sierra research

SR2011-01-03

Screening Health Risk Assessment
Sublette County, Wyoming

prepared for:

Sublette County Commissioners
Wyoming Department of Environmental Quality
Wyoming Department of Health

January 2011

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95811
(916) 444-6666

SR2011-01-03

Screening Health Risk Assessment
Sublette County, Wyoming

prepared for:

Sublette County Commissioners
Wyoming Department of Environmental Quality
Wyoming Department of Health

January 2011

Principal author:

Eric Walther

Sierra Research, Inc.
1801 J Street
Sacramento, CA 95811
(916) 444-6666

Screening Health Risk Assessment
Sublette County, Wyoming

Table of Contents

List of Figures

List of Tables

GLOSSARY

Acute health impact: an adverse short-term (1 hour to 24 hours) health impact

AEGL: Acute Exposure Guideline Level, defined by the National Advisory Committee for Acute Exposure Guidelines Levels for Hazardous Substances based on length of exposure and severity of potential health effects

- *AEGL-1 (8 hour):* Concentration determined to potentially cause mild health effects over a period of 8 hours
- *AEGL-2 (8 hour):* Concentration determined to potentially cause moderate health effects over a period of 8 hours
- *AEGL-1 (1 hour):* Concentration determined to potentially cause mild health effects over a period of 1 hour
- *AEGL-2 (1 hour):* Concentration determined to potentially cause moderate health effects over a period of 1 hour

Air toxics: Alternate terminology for toxic air contaminants

Ambient air: Outside air near ground level inhaled by people

Area Source: Stationary source of emissions, with emission rates below Major Source thresholds

Arithmetic mean: The sum of a set of values of some variable divided by the number of values

ARS: Air Resource Specialists, Inc., the firm that managed the monitoring program for the project

ATL: Air Toxics, Ltd., the laboratory that analyzed the collected air samples

Background: Air toxics concentration or level of health impact from "natural sources, persistence in the environment of past years' emissions and long-range transport from distant sources"[*]

BARG: Bargerville station monitoring ozone, air toxics and meteorology

BISA: Big Sandy station monitoring air toxics and meteorology

BMP: Best management practice

BOUL: Boulder station monitoring air toxics and meteorology

BOND: Bondurant station monitoring air toxics and meteorology

CAST: Station monitoring air toxics and meteorology in EPA's Clean Air Status and Trends Network (CASTNet)

Chronic health impact: An adverse long-term (e.g., one-year) health impact

Coefficient of Variation (CV): As used in this report, the coefficient of variation is a measure of the difference between two data sets. A larger number indicates a greater degree of difference between the two data sets. For this report, a coefficient of variation of 25% or less indicates good correlation between the data sets.

Collocated: Located next to, usually to provide a quality assurance check

DANI: Daniel station monitoring air toxics and meteorology

[*] EPA. "National Air Toxics Assessment Glossary", http://www.epa.gov/ttn/atw/nata2002/gloss.html.

De minimis: Small enough to be considered inconsequential or insignificant

Degrees of freedom: Statistical term referring to the number of values in the final calculation of a statistic that are free to vary

DEQ: Wyoming Department of Environmental Quality

Detectable concentration: Lowest concentration at which an analytical instrument gives some indication as to the presence of the compound

DOE: U.S. Department of Energy

DOH: Wyoming Department of Health

EPA: U.S. Environmental Protection Agency

ERPG: Emergency Response Planning Guideline for maximum airborne concentration, set by the American Industrial Hygiene Association based on exposure level and potential health effects

- *ERPG-1*: Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient health effects or perceiving a clearly defined objectionable odor
- *ERPG-2*: Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action

Excess cancer risk: Potential cancer risk from exposure to specified TAC concentrations, and above the cancer risk already experienced by individuals at the specified location

FARS: Farson-Eden station monitoring ozone, air toxics and meteorology

HAP: Hazardous air pollutant as defined and listed by EPA[*]

HHI: Health hazard index, which is the sum of health hazard quotients

Health hazard quotient: Concentration of an air toxic divided by its Reference Concentration

HRA: Health risk assessment

IDLH: Immediately Dangerous to Life and Health concentration as determined by the National Institute for Occupational Safety and Health

LAB1: La Barge #1 station monitoring ozone, air toxics and meteorology

LAB2: La Barge #2 station monitoring air toxics and meteorology

LINN: Marbleton Easts station monitoring air toxics and meteorology

Major Source: Stationary source whose emissions of either a criteria pollutant or an air toxic are higher than specified "Major Source" emission levels

MARB: Marbleton/Big Piney station monitoring ozone, air toxics and meteorology

MRL: Acute Minimum Risk Level is a concentration defined by the U.S. Agency for Toxic Substances and Disease Registry at or below which the substance is unlikely to pose a measurable risk of harmful non-cancer health effects

Method TO-11: EPA reference method for the measurement of formaldehyde and other carbonyl compounds in air, collected with adsorbent cartridges and analyzed with high performance liquid chromatography to separate the collected aldehydes and ketones from each other and quantify their concentrations

[*] U.S. EPA, http://www.epa.gov/ttn/atw/188polls.html.

Method TO-15: EPA reference method for the measurement of volatile organic compounds (VOCs) in air collected with Summa canisters and analyzed with gas chromatography/mass spectrometry to separate the collected compounds from each other and quantify their concentrations

NAAQS: National Ambient Air Quality Standards

NATA: National Air Toxics Assessment program of the USEPA

NATTS: National Air Toxics Trends Station(s)

NIOSH: National Institute for Occupational Safety and Health

Non-detect: A value that is less than the detectable concentration

Non-road equipment: Bulldozers, scrapers, front-end loaders, and other equipment designed to be operated off public roads

NO: Nitric oxide

NO_2: Nitrogen dioxide

NOx: Nitrogen oxides, the combined sum of nitrogen dioxide (NO_2) and nitric oxide (NO)

O_3: Ozone, a criteria air pollutant that causes irritation of the respiratory tract

OEHHA: State of California Office of Environmental Health Hazard Assessment

On-road vehicles: Cars, trucks, and other vehicles that are street legal and regularly use public roads

PAH: Polycyclic aromatic hydrocarbon, a class of carcinogenic chemicals generated by the combustion of fossil fuels

Percentile: Any one of the points dividing a distribution of values into parts each of which contain 1/100 of the values. For example, the 75th percentile is a value such that 75 percent of the values are less than or equal to it.[*]

PIN1: Pinedale #1 station monitoring air toxics and meteorology

PIN2: Pinedale #2 station monitoring air toxics and meteorology

POM: Polycyclic organic matter

ppbv: Parts per billion by volume, a measure (units) of concentration

Precursors: Air pollutants that react to form another air pollutant (e.g., NOx and volatile organic compounds [VOCs] are precursors of ozone)

PSD: Prevention of Significant Deterioration, a program of federal New Source Review regulations designed to protect areas that attain National Ambient Air Quality Standards

QAPP: Quality Assurance Project Plan, the document that describes how a project (e.g., monitoring network) will take specific actions to assure that the end product has the specified quality

QC: Quality control, the process by which all factors in some process (e.g., monitoring) are reviewed for quality

Reference Concentration (RfC): The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups which include children, asthmatics and the elderly) that is likely to be without an appreciable risk of deleterious effects during a lifetime.[†]

---

[*] EPA. "National Air Toxics Assessment Glossary", http://www.epa.gov/ttn/atw/nata2002/gloss.html

[†] Id.

REL: Reference Exposure Level is the concentration below which the California Office of Environmental Health Hazard Assessment has determined there would be no health effects (determined separately for acute and chronic health effects)

Reporting limit: Lowest concentration that can be quantified numerically

Risk: Probability that an adverse event will occur

SADR: Sand Draw station monitoring ozone, air toxics and meteorology

SCC: Sublette County Commissioners

Screening concentrations: Concentrations determined for individual toxic air contaminants (TACs) to separate lower de minimis concentrations from higher concentrations that merit inclusion in quantitative health risk assessment

Screening health risk assessment: An initial assessment of human health impacts that uses screening criteria and thresholds to determine what toxic air contaminants are present in sufficient concentrations to justify continuing their inclusion in more refined assessment

SLAMS: State or Local Air Monitoring Station

Sorbent cartridge: Length of glass tube filled with a granular or otherwise permeable medium that is coated with a specific chemical to adsorb the chemical compound(s) of interest

Standard deviation: a measure of the variability of a set of numerical values around the arithmetic mean of the set, defined by the equation $\sigma = (\Sigma(x_i - \mu)^2/n)^{0.5}$, for i=1 to i=n, where μ = arithmetic mean, n = number of values, and Σ means summation.

Stationary source: All stationary (i.e., non-moving) pollutant-emitting activities which belong to the same industrial grouping, are located on contiguous or adjacent properties, and are under common control

Summa canister: Stainless steel sphere designed to hold an air sample collected by vacuum, usually including a programmable entry flow control valve, and sometimes coated on the inside to eliminate retention of target molecules on the inside surface of the stainless steel

TAC: Toxic air contaminant

TEEL: Temporary Emergency Exposure Limit, as determined by the U.S. Department of Energy based on expected health effect

- *TEEL-0*: Concentration determined to cause no health effect
- *TEEL-1*: Concentration determined to potentially cause mild health effects

TIC: Tentatively Identified Compound

$\mu g/m^3$: Micrograms per cubic meter

UGWOS: Upper Green Winter Ozone Study

VOC: Volatile Organic Compound

WyDEQ: Wyoming Department of Environmental Quality

1.0 SUMMARY

The development of the natural gas extraction industry in Sublette County (see Figure 1-1) and monitoring observations of ambient ozone concentrations higher than 80 parts per billion measured by the Wyoming Department of Environmental Quality (WyDEQ)[5] during the winters of 2005 and 2006 have triggered public interest in whether air pollutant emissions from gas extraction activities pose any significant risk of adverse health effects. In response to this interest, the Sublette County Commissioners (SCC), Wyoming Department of Health (DOH) and the Wyoming Department of Environmental Quality (DEQ) contracted for an ambient monitoring study of ozone and toxic air contaminants (TACs) in the general vicinity of the natural gas extraction fields.

During the 14-month period from February 2009 through March 2010, the ambient concentrations of 51 TACs were measured at 12 monitoring sites in the study area (see Figure 1-2 and Table 1-1), and ozone was monitored at five sites (see Table 1-1). Air samples were collected over 24-hour periods every sixth day at each of the 12 sites, and transported to a laboratory for chemical analysis. At two of the 12 monitoring sites, Marbleton and Pinedale, a second, collocated sampling instrument also collected 24-hour air samples to provide a measure of variability and quality assurance.[6]

[5] WyDEQ. "Upper Green Winter Ozone Study (UGWOS)," http://deq.state.wy.us/aqd/Upper%20Green%20Winter%20Ozone%20Study.asp.

[6] Therefore, the monitoring network consists of 12 monitoring sites and 14 monitoring stations.

Table 1-1 Monitoring Site Information			
Site Name and Abbreviation	**Elevation (ft)**	**Latitude**	**Longitude**
Air Toxics, Ozone, and Meteorology Monitoring Stations			
Bargerville (BARG)	7,292	42° 49'12"N	109° 45'55"W
Farson-Eden (FARS)	6,612	42° 7'6"N	109° 27'15"W
La Barge #1 (LAB1)	6,571	42° 15'51"N	110° 11'41"W
Marbleton/Big Piney (MARB)	6,862	42° 33'10"N	110° 6'18"W
Sand Draw (SADR)	7,215	42° 36'7"N	109° 37'46"W
Air Toxics and Meteorology Monitoring Stations			
Big Sandy (BISA)	7,193	42° 39'26"N	109° 29'58"W
Boulder (BOUL)	7,013	42° 44'50"N	109° 43'11"W
Bondurant (BOND)	6,631	43° 11'56"N	110° 24'10"W
CASTNet Site (CAST)	7,858	42° 55'45"N	109° 47'16"W
Daniel (DANI)	7,197	42° 51'49"N	110° 4'25"W
La Barge #2 (LAB2)	6,571	42° 15'51"N	110° 11'41"W
Marbleton East (LINN)	6,844	42° 34'27"N	109° 55'48"W
Pinedale #1 and #2 (PIN1 and PIN2)	7,185	42° 52'12"N	109° 52'15"W
Source: Air Resource Specialists, Inc., Table 1-1 in final and quarterly reports.			

A screening analysis of the data collected during this program was conducted to evaluate the potential for acute health impacts, excess cancer risk, and chronic non-cancer health impacts. This screening analysis indicates that there is no potential for significant acute health impacts from the TACs measured by this study.

The potential excess cancer risk from the total set of TACs monitored at the 14 monitoring stations in this study ranged from 14 to 50 in one million. These are upper-bound risks calculated using a conservative screening methodology that assumes a person breathes the average monitored TAC concentrations 24 hours each day for 70 years; actual cancer risk are likely to be significantly lower. These levels are significantly lower than the risks found in most urban areas, and even in rural areas. The U.S. EPA considers excess cancer risk below 100 in one million to be acceptable[7], which is a level exceeded by ambient air toxics for more than 20 million people in the nation.[8]

The potential average non-cancer chronic health hazard index from the TACs monitored in this study ranges from 0.28 to 0.53. As with cancer risk, these upper-bound chronic

[7] U.S. EPA. "Risk Characterization," Region 8; taken from the April 1991 Document 93555.0 by D.R. Clay of EPA's Office of Solid Waste and Emergency Response, http://www.epa.gov/region8/r8risk/hh_risk.html#cancer (accessed December 17, 2010).
[8] U.S. EPA. "1996 National-Scale Air Toxics Assessment Summary of Results", http://www.epa.gov/ttn/atw/nata/risksum.html (accessed January 26, 2011).

health hazard indices were calculated using a screening methodology that assumes a person breathes the average monitored TAC concentrations 24 hours each day for 70 years; actual chronic health hazard indices are likely to be significantly lower. These chronic health hazard indices are well below the value of 1.0 typically used as a significance threshold for individual industrial facilities, and so are extremely low in the context of a large industrial development such as the gas fields in Sublette County.

In summary, the estimated health impacts of the 51 TACs monitored in the study are not high enough to suggest a need for a more refined health risk assessment of the TACs in the ambient air in and near Sublette County.

This report addresses the following topics:

- Design of the air toxics monitoring network, including the choice of TACs and location of monitoring stations;
- Collection and analysis of air samples to determine the concentrations of TACs observed during the monitoring program;
- Quality of the resulting TAC concentrations and suitability for use in a screening health risk assessment;
- Selection of screening values to determine which observed concentrations are high enough to merit quantification of cancer risk and non-cancer health impacts; and
- Uncertainties in the screening health risk assessment methodology.

This report does not address the following:

- Detailed analysis of ozone data collected during the monitoring program; and
- Health effects of each TAC during the different stages of life and at different ages, including any potential genetic effects on a developing fetus.

These additional topics are discussed elsewhere as follows:

- The ozone measurements are discussed in the monitoring program final report[9]; and
- Health effects of individual TACs are addressed in the toxicological and epidemiological literature.[10,11]

[9] Air Resource Specialists, Inc. "Sublette County Air Toxics Inhalation Project Final Data Submittal Report February 3, 2009 – March 31, 2010", June 30, 2010.
[10] U.S. EPA. "Health Effects Information Used in Cancer and Noncancer Risk Characterization for the NATA 1996 National-Scale Assessment", http://www.epa.gov/ttn/atw/nata/nettables.pdf.
[11] U.S. EPA. "Integrated Risk Information System (IRIS), http://www.epa.gov/iris/.

Figure 1-1
Natural Gas Fields in and near Sublette County, Wyoming

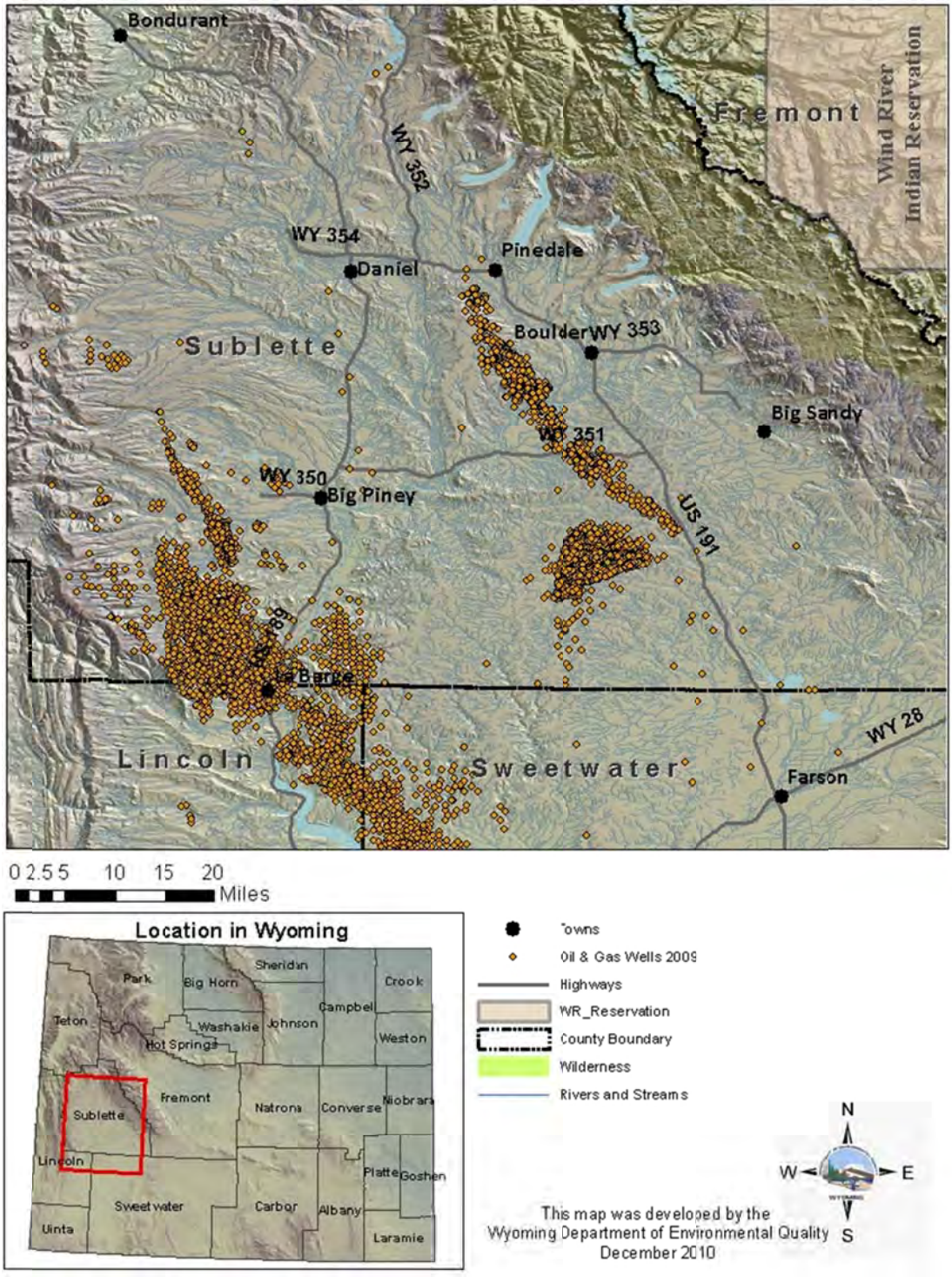
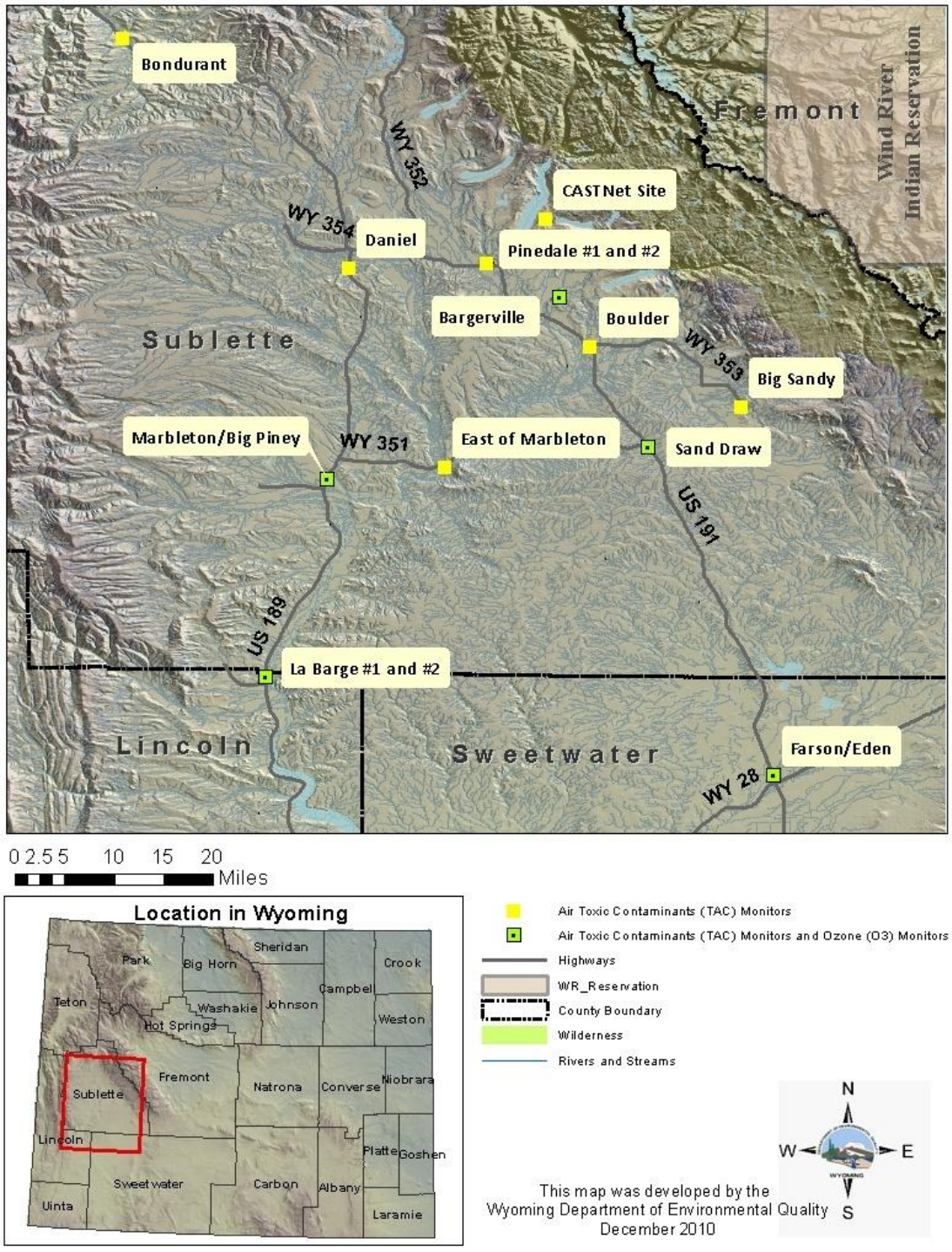


Figure 1-2
Ozone and Toxic Air Contaminant Monitoring Sites, Sublette County Air Toxics Inhalation Project



2.0 INTRODUCTION

Sublette County, Wyoming has experienced tremendous growth in recent years in the exploration and drilling for, and extraction of, natural gas from the Jonah Field, Pinedale Anticline Field, and other fields (see Figure 1-1).[12] The number of wells drilled in Sublette County increased from 1,900 in 2000 to 10,000 in 2006[13]; the number of gas production rigs in Sublette County increased from 2 in 1996 to 49 in 2006[14]; and the statewide number of natural gas and gas condensate wells increased from 5,000 in 1999 to 28,969 by the end of 2008.[15]

Ozone is a criteria pollutant created by reactions between the nitrogen oxides (NOx) emitted by various combustion sources and the VOC emitted by both combustion and non-combustion sources. In 2005, the DEQ Air Quality Division placed ozone ambient air quality monitoring instruments at three sites in the Upper Green River valley. Since the placement of those monitors, winter ozone levels in the Upper Green River valley[16] have been observed to occasionally reach elevated levels of concern (e.g., 122 parts per billion on an eight-hour average basis during February 2008, as compared with the current 8-hour National Ambient Air Quality Standard of 75 parts per billion).[17,18,19] It has been postulated that the largest change in ozone precursor emissions in Sublette County is due to increased oil and gas extraction activities, and that the increase in ozone has been attributed to this industry.[20]

Elevated winter ozone levels occur when specific meteorological conditions occur (e.g., low inversion layer over sun lit snow-covered ground) and when sufficient ozone precursors (NOx and VOCs) are present in the ambient air. Some VOCs (a broad class of chemical compounds) are also TACs. Concern over the potential health impacts of the increase in ozone as well as TAC emissions from oil and gas extraction activities in

---

[12] Coburn, Michael S. Sublette County Socioeconomics for the Sublette Community Partnership, *http://www.sublette-se.org/*.
[13] Collins Planning Associates. "Sublette County, Wyoming – An Assessment of Current Housing Conditions," Graph 12, page 8, February 2008.
[14] Ibid, Graph 10, page 7.
[15] U.S. Energy Information Administration, U.S. Department of Energy. "Annual Wyoming Natural Gas Number of Gas and Gas Condensate Wells," September 29, 2010, http://www.eia.gov/dnav/ng/hist/na1170_swy_8a.htm.
[16] Wyoming Department of Environmental Quality. "Upper Green Winter Ozone Study (UGWOS)," http://deq.state.wy.us/aqd/Upper%20Green%20Winter%20Ozone%20Study.asp.
[17] Ibid.
[18] The 122 ppb 8-hour concentration was reported by Schnell, Russell C., Samuel J. Oltmans, Ryan R. Neely, Maggie S. Endres, John V. Molenar, and Allen B. White. Rapid photochemical production of ozone at high concentrations in a rural site during winter, Natural Geoscience Letters, January 18, 2009.
[19] The 122 ppb 8-hour concentration was also reported by ENVIRON International Corporation. "Final Report 2009 Upper Green River Winter Ozone Study," March 2010.
[20] Ibid.

Sublette County resulted in a field monitoring program in the area of the natural gas production fields and the surrounding valley. The program, funded by Sublette County and organized by the DOH and DEQ, monitored 51 TACs at 14 monitoring stations located at the 12 monitoring sites shown in Figure 1-2 from February 2009 through March 2010. During the same time period, ozone was measured at the five sites shown in Figure 1-2 and listed in Table 1-1. The TAC samples were collected by the Sublette County Conservation District under the supervision of Air Resource Specialists, Inc. (ARS) and analyzed by Air Toxics, Ltd., while the measured ozone concentrations were recorded on data loggers. The objective of the program was to develop sufficient data to describe the exposure of the general population of Sublette County to TACs and ozone, requiring sampling generally in the towns and other populated areas of the County.

