand, and auger to shotcrete transport truck. Shotcrete plant throughput is physically limited by shotcrete discharge auger, at 25.6 tons per hour (19.84 tons per hour gravel/sand and 5.76 tons per hour cement) (4/27/99) (revised 2/20/01)

- SmartAsh 100 disposal unit, specified as follows: 55 gallon steel open head drum, stainless steel lid, plated tubular steel frame, 2 blowers, for burning absorbent materials, paper waste, wood by-products, rags, used filters, waste oil, and other non-hazardous waste at a rate of 50 pounds per hour (5/7/99)

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- One evaporator/Condenser located at Quebecor Printing Nevada's Fernley facility with a maximum design capacity of 2000 gallons per day. (11/30/99)

- Transloading facility for flyash, consisting of railcar transfer to screw conveyor, screw conveyor to belt conveyor, belt conveyor to truck, transferring 80 tons per hour, for Continental Lime Inc.'s Dunphy Transloading facility. (12/1/99)

- Battery decasing, decaning, washing and waste water treatment operations, located at NAVSEA-HWAD. Combined mercury-zinc, mercury-cadmium and silver-zinc battery process rate not to exceed 1000 batteries per hour and 260,000 batteries per year. Only one battery type may be processed at any given time. Mercury content not to exceed 0.552 pounds per battery. Total uncontrolled mercury emissions from the battery decasing, decanning, washing and wastewater treatment operations not to exceed 0.1 pounds per hour and 26 pounds per year. (5/15/2000)

- Crawford Animal Crematories - Model CB400 and a Model 500P to be located at the Silver Hills Vet Hospital in Carson City. The crematories are to be used for the destruction of animal carcasses only. (12/12/00)

- MCI WorldCom - Six Generac 96A04605-S, 60kW, diesel generators - One each at the following locations: Argenta, Lander County; Carlin, Elko County; Clover Valley, Elko County; Shafter, Elko County; Stonehouse, Humboldt County (2/20/01)

- Newmont Gold Company - Portable Cement Mixing Plant consisting of - a mix tank for generating cement slurry, and an auger with a maximum throughput of 700 pounds of cement per minute. (2/20/01)

- Barrick Goldstrike Mines, Inc., Pilot Scale Fluidized Bed Roaster w/ Integral Quenching Eductor. Maximum material throughput of 45 pounds per hour with a roaster operating temperature range between 700 and 1200 F. (4/3/01)

- Industrial Metals & Mining, LLC's ore processing operation located in Silver Springs, Nevada consisting of - weigh and assaying of incoming ore, ore roasting, ore sizing, and ore loading to liquid process solution system. (8/10/01)

- Oglebay Norton Industrial Sands, Inc.'s portable sand transloading conveyor (10/10/01)

- Paramount Nevada Asphalt Company's emulsified asphalt plant (5/22/02)

APPENDIX C

TOXICS RELEASE INVENTORY DATA

The U.S. EPA Toxics Resource Inventory (TRI) contains information from companies and government facilities that meet the requirements listed below:

- ten or more full-time employees; and
- manufactures goods in the industries listed under Standard Industrial Classification (SIC) Codes 20-39; starting with the 1998 reporting year these additional categories: metal mining, coal mining, electric generating utilities that combust coal and/or oil, chemical wholesalers, petroleum bulk plants and terminals, commercial hazardous waste treatment facilities and solvent recyclers; and
- manufactures, imports, or processes more than 25,000 pounds per year of one or more of listed toxic chemicals, or uses more than 10,000 pounds of one or more of listed toxic chemicals (long form criteria); or
- manufactures, imports, or processes more than one million pounds per year of one or more of the listed toxic chemicals, but does not exceed 500 pounds for the total annual reportable amount (short form criteria).

For each facility that meets these requirements, the facility must report:

- facility name, location, and type of business; name of a public contact person for the facility; and certification that the

For each chemical that the facility reports, the following must be provided:

- how the chemical was used (manufactured, processed, or otherwise used);
- how much was intentionally or accidentally released to the air, water, or land;
- how much of the chemical was treated, recycled, or combusted for energy recovery at the facility;
- how chemical wastes were treated at the facility and the treatment efficiency;
- how much waste was sent off-site for treatment, disposal, recycling, or energy recovery;
- where the waste was sent off-site; and
- pollution prevention and chemical recycling activities.

TRI also contains some information about source reduction efforts. Since 1987, data has been collected for more than 300 chemicals that EPA considers toxic. In 1995, 286 additional chemicals were included on the list. Beginning with the 1994 reporting year, federal facilities are required to report TRI chemical releases. Companies and government facilities provide the TRI information annually to EPA.

Source: U.S. EPA, The Emergency Planning and Community Right-to-Know Act; Section 313, Release and Other Waste Management Reporting Requirements. Office of Environmental Information, Washington, D.C. EPA 260/K-01-001, February 2001. http://www.epa.gov/tri.

APPENDIX D

AIR MODELING

ATSDR modeled the emissions from the Kennametal Fallon and Refinery facilities for two reasons: (1) to evaluate why the predicted air concentrations increased with the addition of the HEPA filters, and (2) to determine the spatial distribution of particulate concentrations and the spatial relationship with case and control families. The results of the modeling are presented in the body of this report. In this Appendix, the modeling procedure is discussed.

The Industrial Source Complex, Version 3 Short Term Model (ISC3ST) model was used. The ISC3ST model was run via a commercial interface called ISC-AERMOD View (Version 4.5) produced by Lakes Environmental Software Inc. (www.lakes-environmental.com). The model was run to generate 24-hour maximum and annual average particulate concentrations.

The ISC3ST model requires hourly meteorological data. The model was run using five years of data, 1991 through 1995. Surface and upper air meteorological data was obtained from the National Climatic Data Center of the National Oceanic and Atmospheric Administration (http://lwf.ncdc.noaa.gov). The surface data originated from Fallon NAAS (WMO = 72488, 1991 through 1995), and upper air data originated from the Winnemucca Municipal Airport (WMO = 725830, 1991 through October 1994) and the Reno/Desert Research Institute (WMO = 724890, 1994 through 1995). The surface and upper air were processed to create one file with mixing height for use with ISC3ST. The processing was completed by using the EPA program PCRAMMET (http://www.epa.gov/scram001/tt24.htm#preps).

The ISC3ST model options and parameters are presented in the remainder of this appendix and are intended for a reader with some familiarity with the ISC3ST model. The options and parameters were extracted and simplified from the model input files for brevity as each input file can reach 15 pages or more. Explanations of the model options and the shorthand used is not provided, readers may consult with the ISC3ST manuals available from U.S. EPA at http://www.epa.gov/scram001/tt22.htm#isc for more explanation.