This screening health risk assessment provides information to the Sublette County community and other interested parties concerning potential community-wide health impacts (not workplace exposure) from breathing air toxics and ozone. It is not intended, nor is it believed possible, to predict such potential health impacts for any single individual who may be exposed to ozone and TACs present in Sublette County. A screening health risk assessment was conducted by comparing monitored concentrations with long-term and short-term screening concentrations. Screening concentrations were developed for the 51 TACs following U.S. Environmental Protection Agency (EPA) guidance.[21]

This screening health risk assessment report describes the design and content of the monitoring network (Section 3.0), assesses the quality of the monitoring data (Section 4.0), evaluates the overall statistics of the data (Section 5.0), presents the screening values selected to determine what data warrants quantitative health risk assessment (Section 6.0), compares the monitoring data to the selected screening values (Section 7.0), presents additional pertinent information on the toxic air contaminants (Section 8.0), estimates the uncertainty in the resulting health impacts (Section 9.0), and estimates potential health impacts (Section 10.0). This report uses a health risk screening methodology recommended by EPA.[22]

Because the ozone and TAC concentrations used in the assessment were monitored during only a 14-month period, the assessment represents a "snapshot" in time for characterizing community-wide health impacts from exposure to ozone and TACs. The study was not designed to be a workplace exposure assessment. It does not take into account potential increases or decreases in emissions or the resulting concentrations over time as a result of changes that might be anticipated in oil and gas development activities. It is also not designed to characterize potential health impacts from inhalation of every possible TAC that could be in the atmosphere of Sublette County. Additionally, the screening health risk methodology employed herein is limited to assessing potential health impacts from inhaling outdoor air; it does not characterize potential health impacts from pathways other than inhalation of contaminated air (i.e., indirect exposure pathways, such as dermal exposure and ingestion of soil, mother's milk, homegrown produce, drinking water, fish, pigs, chickens and eggs.).

[21] U.S. EPA. "A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets," Report EPA-904-B-06-001, Version 1.2, EPA, February 2006. (*http://www.epa.gov/region4/air/airtoxic/)*
[22] U.S. EPA (2006), op.cit.

3.0 DATA COLLECTION

In response to a citizen petition submitted on March 22, 2008, SCC, DEQ, and DOH committed to conduct an air toxics and ozone assessment in Sublette County, Wyoming. The objective of the study was to determine the level of risks to human health for citizens of Sublette County who are exposed to air toxics and ozone.

As a first step in this effort, a comprehensive sampling program was designed to gather the data needed for the health risk assessment. The intent of the sampling program was to collect samples sufficient to describe the exposure of the general population of Sublette County to ozone and air toxics (including formaldehyde), by sampling in towns and other populated areas of the county.

Study Design

To implement the air toxics and ozone monitoring study ("monitoring study"), a Technical Committee was formed consisting of representatives from DEQ, DOH, the Sublette County Conservation District, and the Sublette County Department of Public Health. Decisions concerning the monitoring study, including contractor choice and monitoring study design, were made by the Technical Committee and the SCC. ARS was contracted by SCC to conduct the air monitoring study. Twelve primary air toxics and meteorology sampling sites, plus two collocated sites,[23] were established in February 2009. Five of the sites also included continuous ozone monitors. These fourteen monitoring sites collected data from February 2009 through March 2010.[24]

Locations – Based on the objective of the monitoring study, nine population-based sites were chosen to represent communities in Sublette County as well as northern Lincoln and Sweetwater Counties. The population-based sites were Bargerville, Boulder, Daniel, Farson-Eden, LaBarge, Marbleton/Big Piney, Marbleton East, Pinedale, and Sand Draw. Three sites were also chosen to represent the boundaries of Sublette County: Big Sandy, Bondurant, and CASTNet. Initially, more boundary sites were identified, but logistical constraints made deployment and servicing of monitors in the Gros Ventre and Wyoming Range mountains too difficult to accomplish. Considerations for final site selection were based on proximity of area[25] and mobile emission sources, proximity of major stationary

[23] Collocated monitoring sites are monitoring sites placed adjacent to other monitoring sites for the purpose of assessing data quality and consistency.
[24] Study information and reports can be found at: http://deq.state.wy.us/aqd/Ozone%20Air%20Toxics_Sublette%20County.asp.
[25] Area sources refer to smaller, dispersed emission sources that are not large industrial facilities, and not mobile emission sources. Fugitive emissions from a gas or oil pipeline, and dust from an unpaved road, are examples of area sources.

emission sources, accessibility and security, and cooperation of the land or building owners. (See Figure 1-2 for a map of final monitoring locations.)

Sampling Frequency and Methods – Ozone and meteorological data were collected continuously and were made available as hourly averages. All ozone data were collected and validated consistent with EPA's State and Local Air Monitoring Station (SLAMS) guidelines. Meteorological variables (ambient temperature, wind speed, and wind direction) were measured and validated consistent with DEQ's meteorological network, which follows EPA's meteorological monitoring guidelines.

Sampling for the air toxics of concern required both whole air and sorbent sampling techniques. SUMMA® canisters[26] collected integrated air toxics samples over a sampling period of 24 hours on the EPA national 1-day-in-6 schedule. In addition, formaldehyde/acetaldehyde samples were collected on coated silica gel sorbent cartridges using active sampling methodology for the same duration and frequency. The Sublette County Conservation District acted as the site operator by installing and removing the canisters and sorbent filters every six days. The samples were retrieved and forwarded along with associated documentation to the analytical laboratory, Air Toxics, Ltd (ATL). All air toxics samples collected by canister were analyzed consistent with the EPA's TO-15 Method. TO-15 is the method of choice for the EPA Urban Air Toxics Monitoring Program and the EPA National Ambient Air Toxics Trends Stations (NATTS). The formaldehyde/acetaldehyde samples were collected consistent with EPA's TO-11A Method, also used at NATTS.[27]

Toxics Air Contaminant (TAC) Selection – The suite of compounds proposed for TAC analysis using the TO-15 methodology was determined in consultation with ATL. ATL has developed the proposed TO-15 toxics analysis suite over time based on a combination of most frequently detected air toxics. The Technical Committee also considered a citizen request and consulted DEQ's Upper Green Winter Ozone Study (UGWOS) VOC data collected in 2007 and 2008 and cross-referenced it with NATTS data analysis.[28] The NATTS data analysis evaluated NATTS data from 2003-2005 and performed a health risk assessment on those data. The Technical Committee added one TAC—acetaldehyde—that was found in UGWOS. The final list of TACs is presented in Table 3-1.

Tentatively Identified Compounds – The Technical Committee also approved an additional step in the canister analysis to "tentatively identify" any compounds beyond the TAC list that were detected when the canisters were analyzed. This was done to identify compounds that could potentially have been overlooked in the screening health risk assessment. Chromatograph peaks that coincided with established libraries of compounds were semi-qualitatively analyzed. These are referred to as tentatively identified compounds (TICs) and are listed in Table 3-1. It is important to note that TIC results have a significantly higher level of uncertainty than the TAC results, in large part

[26] SUMMA canisters are ultra-clean stainless steel canisters designed to collect and hold air samples.
[27] More information on the NATTS network can be found at http://www.epa.gov/ttn/amtic/natts.html
[28] McCarthy M.C., Hafner H.R., Chinkin L.R., and Charrier J.G. (2007) Temporal variability of selected air toxics in the United States. Atmos. Environ., doi:10.1016/j.atmosenv.2007.1005.1037 (STI-2894).

because the laboratory can't be certain that the TIC reported is, in fact, the compound that was present in the sample. Further discussion of TIC analysis can be found in Section 9.0, Uncertainty.

Quality Assurance/Quality Control of Monitoring Study

The monitoring study followed all EPA quality assurance/quality control requirements for SLAMS, NATTS, and meteorological sites. This included regular calibrations and quality control checks on the ozone and meteorological instrumentation, and collocation of canister/cartridge samplers at two air toxics sites. These collocated samplers took two canister/cartridge samples in the same location to quantify the reproducibility associated with the laboratory analyses. All quality assurance/quality control measures can be found in the study's Quality Assurance Project Plan (QAPP), which is available upon request from DEQ. After the study was completed, T&B Systems performed a data quality assessment to determine the suitability for use of these data in the screening health risk assessment. Results of the data quality assessment can be found in Section 4.0, Data Quality Assessment.

Limitations of Use of Data

The primary use of the monitoring study data is to represent a "snapshot" in time of ambient concentrations of TACs and ozone for characterizing community-wide exposure to these pollutants. Geographically, the monitoring study data are intended to represent ambient air quality in towns and other populated areas of Sublette, Sweetwater, and Lincoln Counties. There are limitations to the use of the study data when deviating from the study objective and design. For example, the study was not designed as a workplace exposure assessment nor was it designed to determine which sources within or outside of the study area contributed most to the measured concentrations. Furthermore, the study does not take into account potential changes in emission patterns over time as a result of anticipated increases in oil and gas development activities or other changes.

Table 3-1 Toxic Air Contaminants (TACs) and Tentatively Identified Compounds (TICs) Sublette County, Wyoming			
Toxic Air Contaminant (TAC)	**CAS Number**	**Tentatively Identified Compound (TIC)**	**CAS Number**
Acetaldehyde	75-07-0	Diethyl phthalate	84-66-2
Formaldehyde	50-00-0	Cyclohexane, methyl-	108-87-2
1,1,1-Trichloroethane	71-55-6	Pentane, 3-methyl-	96-14-0
1,1,2-Trichloroethane	79-00-5	Pentane	109-66-0
1,1,2,2-Tetrachloroethane	79-34-5	2-Butanol	78-92-2
1,1-Dichloroethane	75-34-3	Cyclopentane, methyl-	96-37-7
1,1-Dichloroethene	75-35-4	Hexane, 2-methyl-	591-76-4
1,2,4-Trimethylbenzene	95-63-6	2-Butene, (E)-	624-64-6
1,2-Dichloroethane	107-06-2	Silanol, trimethyl-	1066-40-6
1,2-Dichloropropane	78-87-5	Furan, 2-propyl-	4229-91-8
1,3,5-Trimethylbenzene	108-67-8	Butanal	123-72-8
1,3-Butadiene	106-99-0	Butane, 2-methyl-	78-78-4
1,4-Dichlorobenzene	106-46-7	3-Butenoic acid	625-38-7
1,4-Dioxane	123-91-1	Pentane, 2-methyl-	107-83-5
2,2,4-Trimethylpentane	540-84-1	Acetaldehyde	75-07-0
2-Butanone (MEK)	78-93-3	1H-Tetrazole, 5-methyl-	4076-36-2
2-Hexanone	591-78-6	Butane	106-97-8
2-Propanol (isopropyl alcohol)	67-63-0	2-Butenal, (E)-	123-73-9
4-Ethyltoluene	622-96-8	1-Propene	115-07-1
4-Methyl-2-pentanone	108-10-1	Propane, 2-methyl-	75-28-5
Acetone	67-64-1	1-Hexyn-3-ol	105-31-7
alpha-Chlorotoluene	100-44-7	Heptane, 2,5-dimethyl-	2216-30-0
Benzene	71-43-2	Methane, isocyano-	593-75-9
Bromomethane	74-83-9	Sulfur dioxide	7446-09-5
Carbon Disulfide	75-15-0	Acetonitrile	75-05-8
Carbon Tetrachloride	56-23-5	Propane	74-98-6
Chlorobenzene	108-90-7	Diethyl phthalate	84-66-2
Chloroethane (ethyl chloride)	75-00-3		
Chloroform	67-66-3		
Chloromethane	74-87-3		
cis-1,2-Dichloroethene	156-59-2		
Cumene	98-82-8		
Cyclohexane	110-82-7		
Ethanol	64-17-5		
Ethyl Benzene	100-41-4		
Freon 11 (trichlorofluoromethane)	75-69-4		
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	76-13-1		
Freon 12 (dichlorodifluoromethane)	75-71-8		
Heptane	142-82-5		

Table 3-1 Toxic Air Contaminants (TACs) and Tentatively Identified Compounds (TICs) Sublette County, Wyoming			
Toxic Air Contaminant (TAC)	**CAS Number**	**Tentatively Identified Compound (TIC)**	**CAS Number**
Hexane	110-54-3		
m,p-Xylene	108-38-3/ 106-42-3		
Methyl tert-butyl ether (MTBE)	1634-04-4		
Methylene Chloride (dichloromethane)	75-09-2		
o-Xylene	95-47-6		
Propylbenzene	103-65-1		
Styrene	100-42-5		
Tetrachloroethene	127-18-4		
Tetrahydrofuran	109-99-9		
Toluene	108-88-3		
Trichloroethene	79-01-6		
Vinyl Chloride	75-01-4		

4.0 DATA QUALITY ASSESSMENT

Project team members traveled to Sublette County on September 9-11, 2009, to review the monitoring network[29] (i.e., sampler locations, sampling frequency, sampling methodology), population centers, emission source areas and proximity, topography, and other aspects relevant to the project.

Assessment of the monitoring network during the visit was based, in part, on an abbreviated audit of each monitoring site that included confirmation of reasonable sampler siting (e.g., minimize local traffic effects), verification that sampling equipment was operating, and checks on wind sensor alignment and sampling timer accuracy. In reviewing sampler siting, an emphasis was placed on identifying any air toxics sources located near monitoring sites that might potentially bias the measured concentrations compared to what might be expected to occur within the population centers. A letter summarizing observations from the audit trip is contained in Appendix A.

After receipt of the fifth and final quarterly report (i.e., first quarter [January–March] 2010) containing the validated data set from the complete network, the data were reviewed for key quality indicators including accuracy, precision, completeness, reasonableness, and representativeness. The objective of the data quality assessment was to determine if the monitoring network data were satisfactory to allow the screening health risk assessment to be reliable. Accuracy and precision were verified based on the review of performance checks made during the collection of the data, and a monitoring data quality assessment report was prepared (see Appendix B) on August 2, 2010, after the monitoring was completed. Accuracy refers to the closeness that a measured value of a parameter approaches the "true" value, while precision refers to the degree or fineness with which a parameter is measured.[30] As discussed in more detail in Appendix B, the accuracy of the monitored TAC concentration data was indicated by the calculation of the Coefficient of Variation[31] for each TAC measured at the two collocation sites of Pinedale and La Barge. Satisfactory accuracy of the TAC concentration measurements was also suggested indirectly by the observation that laboratory quality control (QC) criteria, as presented in the monitoring network Quality Assurance Project Plan (QAPP),[32] were met.

---

[29] The informal term "air toxics" is used to refer to the same set of 51 compounds measured in the monitoring network used for this study, also referred to as toxic air contaminants (TACs). Federal regulations use the terminology hazardous air pollutants (HAPs), but only 25 of the 51 compounds are formally designated as HAPs.

[30] For example, if the "true" value of a TAC concentration was 10.0 $\mu g/m^3$, a simultaneous measurement of 11.0 $\mu g/m^3$ by a collocated instrument would suggest that the accuracy of measurement would be no better than the nearest 1 $\mu g/m^3$, while the precision of the measurement was the nearest 0.1 $\mu g/m^3$.

[31] See Appendix C for a discussion of Coefficient of Variation.

[32] Air Resource Specialists, Inc. "Quality Assurance Project Plan for the Sublette County Air Toxics Inhalation Project," January 2010.

Each data set, defined as all data for a specific parameter at a single monitoring site, was checked to make sure that it met a completeness criterion of at least 75% of all possible samples. All data were reviewed using time series plots and statistical evaluation to verify reasonableness.

Representativeness is interpreted for this monitoring network in the context of the number and placement of the monitoring sites relative to the location of the communities located around the gas fields in and near Sublette County. The communities in the area represented by monitoring sites were as follows:

Community	Representative Monitoring Site
• Pinedale:	Pinedale #1 and Pinedale #2
• Boulder:	Boulder
• Marbleton:	Marbleton
• Big Piney:	Marbleton
• Daniel:	Daniel

TAC concentrations were the primary parameters monitored in the network, while wind speed and direction were also monitored at each station. The quality of the meteorological data was also evaluated (see Appendix B). To further validate the meteorological data, two additional checks were made. First, the wind data from the network's Big Sandy (BISA) site for the first quarter of 2010 were compared against data collected for the Upper Green Winter Ozone Study (UGWOS) Speedway site, which was located within about 10 meters from the BISA site and used a system of essentially identical design, including identical 3-meter sensor height. Results of this comparison showed a virtually one-to-one agreement (see Appendix B). Also, winds from the 3-meter high sensor at the network's Pinedale #1 (PIN1) monitoring station were compared against those measured at the collocated DEQ network Pinedale air quality monitoring station 10-meter tower. Again, the two monitoring systems were located within about 10 meters from each other. These results are presented in Appendix B, and the observed differences are expected as a result of the different sensor heights (i.e., the 20% decrease in measured wind speed at the lower sensor height due to increased friction from the ground).

Because the monitoring network data quality was assessed after the end of the monitoring period, the assessment findings were not submitted to the network operator to elicit changes in monitoring methodology during the monitoring study period. However, the assessment concluded that the monitored data were satisfactory for use in the screening health risk assessment.

5.0 STATISTICAL EVALUATION

Appendix D Tables D-1 through D-14 show the 51 TACs monitored at the 14 stations located at the 12 sites in the network during the five quarters in the study, along with the following information for each monitoring station:[33]

a. Number of samples collected (during the full 14-month program period);

b. Number of samples analyzed (during the full 14-month program period, excluding those samples that did not lead to analytical results);

c. Reporting Limit[34] (RL), during the full 14-month program period;

d. Number of samples with detectable concentrations;

e. Frequency of detection (in percent);

f. Maximum and minimum detected concentrations;[35] and

g. Twelve-month average (arithmetic mean) detected concentration. If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is shown as a dash (-).[36] If the frequency of non-detects is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average concentration, following guidance, and these values are used in preparation of the statistics.[37]

Note that the statistics and other information in Items "a" through "f" above are for the full 14-month program period, while the 12-month average detected concentration (Item g) is based on April 2009 through March 2010.

---

[33] The information and statistics presented in this section satisfy the requirements of Step 3 in EPA's Detailed Screening Methodology, U.S. EPA (2006), op.cit.

[34] The Reporting Limit (RL), also known as the Limit of Quantitation, is the concentration that can be quantified numerically, such as the lowest concentration on a linear calibration of the instrument. The Minimum Detection Limit (MDL), also known as the Limit of Detection, is the lower concentration, defined in 40CFR Part 136 Appendix B, at which the analytical instrument gives some indication as to the presence of the compound.

[35] The range of detected concentrations is not listed in the tables, but can be calculated by subtracting the minimum from the maximum.

[36] U.S. EPA. Air Toxics Risk Assessment Reference Library, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction), page I-4, April 2004.

[37] Ibid.

In Appendix D, Tables D-1 through D-14 show that some TACs (e.g., acetaldehyde in Table D-1 for Bargerville) were detected in almost every sample during the monitoring program, and have well-defined maxima, minima, and 12-month averages. Other TACs (e.g., 1,1,2-trichloroethane in Table D-1) were not detected in any sample, and hence no statistics can be calculated. As can be seen in Table 5-1, the entire monitoring network of 14 stations was scheduled for 937 cartridge samples and 937 canister samples during the 14-month period, of which 932 cartridge samples and 915 canister samples were installed. All 932 cartridge samples were collected, but only 889 canisters were collected because of various problems such as malfunctioning of the flow control valve. The laboratory analyses from 920 cartridge samples and 888 canisters were considered acceptable to produce final results (i.e., only 12 sorbent cartridges out of 932, and only one canister out of 889 were not successfully analyzed because they did not satisfy the quality assurance requirements). Some of the 12 sorbent cartridges and the one canister had sampling flow rate problems.

Table 5-1
Monitoring Station Sample Count, Sublette County, Wyoming

Monitoring Station	Scheduled		Installed		Collected[a]		Final Analyses Accepted by ARS		Collected, but not Analyzed or Accepted	
	Canisters	Cartridges	Canisters	Cartridges	Canisters	Cartridges	Canisters	Cartridges	Canisters	Cartridges
Bargerville	67	67	66	67	63	67	62	66	1	1
Big Sandy	67	67	64	66	62	66	62	66	0	0
Bondurant	66	66	63	64	61	64	61	64	0	0
Boulder	67	67	66	67	65	67	65	67	0	0
CASTNet	67	67	64	65	61	65	61	62	0	3
Daniel	67	67	66	67	64	67	64	67	0	0
Farson	67	67	66	67	62	67	62	65	0	2
La Barge #1	67	67	66	67	64	67	64	65	0	2
La Barge #2	67	67	65	67	64	67	64	66	0	1
Marbleton East	67	67	65	67	64	67	64	67	0	0
Marbleton	67	67	66	67	66	67	66	65	0	2
Pinedale #1	67	67	66	67	63	67	63	66	0	1
Pinedale #2	67	67	66	67	65	67	65	67	0	0
Sand Draw	67	67	66	67	65	67	65	67	0	0
Total	937	937	915	932	889	932	888	920	1	12

a. Some samplers were installed but not collected and analyzed because they did not actually sample the air.

6.0 SELECTION OF SCREENING VALUES

The health effects of TACs are typically evaluated in terms of short-term and long-term health effects. Short-term health effects, usually referred to as acute health effects, relate to exposures to a pollutant for a period of 24 hours or less (and more typically, just one hour). Long-term health effects include both the risk of developing cancer due to exposure to pollutants (referred to as excess health risks) and non-cancer health effects associated with exposures to pollutants for more than 24 hours (typically one year or more), and referred to as chronic health effects. All three types of health impacts—acute health impacts, chronic non-cancer health impacts, and excess cancer risks—are evaluated in this assessment.

The first step in assessing these health impacts was to develop screening concentrations to determine which TACs warranted a more detailed risk assessment. The screening concentrations were selected to distinguish those TACs found in the monitoring program samples that were present in concentrations high enough to merit a more detailed risk assessment from those that were not.

Chronic (both cancer and non-cancer) and acute screening concentrations were developed for each TAC in the study. A TAC with maximum measured concentration (24-hour or shorter sample) below the acute and chronic screening concentrations is deemed to be of no potential public health concern, and is not included in the more detailed risk assessment. The process of developing the screening concentrations is discussed in this section, and the resulting screening concentrations are shown in Table 6-1.

The screening values presented in Table 6-1 come from a variety of information sources; these are identified by the letter codes shown in the column headed “Sources of Chronic/Acute Screening Values.” The letter codes are explained in the notes immediately below the table. The chronic non-cancer screening values were taken from non-cancer chronic reference concentrations; these reference concentrations were divided by ten to develop the more conservative screening values presented in Table 6-1.

Table 6-1 Health Risk Assessment Screening Values, Sublette County, Wyoming						
		Chronic Screening Value (µg/m^3)				
Toxic Air Contaminant	CAS Number	Cancer	Non-Cancer	Lower (More Protective)	Acute Screening Value (µg/m^3)	Sources of Chronic/ Acute Screening Values[2,38]
Acetaldehyde	75-07-0	0.45	0.9	0.45	470	a/f
Formaldehyde	50-00-0	181.8	0.98	0.98	55	a/f
1,1,1-Trichloroethane	71-55-6	none	100	100	68,000	a/f
1,1,2-Trichloroethane	79-00-5	0.063	40	0.063	45,000	a/c
1,1,2,2-Tetrachloroethane	79-34-5	0.017	none	0.017	7,000	a/c
1,1-Dichloroethane	75-34-3	0.63	50	0.63	400,000	a/c
1,1-Dichloroethene	75-35-4	none	20	20	20,000	a/d
1,2,4-Trimethylbenzene	95-63-6	none	none	none	700,000	/e
1,2-Dichloroethane	107-06-2	0.038	240	0.038	210,000	a/d
1,2-Dichloropropane	78-87-5	0.053	0.4	0.053	47,000	a/c
1,3,5-Trimethylbenzene	108-67-8	none	none	none	700,000	/e
1,3-Butadiene	106-99-0	0.033	0.2	0.033	1,500,000	a/b
1,4-Dichlorobenzene	106-46-7	0.091	80	0.091	61,000	a/d
1,4-Dioxane	123-91-1	0.13	360	0.13	3,000	a/f
2,2,4-Trimethylpentane	540-84-1	none	0.4	0.4	350,000	a/d
2-Butanone (MEK)	78-93-3	none	none	none	13,000	/f
2-Hexanone	591-78-6	none	3	3	21,000	g/d
2-Propanol (isopropyl alcohol)	67-63-0	none	700	700	3,200	f/f
4-Ethyltoluene	622-96-8	none	none	none	500,000	/d
4-Methyl-2-pentanone	108-10-1	none	300	300	310,000	a/d
Acetone	67-64-1	i	none	none	480,000	/e
alpha-Chlorotoluene	100-44-7	0.02	none	0.02	5,300	a/d
Benzene	71-43-2	0.13	3	0.13	1,300	a/f
Bromomethane	74-83-9	none	0.5	0.5	3,900	a/f
Carbon Disulfide	75-15-0	none	70	70	620	a/b
Carbon Tetrachloride	56-23-5	0.067	19	0.067	1,900	a/f
Chlorobenzene	108-90-7	none	100	100	47,000	a/d
Chloroethane (ethyl chloride)	75-00-3	none	1000	1000	270,000	a/d
Chloroform	67-66-3	none	9.8	9.8	150	a/f
Chloromethane	74-87-3	none	9	9	210,000	a/d
cis-1,2-Dichloroethene	156-59-2	none	none	none	810,000	/d
Cumene	98-82-8	none	40	40	250,000	a/f
Cyclohexane	110-82-7	none	600	600	1,100,000	a/d
Ethanol	64-17-5	none	none	none	1,900,000	/d
Ethyl Benzene	100-41-4	j	100	100	440,000	a/d
Freon 11 (trichlorofluoromethane)	75-69-4	none	none	none	5,700,000	/d

[38] Any letter on the left side of the forward slash refers to the footnote at the end of the table containing the source of the chronic screening value. The letter on the right side of the forward slash refers to the table footnote containing the source of the acute screening value.

Table 6-1 Health Risk Assessment Screening Values, Sublette County, Wyoming						
		Chronic Screening Value (µg/m^3)				
Toxic Air Contaminant	CAS Number	Cancer	Non-Cancer	Lower (More Protective)	Acute Screening Value (µg/m^3)	Sources of Chronic/ Acute Screening Values[2,38]
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	76-13-1	none	none	none	7,800,000	/d
Freon 12 (dichlorodifluoromethane)	75-71-8	none	none	none	5,000,000	/d
Heptane	142-82-5	none	none	none	1,700,000	/d
Hexane	110-54-3	none	70	70	180,000	a/d
m,p-Xylene	108-38-3/ 106-42-3	none	10	10	22,000	j/f
Methyl tert-butyl ether (MTBE)	1634-04-4	3.8	300	3.8	180,000	a/b,e
Methylene Chloride (dichloromethane)	75-09-2	2.1	100	2.1	14,000	a/f
o-Xylene	95-47-6	none	10	10	22,000	j/f
Propylbenzene	103-65-1	none	none	none	150,000	/d
Styrene	100-42-5	none	100	100	21,000	a/f
Tetrachloroethene	127-18-4	0.17	27	0.17	20,000	a/f
Tetrahydrofuran	109-99-9	0.50	60	0.50	150,000	a/d
Toluene	108-88-3	none	300	300	37,000	f/f
Trichloroethene	79-01-6	0.50	60	0.50	70,000	a/b
Vinyl Chloride	75-01-4	0.11	10	0.11	180,000	a/f

a. U.S. EPA. A Preliminary Risk-based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

b. U.S. EPA. A Preliminary Risk-based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix B, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

c. National Institute for Occupational Safety and Health (NIOSH). Documentation for Immediately Dangerous to Life and Health (IDLH) Concentrations: NIOSH Chemical Listing and Documentation of Revised IDLH Values (as of 3/1/95), http://www.cdc.gov/niosh/idlh/intridl4.html, May 1994.

d. TEEL-0 = U.S. Department of Energy Temporary Emergency Exposure Limit, which is temporary level of concern below which no effects are known, http://www.epa.gov/ttn/atw/toxsource/acutesources.html.

e. AEGL-1 is the EPA acute exposure guideline level for mild effects, meaning that it is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

f. California Air Resources Board (CARB). Consolidated Table of OEHHA/ARB-Approved Risk Assessment Health Values, February 9, 2009, http://www.arb.ca.gov/toxics/healthval/contable.pdf.

g. U.S. EPA. Integrated Risk Information System, http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=1019.

h. Data are inadequate for an assessment of human carcinogenic potential (EPA. Integrated Risk Information System [IRIS], http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=0128#carc.

i. Not classifiable as to human carcinogenicity (Class D carcinogen) (EPA. Integrated Risk Information System [IRIS], http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=0051#carc).

j. U.S. EPA. Integrated Risk Information System, http://www.epa.gov/ncea/iris/subst/0270.htm#refinhal.

Screening concentrations for chronic health impacts were the lower (more protective) of (a) the concentration that results in a lifetime cancer risk of one-in-a-million; and (b) one-

tenth of the non-cancer chronic reference concentration. The selection of these concentrations was based upon EPA guidance.[39] Thirty-nine of the 51 TACs in the study have chronic screening concentrations.

Screening concentrations for acute health impacts were also based on EPA guidance.[40] However, the EPA guidance does not always list just a single screening concentration for each compound. Instead, the guidance presents several possible screening concentrations, derived from several agency sources. Where the table contains more than one possible screening concentration, the lowest (most protective) value was used. The screening concentrations included in EPA guidance, with references to the agency or organization that developed them, are listed below.

- Acute Exposure Guideline Level (AEGL)-1 (8 hour)[41]
- AEGL-2 (8 hour)[42]
- AEGL-1 (1 hour)
- AEGL-2 (1 hour)
- Emergency Response Planning Guideline (ERPG)-1[43]
- ERPG-2[44]
- Minimal Risk Level (MRL)[45]
- Reference Exposure Level (REL)[46]
- Immediately Dangerous to Life and Health (IDLH)/10[47]
- Temporary Emergency Exposure Limit (TEEL)-0[48]
- TEEL-1[49]

[39] U.S. EPA (2006). op. cit.
[40] Ibid, Appendix B.
[41] Acute Exposure Guideline Level: mild effects (National Advisory Committee for Acute Exposure Guideline Levels).
[42] Acute Exposure Guideline Level: moderate effects (National Advisory Committee for Acute Exposure Guideline Levels).
[43] Emergency Response Planning Guideline: mild effects (one-hour exposure) (American Industrial Hygiene Association).
[44] Emergency Response Planning Guideline: serious effects (one-hour exposure) (American Industrial Hygiene Association).
[45] Acute Minimum Risk Level (U.S. Agency for Toxic Substances and Disease Registry).
[46] Reference Exposure Level (California Environmental Protection Agency).
[47] Immediately Dangerous to Life and Health divided by 10 (National Institute for Occupational Safety and Health).
[48] Temporary Emergency Exposure Limit: no effect (U.S. Department of Energy).
[49] Temporary Emergency Exposure Limit: mild effect (U.S. Department of Energy).

7.0 COMPARISON TO SCREENING VALUES

This section summarizes the results of the screening assessment.[50] If the maximum detected concentration of a TAC at any monitoring site was equal to or greater than its chronic or acute screening values, that TAC was subjected to a complete screening assessment, following EPA guidance.[51] The 26 TACs that have a maximum monitored concentration exceeding the chronic screening concentrations are indicated in Table 7-1.

Only one of the TACs, 2-propanol (isopropyl alcohol), had a maximum concentration above its acute screening concentration, measured at the CASTNet site on October 16, 2009. The maximum concentration was 4,176 $\mu g/m^3$ and the screening concentration was 3,200 $\mu g/m^3$. The second highest concentration for this compound (at any site) was 1,695 $\mu g/m^3$, which is approximately half of the screening threshold; the third highest concentration was 860 $\mu g/m^3$, which is approximately one-quarter of the screening threshold; and the arithmetic mean of the entire distribution of 2-propanol analyses (across all sites) was 27 $\mu g/m^3$, which was 0.8% of the screening threshold. 2-Propanol was not detected in 39% of the measurements across all sites, and the single value above the screening level was 25 standard deviations above the mean of the detected values. The highest CV calculated for any of the TACs was for 2-propanol measured at the La Barge #2 monitoring station (see Appendix Table B-1), where this one apparent outlier was measured. These statistics all indicate that the maximum concentration was an anomalous outlier, out of 888 analyzed samples (and 539 samples where 2-propanol was detected). As a result, the screening analysis indicates that there is no potential for significant acute health impacts from the TACs measured by the monitoring network.

A more refined risk screening assessment for chronic health effects was conducted for the 26 of the 51 TACs that had maximum 24-hour concentrations measured at one or more of the 12 monitoring sites exceeding the chronic screening concentration (see Table 7-1). At each of these 12 sites, the potential for chronic health impacts from TACs that exceeded the chronic screening concentration was evaluated. Twelve-month average measured concentrations of those pollutants were used to assess the potential risks of cancer and non-cancer health effects from long-term exposure.

The total set of monitored concentrations for each of the TACs subject to continued screening assessment at each of the 12 monitoring sites was compared to its chronic screening value, allowing calculation of the percentage of the total set that equaled or exceeded the chronic screening value. This comparison is presented in Appendix E Tables E-1 through E-14. The results of this further analysis are presented in Section 8.0 below.

[50] The information presented in this section satisfies the requirements of Step 4 in EPA's Detailed Screening Methodology, U.S. EPA (2006), op. cit.
[51] U.S. EPA (2006), op. cit.

Table 7-1
Comparison of TAC Maximum Detected Concentrations Against Health Risk Assessment Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Maximum Observed 24-hr Average Concentration ($\mu g/m^3$)	Chronic Screening Value[a] ($\mu g/m^3$)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Acute Screening Value[c,d] ($\mu g/m^3$)	Is Maximum Observed Concentration >= Final Acute Screening Value (Y or N)
			Cancer	Non-Cancer[b]	Lower (More Protective)			
Acetaldehyde	75-07-0	6.0	0.45	0.9	0.45	Y	470	N
Formaldehyde	50-00-0	5.1	181.8	0.98	0.98	Y	55	N
1,1,1-Trichloroethane	71-55-6	7.1	none	100	100	N	68,000	N
1,1,2-Trichloroethane	79-00-5	1.6	0.063	40	0.063	Y	45,000	N
1,1,2,2-Tetrachloroethane	79-34-5	2.6	0.017	none	0.017	Y	7,000	N
1,1-Dichloroethane	75-34-3	3.7	0.63	50	0.63	Y	400,000	N
1,1-Dichloroethene	75-35-4	1.8	none	20	20	N	20,000	N
1,2,4-Trimethylbenzene	95-63-6	78.6	none	none	none	N	700,000	N
1,2-Dichloroethane	107-06-2	2.4	0.038	240	0.038	Y	210,000	N
1,2-Dichloropropane	78-87-5	2.3	0.053	0.4	0.053	Y	47,000	N
1,3,5-Trimethylbenzene	108-67-8	15.2	none	none	none	N	700,000	N
1,3-Butadiene	106-99-0	0.69	0.033	0.2	0.033	Y	1,500,000	N
1,4-Dichlorobenzene	106-46-7	2.2	0.091	80	0.091	Y	61,000	N
1,4-Dioxane	123-91-1	6.1	0.13	360	0.13	Y	3,000	N
2,2,4-Trimethylpentane	540-84-1	74.7	none	0.4	0.4	Y	350,000	N
2-Butanone (Methyl Ethyl Ketone)	78-93-3	127	none	none	none	N	13,000	N
2-Hexanone	591-78-6	7.4	none	3	3	Y	21,000	N
2-Propanol	67-63-0	4,176	none	700	700	Y	3,200	Y
4-Ethyltoluene	622-96-8	46.2	none	none	none	N	500,000	N
4-Methyl-2-pentanone	108-10-1	9.0	none	300	300	N	310,000	N
Acetone	67-64-1	1,045	none	none	none	N	480,000	N
alpha-Chlorotoluene	100-44-7	7.2	0.02	none	0.02	Y	5,300	N
Benzene	71-43-2	44.7	0.13	3	0.13	Y	1,300	N
Bromomethane	74-83-9	3.0	none	0.5	0.5	Y	3,900	N
Carbon Disulfide	75-15-0	23.7	none	70	70	N	6,200	N
Carbon Tetrachloride	56-23-5	39.6	0.067	19	0.067	Y	1,900	N
Chlorobenzene	108-90-7	0.78	none	100	100	N	47,000	N
Chloroethane	75-00-3	50.1	none	1000	1000	N	270,000	N
Chloroform	67-66-3	10.3	none	9.8	9.8	Y	150	N

Table 7-1
Comparison of TAC Maximum Detected Concentrations Against Health Risk Assessment Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Maximum Observed 24-hr Average Concentration ($\mu g/m^3$)	Chronic Screening Value[a] ($\mu g/m^3$)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Acute Screening Value[c,d] ($\mu g/m^3$)	Is Maximum Observed Concentration >= Final Acute Screening Value (Y or N)
			Cancer	Non-Cancer[b]	Lower (More Protective)			
Chloromethane	74-87-3	15.1	none	9	9	Y	210,000	N
cis-1,2-Dichloroethene	156-59-2	0.67	none	none	none	N	810,000	N
Cumene	98-82-8	5.9	none	40	40	N	250,000	N
Cyclohexane	110-82-7	25.5	none	600	600	N	1,100,000	N
Ethanol	64-17-5	508	none	none	none	N	1,900,000	N
Ethyl Benzene	100-41-4	43.4	none	100	100	N	440,000	N
Freon 11	75-69-4	1.9	none	none	none	N	5,700,000	N
Freon 113	76-13-1	3.3	none	none	none	N	7,800,000	N
Freon 12	75-71-8	3.3	none	none	none	N	5,000,000	N
Heptane	142-82-5	35.6	none	none	none	N	1,700,000	N
Hexane	110-54-3	42.3	none	70	70	N	180,000	N
m,p-Xylene	108-38-3/106-42-3	169	none	10	10	Y	22,000	N
Methyl tert-butyl ether	1634-04-4	2.5	3.8	300	3.8	N	180,000	N
Methylene Chloride	75-09-2	97.2	2.1	100	2.1	Y	14,000	N
o-Xylene	95-47-6	52.1	none	10	10	Y	22,000	N
Propylbenzene	103-65-1	5.9	none	none	none	N	150,000	N
Styrene	100-42-5	24.3	none	100	100	N	21,000	N
Tetrachloroethene	127-18-4	149	0.17	27	0.17	Y	20,000	N
Tetrahydrofuran	109-99-9	9.1	0.50	60	0.50	Y	150,000	N
Toluene	108-88-3	188	none	300	300	N	37,000	N
Trichloroethene	79-01-6	4.2	0.50	60	0.50	Y	700,000	N
Vinyl Chloride	75-01-4	4.6	0.11	10	0.11	Y	180,000	N
-	-	Count = 51	Count = 19	Count = 37	Count=39	Yes Count= 26	Count = 51	Yes Count= 1

a. U.S.EPA. A Preliminary Risk-based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

b. The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level.

c. U.S. EPA. A Preliminary Risk-based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix B, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

d. Dash means that a USDOE TEEL-0 (Temporary Emergency Exposure Limit, a temporary level of concern below which no effects are known) acute screening concentration exists, but is not considered an appropriate screening health risk assessment (HRA) reference value to follow EPA (2006) guidance.

8.0 ADDITIONAL INFORMATION

The purpose of this section is to present additional information[52] that helps decision makers put the results in context[53] for any or all of the 26 TACs that had concentrations exceeding the chronic screening concentrations. For 21 of the 26 TACs that had detected concentrations higher than the chronic screening values, emission information is provided in Table 8-1 from the National Air Toxics Assessment (NATA) database.[54] Only 2-hexanone, 1,4-dioxane, 2-propanol, m-/p-xylenes, and tetrahydrofuran have no NATA emission data for Sublette County. Of the 21 TACs for which NATA emission data exist, the six with the highest emissions are listed below. The remaining 15 TACs had 2002 annual emissions less than 1 tpy each.

1. Formaldehyde: 151 tons per year (tpy)
2. Benzene: 96 tpy
3. 2,2,4-trimethylpentane: 41 tpy
4. Acetaldehyde: 23 tpy
5. 1,3-butadiene: 22 tpy
6. Chloromethane: 6 tpy

In contrast, the 6 TACs, out of the 51 TACs that were monitored in the study, with the highest average concentrations throughout the 14-month duration of the study were as follows:

1. Acetone
2. 2-propanol
3. Ethanol

---

[52] This additional information satisfies the requirements of Step 5 in EPA's Detailed Screening Methodology, U.S. EPA (2006), op. cit.

[53] U.S. EPA (2006), op. cit.

[54] U.S. EPA. "2002 National Air Toxics Assessment," http://www.epa.gov/ttn/atw/nata2002/index.html. According to EPA, "The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing comprehensive evaluation of air toxics in the U.S. EPA developed the NATA as a state-of-the-science screening tool for State/Local/Tribal Agencies to prioritize pollutants, emission sources and locations of interest for further study in order to gain a better understanding of risks. NATA assessments do not incorporate refined information about emission sources, but rather, use general information about sources to develop estimates of risks which are more likely to overestimate impacts than underestimate them. NATA provides estimates of the risk of cancer and other serious health effects from breathing (inhaling) air toxics in order to inform both national and more localized efforts to identify and prioritize air toxics, emission source types and locations which are of greatest potential concern in terms of contributing to population risk. This in turn helps air pollution experts focus limited analytical resources on areas and or populations where the potential for health risks are highest. Assessments include estimates of cancer and non-cancer health effects based on chronic exposure from outdoor sources, including assessments of non-cancer health effects for Diesel Particulate Matter (PM). Assessments provide a snapshot of the outdoor air quality and the risks to human health that would result if air toxic emissions levels remained unchanged."

4. 2-Butanone
5. Toluene
6. m,p-Xylene

A combination of atmospheric reactions and location of the actual set of sources that emit the compounds may explain the lack of direct correlation between the emission strengths and monitored average concentrations. Caution is required when comparing the NATA results with the results of this screening health risk assessment and the underlying monitoring database because of the different methods of obtaining information on two substantially different lists of air toxics and time periods separated by seven years.

Table 8-2 gives known combustion sources for 25 of the 26 TACs that had detected concentrations higher than the chronic screening values, as follows:

- Combustion of motor vehicle engine fuels (Diesel or gasoline);[55] and
- Combustion of natural gas-fired engines.[56]

The remaining TAC, 2-propanol, is not listed as a constituent of the combustion of these three fuels, and its sources inside or outside of Sublette County are not known from the monitoring accomplished in the network. Many of the 51 TACs can also be emitted as VOCs without combustion from various industrial and commercial processes (e.g., tetrachloroethylene, also known as PCE, from dry cleaners).

Concerning ozone, the 4th highest[57] 8-hour averages measured during the monitoring study varied in a narrow range from 57 ppb at La Barge #1 on May 16, 2009, to 65 ppb at Bargerville on May 1, 2009, compared to the National Ambient Air Quality Standard (NAAQS) of 75 ppb. Because of the unique conditions necessary to generate substantial concentrations of ozone in winter, a special study - the Upper Green Winter Ozone Study - was conducted by the DEQ during several winters starting in 2005. Elevated 8-hour average ozone concentrations occurred during the winters of 2005, 2006, and 2008, with the highest being 122 ppb observed at Boulder on February 21, 2008.[58]

According to EPA,[59] the potential health effects of ozone at concentrations that exceed the NAAQS are as follows: "Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or an uncomfortable sensation in the chest. Ozone can reduce lung function and make it more difficult to breathe deeply and vigorously. Breathing may become more rapid and shallow than normal. This may limit a person's ability to engage in vigorous activities. Ozone can aggravate asthma. When ozone levels are high, more

[55] U.S. EPA Office of Transportation and Air Quality (OTAQ).Table 1 – The Master List of Compounds Emitted by Mobile Sources, http://www.epa.gov/otaq/regs/toxics/420b06002.xls.
[56] U.S. EPA. "Compilation of Air Pollutant Emission Factors, (AP-42), Volume 1 (Stationary, Point and Area Sources), Chapter 3 (Stationary Internal Combustion Sources), Section 3.2 (Natural Gas-Fired Reciprocating Engines), Table 3.2-2, http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf.
[57] A violation of the 8-hour average ozone NAAQS requires an exceedance by the 3-year average of the 4th highest daily maximum 8-hour average concentration.
[58] ENVIRON International Corporation. "Final Report 2009 Upper Green River Winter Ozone Study", March 2010.
[59] U.S. EPA. "Ground-Level Ozone Standards Designations," http://www.epa.gov/air/ozonepollution/designations/faq.htm#3.

people with asthma have attacks that require a doctor's attention or use of medication. One reason this happens is that ozone makes people more sensitive to allergens, the most common triggers of asthma attacks. Ozone can increase susceptibility to respiratory infections." Although ozone has these potential health effects when concentrations exceed the 8-hour NAAQS, the lack of an exceedance during the air toxics monitoring program discussed herein, and the infrequent wintertime excursions of ozone concentrations above the 75 ppb 8-hour NAAQS observed in the Upper Green Winter Ozone Study, suggests that such health effects are not expected to occur in Sublette County.

Table 8-1
2002 National Air Toxics Assessment Emissions (tons per year), Sublette County, Wyoming

CAS No.	Toxic Air Contaminant	Total Emissions	Major Point Emissions	Total Area Emissions	Area Point Emissions	Area Nonpoint Emissions	Fire (Wildfire & Prescribed Burn) Emissions	Total Mobile Emissions	Mobile Onroad	Nonroad Emissions	Airport Emissions
79345	1,1,2,2-Tetrachloroethane	0.019		0.019	0.019	0.0000029					
79005	1,1,2-Trichloroethane	0.0000019		0.0000019		0.0000019					
106990	1,3-Butadiene	21.6		0.000041		0.000041	19.10	2.54	1.50	1.02	0.02
106467	1,4-Dichlorobenzene	0.137		0.137	0.0032	0.134					
540841	2,2,4-Trimethylpentane	41.0		1.17		1.17		39.84	12.26	27.58	0.00
75070	Acetaldehyde	22.9		0.025		0.025	19.25	3.60	1.61	1.98	0.02
71432	Benzene	96.23	0.42	16.66	0.090	16.57	53.05	26.11	16.60	9.45	0.06
100447	Benzyl Chloride (alpha-Chlorotoluene)	0.000013		0.000013		0.000013					
56235	Carbon Tetrachloride	0.0019		0.0019	0.000064	0.0018					
67663	Chloroform	0.29		0.29	0.00037	0.29					
107062	Ethylene Dichloride (1, 2-Dichloroethane)	0.0054		0.0054	0.0042	0.0012					
75343	Ethylidene Dichloride (1,1-Dichloroethane)	0.024		0.024	0.024						
50000	Formaldehyde	150.9	19.6	0.072		0.072	121.4	9.8	4.6	5.2	0.058
74839	Methyl Bromide (Bromomethane)	0.0000080		0.0000080		0.0000080					
74873	Methyl Chloride (Chloromethane)	6.08		0.030	0.0064	0.024	6.05				
75092	Methylene Chloride	0.55		0.55	0.13	0.42					
78875	Propylene Dichloride (1, 2-Dichloropropane)	0.0021		0.0021	0.0021	0.000019					
127184	Tetrachloroethylene (Tetrachloroethene)	0.080		0.080	0.065	0.015					
79016	Trichloroethylene (Trichloroethene)	0.045		0.045	0.039	0.0062					
95476	o-Xylene	0.25		0.25		0.25					
75014	Vinyl Chloride	0.048		0.048	0.048	0.000011					

Table 8-2 Potential Sources of Toxic Air Contaminants that Exceed Screening Concentrations, Sublette County, Wyoming		
Toxic Air Contaminant	**CAS Number**	**Potential Sources within Sublette County**
1,1,2-Trichloroethane	79-00-5	Natural gas stationary engines
1,1,2,2-Tetrachloroethane	79-34-5	Natural gas stationary engines
1,1-Dichloroethane	75-34-3	Natural gas stationary engines
1,2-Dichloroethane	107-06-2	Natural gas stationary engines
1,2-Dichloropropane	78-87-5	Natural gas stationary engines
1,3-Butadiene	106-99-0	Motor vehicle exhaust, Natural gas stationary engines
1,4-Dichlorobenzene	106-46-7	Non-combustion
1,4-Dioxane	123-91-1	Non-combustion
2,2,4-Trimethylpentane	540-84-1	Motor vehicle exhaust, Natural gas stationary engines
2-Hexanone	591-78-6	Non-combustion
Acetaldehyde	75-07-0	Motor vehicle exhaust, Natural gas stationary engines
alpha-Chlorotoluene	100-44-7	Non-combustion
Benzene	71-43-2	Motor vehicle exhaust, Natural gas stationary engines
Bromomethane	74-83-9	Motor vehicle exhaust
Carbon Tetrachloride	56-23-5	Natural gas stationary engines
Chloroform	67-66-3	Motor vehicle exhaust, Natural gas stationary engines
Chloromethane	74-87-3	Non-combustion
Formaldehyde	50-00-0	Motor vehicle exhaust, Natural gas stationary engines
Methylene Chloride	75-09-2	Motor vehicle exhaust, Natural gas stationary engines
Tetrachloroethene (PCE)	127-18-4	Non-combustion (e.g., PCE-based dry cleaning machines)
Tetrahydrofuran	109-99-9	Non-combustion
Trichloroethene	79-01-6	Motor vehicle exhaust
Xylenes	95-47-6, 108-38-3 and 106-42-3	Motor vehicle exhaust, Natural gas stationary engines
Vinyl Chloride	75-01-4	Natural gas stationary engines

9.0 UNCERTAINTY

The purpose of this section is to provide information on the level of uncertainty of the measurements, the calculated statistics, and the final conclusions. Two kinds of uncertainty are addressed in this section: quantitative and qualitative.[60] Quantitative uncertainty is addressed in terms of the relative accuracy of the TAC concentrations measured in the project. Two monitoring stations each were installed, in parallel, at Pinedale and La Barge to explore the uncertainty in the monitored TAC concentrations. As discussed in more detail in Appendix B, the laboratory duplicate data showed good repeatability that met the ±25% criterion for the CV[61] presented in the QAPP. However, total sampling accuracy for the TACs measured from Summa Canister samples was more variable. CVs were calculated for the 17 TACs and 28 TAC/monitoring station combinations where at least six valid collocated samples were available over the course of the study. For a comparison between two data sets to be valid, the average concentration of each TAC measured in the samples taken at each pair of monitoring stations had to be at least five times the reporting limit, based on a similar criterion used by the analytical laboratory for evaluating laboratory duplicates. Otherwise, the comparison would be more a reflection of the "noise" in the measurements, rather than the variability in the measurements themselves.

CVs calculated for individual TACs at the two station pairs varied from a low of 15% for cyclohexane concentrations to a high of 176% for 2-propanol concentrations, both measured at La Barge. This compares with the 25% criterion set forth in the QAPP as a measure of consistent data quality. The average CV for 13 of the TACs sampled with Summa Canisters in the two collocated monitoring stations at Pinedale and analyzed with Method TO-15 was 89%, which is similar to the 78% average CV for 11 of the TACs sampled with Summa Canisters in the two collocated monitoring stations at La Barge (analyzed with the same method). The CVs for the sorbent cartridges used to measure acetaldehyde and formaldehyde were consistently low, averaging 22% at the two collocations. These CVs for the two TACs measured with Method TO-11 provide context for the much more variable CVs obtained from Method TO-15 at the two collocated sites. Although covering a wide range between a low of 15% and a high of 176%, the resulting collocated CV values for the TO-15 analysis indicate the relatively low or high variability of the different TACs.

Regardless of the level of CV, the potential cancer risk and chronic health hazard calculated in this screening health risk assessment both depend on long-term average concentrations, not isolated short-term high concentrations, and hence are unaffected by a large CV in 2-propanol (which has only a chronic non-cancer screening value as shown in Table 6-1).

---

[60] This additional information satisfies the requirements of Step 6 in EPA's Detailed Screening Methodology, EPA (2006), op. cit.

[61] See Appendix C for the equations used to calculate Coefficient of Variation.

To evaluate uncertainty in the meteorological data, the wind data from the Big Sandy monitoring station for the 1st quarter 2010 were compared against the meteorological data collected for the Upper Green Winter Ozone Study (UGWOS) 2010 using a nearby measurement system of similar design. As shown in Appendix B Figure B-1, the agreement was virtually one-to-one. Also, winds measured at the two Pinedale monitoring stations were compared. As shown in Appendix B Figure B-2, the less than exact agreement is expected because of the difference in wind speed and direction sensor heights at the two monitoring stations (3 meters versus 10 meters).