Fallon Refinery

Model options: Default, concentrations, rural dispersion parameters
Source information:
- Source ID: Thermit
- Type: POINT
- X Coord: 345908.000 meters (UTM 11, NAD83)
- Y Coord: 4388320.000 meters
- Elevation: 1211.600 meters

Source Parameters for Source ID Thermit (from NDEP)
- Emission rate: 138.43368 g/s
- Release height above ground: 1.829 meters
- Release temperature: 1783.150ºK
- Stack exit gas velocity: 0.71867 m/s
- Stack diameter at release point: 9.144 m

Emission Factors (timing of release)
- 4 hours every Saturday (7 am through 10 am)

Terrain Height: Elevated, simple and complex terrain calculation used. Elevations were obtained from USGS 30 meter DEMs

Flagpole Receptors: No

Grid

Uniform Cartesian Grid Receptor Networks

Grid Number	Origin: SW Corner (UTM 11, NAD83, meters)		Number of Points		Spacing	
	X	Y	X	Y	X	Y
1	321600.56	4351206.45	40	45	1250	1250
2	339281.49	4383519.84	21	21	704.28	492.03
3	340200.78	4366491.8	40	40	350	200

Fallon Facility

Model options: Default, Concentrations, Urban dispersion parameters

Source Locations

Source ID	Source Type	Location (UTM 11, NAD83, meters)		Elevation
		x	y	
POWDERAF	Point	346650.39	4371493.74	1208.84
POWDER_G	Point	346650.39	4371493.74	1208.84
POWDER_H	Point	346650.39	4371493.74	1208.84
POWDER_I	Point	346650.39	4371493.74	1208.84
POWDER_K	Point	346650.39	4371493.74	1208.84
POWDER_M	Point	346650.39	4371493.74	1208.84
BAGCUT	Point	346650.39	4371493.74	1208.84

Source Parameters

Source ID	Emission Rate (g/s)	Release Height Above Ground (m)	Stack Gas Exit Temperature (ºK)	Stack Exit Gas Velocity (m/s)	Stack Inside Diameter (m)
POWDERAF	0.305558611	7.925	298.15	100	0.22
POWDER_G	0.060606667	8.534	298.15	14.08	0.25

POWDER_H	0.162880417	8.53	298.15	8.95231	0.518
POWDER_I	0.203285	8.53	298.15	14.37343	0.457
POWDER_K	0.203285	8.53	298.15	11.19038	0.518
POWDER_M	0.102274	7.62	298.15	19.52675	0.277
BAGCUT	0.305559	6.096	298.15	21.56014	0.457

Emission Factors (timing of release)
24 hours per day/7 days per week

Terrain Height: Elevated, simple and complex terrain calculation used. Elevations were obtained from USGS 30 meter DEMs

Flagpole Receptors: No

Grid
Uniform Cartesian Grid Receptor Networks

Grid Number	Origin-SW corner (meters)		Number of Points		Spacing	
	X	Y	X	Y	X	Y
1	344897.86	4369173.69	21	21	172.94	207.25
2	345967.15	4370876.47	21	21	71.09	61.25
3	346334.39	4371222.24	21	21	31.11	30.22

APPENDIX E

U.S. ENVIRONMENTAL PROTECTION AGENCY'S CUMULATIVE EXPOSURE PROJECT (NATIONWIDE MODELING)

The Cumulative Exposure Project (CEP) air modeling is very different from the Agency for Toxic Substance and Disease Registry (ATSDR) model for a number of reasons. First of all, the CEP estimates were developed through a national modeling study of the 1990 emissions of 148 air pollutants in each census tract in the continental United States. ATSDR's modeling only examined the chemicals emitted from the TRI, AIRS/AFS, or state air compliance files, which totaled 25 air pollutants within 4 miles of the community. Also, the CEP estimates used a long-range air transport model to model concentrations from 100 meters (328 feet) to 50 kilometers (31 miles) from a emissions source. ATSDR's modeling used a short-range air transport model with receptors adjacent to the sources and up to 4 miles away. Additionally, the CEP results are reported for each census tract, which means that the concentrations throughout the census tract have been summarized over the census tract. The ATSDR modeling results are at a larger scale allowing details within a census tract to be available. Also important is that the CEP model included the breakdown, deposition, and creation of the pollutants in the atmosphere.

Finally, the CEP model includes the following six sources: (1) manufacturing point sources (e.g., chemical manufacturing, refineries, primary metals); (2) nonmanufacturing point sources (e.g., electric utility generators, municipal waste combustors); (3) manufacturing area sources (e.g., wood products manufacturing, degreasing); (4) nonmanufacturing area sources (e.g., dry cleaning, consumer products, small medical waste incinerators); (5) onroad mobile sources (e.g., cars, buses, trucks); and (6) nonroad mobile sources (e.g., farm equipment, airplanes, boats, lawn equipment). ATSDR's modeling included only those facilities required to report to the TRI database or regulated under the Clean Air Act. These facilities include facilities from the first three categories and some facilities from the a part of the fourth category. A significant difference is that CEP included mobile sources and ATSDR did not. Detailed information about CEP is available from EPA at http://www.epa.gov/cumulativeexposure/index.htm.

The CEP study divides the contaminant sources into the following 6 general groups:

- *Metal and non metal manufacturing point sources* (excluding combustion sources). These data were obtained through the TRI and AIRs/AFS database.

- *Municipal waste combustors* (MWC). These are facilities that incinerate municipal waste. There were no municipal waste combustors in Hall County in 1990.

- *Treatment, Storage and isposal Facilities* (TSDFs). These are facilities that treat, store long-term, or dispose of hazardous waste. There were no hazardous waste treatment, storage, or disposal facilities (TSDFs) in Hall County in 1990.

- *il Refineries*. There were no oil refineries in Hall County in 1990.

- *ther point sources*. These sources include large (greater than 100 tons/year of total emissions) manufacturing combustion sources such as coal, oil, and natural gas-fired utility boilers used to generate steam or heat, coke ovens, and all other point source combustion sources not included it the MWC and TSDF groups.

- *Area manufacturing and area nonmanufacturing sources* (excludes TSDFs). In general, areas sources are facilities with emissions of all criteria pollutants (nitrogen oxides, sulfur dioxide, volatile organic compounds, total suspended particulates, and carbon monoxide) less than 100 tons per year. Facilities emitting 100 tons per year or greater are considered point sources. There are several different categories for these sources (see the table below).

Types of Manufacturing and Non-manufacturing Sources and Examples	
Type of source	**Example of source**
Stationary source fuel combustion	small boilers and heaters burning fossil fuels to generate heat or steam
Aircraft using unpaved airstrips	airplane emissions not located at a typical airport
Industrial processes	chemical manufacturing, food and kindred products, secondary metal production, petroleum refining, wood products, rubber and plastics
Solvent utilization	surface coating such as painting, degreasing, dry cleaning, graphic arts, consumer products, and other solvent usage categories too small and/or numerous to be treated as point sources
Storage and transport of petroleum and petroleum products	gasoline
Waste disposal, treatment and recovery	such as waste incineration (municipal residential, or commercial/institutional), open burning on-site or at dumps, wastewater treatment, and landfills
Miscellaneous area sources	such as agricultural field burning, managed/ prescribed burning, forest wildfires, structure fires, oil and gas production, construction, gasoline service stations, on-site incineration, open burning, and wastewater treatment
On-road mobile sources	cars, buses, and trucks
Off-road mobile sources	gasoline-powered equipment, such as lawn and garden equipment, generators, gasoline-powered offroad motorcycles and recreational boats, diesel-powered construction and farm equipment, aircraft, railroads, commercial boats, and coal and oil-powered commercial boats

APPENDIX F

U.S. ENVIRONMENTAL PROTECTION AGENCY NATIONAL AIR TOXICS ASSESSMENT (NATIONWIDE MODELING)

The National Air Toxics Assessment (NATA) model is similar to the CEP model but differs in three ways:

- Only 33 air toxics were modeled. These 33 toxic air pollutants are a subset of the 188 toxic air pollutants for which EPA must develop emissions standards and a subset of the 148 pollutants modeled in CEP. The 33 were selected based on a number of factors, including toxicity-weighted emissions, monitoring data, past air quality modeling analysis, and a review of existing risk assessment literature.