In reviewing the ozone data time series plots for the five sites with ozone monitors (see Table 1-1), all concentrations were found to be reasonable from both temporal and spatial perspectives. The five ozone analyzers in the monitoring network received semi-annual multipoint calibration checks using a certified ozone transfer standard. These checks were conducted in February 2009, August 2009, and April 2010. The pass/fail criterion for these checks was ±5% at each ozone concentration. Overall, the measured ozone concentrations were within the ±10% data quality objective, which is the measure of uncertainty.

Qualitative uncertainty is addressed in the context of the questions from the Scope of Work as outlined below.

1. *How representative are the locations of the monitoring stations (i.e., estimated geographical area around each station that is represented by the measured concentrations)?*

Representativeness is defined in EPA's meteorological program guidance.[62] Relative to location, representativeness of monitoring data, in general, depends on the proximity of the monitoring site to the area under consideration. Representativeness is additionally defined in EPA Prevention of Significant Deterioration (PSD) monitoring guidance[63] as data that characterize the air quality for the general area. Consistent with these EPA definitions, several of the 12 monitoring sites were selected to measure ozone and TAC concentrations within local communities; other monitoring sites measured concentrations in the less populated areas surrounding the communities, and on the boundary of the overall area of concern , and are therefore believed to fairly represent the entire area being developed by the natural gas extraction industry.

2. *How completely does the network cover the affected geographical area?*

The network generally surrounds the main industrial activity in the natural gas production fields in the central portion of the county, especially on the northeast side towards the population centers in and around Pinedale. The Bondurant and Farson stations serve as northwest and southeast boundary sites, respectively, of the Pinedale Anticline and Jonah natural gas production fields.

[62] U.S. EPA. "On-Site Meteorological Program Guidance for Regulatory Modeling Applications," 1987.
[63] U.S. EPA. "PSD Monitoring Guideline," 1987.

3. *How probable are the existence and successful sampling of temporal "hot spots" in air toxic concentrations in the geographical area addressed by the monitoring network?*

Based on the design of the monitoring program, the resulting concentrations did not indicate the presence of any "hot spots" in or around the communities equipped with at least one monitoring station.

4. *Could there be other air toxics present that are not targeted for sampling and analysis?*

Combustion of Diesel fuel, gasoline, and natural gas, all of which occurs throughout the study area, emits hundreds of other air toxics at extremely low concentrations. The low concentrations of the 26 TACs detected in this study suggest that it is improbable that other compounds, not in the list of 51 analyzed TACs, would have been detected at levels above reporting limits.

Combustion of natural gas,[64] Diesel fuel,[65] and gasoline[66] generates a class of compounds called polycyclic aromatic hydrocarbons (PAHs) at low emission rates[67] and resulting low ambient concentrations. Hence, they are present at low levels in all ambient air where motor vehicles operate, including in Sublette County. The more-than-14 individual members of this family of compounds can be sampled with a specially treated sorbent cartridge and analyzed with EPA Method TO-13A, but were not included in the monitoring program for several reasons. PAHs are generated at much lower levels than other trace organic compounds. For example, PAHs make up only 0.054% of the total trace organic compounds emitted by combustion of natural gas in 4-stroke lean-burn internal combustion engines,[68] and therefore would not be expected to exceed screening levels for health risk assessment. When determining the methods and TACs to be sampled in the study, the DEQ consulted EPA's NATTS data analyses.[69] The NATTS analyses found that the majority of the samples collected in the national PAH network (~50 sites) yield results below the detection limit. The median risk calculated for PAHs in the NATTS analyses are below the 1-in-a-million cancer risk level. Because the sampling equipment for Method TO-13A would have required 110-volt electric power

[64] U.S. EPA (2000), op. cit.
[65] U.S. EPA. "Compilation of Air Pollutant Emission Factors," (AP-42), Volume 1 (Stationary, Point and Area Sources), Chapter 3 (Stationary Internal Combustion Sources), Section 3.4 (Large Stationary Diesel and all Stationary Dual-Fuel Engines), Table 3.4-4 (PAH Emission Factors for Large Uncontrolled Stationary Diesel Engines), October 1996.
[66] U.S. EPA. "The Master List of Compounds Emitted by Mobile Sources – 2006."
[67] For example, the PAH benzo(e)pyrene is emitted from a stationary 4-stroke lean-burn natural gas-fired engine at 4.15E-07 lb/MMBtu compared to 8.36E-03 lb/MMBtu (larger by a factor of 2,000) of acetaldehyde from the same engine (U.S. EPA, 2000, op. cit. in Table 3.2-2)).
[68] U.S. EPA. . "Compilation of Air Pollutant Emission Factors," (AP-42), Volume 1 (Stationary, Point and Area Sources), Chapter 3 (Stationary Internal Combustion Sources), Section 3.2 (Natural Gas-fired Reciprocating Engines), Table 3.2-2 (Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines), p. 3.2-13, July 2000.
[69] McCarthy, M.C., H.R. Hafner, L.R. Chinkin and J.G. Charrier. "Temporal variability of selected air toxics in the United States," Atmospheric Environment, doi:10.1016/j.atmosenv.2007.1005.1037 (STI-2894) 2007.

and has other logistical difficulties associated with collection, the DOH, DEQ, and the SCC decided not to monitor for PAHs.

This project determined whether any TICs would be included in the screening health risk assessment being applied to the initial set of 51 TACs. Method TO-15, which was used to analyze the TACs collected in a Summa Canister, is based on an instrument called a mass spectrometer. Each compound has a unique "signature" on this instrument—by matching the observations with a library of known signatures, the laboratory can quantify the concentrations of various compounds. In addition to the 51 TACs specified for this project, the laboratory tentatively identified 26 additional compounds (TICs) in the samples by Method TO-15. One of the TICs was acetaldehyde, which had already been quantified by Method TO-11. Another of the TICs, sulfur dioxide, is actually a criteria pollutant rather than a TAC. Therefore, the laboratory identified 24 TICs in the TO-15 samples that could potentially be added to the 51 TACs for inclusion in the screening health risk assessment.

For TICs, the laboratory assigns both an estimated concentration and a match quality to each measurement. The match quality is the probability that the TIC has been correctly identified.[70] Match qualities above 90% are considered good matches, while qualities less than 50% suggest substantial differences between the sample and reference spectra. Only one of the 26 TICs had a match quality better than 90%. Based on the 50% criterion, the four TICs at the bottom of Table 9-1, which is ordered in the sequence of decreasing match quality, were eliminated from further analysis. However, the tentative identification of all but one of the remaining TICs is marginal at best.

The screening HRA is being conducted in conformance with EPA guidance.[71] In Appendices A and B of that guidance document, recommended[72] screening limits or values are provided. Only three of the TICs have recommended screening health values in the same guidance document. One of these, acetaldehyde, is already being addressed in this study, and is being quantified using Method TO-11; the other two TICs,

---

[70] Bradley, Kimberly S. *Determination of Elemental Sulfur in Explosives and Explosive Residues by Gas Chromatography-Mass Spectrometry*, *http://projects.nfstc.org/trace/docs/Trace%20Presentations%20CD-2/bradley_paper.pdf*, and Journal of Forensic Science, Volume 50, pp. 96-103, 2005.

[71] U.S. EPA (2006), op. cit.

[72] According to EPA (2006), the "*U.S. Department of Energy (DOE) . . . has defined Temporary Emergency Exposure Limits (TEELs), which are temporary levels of concern (LOCs) derived according to a tiered, formula-like methodology. . . . DOE has developed TEELs with the intention of providing a reference when no other LOC is available. DOE describes TEELs as 'approximations of potential values' and 'subject to change.' The EPA's emergency planning program (section 112(r)) does not generally rely on them, and they are provided in Table 2 purely to inform situations in which no other acute values are available. For example, a finding of an acute exposure near a TEEL may indicate the need for a more in-depth investigation into the health effects literature. TEELs are not recommended as the basis of regulatory decision-making. Like ERPGs, TEELs are multiple-tiered, representing concentrations associated with no effects (TEEL-0), mild, transient effects (TEEL-1), irreversible or serious effects (TEEL-2), and potentially life-threatening (TEEL-3). Consistent with DOE's intent, Table 2 provides the TEEL-0 and -1 concentrations for substances that lack acute values from other sources*." Note: Appendix B from EPA (2006) is updated through June 12, 2007 as Table 2 on EPA's website at http://www.epa.gov/ttn/atw/toxsource/table2.pdf.

acetonitrile and propane, have match qualities well below 50%. Thus, none of the TICs remain for further analysis.

Table 9-1
Tentatively Identified Compounds

TIC	CAS No.	Average Match Quality (%)	Eliminated For Poor Match Quality?	Eliminated for Having No EPA-Recommended Screening Health Values? [a]	Included in EPA-Recommended HRA Risk Screening Approach? [b]
Diethyl phthalate	84-66-2	92%		Yes	No
Cyclohexane, methyl-	108-87-2	89%		Yes	No
Pentane, 3-methyl-	96-14-0	86%		Yes	No
Pentane	109-66-0	84%		Yes	No
2-Butanol	78-92-2	83%		Yes	No
Cyclopentane, methyl-	96-37-7	82%		Yes	No
Hexane, 2-methyl-	591-76-4	81%		Yes	No
2-Butene, (E)-	624-64-6	80%		Yes	No
Silanol, trimethyl-	1066-40-6	78%		Yes	No
Furan, 2-propyl-	4229-91-8	76%		Yes	No
Butanal	123-72-8	76%		Yes	No
Butane, 2-methyl-	78-78-4	75%		Yes	No
3-Butenoic acid	625-38-7	73%		Yes	No
Pentane, 2-methyl-	107-83-5	72%		Yes	No
Acetaldehyde	75-07-0	68%		Quantitatively addressed by TO-11	Yes
1H-Tetrazole, 5-methyl-	4076-36-2	68%		Yes	No
Butane	106-97-8	61%		Yes	No
2-Butenal, (E)-	123-73-9	61%		Yes	No
1-Propene	115-07-1	54%		Yes	No
Propane, 2-methyl-	75-28-5	53%		Yes	No
1-Hexyn-3-ol	105-31-7	50%		Yes	No
Heptane, 2,5-dimethyl-	2216-30-0	50%		Yes	No
Methane, isocyano-	593-75-9	28%	Yes	Yes	No
Sulfur dioxide	7446-09-5	9%	Yes		Addressed by NAAQS.
Acetonitrile	75-05-8	7%	Yes		No
Propane	74-98-6	7%	Yes		No

a. U.S. EPA (2006), Appendices A and B, op. cit.
b. U.S. EPA (2006), op. cit.

5. *Did the sampling and analysis detect air toxics for which screening values were not available in EPA guidance or other key references?*

EPA chronic screening values were not available for 13 of the 51 TACs monitored in the network (see Table 6-1). EPA acute screening values were not available for 48 of the 51 TACs monitored in the network. Acute screening values for these 48 TACs were available from other agencies, as shown in Table 6-1. A close match was found between the availability of screening values from EPA guidance and from the other main source of screening values, California's Office of Environmental Health Hazard Assessment.[73]

6. *What uncertainty was introduced by the selected sampling frequency, sampling duration, detection limit, or other sampling/analytical parameter?*

Only a short-term spike in a TAC concentration would be potentially missed by the network sampling frequency of every sixth day; no such spikes are typically associated with the operations in the gas fields. Any diurnal variation in the concentration of a TAC would not be quantified by the 24-hour sampling duration, but the daily average concentration would be properly collected. The low reporting limits for the 51 TACs in the study did not introduce uncertainty into the results of the screening nor the estimate of excess cancer risks and non-cancer chronic health hazard index.

7. *Were any specific HAPs mistakenly identified (e.g., hexavalent chromium vs. total chromium)?*

As not all TACs are hazardous air pollutants (HAPs), the more relevant question to be answered is *Were any specific TACs mistakenly identified (e.g., hexavalent chromium vs. total chromium)?*

The program did not uncover any mistaken identification of TACs.

8. *To what extent can any of the emitted HAPs partition to other media (e.g., soil, water) and gain entry to humans from other pathways than inhalation (e.g., dermal exposure, soil ingestion)?*

The monitoring network and the screening health risk assessment were designed to address those air toxics that gain entry to humans through inhalation and that might be expected to be present in significant concentrations (i.e., above screening levels). As a result, all of the TACs evaluated in this study are gaseous pollutants. Non-inhalation pathways require that the compounds first be deposited on the ground or in water, and then ingested along with soil or water, or be brought into physical contact with exposed skin for the dermal absorption pathway. As a result, non-inhalation pathways are not expected to contribute to risk in any significant way.

[73] California Air Resources Board/Office of Environmental Health Hazard Assessment (ARB/OEHHA) *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values,* February 9, 2009, *http://www.arb.ca.gov/toxics/healthval/contable.pdf.*

10.0 POTENTIAL HEALTH IMPACTS

The purpose of this section, following EPA guidance,[74] is to determine if any further characterization of excess cancer risk[75] or non-cancer health hazard is needed. Although only one (suspect) TAC measurement was above the acute screening levels, concentrations of one or more TACs above the chronic screening levels were detected at each of the monitoring sites. Previous sections of this report have discussed the low levels of the 26 TACs that survived the initial screening; the 12-month average (arithmetic mean) concentrations of these TACs were used to determine if excess cancer risk or chronic health hazard from inhaling these concentrations is potentially high enough to warrant a more detailed health risk assessment.

The combined excess cancer risk from the TACs monitored at each of the 14 monitoring stations in this study is calculated in Appendix F Tables F-1 through F-14, and summarized in Table 10-1. The excess cancer risk of inhaling each carcinogenic TAC at the average annual concentration recorded at each monitoring station (see Appendix D) continuously for 70 years is summed to obtain the total excess cancer risk from the set of carcinogenic TACs as shown in Appendix F. Appendix G explains how excess cancer risk was calculated. The lowest calculated excess cancer risk was 14 in one million[76] at the Bondurant monitoring station (see Table 10-1 and Appendix F Table F-3), and the highest was 50 in one million at the Big Sandy monitoring station (see Table 10-1 and Appendix F Table F-2). These cancer risks are the upper-bounds calculated using the screening methodology, which is conservative by its design; actual risks are likely to be significantly lower.

EPA provides context for these results through its National Air Toxics Assessment (NATA) program.[77] The most recent comprehensive survey of the nation, by county, was for 2002[78], and the overall cancer risks for Sublette County were as follows (units = in one million):

- Background: 9.4
- Excess from Major Sources: 0.012
- Excess from Area Sources: 0.8
- Excess from On-road vehicles: 0.13

[74] U.S. EPA (2006), op. cit.
[75] Excess cancer risk is the amount of risk from a specified source of exposure to carcinogens that is above the level of cancer risk we have from all other sources, such as tobacco smoking, foods that we eat, carcinogens in drinking water, exposure to sunlight, X-rays and other forms of radiation.
[76] Units of excess cancer risk are "in one million," which is an expression of the probability or the chance of contracting cancer from the inhalation of, and exposure to, specified concentrations of identified carcinogens, including the 19 carcinogens listed in Tables 6-1 and 7-1.
[77] U.S. EPA. "National Air Toxics Assessments," http://www.epa.gov/ttn/atw/natamain/.
[78] Id, http://www.epa.gov/ttn/atw/nata2002/index.html.

- Excess from Non-road equipment: 0.049
- Total: 10

The two neighboring counties that share the same oil and natural gas fields, Lincoln and Sweetwater, have similar total cancer risks at 11 and 18 in one million, respectively. The methodology of the NATA program was to compile emission inventories and to estimate the resulting airborne concentration by air dispersion modeling, not monitoring. The modeled concentrations were then used to compute excess cancer risk for the median individual in each census tract.

These excess cancer risk levels are significantly lower than the cancer risks found in most urban areas, and even in rural areas. The U.S. EPA considers excess cancer risk below 100 in one million to be acceptable,[79] which is a level exceeded by ambient air toxics for more than 20 million people in the nation.[80] Based on the relatively low excess cancer risks found in this screening health risk assessment and on EPA guidance,[81] no further risk characterization is warranted for the TAC concentrations measured in the 14-month monitoring program.

The potential non-cancer chronic health hazard index from the TACs monitored in this study is also calculated in Appendix F Tables F-1 through F-14, and summarized in Table 10-1. The lowest calculated non-cancer chronic health hazard index was 0.28 at the Boulder monitoring station (see Table 10-1 and Appendix F Table F-4) and the highest was 0.53 at the La Barge #2 monitoring station (see Table 10-1 and Appendix F Table F-9). Appendix G explains how the non-cancer chronic health hazard index was calculated. These non-cancer chronic health hazard indices are the upper-bound calculated using a screening methodology, which is conservative by its design; actual chronic health hazard indices are likely to be significantly lower. A chronic health hazard index of less than 1 is considered to be less than significant.

Using these thresholds of significance, the differences in the levels of excess cancer risk and non-cancer chronic health hazard index between the monitoring sites that were computed for the different concentrations of carcinogenic and non-carcinogenic TACs, respectively, would also be less than significant (i.e., there cannot be significant differences between two or more less-than-significant non-cancer chronic health hazard indices).

EPA provides context for these results also through its NATA program. The 2002 comprehensive survey of the nation, by county, included not only cancer risk, as discussed above, but also "respiratory risk," which is the same as chronic health hazard index as used in this study. The 2002 NATA respiratory risks for Sublette County were as follows (dimensionless):

---

[79] U.S. EPA. "Risk Characterization," Region 8; taken from the April 1991 Document 93555.0 by D.R. Clay of EPA's Office of Solid Waste and Emergency Response, http://www.epa.gov/region8/r8risk/hh_risk.html#cancer (accessed December 17, 2010).
[80] U.S. EPA. "1996 National-Scale Air Toxics Assessment Summary of Results," http://www.epa.gov/ttn/atw/nata/risksum.html (accessed January 26, 2011).
[81] U.S. EPA (2006), op. cit., Step 7, pp. 16-17.

- Background HHI: 0.041
- HHI from Major Sources: 0.00017
- HHI from Area Sources: 1.1
- HHI from On-road vehicles: 0.041
- HHI from Non-road equipment: 0.019
- Total: 1.2

Because the study program of directly monitoring TAC concentrations is so different from the EPA NATA program methodology of assembling an emission inventory followed by modeling ambient concentrations, no conclusion can be drawn from the difference between the resulting chronic health hazard indices. The two neighboring counties that share the same oil and natural gas fields, Lincoln and Sweetwater, have similar respiratory risks (chronic health hazard indices) at 0.62 and 0.96, respectively. The methodology of the NATA program was to compile emission inventories and to estimate the resulting airborne concentration by air dispersion modeling, not monitoring. The modeled concentrations were then divided by the respective chronic reference concentrations to compute chronic health hazard index for the median individual in each census tract.

The estimated health impacts of the 51 TACs monitored in the study are not high enough to suggest a need for a more refined health risk assessment of the TACs in the ambient air in and near Sublette County.

Concerning the ozone measurements in the 14-month monitoring program, the highest 8-hour average concentration was 69 parts per billion by volume (ppbv) at Bargerville on February 23, 2009.[82] The National Ambient Air Quality Standard is 75 ppbv for 8 hours. Because the highest measured concentration was less than the standard, it can be concluded that ozone levels at the five ozone monitoring stations and sites during the study period were low enough to avoid any direct health impacts (i.e., NAAQS are set to protect public health, including the most sensitive subpopulations of infants, the elderly and the ill, with a large margin of safety).

[82] ARS. "Sublette County Air Toxics Inhalation Project Final Data Submittal Report February 3, 2009 – March 31, 2010," Table 4-16 (Highest Daily 8-Hour Average Ozone Concentrations February 2009 – March 2010), page 4-8, June 30, 2010.

Table 10-1
Cancer Risk and Chronic Non-Cancer Health Hazard Index, Sublette County, Wyoming

Monitoring Station	Cancer Risk (in one million)	Chronic Health Hazard Index (-)
Bargerville	16	0.35
Big Sandy	50	0.43
Bondurant	14	0.30
Boulder	20	0.28
CASTNet	22	0.34
Daniel	21	0.35
Farson	18	0.38
La Barge #1	35	0.52
La Barge #2	35	0.53
Marbleton East	20	0.36
Marbleton	29	0.46
Pinedale #1	39	0.46
Pinedale #2	32	0.37
Sand Draw	35	0.47
Minimum	14	0.28
Average	28	0.40
Maximum	50	0.53

Appendix A

Project Initiation Field Trip Report

This appendix contains the October 19, 2009 report on the September 9-11, 2009 trip made by Sierra Research and T&B Systems, Inc. to review the design and operation of the monitoring network established to measure ozone at five monitoring stations and toxic air contaminants at 14 monitoring stations (located at 12 monitoring sites).

October 19, 2009

sierra research

1801 J Street
Sacramento, CA 95811
Tel: (916) 444-6666
Fax: (916) 444-8373

Ann Arbor, MI
Tel: (734) 761-6666
Fax: (734) 761-6755

Dr. Timothy Ryan
Wyoming Department of Health
6101 Yellowstone Road, Suite 510
Cheyenne, WY 82002

Subject: Report on September 9-11, 2009 Field Trip for Sublette County Air Toxics Health Risk Assessment

Dear Tim:

Project Task A includes both the orientation field trip and the assessment of the project data set, which will not be completed until early 2010. This letter report is the first project deliverable under Task A, and consists of a summary of our September 9-11 orientation field trip. The following people participated in the field trip:

- Eric Walther, Sierra Research;
- Dave Bush, T&B Systems, Inc.;
- Tim Ryan, Wyoming Departments of Health and Environmental Quality;
- Lincoln Sherman, Air Resource Specialists, Inc.; and
- Meghann Durbrow, Sublette County Department of Conservation.

General Observations

The field trip included visits to 13 of the air toxics network monitoring sites. This letter summarizes our observations during those visits, as well as overall observations on the relationship between the network and the health risk assessment to be accomplished for the project.

During our drive from Salt Lake City on the afternoon and evening of Wednesday, September 9, Dave Bush and I stopped to inspect the La Barge monitoring station. This station has two collocated air toxics monitoring stations, each of which includes an EPA Method TO-15 Summa canister and an EPA Method TO-11 sorbent tube. One station also monitors wind speed and direction from a height of approximately 10 feet. The La Barge station is located so that it both measures air toxics in that small community, and acts as a boundary station for flow coming into Sublette County from the south along Highway 189.

The sites visited on Thursday, September 10, are listed below, along with some main characteristics. La Barge, visited late Wednesday, and Farson, visited early Friday during the drive back to Salt Lake City, are also listed for completeness.

Site	Characteristics	Notes
La Barge	2 monitoring stations, collocated. Measures TO-11 and TO-15 air toxics. Next to Highway 189.	Measures air toxics in the local community. Serves also as a boundary site relative to air flow from the south along Highway 189. Photograph 1.
Pinedale	2 monitoring stations, collocated. Measures TO-11 and TO-15 air toxics. Also a WyDEQ monitoring station.	Measures air toxics in the local community. Photographs 2 and 3.
CASTNet	Single air toxics monitoring station collocated with monitoring stations of several other programs.	Serves as a northeast boundary site to the valley. Photographs 4 through 8.
Bargerville	Single air toxics monitoring station.	Measures air toxics in the local community. Appears to be at an elevation above contaminant flows from northwest and west. Photographs 9 through 12.
Boulder I	Single air toxics monitoring station.	Measures air toxics in the local community. Photograph 13.
Big Sandy	Single air toxics monitoring	Serves as a southeast boundary site. May receive drainage air from hills to the east. Photographs 14 and 15.
Sand Draw	Single air toxics monitoring station.	Measures air toxics in the locale of gas industry support activities. Photographs 16 through 18.
Boulder II	Single air toxics monitoring station collocated with other monitoring, including photographic program.	Located close to gas industry drilling on mesa to the west. Photographs 19 through 24.
Gas Field (not a monitoring Station)	Drilling, storage and compression facilities	Supports mesa gas field drilling. Photographs 25 through 29.

Site	Characteristics	Notes
Linn	Single air toxics monitoring station.	Located on the north side of the New Fork River valley along Hwy 351. May "see" contaminant circulation around south end of industrial development. Photographs 30 and 31.
Marbleton/ Big Piney	Single air toxics monitoring station.	Measures air toxics in the local community.
Daniel	Single air toxics monitoring station.	Measures air toxics in the local community. Serves as a west and near northwest boundary site. Photographs 32 and 33.
Bondurant	Single air toxics monitoring station.	Serves as the far northwest boundary site. Winds are channeled along NNW/SSE line by nearby ridges to east and west. Photograph 34.

Quality Assurance Review

The air toxics monitoring site locations, configurations, sampling equipment, and operating procedures were compared against the guidelines presented in the EPA "Technical Assistance Document (TAD) for the National Ambient Air Toxics Trends and Assessment Program" (February 28, 2007) to verify that monitoring is being conducted in a manner consistent with approved methods, and to document any exceptions.

Siting

In reviewing the siting of the air toxic samplers, the locations were compared with the following guidance presented in the TAD:

> *The vertical placement of the sample inlet and inlet funnel should be in the breathing zone at a height of approximately 2 to 4 m above ground level. In addition, the inlet funnel should be positioned more than 1 m, both vertically and horizontally, away from the housing structure. The inlet funnel should be positioned away from nearby obstructions such as a forest canopy or building. The vertical distance between the inlet funnel and any obstacle should be at least two times the height difference between the obstacle and the inlet funnel. Unrestricted airflow across the inlet funnel should occur within an arc of at least 270 degrees. The predominant and second most predominant wind directions must be included in this arc.*

The TAD does not specifically address distance from roadways. For this, the criterion used for PAMS VOC monitoring (i.e., greater than 10 meters from roadways) was used. Guidelines in Volumes 2 and 4 of the EPA "Quality Assurance Handbook for Air Pollution Measurement" were used for reviewing siting of ozone and meteorological measurements, though the wind measurement siting criteria were only loosely compared due to the data quality objectives needed for this study and the low (2-meter) sensor locations.

All samplers in the Sublette County air toxics monitoring network have inlets located at a height of 2 meters above ground, and the sampler housing structure is sufficiently small to not be a factor. All samplers were also located at least 10 meters from roadways. Most of the sites meet the remaining criteria specified in the TAD. The following exceptions are due primarily to the difficulty associated with finding accessible locations at which to place the samplers. The exceptions primarily deal with the representativeness of the wind measurements, and are presented here to provide individuals analyzing the data with any information relating to data representativeness. Although the wind field is diverted around the buildings described below, we do not expect the resulting wind fields to significantly affect the TAC concentrations measured at these monitoring stations.

- Marbleton – A pump building located 2 meters east of the wind sensors may be acting as an obstruction to wind flow. Wind roses for the first two quarters show little wind from the east quadrant, though this is not inconsistent with prevailing winds in the area.

- La Barge – A large building located about 13 meters southwest of the wind sensors is likely acting as an obstruction to the air flow. Wind roses for the first two quarters show a high frequency of winds from the west and south, but few winds from the southwest, consistent with the location of the building.

- Boulder – A large building located about 12 meters northwest of the wind sensors is likely acting as an obstruction to wind flow. Wind roses for the first two quarters show a high frequency of winds from the WNW and NNW, with a drop in frequency of winds from the northwest, consistent with winds going around the building. Wind speeds are also likely affected. Reported wind speeds are notably lower at this site than at other network sites in the vicinity, and the wind sensor (vane and propeller) visually appeared inconsistent with the apparent neighborhood scale wind at times during the site visit. Since the prevailing winds in this area are from the northwest, the location to some degree does not meet the criterion that winds from the predominant wind direction should be unrestricted, though the location of the building does meet the two times the obstruction height criterion mentioned above.

- Bondurant – A barn located about 12 meters northwest of the wind sensors is likely acting as an obstruction. The site is located in a northwest/southeast oriented valley with winds clearly defined by the terrain. Wind roses for the first two quarters show a high frequency of winds from the NNW, with virtually no winds from the northwest, consistent with air flow deflecting around the building. Wind speeds are also likely affected. Reported wind speeds are notably lower at this site than at the other sites in the network. Since the prevailing winds in this

area are from the northwest, the location to some degree does not meet the criterion that winds from the predominant wind direction should be unrestricted, though the location of the building does meet the two times the obstruction height criterion mentioned above.

All applicable criteria for the siting of the ozone analyzers are being met.

Air Toxic Samplers

The equipment used to collect the air toxic samples was compared against the guidelines in the TAD. Most differences are inconsequential, as the TAD anticipates sampling from a larger inlet and sample manifold at a conventional air quality monitoring station, rather than from the compact units used in this remote-site study. Nonetheless, the differences are documented below.

- The TAD states that chromatograph-grade stainless steel should be used for all sample lines. While stainless steel tubes are used as sample inlets, the tubing within the sampler is Teflon. This is not considered an issue, due to the short lengths and known inert nature of Teflon.

- Similarly, the TAD specifies the use of stainless steel solenoids, while the material coating the network solenoids is Teflon. Again, this is not considered a significant issue.

- The sample systems specified in the TAD contain a bypass pump drawing excess air through the sample manifold. This is done primarily to decrease sample air residence time within the manifold, and any reactions between the substances being sampled, walls, and other substances. Residence times were estimated as approximately 15 seconds for the sample lines as configured. These residence times are adequate because the Photochemical Assessment Monitoring Stations (PAMS) residence time criterion is less than 20 seconds. Thus, a bypass pump is not needed.

- For TO-11A sampling, the TAD specifies the use of an ozone scrubber upstream of the sorbent tube. The network samplers are equipped with a cartridge style ozone scrubber. The TAD acknowledges that a cartridge scrubber is allowed for TO-11A sampling, but states that a denuder style scrubber is required for National Air Toxics Trend Stations (NATTS). The primary issue regarding cartridge scrubbers is that they can be susceptible to plugging problems in the presence of moisture. Given the dry environment of Sublette County, this is not considered a significant issue, and, barring any noted decreases in sample flow rate, the samples will be valid.

The TAD specifically indicates that all air toxic sampler systems should undergo a certification process to identify any additive or subtractive biases. For TO-15, this involves a challenge sample consisting of a certified standard blend of organic compounds at concentrations of around 10 parts per billion by volume (ppbv) collected through the sampling system over a 24-hour period. Analyzed samples should show

recoveries in the range of 85 to 115 percent for each compound. The system should also be challenged with certified zero air, with results showing 0.2 ppbv or less for all compounds. The certification process for TO-11A is similar, though only the challenge using zero air is required.

This certification process has apparently not been conducted for the sampling systems used in the network. While the differences noted above are mostly not considered significant, it is highly recommended that the network sample system undergo this certification process as soon as it can be arranged. Successful certification would effectively eliminate concerns regarding sampler performance.

Ozone Monitoring

As noted above, all siting criteria for ozone are being met; there are differences, however, between the procedures implemented at the toxic air monitoring sites and the methodologies for collecting performance data as described in the Air Resource Specialists' Quality Assurance Performance Plan (QAPP) for the monitoring network. The ozone monitoring sites utilize TECO Model 49 ozone analyzers equipped with options for conducting daily internal zero, precision, and span checks. Precision and span concentrations are generated using an ozone-generating UV lamp within the analyzer. While ozone generators have the potential of being certified as a transfer standard (through routine checks using defined performance criteria), these systems are not being operated as transfer standards, and are essentially providing a more qualitative (or semi-quantitative) indication of instrument performance. Thus, the "precision" input concentrations are not traceable to a standard.

For example, the field technician has indicated that she has on occasion adjusted ozone lamp voltages (the lamp voltage controls the ozone test concentration) when the response of the analyzer drifts beyond an established percent of the target concentration. This procedure, in essence, assumes that a shift in results is most likely due to a change in the ozone production by the lamp or changes in the flow of air through the ozone generator. This is a reasonable assumption, as UV photometric ozone analyzers typically are either working accurately, or obviously not working. The automated zero and span checks used at these sites will readily identify a malfunctioning analyzer. There is some danger that significant inaccuracies in the response will be identified only when the analyzer is compared against a certified transfer standard during its semi-annual calibration, resulting in long periods of invalid or questionable data. However, the possibility of this scenario occurring is remote, given the nature of the analyzers.

Barring highly unusual situations, semi-annual calibrations against a transfer standard, combined with the semi-quantitative precision and span checks, will verify the accuracy of the collected data. However, the precision data will not meet the requirements of 40 CFR 58 for one-point checks because the input concentration is not definitively known or traceable. The lack of a certified transfer standard at the sites is contrary to the project QAPP, which states that a transfer standard is present at each site. It is recommended that the QAPP be revised to accurately describe the actual quality control checks for the ozone analyzers.

Because only a draft version of the QAPP was available for review at the time of the network review trip, the QAPP should be finalized as soon as possible. The finalized version, in addition to supplying portions labeled as missing in the draft, should include the following:

- A detailed description, including schematics, pictures and performance testing results, of the air toxics sampler used for this study, should be provided.
- Standard operating procedures, including checklists, for routine field operations associated with these samplers should be included as an appendix.
- A more detailed description of the actual procedures and standards used for performance checks of the ozone analyzers needs to be included. Consistency between sections and tables should be verified.
- A description of the canister cleaning procedures is recommended.

Site Operations

Site operations are being conducted adequately by the field technician, Meghann Durbrow. Samples are collected and reloaded the day after sampling to minimize the time during which the exposed TO-11A (carbonyl) samples are not cooled to refrigerator temperature. Ms. Durbrow makes an extra trip to the Pinedale site to load one of the carbonyl collocated samplers immediately before the sample day, thereby seeing any effect that pre-sampling lack of refrigeration has on carbonyl sampler results. Chain-of-custody forms are filled out for all samples and sample handling is appropriate. All components of the monitoring system are checked during the collection/reloading visit using a checklist log. Ms, Durbrow has prepared written Standard Operating Procedures (SOPs) for the operations.

Please contact me at 916-273-5134 if you have questions.

Sincerely,

Eric Walther
Project Manager
Sublette County Air Toxics Health Risk Assessment Project

Appendix B

Monitoring Data Assessment

prepared by T&B Systems, Inc.

This appendix contains the detailed assessment of the ozone, toxic air contaminant, and ozone monitoring data obtained from the network, and its quality assurance that allowed the data to be used in the screening health risk assessment.

Toxic Air Contaminant Monitoring Data Assessment
Sublette County Air Toxics Health Risk Assessment

Ambient air monitoring data were collected from 14 monitoring stations located at 12 sites in and near Sublette County, Wyoming by Air Resource Specialists, Inc. (ARS) from the first quarter of 2009 through the first quarter of 2010. The data included measurements for air toxics (24-hour samples every 6th day), wind speed, wind direction, and temperature. In addition, five of these sites were equipped with ozone (O_3) analyzers. The data were validated and submitted by ARS in five quarterly data reports. This report was drafted on August 2, 2010, and presents reviews of the data reports and submitted data for the purpose of assessing data quality. Because it was a post-monitoring assessment, the findings herein were not submitted to elicit changes in monitoring methodology during the active period of the network.

Review Methodology

Information supplied with the data reports consisted of the validated hourly air toxics concentrations, ozone concentration, and meteorological data presented in spreadsheets, detailed data files for the air toxic data including all quality control (QC) data, and the results of the semi-annual calibration checks of the ozone analyzers. In general, the review methodology consisted of spot-checking the data in the tables and figures of each data report per the validated hourly data and checking the data for reasonableness and consistency. Particular attention was placed on reviewing available QC data, as well as the key data quality objectives in the management of this monitoring network (accuracy, precision, completeness, and reasonableness).

Data Report Content

The data collected at the 14 stations provided a total of 69 types of measurements reported for each calendar quarter. The data recovery statistics included calculations of percent data collected and percent valid data. The statistics indicated that the data recovery objective of 75% was met in every quarter for each type of measurement, with the exception of formaldehyde/acetaldehyde at La Barge #1 in the first quarter of 2009. However, monitoring did not begin until February 24, 2009, so there was a total of only 6 samples possible for the quarter. No mention of the two lost samples of formaldehyde/acetaldehyde was made in Table 3-8 (Operational Summary for La Barge #1), though data files reveal that the samples were invalidated due to sampler problems (low sample flow rates).

While no other parameters fell below the data recovery goals presented in the Quality Assurance Program Plan (QAPP), several errors in the report tables were noted during the review:

- In Table 4-1 of the 3rd quarter 2009 report (BARG), the number of air toxic canisters and formaldehyde/acetaldehyde samples apparently should be 13 and 15, respectively. In addition, the number of valid canisters should be 13, resulting in a data recovery of 86.7%, not 93.3%.

- In Table 4-7 of the 1st quarter 2010 report (FARS), the number of collected and valid canisters should be 15, resulting in a data recovery of 100%, not 93.3%.

- The following tables have the data recovery statistics for the canisters and formaldehyde/acetaldehyde samples reversed:

    - 2nd quarter 2009, Table 4-2 (BISA)
    - 3rd quarter 2009, Table 4-2 (BISA)
    - 3rd quarter 2009, Table 4-3 (BOUL)
    - 3rd quarter 2009, Table 4-7 (FARS)
    - 3rd quarter 2009, Table 4-9 (LAB2)
    - 3rd quarter 2009, Table 4-10 (LINN)

In addition to verifying data recovery statistics, the following checks were conducted to verify the content of the reports:

- The hourly data from one selected site per quarter were used to re-calculate and check the 1-hour and 8-hour ozone statistics data in the report tables.

- The hourly data from one selected site per quarter were used to recreate the ozone pollutant roses using Lakes Environmental software. These new pollutant roses were then compared to the five selected pollutant roses in the reports.

- The hourly data from the 1st Quarter of 2010 for Bargerville were used to recreate ozone diurnal plots, which were then compared to the plots in the report.

- Selected ozone plots from Section 4 of the reports were compared to the ozone plots for the same sites and reporting periods in Appendix A of the reports.

- The hourly data from the 2nd Quarter 2009 and the 1st Quarter 2010 for the Big Sandy site were used to recreate the wind roses using Lakes Environmental software.

It is worth noting that Figures 4-9 through 4-13 of the 2nd Quarter 2009 report use data from April 2009 only when generating the diurnal trend plots, while in the other four reports data from the entire quarter are used.

Ozone and Meteorological Data Quality

The ozone and meteorological data time series plots for the five sites in each of the five quarterly reports were reviewed and found to be reasonable from both temporal and spatial perspectives. It was noted that the diurnal variation at Bargerville was significantly less than the variation at the other four sites, particularly in the winter months. This is consistent with the fact that the Bargerville site is located higher in elevation than the other ozone monitoring sites, and consequently may not be as influenced by the low inversions known to occur in this region during the winter. While the daily peak ozone concentrations at Bargerville were in reasonable agreement with the other sites, the daily minimums were considerably higher. This effectively pushed the average concentrations for Bargerville to higher values than at the other four ozone monitoring sites. The ozone maximum, minimum, and average plots for Farson, La Barge, Marbleton, and Sand Draw showed reasonably close temporal agreement with one another for each reporting period.

The five ozone analyzers in the monitoring network received semi-annual multipoint calibration checks using a certified ozone transfer standard. These checks were conducted in February 2009, August 2009, and April 2010. The pass/fail criterion for these checks was ±5% at each ozone concentration.

The documentation from these checks was reviewed and it was found that all ozone analyzers passed the checks, with the exceptions of those performed at Farson on August 24, 2009 and Marbleton on August 26, 2009. In both cases the analyzer span setting/ozone coefficients were subsequently adjusted such that the analyzers agreed with the transfer standard concentrations, and post-adjustment multipoint checks were then conducted. It should be noted that these two failed checks did not have any effect on the reported data, for there were no ozone data invalidated at either site prior to the times of the calibration checks, since data were still within the ±10% data quality objective.

To further validate the meteorological data, two additional checks were made. First, the wind data from Big Sandy (BISA) for the 1st quarter 2010 was compared against data collected for the Upper Green Winter Ozone Study (UGWOS) 2010 using a collocated system of similar design. Results of this comparison are presented in Figure B-1, showing virtually one-to-one agreement. Second, winds from Pinedale (PIN1) are compared against those measured at the collocated Pinedale air quality monitoring site using a 10-meter tower. These results are presented in Figure B-2. The noted disagreement is expected, given the difference in sensor heights (3 meters versus 10 meters), and the comparison is considered favorable. However, the comparison does demonstrate the decrease in measured wind speed (by about 20%) observed by lowering the sensor height.

Air Toxics Data Quality

The following checks were conducted to evaluate the data quality of the air toxic data:

- Approximately 75% of the TO-15 laboratory data files and 100% of the TO-11 were reviewed to verify that laboratory data quality objectives were met. This included review of the daily Continuing Calibration Verifications (CCV) recoverability, sample surrogate recoverability laboratory blanks, laboratory duplicate results, and field blank data to verify that results meet the criteria presented in the QAPP.

- The air toxic data presented in the bar graph plots in the data reports were spot-checked against the data files. These checks concentrated on notably high values or discrepancies in the collocated data.

- The collocated data were processed using EPA procedures for calculating sampling precision using collocated samples. Coefficient of Variation (CV) values were calculated for all compounds where at least 6 valid collocated comparisons were available over the course of the study. For a comparison to be valid, the average concentration for the two samples had to be at least five times the minimum reporting limit, per a similar criteria used by the laboratory for evaluating laboratory duplicates. Calculations were based on the relative difference as defined by the EPA for collocated samples as follows:

$$d = (\text{primary} - \text{collocated}) / ((\text{primary} + \text{collocated})/2) \times 100\%$$

Essentially all laboratory QC criteria, as presented in the QAPP, were met. Field blanks for the formaldehyde/acetaldehyde samples were incorporated into the monitoring beginning mid-June 2009. These field blanks initially had detected formaldehyde concentrations equal to approximately two times the reporting limit. These detected concentrations basically only occurred through the end of June 2009, though occasionally (but rarely) a blank would report similar concentrations for formaldehyde. This is not considered a significant problem since, for the majority of sites, analyzed concentrations were typically 10 times the blank concentration. The possible exception is for the Pinedale (PIN1) monitoring station, where analyzed concentrations were more on the order of 4 or 5 times the blank concentration.

Table B-1 presents the precision data calculated from the collocated samples. Review of the laboratory duplicate data showed good repeatability, easily meeting the ± 25% criteria presented in the QAPP. However, as can be seen in Table B-1, total sampling precision for the canisters was not always good. Only four compounds had CVs within approximately 40% (butanone, chloromethane, cyclohexane, and heptane). Acetone showed good precision at Pinedale (PIN), but not at La Barge (LAB). This is likely due to the higher concentrations and number of comparable samples at Pinedale, providing a more representative precision data set. The remaining compounds all have CVs greater than 47%, with many CVs above 100%.

In contrast, precision for the formaldehyde/acetaldehyde samples was generally very good, with CVs within 30%.

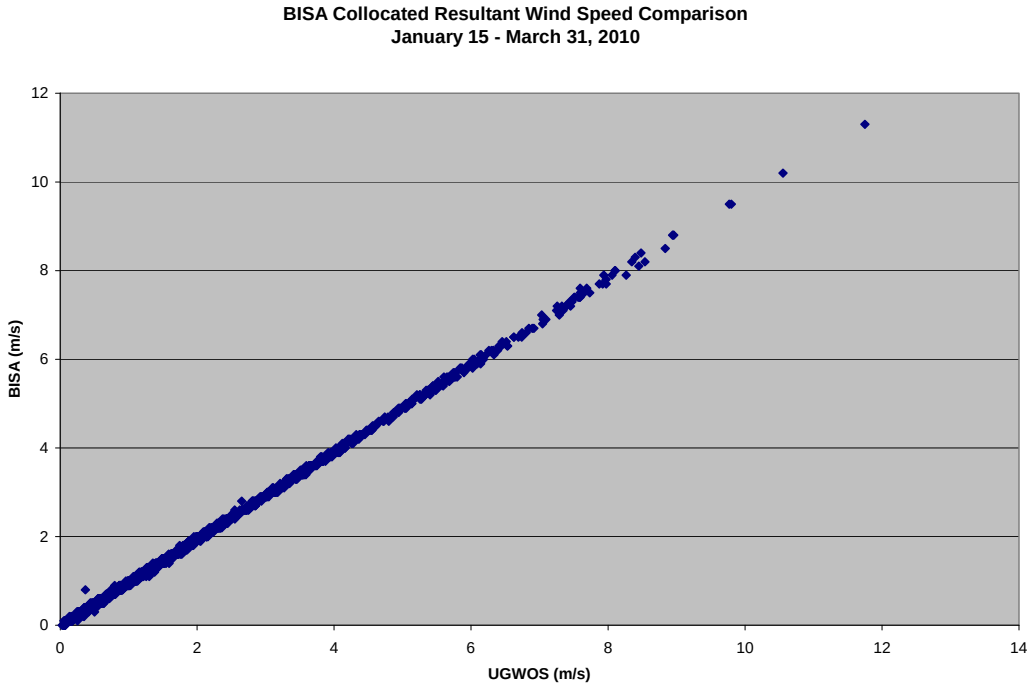
As stated above, an emphasis was placed on reviewing days with notably higher air toxic concentrations. In reviewing the air toxics composition on those days, it should be noted that 2-propanol and/or ethanol are the major contributors to the high concentrations noted. In most cases, though, increased 2-propanol and ethanol concentrations were accompanied by similar increases for many of the other compounds, indicating an overall more contaminated sample. However, during review of the collocated data for the 4th quarter of 2009, three instances were noted where the increase in total air toxics was due almost entirely to high 2-propanol and/or ethanol. These were as follows:

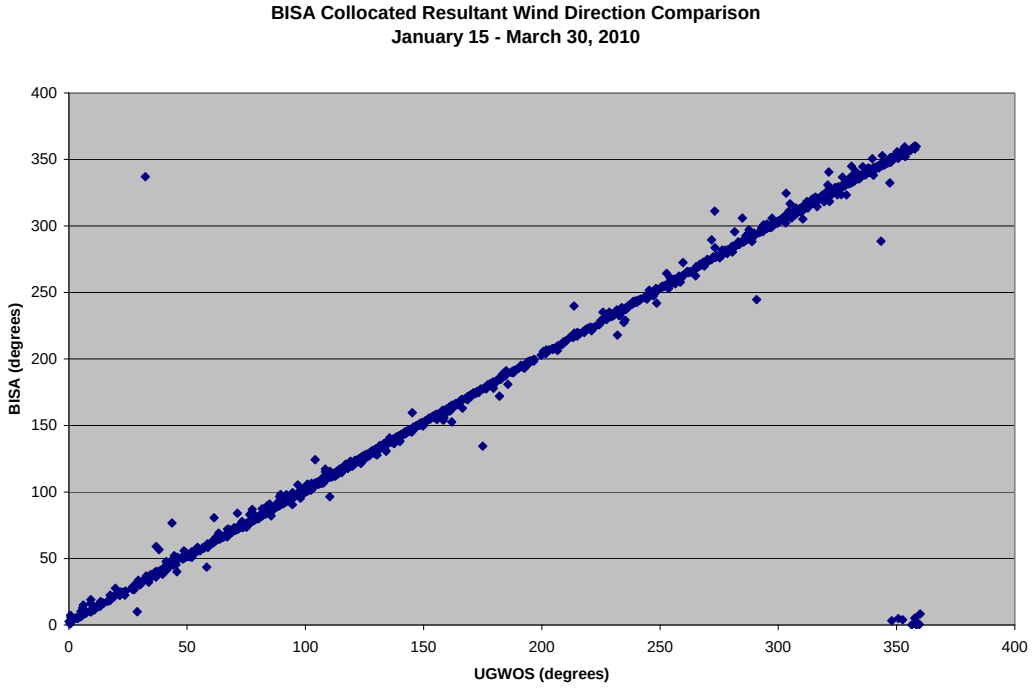
- PIN2 11/9/09 – 2-Propanol and Ethanol
- PIN2 11/21/09 – 2-Propanol
- LAB2 10/22/09 – 2-Propanol

Both 2-propanol and ethanol had very high CVs, and these occurrences further demonstrate possible limitations in the accuracy of the data for particularly these compounds, but also for many other canister compounds with high CVs.

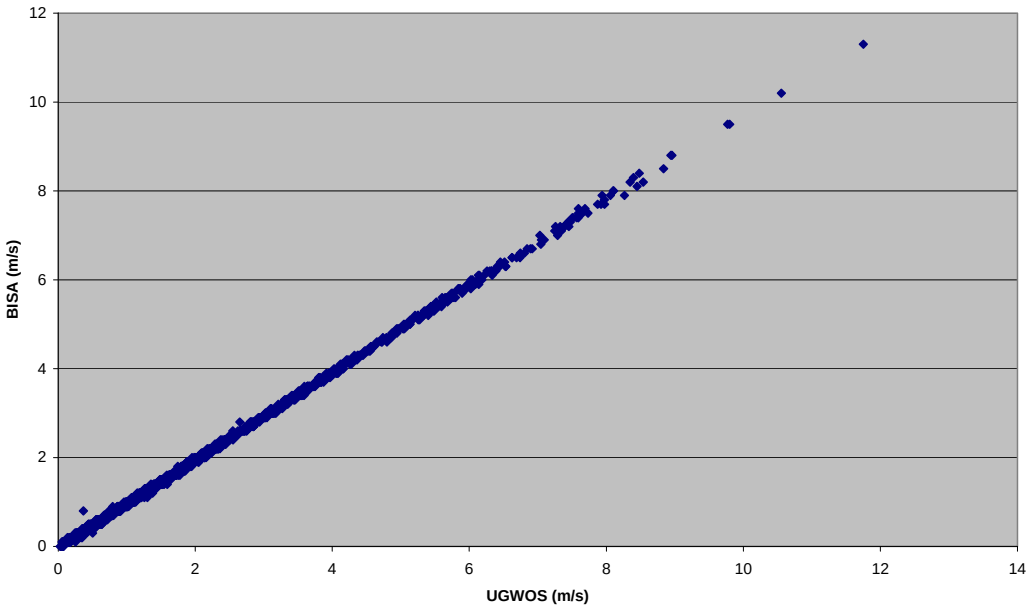
While reviewing the reports, two additional issues were noted. First, in the second quarter 2009 report, the scale for the TO-15 data plots for BOUL is 0 to 100 ppbv, rather than 0 to 400 ppbv as it is for the other sites. This could be confusing when reviewing the plots. Second, the plots in the first quarter 2009 report show TO-15 data for March 20, 2009, as expected. However, the TO-15 data file for the quarter shows data for March 23 instead of March 20. It is assumed that this is a mistake in the data file, but this should be verified.