- The emissions inventory used to estimate concentrations for 1996 is much improved over the 1990 data used in the CEP. It is based on extensive state and local input and includes specific information (exact locations and emission characteristics) about many more sources than did the inventory used in the CEP.

- Air concentrations were estimated at the county level instead of the census tract level in the CEP.

NATA included four steps that looked at the year 1996.

- Compiling a national emissions inventory of air toxics emissions from outdoor sources. Available here
- Estimating ambient concentrations of air toxics across the contiguous United States. Available here
- Estimating population exposures across the contiguous United States. Available here
- Characterizing potential public health risk due to inhalation of air toxics including both cancer and noncancer effects.

The goal of the national-scale assessment was to identify those air toxics which are of greatest potential concern, in terms of contribution to population risk. The results will be used by EPA to set priorities for the collection of additional air toxics data (e.g., emissions data and ambient monitoring data). More information about NATA can be found at EPA's web site at the following address: http://www.epa.gov/ttn/atw/nata/.

APPENDIX G

ATSDR CANCER RISK CATEGORIES

ATSDR Cancer Risk Categories

Category	Fraction	Decimal	Exponential
No Increased Risk	<1/100,000	<0.00001	<1E-05
No Apparent Increased Risk	1/100,000	0.00001	1E–05
Low Increased Risk	1/10,000	0.0001	1E–04
Moderate Increased Risk	1/1,000	0.001	1E–03
High Increased Risk	1/100	0.01	1E–02
Very High Increased Risk	1/100	0.01	1E–02

Note: Category definitions used by ATSDR are intended to define categories of estimated risk to convey the degree of hazard from the defined exposure relative to other exposures.

APPENDIX H

CANCER RISK FROM THE U.S. EPA CUMULATIVE EXPOSURE PROJECT AND THE U.S. EPA NATIONAL AIR TOXICS ASSESSMENT

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	Tract ID	1990 Population	Urban or Rural	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	Total
Churchill County	320019501.98	162	R	9.36e-11	7.78e-07	1.14e-06	3.06e-07	1.98e-05	2.21e-05	2.78e-05
Churchill County	320019502.00	6,405	R	2.08e-09	1.32e-06	3.07e-06	6.20e-07	2.01e-05	2.51e-05	3.58e-05
Churchill County	320019503.00	7,234	R	1.86e-09	3.89e-06	1.02e-05	2.16e-06	2.02e-05	3.65e-05	1.33e-04
Churchill County	320019504.00	1,166	R	1.29e-09	1.62e-06	3.64e-06	1.55e-06	1.87e-05	2.55e-05	4.57e-05
Churchill County	320019505.00	2,971	R	1.70e-09	1.16e-06	2.61e-06	1.00e-06	1.97e-05	2.45e-05	3.60e-05
Clark County	320030001.01	5,608	U	2.38e-08	6.62e-06	7.93e-06	4.50e-06	2.00e-05	3.91e-05	7.05e-05
Clark County	320030001.02	6,175	U	2.20e-08	7.48e-06	8.54e-06	3.91e-06	2.01e-05	4.00e-05	7.55e-05
Clark County	320030001.03	4,869	U	2.20e-08	7.18e-06	9.19e-06	4.49e-06	2.01e-05	4.10e-05	8.46e-05
Clark County	320030001.04	6,286	U	2.10e-08	5.91e-06	7.79e-06	3.81e-06	1.99e-05	3.74e-05	7.26e-05
Clark County	320030001.05	3,119	U	2.30e-08	5.81e-06	7.79e-06	3.61e-06	2.01e-05	3.74e-05	6.78e-05
Clark County	320030002.01	2,879	U	2.46e-08	6.14e-06	7.98e-06	4.60e-06	2.00e-05	3.88e-05	8.60e-05
Clark County	320030002.02	5,734	U	2.24e-08	6.33e-06	8.44e-06	5.14e-06	2.00e-05	3.99e-05	8.44e-05
Clark County	320030003.01	3,448	U	2.56e-08	9.20e-06	1.10e-05	6.84e-06	1.99e-05	4.70e-05	1.50e-04
Clark County	320030003.02	4,193	U	2.56e-08	8.97e-06	1.12e-05	6.08e-06	2.00e-05	4.63e-05	1.49e-04
Clark County	320030004.00	6,889	U	2.27e-08	1.07e-05	1.06e-05	6.66e-06	2.01e-05	4.80e-05	1.67e-04
Clark County	320030005.02	8,807	U	3.01e-08	1.14e-05	1.23e-05	7.14e-06	2.01e-05	5.10e-05	9.87e-05
Clark County	320030005.03	5,477	U	2.25e-08	1.28e-05	1.32e-05	7.99e-06	2.01e-05	5.41e-05	1.25e-04
Clark County	320030005.04	6,476	U	2.41e-08	1.29e-05	1.27e-05	7.59e-06	2.01e-05	5.33e-05	1.01e-04
Clark County	320030005.06	5,127	U	2.45e-08	8.80e-06	1.00e-05	5.80e-06	2.02e-05	4.48e-05	7.52e-05
Clark County	320030005.07	8,969	U	2.48e-08	9.55e-06	1.07e-05	6.16e-06	2.00e-05	4.65e-05	7.97e-05
Clark County	320030005.08	7,703	U	2.44e-08	1.23e-05	1.34e-05	7.70e-06	2.01e-05	5.36e-05	9.91e-05
Clark County	320030005.09	8,423	U	2.37e-08	1.23e-05	1.38e-05	7.88e-06	2.01e-05	5.41e-05	9.81e-05
Clark County	320030006.00	2,832	U	2.12e-08	1.29e-05	1.25e-05	7.81e-06	1.99e-05	5.32e-05	1.24e-04
Clark County	320030007.00	3,610	U	2.28e-08	1.02e-05	1.10e-05	6.84e-06	2.02e-05	4.82e-05	2.36e-04