Figure B-1
BISA Collocated Wind Measurement Comparison





BISA Collocated Resultant Wind Speed Comparison
January 15 - March 31, 2010



BISA Collocated Resultant Wind Direction Comparison
January 15 - March 30, 2010

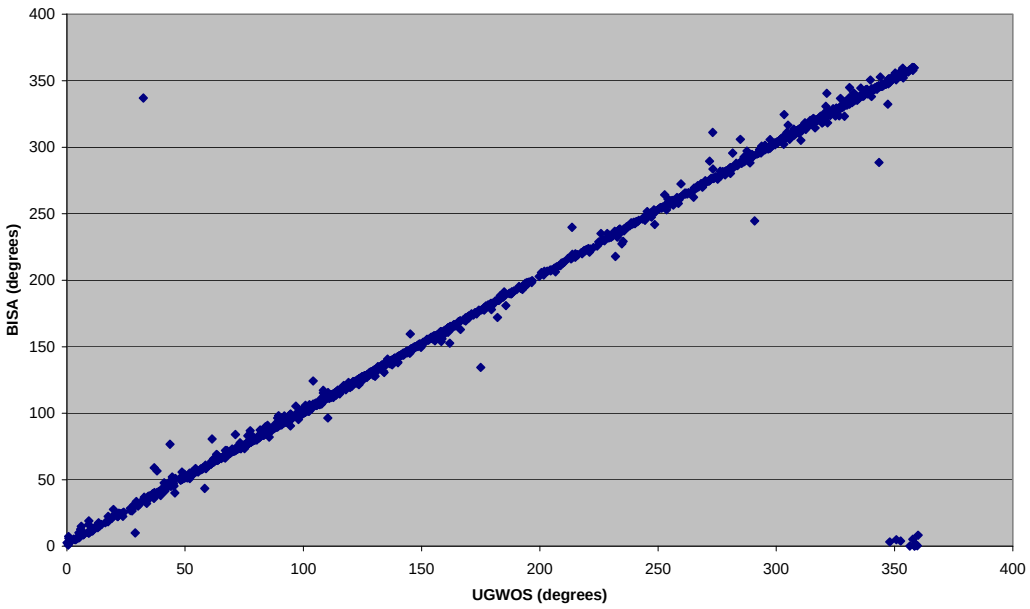
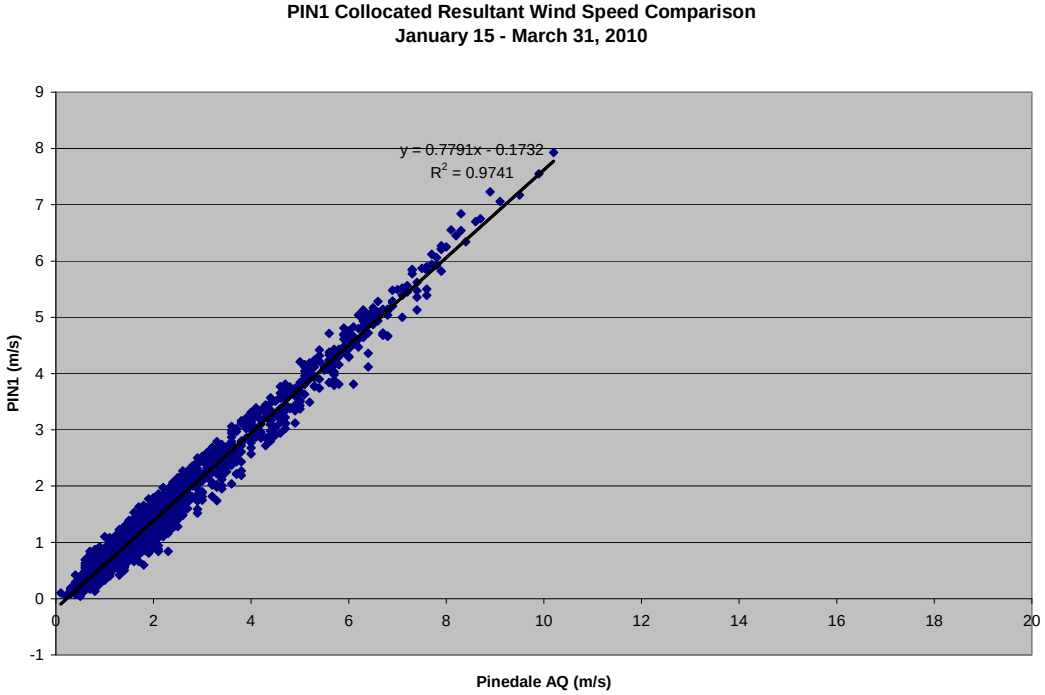
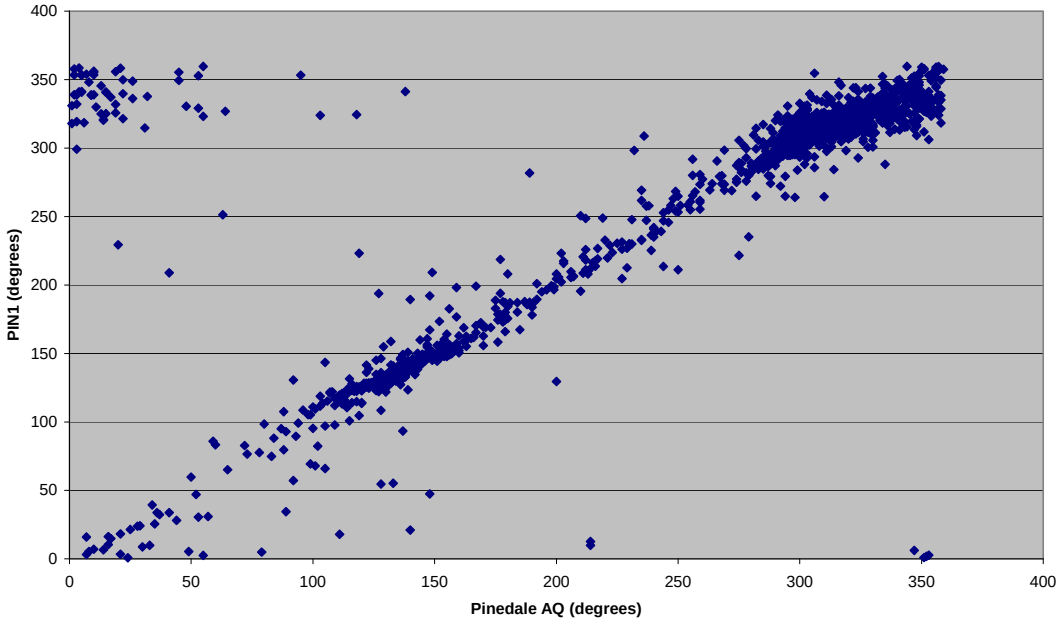


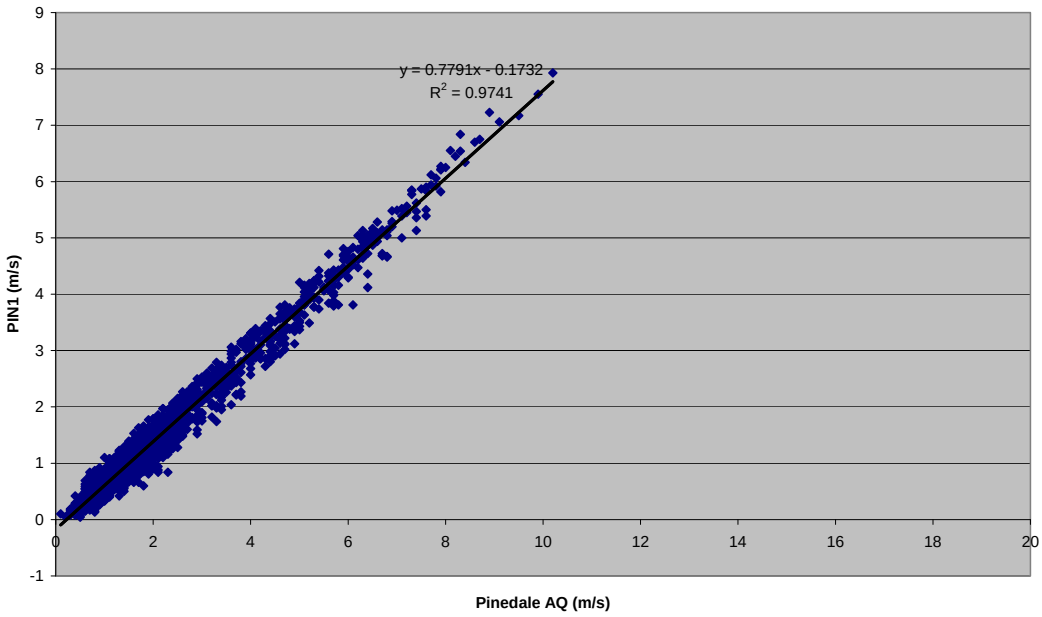
Figure B-2
PIN1 Collocated Wind Measurement Comparison



PIN1 Collocated Resultant Wind Direction Comparison
January 15 - March 31, 2010



PIN1 Collocated Resultant Wind Speed Comparison
January 15 - March 31, 2010



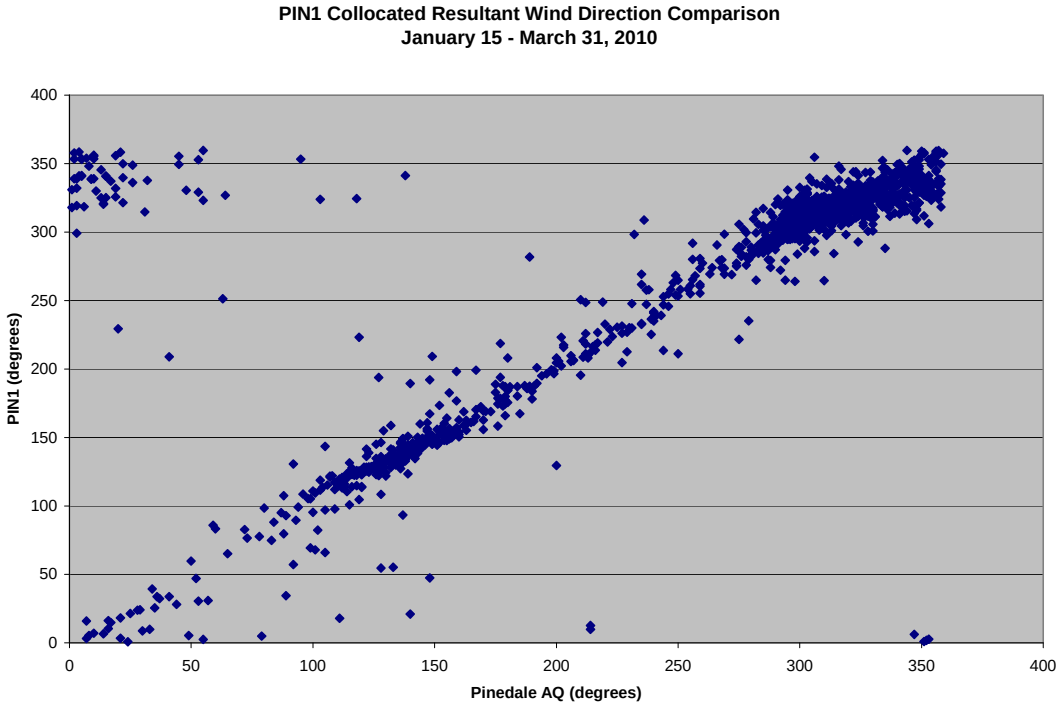

PIN1 Collocated Resultant Wind Direction Comparison
January 15 - March 31, 2010
PIN1 (degrees)
Pinedale AQ (degrees)
0
50
100
150
200
250
300
350
400

Table B-1
Precision Calculations for Air Toxics Data

Compound	CV (%)	N	Average Conc (ppb)	25th Perc (%)	75th Perc (%)
PIN 2-Butanone	41.4	48	9.5	-38.9	13.7
LAB 2-Propanol	175.7	8	53.9	-142.9	98.7
PIN 2-Propanol	113.9	19	29.7	-130.6	51.7
LAB Acetone	141.9	6	10.1	-136.2	-10.5
PIN Acetone	27.0	52	83.2	-13.5	10.9
LAB Benzene	47.3	37	1.6	-23.3	5.7
PIN Benzene	159.3	10	2.0	-128.6	147.9
PIN Chloroethane	78.8	27	3.8	-41.1	69.8
PIN Chloromethane	39.1	25	2.3	-12.5	51.2
LAB Cyclohexane	15.4	18	3.2	-9.1	1.9
LAB Ethanol	141.0	12	22.4	-134.0	75.3
PIN Ethanol	107.8	21	20.9	-147.8	89.5
LAB Ethyl Benzene	89.0	17	1.0	-35.3	26.1
PIN Ethyl Benzene	164.4	10	0.8	-157.4	134.1
LAB Heptane	16.1	11	2.0	-11.7	3.9
PIN Heptane	32.2	12	2.2	-3.2	25.1
LAB Hexane	55.8	21	3.2	-16.4	11.1
LAB m,p-xylene	54.8	46	2.4	-20.1	16.6
PIN m,p-xylene	120.7	20	2.4	-140.5	115.2
LAB o-xylene	71.9	23	1.0	-28.5	19.7
PIN o-xylene	135.4	14	1.1	-145.0	103.6
LAB Toluene	53.7	59	4.1	-17.3	10.2
PIN Toluene	73.0	56	2.0	-15.8	58.0
PIN Vinyl Chloride	65.8	37	0.4	-37.7	64.3
LAB Acetaldehyde	22.5	61	0.9	-15.6	10.5
PIN Acetaldehyde	26.2	61	0.8	1.5	37.0
LAB Formaldehyde	15.2	61	1.5	-8.7	11.2
PIN Formaldehyde	22.3	61	1.2	0.8	32.2

Appendix C

Coefficient of Variation Calculation

This appendix shows the mathematical basis for the calculation of the Coefficient of Variation, which is discussed in Appendix B and presented in Table B-1.

Coefficient of Variation Calculation

For each sampling event i, the relative difference in the two concentrations of each TAC measured in the two collocated samplers was calculated as follows:

$$d_i\ (\%) = (primary_i - collocated_i) / ((primary_i + collocated_i)/2) \times 100\%.$$

For a set of n sampling events, the Coefficient of Variation (CV) is calculated as follows:

$$CV = ((n\Sigma d_i^2 - (\Sigma d_i)^2)/n(n-1))^{0.5} * ((n-1)/\chi^2_{0.1,n-1})^{0.5}$$

where $\chi^2_{0.1,n-1}$ is the 10th percentile of a chi-squared distribution with *n-1* degrees of freedom, and the Σ summations are from i=1 to i=n.

Appendix D

Toxic Air Contaminant Statistics

This appendix contains 14 tables giving the following statistics for each monitoring station:

- Number of samples collected during the complete 14-month monitoring period;
- Number of samples analyzed;
- Reporting limit;
- Number of samples with detectable concentrations;
- Frequency of detection;
- Maximum detected concentration;
- Minimum detected concentration; and
- 12-month Average (April 2009 – March 2010) Detected Concentration.

Table D-1
Toxic Air Contaminant Statistics, Bargerville Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	66	0.14	64	97%	5.48	0.17	1.25
Formaldehyde	50-00-0	67	66	0.07	66	100%	2.54	0.06	1.38
1,1,1-Trichloroethane	71-55-6	63	62	0.11	1	1.6%	1.85	1.85	-
1,1,2-Trichloroethane	79-00-5	63	62	0.11	0	0.0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	63	62	0.14	0	0.0%	ND	ND	-
1,1-Dichloroethane	75-34-3	63	62	0.08	0	0.0%	ND	ND	-
1,1-Dichloroethene	75-35-4	63	62	0.04	1	1.6%	0.09	0.09	-
1,2,4-Trimethylbenzene	95-63-6	63	62	0.50	10	16%	18.67	0.88	0.86
1,2-Dichloroethane	107-06-2	63	61	0.08	1	1.6%	0.19	0.19	-
1,2-Dichloropropane	78-87-5	63	62	0.47	1	1.6%	0.92	0.92	-
1,3,5-Trimethylbenzene	108-67-8	63	62	0.50	2	3.2%	4.81	1.13	-
1,3-Butadiene	106-99-0	63	62	0.22	0	0.0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	63	62	0.61	0	0.0%	ND	ND	-
1,4-Dioxane	123-91-1	63	62	0.37	0	0.0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	62	61	2.30	2	3.3%	10.74	5.6	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	63	62	0.30	57	92%	21.22	0.47	2.67
2-Hexanone	591-78-6	63	62	2.10	0	0.0%	ND	ND	-
2-Propanol	67-63-0	63	62	1.20	33	53%	491.27	2.14	19.26
4-Ethyltoluene	622-96-8	63	62	0.50	9	15%	15.72	0.88	0.74
4-Methyl-2-pentanone	108-10-1	63	62	0.42	3	4.8%	1.35	0.66	-
Acetone	67-64-1	63	62	1.20	60	97%	47.48	2.07	9.78
alpha-Chlorotoluene	100-44-7	63	62	0.53	0	0.0%	ND	ND	-
Benzene	71-43-2	63	62	0.16	62	100%	18.2	0.3	1.64

Table D-1
Toxic Air Contaminant Statistics, Bargerville Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	63	62	0.39	3	4.8%	1.55	0.7	-
Carbon Disulfide	75-15-0	63	62	1.60	2	3.2%	23.65	9.65	-
Carbon Tetrachloride	56-23-5	63	60	0.64	0	0.0%	ND	ND	-
Chlorobenzene	108-90-7	63	62	0.47	0	0.0%	ND	ND	-
Chloroethane	75-00-3	63	62	0.27	0	0.0%	ND	ND	-
Chloroform	67-66-3	63	62	0.50	0	0.0%	ND	ND	-
Chloromethane	74-87-3	63	62	0.21	61	98%	1.63	0.56	0.94
cis-1,2-Dichloroethene	156-59-2	63	62	0.08	0	0.0%	ND	ND	-
Cumene	98-82-8	63	62	0.50	0	0.0%	ND	ND	-
Cyclohexane	110-82-7	63	62	0.35	12	19%	1.38	0.58	0.31
Ethanol	64-17-5	63	62	0.96	58	94%	79.09	1.75	8.66
Ethyl Benzene	100-41-4	63	62	0.09	49	79%	14.32	0.15	0.78
Freon 11	75-69-4	63	62	0.57	48	77%	1.8	0.9	0.97
Freon 113	76-13-1	63	62	0.78	0	0.0%	ND	ND	-
Freon 12	75-71-8	63	62	0.50	61	98%	2.92	1.43	2.08
Heptane	142-82-5	63	62	0.42	13	21%	6.14	0.66	0.55
Hexane	110-54-3	63	62	0.36	21	34%	15.15	0.67	1.15
m,p-Xylene	108-38-3/ 106-42-3	63	62	0.18	60	97%	60.75	0.31	3.32
Methyl tert-butyl ether	1634-04-4	63	62	0.37	0	0.0%	ND	ND	-
Methylene Chloride	75-09-2	63	56	0.71	9	16%	12.84	1.28	0.81
o-Xylene	95-47-6	63	62	0.09	58	94%	17.79	0.14	0.97
Propylbenzene	103-65-1	63	62	0.50	1	1.6%	3.19	3.19	-
Styrene	100-42-5	63	62	0.43	4	6.5%	2.43	0.72	-

Table D-1
Toxic Air Contaminant Statistics, Bargerville Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	63	62	0.14	5	8.1%	149.12	0.45	-
Tetrahydrofuran	109-99-9	63	62	1.50	2	3.2%	7.37	2.53	-
Toluene	108-88-3	63	62	0.08	62	100%	64.02	0.38	5.41
Trichloroethene	79-01-6	63	60	0.11	2	3.3%	1.18	0.26	-
Vinyl Chloride	75-01-4	63	62	0.03	0	0.0%	ND	ND	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-2
Toxic Air Contaminant Statistics, Big Sandy Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	66	66	0.14	66	100%	2.65	0.3	0.97
Formaldehyde	50-00-0	66	65	0.07	65	100%	2.72	0.29	1.09
1,1,1-Trichloroethane	71-55-6	62	62	0.11	2	3.2%	1.47	0.5	-
1,1,2-Trichloroethane	79-00-5	62	62	0.11	14	23%	1.58	0.17	0.15
1,1,2,2-Tetrachloroethane	79-34-5	62	62	0.14	0	0.0%	ND	ND	-
1,1-Dichloroethane	75-34-3	62	62	0.08	36	58%	3.72	0.16	0.49
1,1-Dichloroethene	75-35-4	62	62	0.04	11	18%	0.33	0.07	0.04
1,2,4-Trimethylbenzene	95-63-6	62	62	0.50	11	18%	21.62	0.98	1.14
1,2-Dichloroethane	107-06-2	62	62	0.08	43	69%	2.43	0.14	0.51
1,2-Dichloropropane	78-87-5	62	62	0.47	5	8.1%	2.31	0.83	-
1,3,5-Trimethylbenzene	108-67-8	62	62	0.50	4	6.5%	5.4	0.98	-
1,3-Butadiene	106-99-0	62	62	0.22	6	9.7%	0.64	0.55	-
1,4-Dichlorobenzene	106-46-7	62	62	0.61	0	0.0%	ND	ND	-
1,4-Dioxane	123-91-1	62	62	0.37	1	1.6%	6.12	6.12	-
2,2,4-Trimethylpentane	540-84-1	61	61	2.30	4	6.6%	25.68	6.07	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	62	62	0.30	61	98%	126.73	0.59	32.76
2-Hexanone	591-78-6	62	62	2.10	7	11%	7.37	4.09	1.67
2-Propanol	67-63-0	62	62	1.20	49	79%	393.02	1.97	20.62
4-Ethyltoluene	622-96-8	62	62	0.50	8	13%	18.67	0.79	0.98
4-Methyl-2-pentanone	108-10-1	62	62	0.42	26	42%	4.91	0.61	1.14
Acetone	67-64-1	62	62	1.20	62	100%	973.33	4.27	197.41
alpha-Chlorotoluene	100-44-7	62	62	0.53	1	1.6%	7.24	7.24	-
Benzene	71-43-2	62	62	0.16	61	98%	44.7	0.32	2.53

Table D-2
Toxic Air Contaminant Statistics, Big Sandy Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	62	62	0.39	3	4.8%	1.47	0.74	-
Carbon Disulfide	75-15-0	62	62	1.60	2	3.2%	4.36	3.73	-
Carbon Tetrachloride	56-23-5	62	61	0.64	0	0.0%	ND	ND	-
Chlorobenzene	108-90-7	62	62	0.47	0	0.0%	ND	ND	-
Chloroethane	75-00-3	62	62	0.27	51	82%	50.1	0.5	7.59
Chloroform	67-66-3	62	62	0.50	1	1.6%	1.22	1.22	-
Chloromethane	74-87-3	62	62	0.21	62	100%	15.06	0.83	4.28
cis-1,2-Dichloroethene	156-59-2	62	62	0.08	2	3.2%	0.44	0.14	-
Cumene	98-82-8	62	62	0.50	1	1.6%	1.52	1.52	-
Cyclohexane	110-82-7	62	62	0.35	9	15%	7.91	0.62	0.45
Ethanol	64-17-5	62	62	0.96	62	100%	184.54	1.64	19.44
Ethyl Benzene	100-41-4	62	62	0.09	58	94%	43.39	0.13	1.56
Freon 11	75-69-4	62	62	0.57	50	81%	1.57	0.9	1.00
Freon 113	76-13-1	62	62	0.78	0	0.0%	ND	ND	-
Freon 12	75-71-8	62	62	0.50	62	100%	2.67	1.43	2.11
Heptane	142-82-5	62	62	0.42	48	77%	35.63	0.66	4.67
Hexane	110-54-3	62	62	0.36	40	65%	34.87	0.6	2.13
m,p-Xylene	108-38-3/ 106-42-3	62	62	0.18	62	100%	169.24	0.38	6.16
Methyl tert-butyl ether	1634-04-4	62	62	0.37	0	0.0%	ND	ND	-
Methylene Chloride	75-09-2	62	62	0.71	40	65%	97.2	1.15	3.80
o-Xylene	95-47-6	62	62	0.09	60	97%	52.07	0.15	1.95
Propylbenzene	103-65-1	62	62	0.50	3	4.8%	3.83	1.18	-
Styrene	100-42-5	62	62	0.43	3	4.8%	8.94	1.11	-

Table D-2
Toxic Air Contaminant Statistics, Big Sandy Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	62	62	0.14	14	23%	3.19	0.26	0.31
Tetrahydrofuran	109-99-9	62	62	1.50	1	1.6%	5.31	5.31	-
Toluene	108-88-3	62	62	0.08	62	100%	169.48	0.37	8.92
Trichloroethene	79-01-6	62	60	0.11	4	6.7%	3.87	0.7	-
Vinyl Chloride	75-01-4	62	62	0.03	56	90%	4.6	0.05	0.97

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-3
Toxic Air Contaminant Statistics, Bondurant Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	64	64	0.14	62	97%	3.51	0.28	1.16
Formaldehyde	50-00-0	64	64	0.07	64	100%	3.07	0.2	1.06
1,1,1-Trichloroethane	71-55-6	61	61	0.11	3	4.9%	7.09	0.33	-
1,1,2-Trichloroethane	79-00-5	61	61	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	61	61	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	61	61	0.08	1	1.6%	0.35	0.35	-
1,1-Dichloroethene	75-35-4	61	61	0.04	2	3.3%	1.82	0.23	-
1,2,4-Trimethylbenzene	95-63-6	61	61	0.50	10	16.4%	7.86	0.84	0.69
1,2-Dichloroethane	107-06-2	61	60	0.08	3	5%	1.82	0.29	-
1,2-Dichloropropane	78-87-5	61	61	0.47	1	1.6%	2.08	2.08	-
1,3,5-Trimethylbenzene	108-67-8	61	61	0.50	4	6.6%	2.01	1.08	-
1,3-Butadiene	106-99-0	61	61	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	61	61	0.61	1	1.6%	2.16	2.16	-
1,4-Dioxane	123-91-1	61	61	0.37	2	3.3%	1.55	1.48	-
2,2,4-Trimethylpentane	540-84-1	61	61	2.30	1	1.6%	4.62	4.62	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	61	61	0.30	57	93.4%	22.99	0.47	2.74
2-Hexanone	591-78-6	61	61	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	61	61	1.20	32	52.5%	343.89	1.94	18.23
4-Ethyltoluene	622-96-8	61	61	0.50	7	11.5%	6.88	0.84	0.60
4-Methyl-2-pentanone	108-10-1	61	61	0.42	3	4.9%	8.6	0.7	-
Acetone	67-64-1	61	61	1.20	61	100%	192.29	2.21	13.09
alpha-Chlorotoluene	100-44-7	61	61	0.53	0	0%	ND	ND	-
Benzene	71-43-2	61	61	0.16	59	96.7%	10.86	0.28	1.30

Table D-3
Toxic Air Contaminant Statistics, Bondurant Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	61	61	0.39	3	4.9%	1.36	0.78	-
Carbon Disulfide	75-15-0	61	61	1.60	2	3.3%	18.36	9.34	-
Carbon Tetrachloride	56-23-5	61	60	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	61	61	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	61	61	0.27	1	1.6%	2.45	2.45	-
Chloroform	67-66-3	61	61	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	61	61	0.21	60	98.4%	3.71	0.52	0.99
cis-1,2-Dichloroethene	156-59-2	61	61	0.08	0	0%	ND	ND	-
Cumene	98-82-8	61	61	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	61	61	0.35	2	3.3%	0.79	0.55	-
Ethanol	64-17-5	61	60	0.96	58	96.7%	48.96	1.54	8.13
Ethyl Benzene	100-41-4	61	61	0.09	48	78.7%	8.24	0.13	0.69
Freon 11	75-69-4	61	61	0.57	51	83.6%	1.85	0.84	1.03
Freon 113	76-13-1	61	61	0.78	1	1.6%	3.29	3.29	-
Freon 12	75-71-8	61	61	0.50	61	100%	3.16	1.53	2.19
Heptane	142-82-5	61	61	0.42	5	8.2%	9.83	0.98	-
Hexane	110-54-3	61	61	0.36	16	26.2%	9.16	0.56	0.77
m,p-Xylene	108-38-3/ 106-42-3	61	61	0.18	55	90.2%	32.98	0.37	2.63
Methyl tert-butyl ether	1634-04-4	61	61	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	61	57	0.71	6	10.5%	9.03	1.81	0.78
o-Xylene	95-47-6	61	61	0.09	52	85.3%	9.98	0.14	0.78
Propylbenzene	103-65-1	61	61	0.50	3	4.9%	1.47	0.88	-
Styrene	100-42-5	61	61	0.43	3	4.9%	2.6	0.72	-