County	Tract ID	1990 Population	Urban or Rural	1996 National Air Toxics Assessment: Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	1990 Cumulative Exposure Project: Total
Clark County	320030008.00	2,363	U	2.17e-08	1.03e-05	1.13e-05	7.29e-06	2.01e-05	4.91e-05	1.14e-04
Clark County	320030009.00	1,705	U	2.14e-08	9.29e-06	9.64e-06	6.76e-06	2.00e-05	4.58e-05	2.52e-04
Clark County	320030010.97	8,257	U	2.11e-08	5.66e-06	8.18e-06	3.97e-06	2.01e-05	3.79e-05	6.92e-05
Clark County	320030010.98	5,850	U	2.19e-08	5.57e-06	7.58e-06	4.71e-06	1.98e-05	3.77e-05	6.98e-05
Clark County	320030011.00	4,868	U	2.19e-08	1.09e-05	1.00e-05	7.64e-06	2.00e-05	4.86e-05	1.81e-04
Clark County	320030012.00	3,397	U	2.24e-08	8.69e-06	9.42e-06	7.19e-06	2.01e-05	4.54e-05	9.43e-05
Clark County	320030013.00	4,079	U	2.17e-08	8.80e-06	9.42e-06	7.32e-06	2.00e-05	4.55e-05	8.43e-05
Clark County	320030014.00	5,622	U	1.51e-08	8.58e-06	9.44e-06	6.93e-06	1.99e-05	4.49e-05	7.57e-05
Clark County	320030015.00	4,787	U	2.32e-08	9.64e-06	9.85e-06	7.08e-06	2.01e-05	4.67e-05	7.85e-05
Clark County	320030016.02	4,627	U	2.21e-08	8.74e-06	9.81e-06	7.14e-06	2.00e-05	4.57e-05	8.22e-05
Clark County	320030016.03	5,040	U	2.25e-08	9.36e-06	1.08e-05	6.77e-06	2.00e-05	4.70e-05	7.19e-05
Clark County	320030016.04	9,105	U	2.15e-08	9.39e-06	1.01e-05	7.73e-06	2.00e-05	4.72e-05	7.54e-05
Clark County	320030017.01	5,325	U	1.37e-08	7.53e-06	8.73e-06	8.55e-06	2.02e-05	4.50e-05	7.76e-05
Clark County	320030017.02	6,777	U	1.35e-08	7.24e-06	8.82e-06	8.58e-06	2.01e-05	4.47e-05	6.48e-05
Clark County	320030017.03	7,054	U	1.19e-08	6.63e-06	8.62e-06	1.24e-05	2.02e-05	4.79e-05	6.24e-05
Clark County	320030017.04	6,219	U	1.23e-08	7.13e-06	9.06e-06	1.00e-05	2.02e-05	4.64e-05	7.75e-05
Clark County	320030017.05	5,850	U	1.25e-08	8.31e-06	9.28e-06	9.36e-06	2.00e-05	4.70e-05	7.79e-05
Clark County	320030018.01	5,154	U	1.53e-08	8.78e-06	9.30e-06	7.82e-06	2.00e-05	4.59e-05	7.57e-05
Clark County	320030018.02	5,410	U	1.40e-08	8.44e-06	8.48e-06	8.11e-06	2.01e-05	4.52e-05	7.22e-05
Clark County	320030019.00	8,151	U	2.18e-08	1.06e-05	9.78e-06	8.60e-06	2.00e-05	4.90e-05	8.54e-05
Clark County	320030020.00	3,851	U	2.24e-08	1.11e-05	7.96e-06	8.21e-06	2.01e-05	4.74e-05	7.88e-05
Clark County	320030022.01	3,480	U	2.15e-08	6.34e-06	7.47e-06	4.20e-06	1.99e-05	3.80e-05	7.05e-05
Clark County	320030022.02	13,850	U	2.11e-08	8.36e-06	9.15e-06	5.02e-06	2.02e-05	4.27e-05	7.99e-05
Clark County	320030023.00	3,993	U	2.20e-08	6.89e-06	6.52e-06	6.91e-06	2.01e-05	4.05e-05	5.98e-05
Clark County	320030024.01	10,147	U	2.33e-08	1.80e-05	1.36e-05	1.36e-05	2.01e-05	6.54e-05	1.28e-04

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	Tract ID	1990 Population	Urban or Rural	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	Total
Clark County	320030024.02	5,958	U	2.36e-08	1.51e-05	1.18e-05	1.41e-05	2.02e-05	6.13e-05	1.23e-04
Clark County	320030025.01	4,001	U	1.38e-08	8.84e-06	8.00e-06	1.03e-05	2.00e-05	4.72e-05	7.04e-05
Clark County	320030025.02	8,041	U	1.23e-08	8.25e-06	8.95e-06	1.46e-05	2.01e-05	5.19e-05	7.48e-05
Clark County	320030026.00	10,914	U	2.25e-08	7.63e-06	8.08e-06	1.56e-05	2.02e-05	5.15e-05	7.37e-05
Clark County	320030027.01	9,538	U	1.25e-08	6.64e-06	8.59e-06	2.56e-05	2.01e-05	6.10e-05	7.16e-05
Clark County	320030027.02	5,460	U	2.18e-08	3.83e-06	5.87e-06	3.63e-05	2.01e-05	6.61e-05	4.64e-05
Clark County	320030028.03	8,628	U	1.10e-08	2.93e-06	5.36e-06	6.06e-06	1.98e-05	3.42e-05	4.34e-05
Clark County	320030028.04	3,187	U	1.10e-08	1.87e-06	3.41e-06	2.91e-06	1.97e-05	2.79e-05	3.47e-05
Clark County	320030028.05	7,068	U	1.04e-08	4.28e-06	6.03e-06	1.46e-05	2.01e-05	4.50e-05	4.92e-05
Clark County	320030028.06	9,648	U	1.02e-08	5.51e-06	6.84e-06	1.02e-05	2.02e-05	4.27e-05	5.60e-05
Clark County	320030029.05	5,177	U	2.06e-08	4.75e-06	6.84e-06	3.25e-06	1.97e-05	3.46e-05	6.30e-05
Clark County	320030029.06	7,612	U	1.96e-08	3.22e-06	5.56e-06	2.51e-06	2.00e-05	3.13e-05	4.52e-05
Clark County	320030029.07	7,838	U	2.14e-08	4.43e-06	7.11e-06	3.04e-06	1.99e-05	3.45e-05	5.47e-05
Clark County	320030029.08	3,160	U	2.04e-08	5.41e-06	7.63e-06	3.54e-06	1.98e-05	3.64e-05	6.08e-05
Clark County	320030029.09	4,886	U	2.08e-08	6.03e-06	7.95e-06	3.78e-06	1.97e-05	3.75e-05	6.66e-05
Clark County	320030029.10	9,313	U	2.13e-08	4.02e-06	6.54e-06	3.05e-06	1.99e-05	3.35e-05	4.60e-05
Clark County	320030029.11	7,342	U	2.23e-08	8.11e-06	9.57e-06	4.60e-06	1.99e-05	4.22e-05	7.76e-05
Clark County	320030029.12	6,926	U	2.18e-08	7.90e-06	8.78e-06	4.57e-06	2.00e-05	4.13e-05	6.70e-05
Clark County	320030029.13	10,977	U	1.99e-08	5.92e-06	6.75e-06	3.87e-06	2.00e-05	3.66e-05	5.65e-05
Clark County	320030029.14	9,474	U	1.97e-08	2.46e-06	4.54e-06	2.42e-06	1.99e-05	2.93e-05	3.93e-05
Clark County	320030030.01	3,937	U	2.14e-08	7.02e-06	9.07e-06	4.66e-06	2.00e-05	4.08e-05	8.63e-05
Clark County	320030030.02	11,237	U	2.21e-08	5.58e-06	8.20e-06	3.96e-06	2.00e-05	3.77e-05	6.69e-05
Clark County	320030031.00	7,461	U	2.42e-08	6.30e-06	8.62e-06	4.32e-06	1.99e-05	3.91e-05	6.93e-05
Clark County	320030032.01	3,007	U	2.90e-08	2.15e-06	4.89e-06	2.05e-06	2.01e-05	2.93e-05	3.59e-05
Clark County	320030032.02	10,618	U	2.00e-08	2.25e-06	4.05e-06	2.27e-06	2.00e-05	2.86e-05	3.64e-05

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	Tract ID	1990 Population	Urban or Rural	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	Total
Clark County	320030033.00	4,424	U	3.85e-08	2.46e-06	5.73e-06	2.60e-06	1.99e-05	3.07e-05	3.83e-05
Clark County	320030034.01	8,062	U	3.23e-08	6.61e-06	8.50e-06	4.70e-06	1.99e-05	3.98e-05	1.14e-04
Clark County	320030034.03	8,788	U	3.22e-08	3.41e-06	6.37e-06	2.93e-06	2.02e-05	3.29e-05	4.96e-05
Clark County	320030034.04	5,709	U	3.30e-08	3.94e-06	7.26e-06	3.37e-06	2.01e-05	3.47e-05	4.86e-05
Clark County	320030034.05	9,530	U	3.15e-08	4.32e-06	6.65e-06	3.69e-06	1.98e-05	3.44e-05	5.44e-05
Clark County	320030034.06	9,718	U	2.47e-08	5.41e-06	7.53e-06	3.91e-06	2.00e-05	3.69e-05	6.22e-05
Clark County	320030034.07	7,221	U	3.26e-08	5.89e-06	8.69e-06	4.00e-06	1.98e-05	3.85e-05	6.93e-05
Clark County	320030035.00	2,405	U	3.85e-08	1.04e-05	1.32e-05	7.08e-06	2.01e-05	5.08e-05	1.07e-04
Clark County	320030036.01	2,682	U	3.12e-08	2.91e-06	5.32e-06	2.88e-06	2.01e-05	3.12e-05	3.95e-05
Clark County	320030036.02	4,065	U	3.39e-08	4.84e-06	7.23e-06	4.30e-06	2.02e-05	3.66e-05	5.44e-05
Clark County	320030037.00	3,223	U	3.75e-08	6.67e-06	9.92e-06	5.48e-06	2.01e-05	4.22e-05	7.26e-05
Clark County	320030038.00	3,865	U	3.09e-08	1.28e-05	1.22e-05	7.20e-06	1.99e-05	5.22e-05	2.39e-04
Clark County	320030039.97	54	U	2.55e-08	1.05e-05	1.02e-05	5.64e-06	1.71e-05	4.34e-05	2.39e-04
Clark County	320030039.98	953	U	2.90e-08	1.31e-05	1.24e-05	6.97e-06	2.00e-05	5.24e-05	1.49e-04
Clark County	320030040.00	2,674	U	2.86e-08	1.28e-05	1.17e-05	6.69e-06	2.02e-05	5.14e-05	1.13e-04
Clark County	320030041.00	4,565	U	2.70e-08	1.14e-05	1.26e-05	6.95e-06	2.02e-05	5.12e-05	1.10e-04
Clark County	320030042.00	4,674	U	2.74e-08	1.09e-05	1.08e-05	6.41e-06	2.01e-05	4.83e-05	1.40e-04
Clark County	320030043.00	5,638	U	3.07e-08	1.26e-05	1.22e-05	7.29e-06	1.99e-05	5.21e-05	1.67e-04
Clark County	320030044.00	5,611	U	2.29e-08	1.01e-05	1.11e-05	6.29e-06	2.00e-05	4.76e-05	9.62e-05
Clark County	320030045.00	4,134	U	2.34e-08	1.04e-05	1.15e-05	6.78e-06	2.01e-05	4.88e-05	1.07e-04
Clark County	320030046.00	6,024	U	3.03e-08	7.02e-06	8.05e-06	4.69e-06	1.99e-05	3.97e-05	6.65e-05
Clark County	320030047.02	10,494	U	2.53e-08	8.85e-06	9.54e-06	5.62e-06	2.00e-05	4.41e-05	1.35e-04
Clark County	320030047.03	3,953	U	3.12e-08	1.22e-05	1.05e-05	5.89e-06	2.01e-05	4.87e-05	1.05e-04
Clark County	320030047.04	5,891	U	2.85e-08	7.27e-06	8.47e-06	4.42e-06	2.00e-05	4.02e-05	6.52e-05
Clark County	320030047.05	5,393	U	2.76e-08	7.99e-06	8.74e-06	4.96e-06	2.01e-05	4.18e-05	7.16e-05

County	Tract ID	1990 Population	Urban or Rural	1996 National Air Toxics Assessment: Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	1990 Cumulative Exposure Project: Total
Clark County	320030047.06	6,480	U	2.94e-08	1.01e-05	9.05e-06	4.81e-06	2.01e-05	4.41e-05	7.92e-05
Clark County	320030048.97	4,765	U	2.57e-08	7.26e-06	7.71e-06	4.47e-06	2.02e-05	3.97e-05	5.89e-05
Clark County	320030048.98	8,377	U	2.91e-08	7.00e-06	6.31e-06	3.27e-06	2.00e-05	3.66e-05	5.98e-05
Clark County	320030049.01	9,437	U	2.44e-08	7.01e-06	8.06e-06	4.55e-06	2.01e-05	3.97e-05	5.84e-05
Clark County	320030049.02	8,248	U	2.32e-08	8.29e-06	9.62e-06	5.68e-06	2.02e-05	4.38e-05	6.93e-05
Clark County	320030049.03	8,709	U	2.17e-08	7.88e-06	7.98e-06	5.99e-06	2.02e-05	4.20e-05	5.72e-05
Clark County	320030050.01	9,365	U	1.99e-08	6.86e-06	7.35e-06	6.92e-06	2.00e-05	4.11e-05	5.44e-05
Clark County	320030050.02	6,141	U	1.14e-08	7.41e-06	6.89e-06	8.22e-06	2.02e-05	4.28e-05	5.90e-05
Clark County	320030051.00	19,422	U	1.00e-08	5.76e-06	6.33e-06	5.42e-06	1.99e-05	3.74e-05	4.82e-05
Clark County	320030052.00	3,813	U	1.58e-08	2.08e-05	6.11e-06	3.21e-06	2.03e-05	5.04e-05	9.28e-05
Clark County	320030053.01	8,451	U	1.02e-08	3.41e-06	4.73e-06	3.68e-06	2.00e-05	3.18e-05	3.99e-05
Clark County	320030053.02	10,518	U	1.34e-08	2.62e-06	3.58e-06	2.40e-06	1.96e-05	2.82e-05	3.64e-05
Clark County	320030054.01	6,879	U	8.83e-09	8.53e-06	4.40e-06	4.23e-06	2.00e-05	3.72e-05	4.39e-05
Clark County	320030054.02	10,972	U	1.61e-08	1.01e-05	7.77e-06	4.54e-06	2.00e-05	4.24e-05	7.34e-05
Clark County	320030054.03	3,479	U	1.51e-08	2.94e-06	3.83e-06	2.38e-06	2.01e-05	2.93e-05	3.62e-05
Clark County	320030055.01	2,497	U	1.59e-08	1.36e-06	2.94e-06	1.36e-06	1.98e-05	2.55e-05	3.64e-05
Clark County	320030055.02	3,880	U	2.01e-08	8.71e-06	5.56e-06	2.53e-06	2.00e-05	3.68e-05	2.07e-04
Clark County	320030055.03	3,218	U	1.77e-08	8.80e-06	5.55e-06	2.30e-06	2.00e-05	3.67e-05	2.08e-04
Clark County	320030055.04	2,974	U	1.73e-08	4.01e-06	4.71e-06	2.14e-06	1.99e-05	3.08e-05	6.43e-05
Clark County	320030056.01	4,566	U	2.29e-08	4.60e-06	5.22e-06	3.48e-06	2.00e-05	3.33e-05	4.45e-05
Clark County	320030056.02	4,740	U	1.60e-07	5.48e-07	1.73e-06	1.67e-06	2.00e-05	2.41e-05	3.36e-05
Clark County	320030056.03	2,652	U	5.99e-08	2.31e-07	1.09e-06	7.64e-07	1.97e-05	2.18e-05	2.93e-05
Clark County	320030057.00	6,734	U	1.45e-07	4.82e-07	1.37e-06	6.13e-07	1.98e-05	2.24e-05	4.01e-04
Clark County	320030058.97	15,120	U	1.70e-08	2.89e-06	4.50e-06	2.20e-06	2.00e-05	2.96e-05	4.59e-05
Clark County	320030058.98	5,995	U	1.61e-08	7.88e-07	1.68e-06	8.72e-07	2.00e-05	2.34e-05	2.91e-05