Table D-3
Toxic Air Contaminant Statistics, Bondurant Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	61	61	0.14	8	13.1%	2.24	0.27	0.19
Tetrahydrofuran	109-99-9	61	61	1.50	0	0%	ND	ND	-
Toluene	108-88-3	61	61	0.08	61	100%	188.31	0.14	6.81
Trichloroethene	79-01-6	61	61	0.11	4	6.6%	3.33	0.22	-
Vinyl Chloride	75-01-4	61	61	0.03	1	1.6%	0.49	0.49	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-4
Toxic Air Contaminant Statistics, Boulder Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	67	0.14	65	97%	2.72	0.27	0.92
Formaldehyde	50-00-0	67	66	0.07	66	100%	2.22	0.28	0.92
1,1,1-Trichloroethane	71-55-6	65	65	0.11	2	3.1%	1.36	0.87	-
1,1,2-Trichloroethane	79-00-5	65	65	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	65	65	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	65	65	0.08	0	0%	ND	ND	-
1,1-Dichloroethene	75-35-4	65	65	0.04	1	1.5%	0.26	0.26	-
1,2,4-Trimethylbenzene	95-63-6	65	65	0.50	17	26.2%	4.77	0.79	0.65
1,2-Dichloroethane	107-06-2	65	64	0.08	1	1.6%	0.24	0.24	-
1,2-Dichloropropane	78-87-5	65	65	0.47	1	1.5%	0.83	0.83	-
1,3,5-Trimethylbenzene	108-67-8	65	65	0.50	3	4.6%	1.38	0.79	-
1,3-Butadiene	106-99-0	65	65	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	65	65	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	65	65	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	64	64	2.30	0	0%	ND	ND	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	65	65	0.30	63	96.9%	17.68	0.5	2.77
2-Hexanone	591-78-6	65	65	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	65	65	1.20	35	53.9%	368.46	2.04	13.65
4-Ethyltoluene	622-96-8	65	65	0.50	14	21.5%	4.52	0.79	0.56
4-Methyl-2-pentanone	108-10-1	65	65	0.42	1	1.5%	1.97	1.97	-
Acetone	67-64-1	65	65	1.20	64	98.5%	47.48	2.61	11.13
alpha-Chlorotoluene	100-44-7	65	65	0.53	0	0%	ND	ND	-
Benzene	71-43-2	65	65	0.16	65	100%	12.77	0.35	2.05

Table D-4
Toxic Air Contaminant Statistics, Boulder Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	65	65	0.39	1	1.5%	1.13	1.13	-
Carbon Disulfide	75-15-0	65	65	1.60	3	4.6%	5.29	3.42	-
Carbon Tetrachloride	56-23-5	65	64	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	65	65	0.47	1	1.5%	0.78	0.78	-
Chloroethane	75-00-3	65	65	0.27	0	0%	ND	ND	-
Chloroform	67-66-3	65	65	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	65	65	0.21	65	100%	1.49	0.5	0.95
cis-1,2-Dichloroethene	156-59-2	65	65	0.08	0	0%	ND	ND	-
Cumene	98-82-8	65	65	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	65	65	0.35	20	30.8%	3.44	0.55	0.58
Ethanol	64-17-5	65	65	0.96	59	90.8%	244.79	2.07	12.27
Ethyl Benzene	100-41-4	65	65	0.09	62	95.4%	5.64	0.14	0.79
Freon 11	75-69-4	65	65	0.57	46	70.8%	1.63	0.9	0.92
Freon 113	76-13-1	65	65	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	65	65	0.50	63	96.9%	3.11	1.43	2.08
Heptane	142-82-5	65	65	0.42	23	35.4%	4.91	0.66	0.69
Hexane	110-54-3	65	65	0.36	36	55.4%	12.33	0.6	1.34
m,p-Xylene	108-38-3/ 106-42-3	65	65	0.18	65	100%	25.6	0.34	3.47
Methyl tert-butyl ether	1634-04-4	65	65	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	65	59	0.71	9	15.3%	15.97	1.18	1.06
o-Xylene	95-47-6	65	65	0.09	65	100%	7.38	0.14	0.99
Propylbenzene	103-65-1	65	65	0.50	0	0%	ND	ND	-
Styrene	100-42-5	65	65	0.43	10	15.4%	24.27	0.72	0.41

Table D-4
Toxic Air Contaminant Statistics, Boulder Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	65	65	0.14	17	26.2%	4.95	0.24	0.29
Tetrahydrofuran	109-99-9	65	65	1.50	0	0%	ND	ND	-
Toluene	108-88-3	65	65	0.08	65	100%	56.49	0.6	6.46
Trichloroethene	79-01-6	65	64	0.11	4	6.3%	1.34	0.4	-
Vinyl Chloride	75-01-4	65	65	0.03	0	0%	ND	ND	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-5
Toxic Air Contaminant Statistics, CASTNet Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	65	62	0.14	61	98.4%	4.44	0.27	1.14
Formaldehyde	50-00-0	65	62	0.07	62	100%	2.57	0.27	1.11
1,1,1-Trichloroethane	71-55-6	61	61	0.11	4	6.6%	2.84	0.23	-
1,1,2-Trichloroethane	79-00-5	61	61	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	61	61	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	61	61	0.08	1	1.6%	0.17	0.17	-
1,1-Dichloroethene	75-35-4	61	61	0.04	2	3.3%	0.26	0.15	-
1,2,4-Trimethylbenzene	95-63-6	61	61	0.50	11	18.0%	12.28	0.84	1.04
1,2-Dichloroethane	107-06-2	61	60	0.08	3	5%	1.74	0.4	-
1,2-Dichloropropane	78-87-5	61	61	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	61	61	0.50	4	6.6%	3.39	1.23	-
1,3-Butadiene	106-99-0	61	61	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	61	61	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	61	61	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	60	60	2.30	3	5%	11.21	4.06	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	61	61	0.30	53	86.9%	29.47	0.59	3.56
2-Hexanone	591-78-6	61	61	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	61	61	1.20	35	57.4%	4175.82	2.09	90.53
4-Ethyltoluene	622-96-8	61	61	0.50	7	11.5%	12.77	1.72	0.88
4-Methyl-2-pentanone	108-10-1	61	61	0.42	6	9.8%	2.87	0.78	-
Acetone	67-64-1	61	61	1.20	59	96.7%	47.48	2.09	11.67
alpha-Chlorotoluene	100-44-7	61	61	0.53	0	0%	ND	ND	-
Benzene	71-43-2	61	61	0.16	61	100%	38.31	0.3	2.42

Table D-5
Toxic Air Contaminant Statistics, CASTNet Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	61	61	0.39	3	4.9%	1.44	0.74	-
Carbon Disulfide	75-15-0	61	61	1.60	1	1.6%	3.08	3.08	-
Carbon Tetrachloride	56-23-5	61	60	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	61	61	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	61	61	0.27	0	0%	ND	ND	-
Chloroform	67-66-3	61	61	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	61	61	0.21	60	98.4%	1.82	0.54	0.98
cis-1,2-Dichloroethene	156-59-2	61	61	0.08	0	0%	ND	ND	-
Cumene	98-82-8	61	61	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	61	61	0.35	4	6.6%	4.82	0.58	-
Ethanol	64-17-5	61	61	0.96	56	91.8%	508.42	1.71	26.54
Ethyl Benzene	100-41-4	61	61	0.09	52	85.3%	14.75	0.14	1.10
Freon 11	75-69-4	61	61	0.57	44	72.1%	1.8	0.95	0.99
Freon 113	76-13-1	61	61	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	61	61	0.50	60	98.4%	3.26	1.63	2.13
Heptane	142-82-5	61	61	0.42	11	18%	12.7	0.9	0.74
Hexane	110-54-3	61	61	0.36	22	36%	42.27	0.63	1.95
m,p-Xylene	108-38-3/ 106-42-3	61	61	0.18	60	98.4%	65.09	0.3	4.79
Methyl tert-butyl ether	1634-04-4	61	61	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	61	55	0.71	8	14.6%	15.62	2.43	1.09
o-Xylene	95-47-6	61	61	0.09	55	90.2%	18.23	0.17	1.33
Propylbenzene	103-65-1	61	61	0.50	3	4.9%	1.67	0.98	-
Styrene	100-42-5	61	61	0.43	12	19.7%	4	0.89	0.44

Table D-5
Toxic Air Contaminant Statistics, CASTNet Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	61	61	0.14	5	8.2%	74.56	0.39	-
Tetrahydrofuran	109-99-9	61	61	1.50	0	0%	ND	ND	-
Toluene	108-88-3	61	61	0.08	61	100%	154.41	0.64	8.94
Trichloroethene	79-01-6	61	59	0.11	5	8.5%	3.54	0.19	-
Vinyl Chloride	75-01-4	61	61	0.03	0	0%	ND	ND	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-6
Toxic Air Contaminant Statistics, Daniel Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Daniel							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	67	0.14	64	95.5%	5.24	0.31	1.24
Formaldehyde	50-00-0	67	67	0.07	66	98.5%	2.8	0.43	1.32
1,1,1-Trichloroethane	71-55-6	64	64	0.11	1	1.6%	1.2	1.2	-
1,1,2-Trichloroethane	79-00-5	64	64	0.11	1	1.6%	0.21	0.21	-
1,1,2,2-Tetrachloroethane	79-34-5	64	64	0.14	1	1.6%	1.37	1.37	-
1,1-Dichloroethane	75-34-3	64	64	0.08	23	35.9%	0.69	0.13	0.14
1,1-Dichloroethene	75-35-4	64	64	0.04	0	0%	ND	ND	-
1,2,4-Trimethylbenzene	95-63-6	64	64	0.50	8	12.5%	7.37	1.08	0.52
1,2-Dichloroethane	107-06-2	64	64	0.08	31	48.4%	0.69	0.13	0.15
1,2-Dichloropropane	78-87-5	64	64	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	64	64	0.50	2	3.1%	2.31	0.93	-
1,3-Butadiene	106-99-0	64	64	0.22	2	3.1%	0.55	0.53	-
1,4-Dichlorobenzene	106-46-7	64	64	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	64	64	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	63	63	2.30	3	4.8%	8.4	3.92	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	64	64	0.30	64	100%	73.68	1.15	17.58
2-Hexanone	591-78-6	64	64	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	64	64	1.20	42	65.6%	147.38	1.92	13.74
4-Ethyltoluene	622-96-8	64	64	0.50	6	9.4%	6.88	0.98	-
4-Methyl-2-pentanone	108-10-1	64	64	0.42	17	26.6%	2.7	0.74	0.62
Acetone	67-64-1	64	64	1.20	64	100%	1044.55	8.78	162.36
alpha-Chlorotoluene	100-44-7	64	64	0.53	0	0%	ND	ND	-
Benzene	71-43-2	64	64	0.16	64	100%	14.37	0.3	1.26

Table D-6 Toxic Air Contaminant Statistics, Daniel Monitoring Station, Sublette County, Wyoming									
		Daniel							
Toxic Air Contaminant	CAS Number	No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	64	64	0.39	4	6.3%	1.82	0.66	-
Carbon Disulfide	75-15-0	64	64	1.60	1	1.6%	3.73	3.73	-
Carbon Tetrachloride	56-23-5	64	63	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	64	64	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	64	64	0.27	48	75%	17.93	0.5	2.62
Chloroform	67-66-3	64	64	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	64	64	0.21	64	100%	7.64	0.87	2.11
cis-1,2-Dichloroethene	156-59-2	64	64	0.08	0	0%	ND	ND	-
Cumene	98-82-8	64	64	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	64	64	0.35	7	10.9%	1.79	0.62	0.25
Ethanol	64-17-5	64	64	0.96	62	96.9%	82.85	1.66	12.46
Ethyl Benzene	100-41-4	64	64	0.09	48	75%	8.68	0.15	0.58
Freon 11	75-69-4	64	64	0.57	51	79.7%	1.91	0.84	1.01
Freon 113	76-13-1	64	64	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	64	64	0.50	64	100%	2.87	1.43	2.13
Heptane	142-82-5	64	64	0.42	40	62.5%	12.29	0.82	2.09
Hexane	110-54-3	64	64	0.36	28	43.8%	11.98	0.53	0.95
m,p-Xylene	108-38-3/ 106-42-3	64	64	0.18	60	93.8%	39.92	0.29	2.25
Methyl tert-butyl ether	1634-04-4	64	63	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	64	61	0.71	23	37.7%	12.15	1.04	1.11
o-Xylene	95-47-6	64	64	0.09	55	85.9%	12.58	0.16	0.75
Propylbenzene	103-65-1	64	64	0.50	1	1.6%	1.42	1.42	-
Styrene	100-42-5	64	64	0.43	2	3.1%	1.23	0.85	-

Table D-6
Toxic Air Contaminant Statistics, Daniel Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Daniel							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	64	64	0.14	11	17.2%	2.51	0.28	0.20
Tetrahydrofuran	109-99-9	64	64	1.50	0	0%	ND	ND	-
Toluene	108-88-3	64	64	0.08	64	100%	90.39	0.24	4.65
Trichloroethene	79-01-6	64	64	0.11	0	0%	ND	ND	-
Vinyl Chloride	75-01-4	64	64	0.03	55	85.9%	1.86	0.04	0.33

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-7
Toxic Air Contaminant Statistics, Farson Monitoring Station, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	65	0.14	65	100%	5.59	0.2	1.54
Formaldehyde	50-00-0	67	65	0.07	65	100%	3.1	0.23	1.33
1,1,1-Trichloroethane	71-55-6	62	62	0.11	4	6.5%	0.98	0.34	-
1,1,2-Trichloroethane	79-00-5	62	62	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	62	62	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	62	62	0.08	0	0%	ND	ND	-
1,1-Dichloroethene	75-35-4	62	62	0.04	1	1.6%	0.08	0.08	-
1,2,4-Trimethylbenzene	95-63-6	62	62	0.50	12	19.4%	78.6	1.18	2.03
1,2-Dichloroethane	107-06-2	62	62	0.08	1	1.6%	1.33	1.33	-
1,2-Dichloropropane	78-87-5	62	62	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	62	62	0.50	5	8.1%	15.23	0.93	-
1,3-Butadiene	106-99-0	62	62	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	62	62	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	62	62	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	61	61	2.30	3	4.9%	7	5.6	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	62	62	0.30	58	93.6%	11.79	0.44	2.26
2-Hexanone	591-78-6	62	62	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	62	62	1.20	33	53.2%	515.84	2.21	23.72
4-Ethyltoluene	622-96-8	62	62	0.50	11	17.7%	46.18	0.79	1.30
4-Methyl-2-pentanone	108-10-1	62	62	0.42	1	1.6%	0.86	0.86	-
Acetone	67-64-1	62	62	1.20	62	100%	23.74	1.92	9.47
alpha-Chlorotoluene	100-44-7	62	62	0.53	0	0%	ND	ND	-
Benzene	71-43-2	62	62	0.16	62	100%	13.73	0.31	1.85

Table D-7
Toxic Air Contaminant Statistics, Farson Monitoring Station, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	62	62	0.39	2	3.2%	1.55	0.7	-
Carbon Disulfide	75-15-0	62	62	1.60	3	4.8%	9.96	5.29	-
Carbon Tetrachloride	56-23-5	62	62	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	62	62	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	62	62	0.27	1	1.6%	1.69	1.69	-
Chloroform	67-66-3	62	62	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	62	62	0.21	61	98.4%	2.68	0.45	0.95
cis-1,2-Dichloroethene	156-59-2	62	62	0.08	0	0%	ND	ND	-
Cumene	98-82-8	62	62	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	62	62	0.35	21	33.9%	3.16	0.55	0.47
Ethanol	64-17-5	62	62	0.96	58	93.6%	154.41	1.77	14.02
Ethyl Benzene	100-41-4	62	62	0.09	60	96.8%	6.51	0.16	0.87
Freon 11	75-69-4	62	62	0.57	48	77.4%	1.57	0.9	0.96
Freon 113	76-13-1	62	62	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	62	62	0.50	61	98.4%	2.97	1.33	2.09
Heptane	142-82-5	62	62	0.42	19	30.7%	4.1	0.66	0.59
Hexane	110-54-3	62	62	0.36	34	54.8%	10.57	0.63	1.34
m,p-Xylene	108-38-3/ 106-42-3	62	62	0.18	62	100%	52.07	0.52	4.35
Methyl tert-butyl ether	1634-04-4	62	62	0.37	1	1.6%	2.45	2.45	-
Methylene Chloride	75-09-2	62	57	0.71	7	12.3%	6.94	1.28	0.79
o-Xylene	95-47-6	62	62	0.09	62	100%	23.43	0.17	1.31
Propylbenzene	103-65-1	62	62	0.50	3	4.8%	5.4	0.69	-
Styrene	100-42-5	62	62	0.43	8	12.9%	3.7	0.89	0.45

Table D-7
Toxic Air Contaminant Statistics, Farson Monitoring Station, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	62	62	0.14	5	8.1%	14.23	0.38	-
Tetrahydrofuran	109-99-9	62	62	1.50	0	0%	ND	ND	-
Toluene	108-88-3	62	62	0.08	62	100%	60.26	0.79	6.40
Trichloroethene	79-01-6	62	61	0.11	5	8.2%	1.13	0.15	-
Vinyl Chloride	75-01-4	62	62	0.03	1	1.6%	0.04	0.04	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-8
Toxic Air Contaminant Statistics, La Barge #1 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	($\mu g/m^3$)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	65	0.14	65	100%	3.03	0.5	1.55
Formaldehyde	50-00-0	67	65	0.07	65	100%	3.82	0.74	1.90
1,1,1-Trichloroethane	71-55-6	64	64	0.11	6	9.4%	1.64	0.19	-
1,1,2-Trichloroethane	79-00-5	64	64	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	64	64	0.14	1	1.6%	0.34	0.34	-
1,1-Dichloroethane	75-34-3	64	64	0.08	0	0%	ND	ND	-
1,1-Dichloroethene	75-35-4	64	64	0.04	2	3.1%	0.15	0.1	-
1,2,4-Trimethylbenzene	95-63-6	64	64	0.50	23	35.9%	25.55	0.79	1.44
1,2-Dichloroethane	107-06-2	64	63	0.08	5	7.9%	1.25	0.12	-
1,2-Dichloropropane	78-87-5	64	64	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	64	64	0.50	6	9.4%	7.37	0.84	-
1,3-Butadiene	106-99-0	64	64	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	64	64	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	64	64	0.37	1	1.5%	1.62	1.62	-
2,2,4-Trimethylpentane	540-84-1	63	63	2.30	4	6.4%	45.76	4.58	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	64	64	0.30	61	95.3%	24.76	0.53	2.60
2-Hexanone	591-78-6	64	64	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	64	64	1.20	32	50%	638.66	1.97	21.75
4-Ethyltoluene	622-96-8	64	64	0.50	17	26.6%	26.04	0.98	1.30
4-Methyl-2-pentanone	108-10-1	64	64	0.42	4	6.3%	1.6	0.78	-
Acetone	67-64-1	64	64	1.20	64	100%	64.1	2.16	9.79
alpha-Chlorotoluene	100-44-7	64	64	0.53	0	0%	ND	ND	-
Benzene	71-43-2	64	64	0.16	64	100%	17.88	0.7	3.70

Table D-8
Toxic Air Contaminant Statistics, La Barge #1 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	64	64	0.39	2	3.1%	1.51	1.24	-
Carbon Disulfide	75-15-0	64	64	1.60	1	1.6%	2.52	2.52	-
Carbon Tetrachloride	56-23-5	64	63	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	64	64	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	64	64	0.27	0	0%	ND	ND	-
Chloroform	67-66-3	64	64	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	64	64	0.21	64	100%	1.88	0.54	1.00
cis-1,2-Dichloroethene	156-59-2	64	64	0.08	3	4.7%	0.67	0.21	-
Cumene	98-82-8	64	64	0.50	1	1.6%	5.9	5.9	-
Cyclohexane	110-82-7	64	64	0.35	58	90.6%	25.46	0.93	5.19
Ethanol	64-17-5	64	64	0.96	63	98.4%	99.8	1.86	10.88
Ethyl Benzene	100-41-4	64	64	0.09	63	98.4%	38.19	0.22	2.01
Freon 11	75-69-4	64	64	0.57	49	76.6%	1.68	0.9	1.01
Freon 113	76-13-1	64	64	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	64	64	0.50	64	100%	3.11	1.19	2.15
Heptane	142-82-5	64	64	0.42	55	85.9%	15.56	0.7	3.39
Hexane	110-54-3	64	64	0.36	61	95.3%	23.95	0.7	5.80
m,p-Xylene	108-38-3/ 106-42-3	64	64	0.18	63	98.4%	143.21	1.04	9.01
Methyl tert-butyl ether	1634-04-4	64	63	0.37	1	1.6%	2.41	2.41	-
Methylene Chloride	75-09-2	64	62	0.71	7	11.3%	7.64	1.04	0.75
o-Xylene	95-47-6	64	64	0.09	63	98.4%	43.39	0.3	2.45
Propylbenzene	103-65-1	64	64	0.50	4	6.3%	5.9	0.84	-
Styrene	100-42-5	64	64	0.43	14	21.9%	7.24	0.72	0.50

Table D-8
Toxic Air Contaminant Statistics, La Barge #1 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	64	64	0.14	22	34.4%	2.64	0.25	0.32
Tetrahydrofuran	109-99-9	64	64	1.50	1	1.6%	2.59	2.59	-
Toluene	108-88-3	64	64	0.08	64	100%	124.28	0.83	16.30
Trichloroethene	79-01-6	64	63	0.11	7	11.1%	3.17	0.18	0.16
Vinyl Chloride	75-01-4	64	64	0.03	0	0%	ND	ND	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-9
Toxic Air Contaminant Statistics, La Barge #2 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	66	0.14	65	98.5%	3.31	0.5	1.62
Formaldehyde	50-00-0	67	66	0.07	66	100%	3.76	0.76	1.89
1,1,1-Trichloroethane	71-55-6	64	64	0.11	2	3.1%	0.44	0.27	-
1,1,2-Trichloroethane	79-00-5	64	64	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	64	64	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	64	64	0.08	0	0%	ND	ND	-
1,1-Dichloroethene	75-35-4	64	64	0.04	2	3.1%	0.11	0.09	-
1,2,4-Trimethylbenzene	95-63-6	64	64	0.50	27	42.2%	14.25	0.74	0.95
1,2-Dichloroethane	107-06-2	64	63	0.08	1	1.6%	0.57	0.57	-
1,2-Dichloropropane	78-87-5	64	64	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	64	64	0.50	5	7.8%	3.93	0.74	-
1,3-Butadiene	106-99-0	64	64	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	64	64	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	64	64	0.37	3	4.7%	3.46	1.76	-
2,2,4-Trimethylpentane	540-84-1	63	63	2.30	3	4.8%	9.81	8.4	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	64	64	0.30	59	92.2%	9.14	0.5	1.76
2-Hexanone	591-78-6	64	64	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	64	64	1.20	35	54.7%	442.15	1.92	22.25
4-Ethyltoluene	622-96-8	64	64	0.50	21	32.8%	13.26	0.74	0.84
4-Methyl-2-pentanone	108-10-1	64	64	0.42	4	6.3%	4.09	0.98	-
Acetone	67-64-1	64	64	1.20	62	96.9%	42.73	2.04	8.91
alpha-Chlorotoluene	100-44-7	64	64	0.53	0	0%	ND	ND	-
Benzene	71-43-2	64	64	0.16	64	100%	20.43	0.64	3.79

Table D-9
Toxic Air Contaminant Statistics, La Barge #2 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	64	64	0.39	2	3.1%	1.86	1.24	-
Carbon Disulfide	75-15-0	64	64	1.60	1	1.6%	2.55	2.55	-
Carbon Tetrachloride	56-23-5	64	63	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	64	64	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	64	64	0.27	0	0%	ND	ND	-
Chloroform	67-66-3	64	64	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	64	64	0.21	63	98.4%	1.59	0.52	1.00
cis-1,2-Dichloroethene	156-59-2	64	64	0.08	1	1.6%	0.23	0.23	-
Cumene	98-82-8	64	64	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	64	64	0.35	60	93.8%	25.46	0.79	5.32
Ethanol	64-17-5	64	64	0.96	60	93.8%	207.13	1.81	14.56
Ethyl Benzene	100-41-4	64	64	0.09	64	100%	31.24	0.19	1.64
Freon 11	75-69-4	64	64	0.57	52	81.3%	1.68	0.84	1.03
Freon 113	76-13-1	64	64	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	64	64	0.50	64	100%	2.82	1.43	2.16
Heptane	142-82-5	64	64	0.42	60	93.8%	15.15	0.66	3.64
Hexane	110-54-3	64	64	0.36	64	100%	23.6	0.67	6.06
m,p-Xylene	108-38-3/ 106-42-3	64	64	0.18	64	100%	121.51	0.87	7.82
Methyl tert-butyl ether	1634-04-4	64	64	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	64	60	0.71	6	10%	13.54	1.04	-
o-Xylene	95-47-6	64	64	0.09	64	100%	28.64	0.28	1.90
Propylbenzene	103-65-1	64	64	0.50	1	1.6%	2.6	2.6	-
Styrene	100-42-5	64	64	0.43	18	28.1%	8.09	0.85	0.48

Table D-9
Toxic Air Contaminant Statistics, La Barge #2 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	64	64	0.14	19	29.7%	2.78	0.21	0.25
Tetrahydrofuran	109-99-9	64	64	1.50	1	1.6%	3.54	3.54	-
Toluene	108-88-3	64	64	0.08	64	100%	86.62	1.81	14.97
Trichloroethene	79-01-6	64	63	0.11	5	7.9%	1.18	0.23	-
Vinyl Chloride	75-01-4	64	64	0.03	1	1.6%	0.18	0.18	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-10
Toxic Air Contaminant Statistics, Marbleton East Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	67	0.14	65	97%	5.96	0.28	1.35
Formaldehyde	50-00-0	67	67	0.07	67	100%	3.35	0.26	1.26
1,1,1-Trichloroethane	71-55-6	64	64	0.11	3	4.7%	0.42	0.23	-
1,1,2-Trichloroethane	79-00-5	64	64	0.11	0	0%	ND	ND	-
1,1,2,2-Tetrachloroethane	79-34-5	64	64	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	64	64	0.08	0	0%	ND	ND	-
1,1-Dichloroethene	75-35-4	64	64	0.04	1	1.6%	0.15	0.15	-
1,2,4-Trimethylbenzene	95-63-6	64	64	0.50	13	20.3%	7.86	0.79	0.77
1,2-Dichloroethane	107-06-2	64	63	0.08	1	1.6%	0.17	0.17	-
1,2-Dichloropropane	78-87-5	64	64	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	64	64	0.50	5	7.8%	3	0.79	-
1,3-Butadiene	106-99-0	64	64	0.22	0	0%	ND	ND	-
1,4-Dichlorobenzene	106-46-7	64	64	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	64	64	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	63	63	2.30	3	4.8%	8.87	6.07	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	64	64	0.30	61	95.3%	12.97	0.44	2.21
2-Hexanone	591-78-6	64	64	2.10	0	0%	ND	ND	-
2-Propanol	67-63-0	64	64	1.20	35	54.7%	393.02	2.26	17.10
4-Ethyltoluene	622-96-8	64	64	0.50	10	15.6%	8.84	1.13	0.70
4-Methyl-2-pentanone	108-10-1	64	64	0.42	2	3.1%	8.6	0.66	-
Acetone	67-64-1	64	64	1.20	64	100%	40.36	2.61	10.52
alpha-Chlorotoluene	100-44-7	64	64	0.53	0	0%	ND	ND	-
Benzene	71-43-2	64	64	0.16	64	100%	13.09	0.3	1.97