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	**Tract ID**	**1990 Population**	**Urban or Rural**	**Major**	**Area and Other**	**Onroad Mobile**	**Nonroad Mobile**	**Estimated Background**	**Total**	**Total**
Clark County	320030059.00	1,290	U	1.41e-07	1.18e-06	2.15e-06	1.94e-06	2.01e-05	2.55e-05	3.35e-05
Douglas County	320050001.00	7,129	R	8.38e-09	4.72e-06	4.83e-06	8.11e-07	2.00e-05	3.04e-05	3.66e-05
Douglas County	320050002.98	4,168	R	6.71e-09	4.63e-06	6.02e-06	1.53e-06	2.00e-05	3.22e-05	4.42e-05
Douglas County	320050003.00	3,631	R	1.64e-09	6.97e-06	4.55e-06	8.69e-07	2.01e-05	3.25e-05	4.67e-05
Douglas County	320050004.00	2,475	R	1.65e-09	7.56e-06	5.84e-06	9.18e-07	2.02e-05	3.45e-05	4.94e-05
Douglas County	320050005.00	8,775	R	2.67e-09	6.19e-06	5.49e-06	8.17e-07	2.01e-05	3.26e-05	4.40e-05
Douglas County	320050006.00	1,459	R	9.89e-10	4.08e-06	2.56e-06	3.98e-07	1.99e-05	2.70e-05	3.36e-05
Elko County	320079501.00	1,092	U	0.00e+00	1.61e-06	2.52e-07	3.64e-08	2.01e-05	2.20e-05	2.75e-05
Elko County	320079502.00	1,980	U	0.00e+00	6.54e-07	2.17e-07	1.16e-08	2.00e-05	2.08e-05	2.69e-05
Elko County	320079503.00	132	U	0.00e+00	1.20e-06	7.31e-07	1.35e-07	1.45e-05	1.66e-05	2.71e-05
Elko County	320079504.00	201	U	0.00e+00	1.28e-06	3.29e-07	1.41e-07	2.01e-05	2.19e-05	2.74e-05
Elko County	320079505.00	1,032	U	0.00e+00	1.19e-07	1.01e-07	1.28e-08	2.01e-05	2.03e-05	2.69e-05
Elko County	320079506.00	90	U	0.00e+00	1.44e-07	8.10e-08	6.94e-08	1.54e-05	1.56e-05	2.71e-05
Elko County	320079507.00	5,871	U	0.00e+00	2.81e-06	1.59e-06	2.45e-07	1.97e-05	2.44e-05	2.97e-05
Elko County	320079508.00	1,884	U	0.00e+00	1.40e-05	1.02e-05	1.36e-06	2.01e-05	4.55e-05	1.52e-04
Elko County	320079509.00	2,215	U	7.09e-11	1.07e-05	7.95e-06	1.21e-06	2.01e-05	3.99e-05	7.28e-05
Elko County	320079510.00	1,666	U	0.00e+00	1.24e-05	1.00e-05	1.50e-06	2.02e-05	4.41e-05	7.51e-05
Elko County	320079511.00	279	U	0.00e+00	2.57e-06	1.47e-06	1.87e-07	1.97e-05	2.40e-05	2.90e-05
Elko County	320079512.00	3,773	U	0.00e+00	3.24e-06	1.72e-06	2.63e-07	2.00e-05	2.52e-05	2.91e-05
Elko County	320079513.00	2,671	U	8.41e-11	6.83e-06	4.59e-06	7.15e-07	2.01e-05	3.23e-05	5.11e-05
Elko County	320079514.00	6,031	U	0.00e+00	2.53e-06	1.36e-06	1.92e-07	1.98e-05	2.39e-05	2.93e-05
Elko County	320079515.00	2,297	U	0.00e+00	9.42e-07	1.87e-07	1.93e-08	2.03e-05	2.15e-05	2.69e-05
Elko County	320079516.00	2,314	U	0.00e+00	1.25e-06	4.80e-07	5.72e-08	2.00e-05	2.18e-05	2.76e-05
Esmeralda County	320099501.00	672	R	0.00e+00	9.23e-08	2.67e-08	1.04e-08	2.03e-05	2.05e-05	2.69e-05
Esmeralda County	320099502.00	672	R	0.00e+00	3.48e-07	5.17e-08	5.80e-09	2.04e-05	2.08e-05	2.70e-05

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	**Tract ID**	**1990 Population**	**Urban or Rural**	**Major**	**Area and Other**	**Onroad Mobile**	**Nonroad Mobile**	**Estimated Background**	**Total**	**Total**
Eureka County	320119601.00	59	R	2.71e-10	6.82e-08	5.66e-08	6.11e-09	1.71e-05	1.72e-05	2.69e-05
Eureka County	320119602.00	376	R	1.71e-10	3.26e-07	1.21e-07	1.29e-08	2.02e-05	2.07e-05	2.69e-05
Eureka County	320119603.00	452	R	0.00e+00	3.97e-07	6.06e-08	5.34e-09	2.01e-05	2.06e-05	2.69e-05
Eureka County	320119604.00	660	R	0.00e+00	4.21e-07	6.05e-08	4.44e-09	2.01e-05	2.05e-05	2.69e-05
Humboldt County	320139601.00	1,206	U	0.00e+00	1.07e-07	1.25e-07	5.07e-09	2.02e-05	2.05e-05	2.69e-05
Humboldt County	320139602.00	255	U	0.00e+00	9.91e-08	1.12e-07	7.75e-09	2.00e-05	2.03e-05	2.69e-05
Humboldt County	320139603.00	12	U	0.00e+00	7.81e-08	7.87e-08	4.02e-08	1.58e-05	1.59e-05	2.71e-05
Humboldt County	320139605.00	3,902	U	0.00e+00	3.95e-07	4.01e-07	2.04e-08	2.02e-05	2.11e-05	2.81e-05
Humboldt County	320139606.00	2,068	U	9.12e-09	3.95e-07	3.98e-07	1.95e-08	2.02e-05	2.10e-05	2.81e-05
Humboldt County	320139607.00	5,400	U	8.61e-09	3.90e-07	3.87e-07	2.10e-08	1.99e-05	2.08e-05	2.81e-05
Lander County	320159701.98	5,281	R	1.60e-08	9.73e-08	9.04e-08	1.01e-08	2.01e-05	2.03e-05	2.71e-05
Lander County	320159702.00	720	R	2.95e-09	3.67e-07	1.04e-07	1.85e-08	2.02e-05	2.07e-05	2.70e-05
Lander County	320159703.00	267	R	0.00e+00	4.03e-07	1.04e-07	2.03e-08	2.01e-05	2.06e-05	2.70e-05
Lincoln County	320179501.00	1,655	R	0.00e+00	1.84e-06	1.21e-07	7.80e-09	2.03e-05	2.23e-05	2.70e-05
Lincoln County	320179502.00	70	R	0.00e+00	5.51e-07	6.71e-08	6.22e-09	1.86e-05	1.92e-05	2.70e-05
Lincoln County	320179503.00	904	R	0.00e+00	2.28e-07	5.38e-08	4.83e-09	2.00e-05	2.03e-05	2.69e-05
Lincoln County	320179504.00	1,146	R	0.00e+00	1.82e-06	1.19e-07	7.99e-09	2.01e-05	2.20e-05	2.70e-05
Lyon County	320199601.00	5,170	R	4.21e-08	1.17e-06	6.04e-06	9.87e-07	1.98e-05	2.81e-05	4.11e-05
Lyon County	320199602.00	3,270	R	1.37e-08	6.07e-07	2.26e-06	5.05e-07	1.96e-05	2.30e-05	3.04e-05
Lyon County	320199603.00	4,398	R	2.38e-07	2.82e-06	4.13e-06	8.61e-07	1.99e-05	2.80e-05	3.61e-05
Lyon County	320199604.00	4,626	R	4.06e-09	1.10e-06	2.58e-06	3.78e-07	2.01e-05	2.42e-05	3.17e-05
Lyon County	320199605.00	1,101	R	4.33e-09	1.69e-06	1.28e-06	2.07e-07	2.00e-05	2.32e-05	2.84e-05
Lyon County	320199606.00	1,436	R	5.58e-09	1.39e-06	2.94e-06	4.15e-07	2.00e-05	2.48e-05	3.19e-05
Mineral County	320219701.00	2,492	R	9.22e-11	3.22e-07	2.66e-07	9.19e-08	2.01e-05	2.08e-05	2.79e-05
Mineral County	320219702.00	1,888	R	0.00e+00	3.12e-07	1.43e-07	6.54e-08	2.02e-05	2.07e-05	2.79e-05

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	**Tract ID**	**1990 Population**	**Urban or Rural**	**Major**	**Area and Other**	**Onroad Mobile**	**Nonroad Mobile**	**Estimated Background**	**Total**	**Total**
Mineral County	320219703.00	2,094	R	0.00e+00	3.16e-07	1.41e-07	6.58e-08	2.02e-05	2.07e-05	2.79e-05
Nye County	320239801.00	2,982	U	0.00e+00	6.95e-07	5.62e-08	1.47e-08	2.01e-05	2.09e-05	2.70e-05
Nye County	320239802.00	3,786	U	0.00e+00	3.43e-07	5.15e-08	5.65e-09	2.02e-05	2.06e-05	2.70e-05
Nye County	320239803.00	2,386	U	0.00e+00	2.49e-08	2.52e-08	5.03e-09	2.01e-05	2.01e-05	5.41e-05
Nye County	320239804.00	7,509	U	8.00e-10	2.43e-07	3.72e-07	4.22e-07	1.95e-05	2.05e-05	2.79e-05
Nye County	320239805.00	1,119	U	0.00e+00	1.31e-07	2.70e-08	9.80e-09	1.52e-05	1.53e-05	2.69e-05
Pershing County	320279801.00	4,336	R	0.00e+00	1.76e-07	2.16e-07	3.11e-08	2.02e-05	2.06e-05	2.73e-05
Storey County	320299701.00	2,527	R	2.51e-07	2.70e-06	7.13e-06	1.58e-06	2.00e-05	3.17e-05	3.71e-05
Washoe County	320310001.00	5,111	U	2.35e-08	9.30e-06	1.90e-05	3.85e-06	2.01e-05	5.23e-05	1.66e-04
Washoe County	320310002.00	5,358	U	2.62e-08	1.79e-05	3.00e-05	6.47e-06	2.00e-05	7.44e-05	1.79e-04
Washoe County	320310003.00	3,734	U	2.31e-08	8.84e-06	1.92e-05	4.28e-06	2.01e-05	5.24e-05	1.18e-04
Washoe County	320310004.00	4,898	U	2.72e-08	9.34e-06	2.15e-05	4.67e-06	2.00e-05	5.55e-05	1.23e-04
Washoe County	320310007.00	5,526	U	2.65e-08	1.62e-05	2.51e-05	5.35e-06	2.01e-05	6.67e-05	1.34e-04
Washoe County	320310009.00	3,779	U	2.52e-08	1.48e-05	2.17e-05	5.56e-06	2.01e-05	6.22e-05	1.48e-04
Washoe County	320310010.02	6,295	U	2.75e-08	4.46e-06	1.16e-05	2.61e-06	2.00e-05	3.87e-05	4.62e-05
Washoe County	320310010.03	5,834	U	2.29e-08	5.66e-06	1.31e-05	3.11e-06	1.99e-05	4.18e-05	6.69e-05
Washoe County	320310010.04	6,615	U	2.40e-08	1.68e-05	2.46e-05	6.46e-06	2.00e-05	6.79e-05	1.56e-04
Washoe County	320310010.05	3,001	U	2.48e-08	9.61e-06	1.90e-05	4.31e-06	2.00e-05	5.29e-05	1.01e-04
Washoe County	320310011.01	3,258	U	2.62e-08	9.47e-06	2.03e-05	4.48e-06	2.00e-05	5.43e-05	1.23e-04
Washoe County	320310011.02	7,140	U	2.48e-08	4.88e-06	1.27e-05	2.97e-06	2.00e-05	4.05e-05	1.08e-04
Washoe County	320310011.03	1,918	U	2.45e-08	3.95e-06	1.16e-05	2.76e-06	2.01e-05	3.84e-05	5.31e-05
Washoe County	320310012.00	3,240	U	2.60e-08	7.34e-06	1.64e-05	3.76e-06	2.00e-05	4.75e-05	8.38e-05
Washoe County	320310013.00	3,951	U	2.65e-08	1.04e-05	2.13e-05	4.74e-06	2.00e-05	5.64e-05	1.26e-04
Washoe County	320310014.00	2,970	U	2.27e-08	1.10e-05	2.17e-05	4.73e-06	2.01e-05	5.75e-05	1.65e-04
Washoe County	320310015.00	7,111	U	2.33e-08	8.79e-06	1.56e-05	3.45e-06	1.99e-05	4.78e-05	8.79e-05

County	Tract ID	1990 Population	Urban or Rural	1996 National Air Toxics Assessment: Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	1990 Cumulative Exposure Project: Total
Washoe County	320310017.00	7,258	U	2.75e-08	1.09e-05	2.07e-05	5.13e-06	2.00e-05	5.68e-05	1.04e-04
Washoe County	320310018.00	6,133	U	2.66e-08	1.42e-05	2.31e-05	5.63e-06	2.00e-05	6.30e-05	1.32e-04
Washoe County	320310019.00	8,678	U	3.10e-08	1.55e-05	2.36e-05	6.70e-06	2.00e-05	6.59e-05	1.49e-04
Washoe County	320310021.01	1,678	U	2.74e-08	9.04e-06	1.45e-05	3.76e-06	2.00e-05	4.73e-05	7.12e-05
Washoe County	320310021.02	10,914	U	3.15e-08	6.40e-06	1.51e-05	3.73e-06	1.99e-05	4.51e-05	5.87e-05
Washoe County	320310022.02	1,454	U	2.15e-07	4.38e-06	1.12e-05	2.34e-06	2.01e-05	3.82e-05	4.53e-05
Washoe County	320310022.03	6,942	U	2.67e-08	9.34e-06	1.87e-05	5.63e-06	2.01e-05	5.37e-05	1.13e-04
Washoe County	320310022.04	4,724	U	2.68e-08	7.94e-06	1.58e-05	3.97e-06	1.99e-05	4.77e-05	8.74e-05
Washoe County	320310022.05	3,963	U	2.96e-08	5.59e-06	1.49e-05	3.55e-06	2.00e-05	4.42e-05	5.63e-05
Washoe County	320310023.00	2,507	U	1.96e-08	2.88e-06	7.45e-06	1.94e-06	2.00e-05	3.23e-05	3.78e-05
Washoe County	320310024.01	7,098	U	2.52e-08	6.41e-06	1.64e-05	3.77e-06	2.01e-05	4.66e-05	9.14e-05
Washoe County	320310024.02	5,084	U	2.39e-08	4.27e-06	1.12e-05	2.69e-06	1.97e-05	3.80e-05	5.31e-05
Washoe County	320310025.00	3,981	U	2.66e-08	6.82e-06	1.66e-05	3.58e-06	1.98e-05	4.68e-05	8.22e-05
Washoe County	320310026.01	8,522	U	2.23e-08	6.78e-06	1.69e-05	2.88e-06	2.00e-05	4.66e-05	6.21e-05
Washoe County	320310026.03	8,672	U	2.02e-08	5.15e-06	1.40e-05	2.59e-06	2.00e-05	4.18e-05	5.33e-05
Washoe County	320310026.04	7,797	U	2.72e-08	5.40e-06	1.36e-05	2.62e-06	1.98e-05	4.14e-05	5.31e-05
Washoe County	320310027.01	7,865	U	3.30e-08	7.77e-06	1.73e-05	3.81e-06	2.01e-05	4.90e-05	5.88e-05
Washoe County	320310027.02	4,582	U	3.17e-08	9.45e-06	2.05e-05	4.62e-06	2.00e-05	5.46e-05	7.50e-05
Washoe County	320310028.00	8,388	U	3.23e-08	1.17e-05	2.18e-05	5.76e-06	2.01e-05	5.93e-05	1.16e-04
Washoe County	320310029.01	3,795	U	3.90e-08	1.22e-05	2.41e-05	5.95e-06	1.98e-05	6.20e-05	1.18e-04
Washoe County	320310029.02	4,161	U	3.94e-08	1.54e-05	2.44e-05	5.81e-06	2.00e-05	6.56e-05	1.28e-04
Washoe County	320310030.00	6,259	U	3.94e-08	1.97e-05	2.32e-05	5.72e-06	2.01e-05	6.88e-05	1.40e-04
Washoe County	320310031.01	3,107	U	4.34e-08	8.57e-06	1.40e-05	3.38e-06	2.00e-05	4.60e-05	6.58e-05
Washoe County	320310031.03	7,823	U	4.88e-08	1.01e-05	1.81e-05	4.15e-06	1.99e-05	5.24e-05	9.50e-05
Washoe County	320310031.05	1,814	U	4.58e-08	1.31e-05	2.16e-05	5.01e-06	2.01e-05	5.99e-05	1.04e-04

				1996 National Air Toxics Assessment						1990 Cumulative Exposure Project
County	Tract ID	1990 Population	Urban or Rural	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	Total	Total
Washoe County	320310031.06	7,873	U	4.53e-08	1.25e-05	2.34e-05	5.52e-06	2.00e-05	6.15e-05	1.27e-04
Washoe County	320310032.98	8,659	U	2.81e-08	4.66e-06	8.74e-06	2.12e-06	2.00e-05	3.56e-05	3.93e-05
Washoe County	320310033.01	446	U	2.98e-08	2.46e-05	1.84e-05	5.63e-06	2.03e-05	6.89e-05	1.34e-04
Washoe County	320310033.02	3,127	U	1.07e-08	1.14e-05	8.44e-06	1.58e-06	1.99e-05	4.14e-05	6.45e-05
Washoe County	320310033.04	4,367	U	1.02e-08	9.03e-06	7.08e-06	1.28e-06	2.00e-05	3.74e-05	4.61e-05
Washoe County	320310034.98	7,259	U	6.07e-08	1.39e-06	4.66e-06	1.10e-06	2.02e-05	2.74e-05	3.20e-05
White Pine County	320339701.00	2,309	R	0.00e+00	1.22e-06	1.92e-07	3.26e-08	2.01e-05	2.16e-05	2.75e-05
White Pine County	320339702.00	4,336	R	0.00e+00	1.34e-06	1.90e-07	2.87e-08	2.01e-05	2.16e-05	2.80e-05
White Pine County	320339703.00	2,617	R	0.00e+00	9.31e-06	4.53e-07	1.17e-07	2.01e-05	3.00e-05	3.22e-05
Carson City	325100001.00	466	U	1.22e-08	1.23e-04	1.13e-05	4.39e-06	2.02e-05	1.59e-04	1.99e-04
Carson City	325100002.00	5,578	U	1.23e-08	1.33e-05	7.70e-06	3.80e-06	2.01e-05	4.49e-05	8.84e-05
Carson City	325100003.00	2,298	U	1.25e-08	6.81e-06	5.25e-06	2.68e-06	2.03e-05	3.50e-05	4.42e-05
Carson City	325100004.00	3,385	U	1.37e-08	1.22e-05	6.03e-06	3.20e-06	1.99e-05	4.14e-05	4.95e-05
Carson City	325100005.00	5,380	U	1.32e-08	2.54e-05	7.78e-06	3.89e-06	2.00e-05	5.71e-05	8.20e-05
Carson City	325100006.00	5,524	U	1.26e-08	1.66e-05	6.90e-06	3.29e-06	2.00e-05	4.68e-05	6.65e-05
Carson City	325100007.00	5,300	U	1.14e-08	2.96e-05	8.08e-06	3.96e-06	2.00e-05	6.16e-05	9.32e-05
Carson City	325100008.00	3,202	U	1.07e-08	7.81e-06	7.21e-06	2.67e-06	2.01e-05	3.78e-05	4.84e-05
Carson City	325100009.00	4,790	U	1.48e-08	1.11e-05	7.62e-06	3.73e-06	2.00e-05	4.25e-05	8.22e-05
Carson City	325100010.00	4,520	U	1.51e-08	7.23e-06	5.50e-06	2.65e-06	2.00e-05	3.54e-05	4.36e-05