Table D-10
Toxic Air Contaminant Statistics, Marbleton East Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	64	64	0.39	2	3.1%	1.2	1.2	-
Carbon Disulfide	75-15-0	64	64	1.60	1	1.6%	2.55	2.55	-
Carbon Tetrachloride	56-23-5	64	63	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	64	64	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	64	64	0.27	0	0%	ND	ND	-
Chloroform	67-66-3	64	64	0.50	1	1.6%	0.83	0.83	-
Chloromethane	74-87-3	64	64	0.21	63	98.4%	1.98	0.52	0.95
cis-1,2-Dichloroethene	156-59-2	64	64	0.08	2	3.1%	0.55	0.31	-
Cumene	98-82-8	64	64	0.50	1	1.6%	1.03	1.03	-
Cyclohexane	110-82-7	64	64	0.35	28	43.8%	4.13	0.62	0.78
Ethanol	64-17-5	64	64	0.96	56	87.5%	173.24	2.07	12.79
Ethyl Benzene	100-41-4	64	64	0.09	56	87.5%	10.41	0.14	0.90
Freon 11	75-69-4	64	64	0.57	45	70.3%	1.74	0.9	0.94
Freon 113	76-13-1	64	64	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	64	64	0.50	64	100%	3.01	1.58	2.16
Heptane	142-82-5	64	64	0.42	28	43.8%	4.51	0.66	0.80
Hexane	110-54-3	64	64	0.36	38	59.4%	42.27	0.6	2.10
m,p-Xylene	108-38-3/ 106-42-3	64	64	0.18	63	98.4%	40.79	0.28	4.01
Methyl tert-butyl ether	1634-04-4	64	64	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	64	59	0.71	10	17%	6.25	1.18	0.76
o-Xylene	95-47-6	64	64	0.09	59	92.2%	9.55	0.17	1.03
Propylbenzene	103-65-1	64	64	0.50	3	4.7%	1.57	0.79	-
Styrene	100-42-5	64	64	0.43	5	7.8%	3.49	1.11	-

Table D-10
Toxic Air Contaminant Statistics, Marbleton East Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	64	64	0.14	10	15.6%	2.51	0.22	0.23
Tetrahydrofuran	109-99-9	64	64	1.50	0	0%	ND	ND	-
Toluene	108-88-3	64	64	0.08	64	100%	71.56	0.31	7.36
Trichloroethene	79-01-6	64	64	0.11	8	12.5%	3.87	0.33	0.16
Vinyl Chloride	75-01-4	64	64	0.03	0	0%	ND	ND	-

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-11 Toxic Air Contaminant Statistics, Marbleton Monitoring Station, Sublette County, Wyoming									
		Marbleton							
Toxic Air Contaminant	CAS Number	No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	65	0.14	63	96.9%	3.71	0.49	1.61
Formaldehyde	50-00-0	67	65	0.07	64	98.5%	5.08	0.77	1.88
1,1,1-Trichloroethane	71-55-6	66	66	0.11	1	1.5%	0.6	0.6	-
1,1,2-Trichloroethane	79-00-5	66	66	0.11	1	1.5%	0.2	0.2	-
1,1,2,2-Tetrachloroethane	79-34-5	66	66	0.14	0	0%	ND	ND	-
1,1-Dichloroethane	75-34-3	66	66	0.08	29	43.9%	0.81	0.13	0.22
1,1-Dichloroethene	75-35-4	66	66	0.04	2	3.0%	0.19	0.1	-
1,2,4-Trimethylbenzene	95-63-6	66	66	0.50	14	21.2%	7.37	1.03	0.84
1,2-Dichloroethane	107-06-2	66	66	0.08	42	63.6%	0.77	0.12	0.25
1,2-Dichloropropane	78-87-5	66	66	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	66	66	0.50	3	4.6%	1.77	0.93	-
1,3-Butadiene	106-99-0	66	66	0.22	1	1.5%	0.42	0.42	-
1,4-Dichlorobenzene	106-46-7	66	66	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	66	66	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	65	65	2.30	3	4.6%	6.07	4.02	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	66	66	0.30	66	100%	79.58	1.24	21.88
2-Hexanone	591-78-6	66	66	2.10	1	1.5%	4.09	4.09	-
2-Propanol	67-63-0	66	66	1.20	43	65.2%	140.01	1.84	15.23
4-Ethyltoluene	622-96-8	66	66	0.50	12	18.2%	4.67	0.98	0.70
4-Methyl-2-pentanone	108-10-1	66	66	0.42	15	22.7%	2.05	0.86	0.51
Acetone	67-64-1	66	66	1.20	66	100%	902.11	5.93	167.63
alpha-Chlorotoluene	100-44-7	66	66	0.53	0	0%	ND	ND	-
Benzene	71-43-2	66	66	0.16	66	100%	7.98	0.31	1.49

Table D-11
Toxic Air Contaminant Statistics, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	66	66	0.39	6	9.1%	2.06	0.81	-
Carbon Disulfide	75-15-0	66	66	1.60	1	1.5%	2.96	2.96	-
Carbon Tetrachloride	56-23-5	66	66	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	66	66	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	66	66	0.27	56	84.9%	14.5	0.5	4.19
Chloroform	67-66-3	66	66	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	66	66	0.21	66	100%	5.98	0.85	2.48
cis-1,2-Dichloroethene	156-59-2	66	66	0.08	1	1.5%	0.63	0.63	-
Cumene	98-82-8	66	66	0.50	1	1.5%	0.98	0.98	-
Cyclohexane	110-82-7	66	66	0.35	17	25.8%	5.85	0.55	0.42
Ethanol	64-17-5	66	66	0.96	66	100%	133.7	2.07	12.88
Ethyl Benzene	100-41-4	66	66	0.09	64	97%	32.55	0.16	1.14
Freon 11	75-69-4	66	66	0.57	57	86.4%	1.63	0.9	1.07
Freon 113	76-13-1	66	66	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	66	66	0.50	66	100%	2.92	1.48	2.13
Heptane	142-82-5	66	66	0.42	60	90.9%	10.24	0.61	2.92
Hexane	110-54-3	66	66	0.36	53	80.3%	8.81	0.56	1.35
m,p-Xylene	108-38-3/ 106-42-3	66	66	0.18	66	100%	112.83	0.34	4.30
Methyl tert-butyl ether	1634-04-4	66	65	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	66	63	0.71	26	41.3%	22.57	1.04	1.50
o-Xylene	95-47-6	66	66	0.09	65	98.5%	25.17	0.2	1.24
Propylbenzene	103-65-1	66	66	0.50	1	1.5%	1.23	1.23	-
Styrene	100-42-5	66	66	0.43	1	1.5%	2.21	2.21	-

Table D-11
Toxic Air Contaminant Statistics, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	66	66	0.14	22	33.3%	2.78	0.19	0.24
Tetrahydrofuran	109-99-9	66	66	1.50	1	1.5%	9.14	9.14	-
Toluene	108-88-3	66	66	0.08	66	100%	36.53	0.49	5.11
Trichloroethene	79-01-6	66	66	0.11	4	6.1%	4.19	0.3	-
Vinyl Chloride	75-01-4	66	66	0.03	51	77.3%	1.71	0.06	0.52

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-12
Toxic Air Contaminant Statistics, Pinedale #1 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	66	0.14	66	100%	5.16	0.33	1.54
Formaldehyde	50-00-0	67	66	0.07	66	100%	3.77	0.38	1.57
1,1,1-Trichloroethane	71-55-6	63	63	0.11	1	1.6%	0.39	0.39	-
1,1,2-Trichloroethane	79-00-5	63	63	0.11	9	14.3%	0.43	0.18	0.09
1,1,2,2-Tetrachloroethane	79-34-5	63	63	0.14	2	3.2%	2.61	0.69	-
1,1-Dichloroethane	75-34-3	63	63	0.08	39	61.9%	1.46	0.13	0.34
1,1-Dichloroethene	75-35-4	63	63	0.04	3	4.8%	0.1	0.07	-
1,2,4-Trimethylbenzene	95-63-6	63	63	0.50	22	34.9%	37.34	0.84	1.64
1,2-Dichloroethane	107-06-2	63	63	0.08	42	66.7%	1.58	0.12	0.34
1,2-Dichloropropane	78-87-5	63	63	0.47	2	3.2%	1.34	0.92	-
1,3,5-Trimethylbenzene	108-67-8	63	63	0.50	5	7.9%	11.79	0.88	-
1,3-Butadiene	106-99-0	63	63	0.22	3	4.8%	0.69	0.53	-
1,4-Dichlorobenzene	106-46-7	63	63	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	63	63	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	62	62	2.30	3	4.8%	7.94	5.6	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	63	63	0.30	63	100%	91.37	0.83	22.45
2-Hexanone	591-78-6	63	63	2.10	4	6.4%	5.73	4.91	-
2-Propanol	67-63-0	63	63	1.20	47	74.6%	196.51	1.99	20.49
4-Ethyltoluene	622-96-8	63	63	0.50	15	23.8%	29.97	0.79	1.33
4-Methyl-2-pentanone	108-10-1	63	63	0.42	23	36.5%	4.91	0.66	0.93
Acetone	67-64-1	63	63	1.20	63	100%	902.11	6.88	174.72
alpha-Chlorotoluene	100-44-7	63	63	0.53	0	0%	ND	ND	-
Benzene	71-43-2	63	63	0.16	63	100%	19.8	0.28	2.11

Table D-12
Toxic Air Contaminant Statistics, Pinedale #1 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	63	63	0.39	2	3.2%	1.51	0.74	-
Carbon Disulfide	75-15-0	63	63	1.60	4	6.4%	7.16	2.77	-
Carbon Tetrachloride	56-23-5	63	62	0.64	1	1.6%	39.61	39.61	-
Chlorobenzene	108-90-7	63	63	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	63	63	0.27	48	76.2%	50.1	0.5	6.32
Chloroform	67-66-3	63	63	0.50	1	1.6%	10.25	10.25	-
Chloromethane	74-87-3	63	63	0.21	63	100%	12.79	0.6	3.40
cis-1,2-Dichloroethene	156-59-2	63	63	0.08	1	1.6%	0.13	0.13	-
Cumene	98-82-8	63	63	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	63	63	0.35	9	14.3%	2.27	0.58	0.29
Ethanol	64-17-5	63	63	0.96	60	95.2%	148.76	3.01	15.21
Ethyl Benzene	100-41-4	63	63	0.09	60	95.2%	8.68	0.16	1.06
Freon 11	75-69-4	63	63	0.57	45	71.4%	1.63	0.84	0.91
Freon 113	76-13-1	63	63	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	63	63	0.50	63	100%	2.87	1.53	2.11
Heptane	142-82-5	63	63	0.42	51	81%	16.79	0.78	3.39
Hexane	110-54-3	63	63	0.36	43	68.3%	20.43	0.6	1.59
m,p-Xylene	108-38-3/ 106-42-3	63	63	0.18	60	95.2%	78.11	0.65	5.09
Methyl tert-butyl ether	1634-04-4	63	63	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	63	63	0.71	38	60.3%	10.76	1.11	1.95
o-Xylene	95-47-6	63	63	0.09	61	96.8%	43.39	0.15	1.92
Propylbenzene	103-65-1	63	63	0.50	3	4.8%	1.82	0.88	-
Styrene	100-42-5	63	63	0.43	6	9.5%	19.58	0.81	-

Table D-12
Toxic Air Contaminant Statistics, Pinedale #1 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	($\mu g/m^3$)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	63	63	0.14	7	11.1%	2.71	0.31	0.17
Tetrahydrofuran	109-99-9	63	63	1.50	0	0%	ND	ND	-
Toluene	108-88-3	63	63	0.08	63	100%	79.09	0.6	6.90
Trichloroethene	79-01-6	63	62	0.11	0	0%	ND	ND	-
Vinyl Chloride	75-01-4	63	63	0.03	54	85.7%	3.07	0.04	0.70

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-13
Toxic Air Contaminant Statistics, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	67	0.14	65	97%	3.16	0.35	1.18
Formaldehyde	50-00-0	67	67	0.07	67	100%	2.89	0.49	1.31
1,1,1-Trichloroethane	71-55-6	65	65	0.11	7	10.8%	2.07	0.17	0.11
1,1,2-Trichloroethane	79-00-5	65	65	0.11	4	6.2%	0.23	0.17	-
1,1,2,2-Tetrachloroethane	79-34-5	65	65	0.14	1	1.5%	1.03	1.03	-
1,1-Dichloroethane	75-34-3	65	65	0.08	37	56.9%	0.77	0.14	0.27
1,1-Dichloroethene	75-35-4	65	65	0.04	3	4.6%	0.27	0.1	-
1,2,4-Trimethylbenzene	95-63-6	65	65	0.50	16	24.6%	4.91	0.98	0.77
1,2-Dichloroethane	107-06-2	65	64	0.08	39	60.9%	1.94	0.14	0.27
1,2-Dichloropropane	78-87-5	65	65	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	65	65	0.50	4	6.2%	1.67	1.18	-
1,3-Butadiene	106-99-0	65	65	0.22	2	3.1%	0.57	0.4	-
1,4-Dichlorobenzene	106-46-7	65	65	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	65	65	0.37	0	0%	ND	ND	-
2,2,4-Trimethylpentane	540-84-1	64	64	2.30	4	6.3%	74.7	7	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	65	65	0.30	63	96.9%	94.31	1.12	24.30
2-Hexanone	591-78-6	65	65	2.10	2	3.1%	4.91	4.5	-
2-Propanol	67-63-0	65	65	1.20	44	67.7%	859.73	2.21	33.07
4-Ethyltoluene	622-96-8	65	65	0.50	11	16.9%	4.67	0.84	0.66
4-Methyl-2-pentanone	108-10-1	65	65	0.42	18	27.7%	9.01	0.7	0.78
Acetone	67-64-1	65	65	1.20	65	100%	878.37	6.88	177.61
alpha-Chlorotoluene	100-44-7	65	65	0.53	0	0%	ND	ND	-
Benzene	71-43-2	65	65	0.16	64	98.5%	14.69	0.31	1.84

Table D-13
Toxic Air Contaminant Statistics, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	65	65	0.39	4	6.2%	2.99	0.7	-
Carbon Disulfide	75-15-0	65	65	1.60	3	4.6%	5.91	2.71	-
Carbon Tetrachloride	56-23-5	65	64	0.64	1	1.6%	3.65	3.65	-
Chlorobenzene	108-90-7	65	65	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	65	65	0.27	53	81.5%	16.61	0.58	4.72
Chloroform	67-66-3	65	65	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	65	65	0.21	65	100%	6.81	0.93	2.90
cis-1,2-Dichloroethene	156-59-2	65	65	0.08	0	0%	ND	ND	-
Cumene	98-82-8	65	65	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	65	65	0.35	10	15.4%	1.93	0.72	0.33
Ethanol	64-17-5	65	65	0.96	64	98.5%	184.54	1.83	22.41
Ethyl Benzene	100-41-4	65	65	0.09	60	92.3%	7.81	0.16	0.98
Freon 11	75-69-4	65	65	0.57	54	83.1%	1.8	0.9	1.00
Freon 113	76-13-1	65	65	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	65	65	0.50	65	100%	3.11	1.43	2.08
Heptane	142-82-5	65	65	0.42	58	89.2%	13.11	0.7	3.84
Hexane	110-54-3	65	65	0.36	42	64.6%	11.98	0.53	1.64
m,p-Xylene	108-38-3/ 106-42-3	65	65	0.18	63	96.9%	29.51	0.39	3.85
Methyl tert-butyl ether	1634-04-4	65	65	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	65	63	0.71	33	52.4%	48.6	1.04	2.28
o-Xylene	95-47-6	65	65	0.09	62	95.4%	7.81	0.18	1.20
Propylbenzene	103-65-1	65	65	0.50	4	6.2%	0.98	0.79	-
Styrene	100-42-5	65	65	0.43	3	4.6%	1.83	0.72	-

Table D-13
Toxic Air Contaminant Statistics, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	65	65	0.14	17	26.2%	2.44	0.24	0.25
Tetrahydrofuran	109-99-9	65	65	1.50	0	0%	ND	ND	-
Toluene	108-88-3	65	65	0.08	64	98.5%	90.39	0.6	7.82
Trichloroethene	79-01-6	65	64	0.11	8	12.5%	1.34	0.16	0.11
Vinyl Chloride	75-01-4	65	65	0.03	58	89.2%	1.69	0.04	0.57

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Table D-14
Toxic Air Contaminant Statistics, Sand Draw Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Sand Draw							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Acetaldehyde	75-07-0	67	67	0.14	65	97%	4.94	0.41	1.45
Formaldehyde	50-00-0	67	67	0.07	67	100%	3.88	0.66	1.80
1,1,1-Trichloroethane	71-55-6	65	65	0.11	3	4.6%	1.31	0.35	-
1,1,2-Trichloroethane	79-00-5	65	65	0.11	1	1.5%	0.19	0.19	-
1,1,2,2-Tetrachloroethane	79-34-5	65	65	0.14	1	1.5%	0.32	0.32	-
1,1-Dichloroethane	75-34-3	65	65	0.08	34	52.3%	0.57	0.13	0.17
1,1-Dichloroethene	75-35-4	65	65	0.04	3	4.6%	0.09	0.08	-
1,2,4-Trimethylbenzene	95-63-6	65	65	0.50	21	32.3%	7.86	0.84	0.95
1,2-Dichloroethane	107-06-2	65	65	0.08	42	64.6%	0.73	0.13	0.20
1,2-Dichloropropane	78-87-5	65	65	0.47	0	0%	ND	ND	-
1,3,5-Trimethylbenzene	108-67-8	65	65	0.50	6	9.2%	2.36	0.79	-
1,3-Butadiene	106-99-0	65	65	0.22	3	4.6%	0.53	0.42	-
1,4-Dichlorobenzene	106-46-7	65	65	0.61	0	0%	ND	ND	-
1,4-Dioxane	123-91-1	65	65	0.37	1	1.5%	0.83	0.83	-
2,2,4-Trimethylpentane	540-84-1	64	64	2.30	3	4.7%	7.47	4.48	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	65	65	0.30	65	100%	88.42	0.53	19.71
2-Hexanone	591-78-6	65	65	2.10	2	3.1%	4.91	4.91	-
2-Propanol	67-63-0	65	65	1.20	44	67.7%	1694.89	2.14	46.12
4-Ethyltoluene	622-96-8	65	65	0.50	14	21.5%	7.86	0.79	0.78
4-Methyl-2-pentanone	108-10-1	65	65	0.42	28	43.1%	4.09	0.66	0.92
Acetone	67-64-1	65	65	1.20	65	100%	807.15	5.93	170.48
alpha-Chlorotoluene	100-44-7	65	65	0.53	0	0%	ND	ND	-
Benzene	71-43-2	65	65	0.16	64	98.5%	22.03	0.57	2.45

Table D-14
Toxic Air Contaminant Statistics, Sand Draw Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Sand Draw							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Bromomethane	74-83-9	65	65	0.39	2	3.1%	1.36	1.32	-
Carbon Disulfide	75-15-0	65	65	1.60	1	1.5%	3.11	3.11	-
Carbon Tetrachloride	56-23-5	65	65	0.64	0	0%	ND	ND	-
Chlorobenzene	108-90-7	65	65	0.47	0	0%	ND	ND	-
Chloroethane	75-00-3	65	65	0.27	51	78.5%	16.61	0.53	3.02
Chloroform	67-66-3	65	65	0.50	0	0%	ND	ND	-
Chloromethane	74-87-3	65	65	0.21	65	100%	7.43	0.76	2.50
cis-1,2-Dichloroethene	156-59-2	65	65	0.08	0	0%	ND	ND	-
Cumene	98-82-8	65	65	0.50	0	0%	ND	ND	-
Cyclohexane	110-82-7	65	65	0.35	36	55.4%	3.78	0.55	0.87
Ethanol	64-17-5	65	65	0.96	63	96.9%	301.29	1.6	17.71
Ethyl Benzene	100-41-4	65	65	0.09	63	96.9%	10.41	0.16	1.03
Freon 11	75-69-4	65	65	0.57	47	72.3%	1.74	0.9	0.94
Freon 113	76-13-1	65	65	0.78	0	0%	ND	ND	-
Freon 12	75-71-8	65	65	0.50	65	100%	2.92	1.43	2.10
Heptane	142-82-5	65	65	0.42	62	95.4%	11.47	0.7	3.29
Hexane	110-54-3	65	65	0.36	59	90.8%	22.9	0.67	2.26
m,p-Xylene	108-38-3/ 106-42-3	65	65	0.18	65	100%	39.49	0.69	4.59
Methyl tert-butyl ether	1634-04-4	65	64	0.37	0	0%	ND	ND	-
Methylene Chloride	75-09-2	65	62	0.71	28	45.2%	45.13	1.11	1.98
o-Xylene	95-47-6	65	65	0.09	65	100%	11.28	0.19	1.34
Propylbenzene	103-65-1	65	65	0.50	4	6.2%	1.72	0.98	-
Styrene	100-42-5	65	65	0.43	1	1.5%	1.02	1.02	-

Table D-14
Toxic Air Contaminant Statistics, Sand Draw Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Sand Draw							
		No. Samples Collected[a]	No. Samples Analyzed[a]	Reporting Limit	No. Samples with Detectable Concentrations[a]	Frequency Of Detection[a]	Maximum Detected Concentration[a]	Minimum Detected Concentration[a]	12-Month Average (April 2009 - March 2010) Detected Concentration[b]
		(-)	(-)	(µg/m^3)	(-)	(%)	(µg/m3)	(µg/m3)	(µg/m3)
Tetrachloroethene	127-18-4	65	65	0.14	16	24.6%	10.17	0.24	0.50
Tetrahydrofuran	109-99-9	65	65	1.50	0	0%	ND	ND	-
Toluene	108-88-3	65	65	0.08	65	100%	90.39	1.05	8.40
Trichloroethene	79-01-6	65	65	0.11	6	9.2%	0.86	0.21	-
Vinyl Chloride	75-01-4	65	65	0.03	52	80%	1.76	0.04	0.41

[a] For the full program period of approximately 14 months.

[b] If the frequency of non-detects is greater than 90%, then the arithmetic mean and any other statistical descriptors are not meaningful, and hence the arithmetic mean is set equal to a dash (-). If the frequency is equal to or less than 90%, then the non-detected concentrations are conservatively assumed to equal one-half of the reporting limit in the calculation of the average (arithmetic mean) concentration, following guidance (USEPA, 2004).

USEPA. *Air Toxics Risk Assessment Reference Library*, Volume 1, Technical Resource Manual, EPA-453-K-04-001A, Appendix I - Use of Air Monitoring Data to Develop Estimates of Exposure Concentration (Data Analysis and Reduction, April 2004.

Appendix E

Monitoring Stations Comparisons to Screening Values

This appendix contains 14 tables containing the following information for each monitoring station:

- Maximum observed quarterly concentration;
  - February - March 2009
  - April – June 2009
  - July – September 2009
  - October – December 2009
  - January – March 2010
- Maximum observed concentration;
- Chronic screening value;
  - Cancer
  - Non-cancer
  - Final
- Is maximum observed concentration >= Final Chronic Screening Value (Y or N);
- Percent detections exceeding final chronic screening value (%).

Table E-1
Bargerville Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.11	1.78	5.48	2.65	1.72	5.5	0.45	0.9	0.45	Y	**94%**
Formaldehyde	50-00-0	1.77	1.24	2.54	2.22	2.41	2.5	181.8	0.98	0.98	Y	**74%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	ND	ND	ND	0.19	0.2	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	0.92	0.9		0.4	0.4	Y	**100%**
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	5.60	10.74	ND	ND	10.7		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	1.53	12.45	18.20	4.47	2.01	18.2	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.55	0.20	1.09	0.20	1.6		0.5	0.50	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.14	1.28	1.24	1.63	1.51	1.6		9	9	N	-
Methylene Chloride	75-09-2	0.36	3.47	12.84	1.70	1.49	12.8	2.13	100	2.13	Y	**33%**
Tetrachloroethene	127-18-4	0.07	149.12	0.62	0.07	0.54	149	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	7.37	2.53	ND	ND	7.4	0.50	60	0.50	Y	**100%**
Trichloroethene	79-01-6	0.06	0.06	0.26	0.06	1.18	1.2	0.50	60	0.50	Y	**50%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.01	0.0	0.11	10	0.11	N	-
											Count= 11	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 7

Minimum percentage of detections exceeding the final chronic screening value = 33%

Table E-2
Big Sandy Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	0.89	1.28	2.65	1.21	1.07	2.7	0.45	0.9	0.45	Y	**88%**
Formaldehyde	50-00-0	1.41	1.18	2.72	1.26	1.37	2.7	181.8	0.98	0.98	Y	**48%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.43	0.29	1.58	1.6	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	1.66	0.57	3.72	3.7	0.63	50	0.63	Y	**42%**
1,2-Dichloroethane	107-06-2	ND	0.69	2.43	0.69	2.18	2.4	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	1.43	ND	2.31	2.3		0.4	0.4	Y	**100%**
1,3-Butadiene	106-99-0	ND	ND	0.64	ND	ND	0.64	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	6.12	ND	ND	6.1	0.13	360	0.13	Y	**100%**
2,2,4-Trimethylpentane	540-84-1	ND	25.68	11.67	6.07	9.81	25.7		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	7.37	1.05	1.05	7.4		3	3	Y	**100%**
alpha-Chlorotoluene	100-44-7	ND	7.24	ND	ND	ND	7.2	0.02		0.02	Y	**100%**
Benzene	71-43-2	0.77	44.70	15.33	9.58	13.73	44.7	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	0.20	1.47	0.89	0.20	1.5		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	1.22	1.2		9.8	9.8	N	-
Chloromethane	74-87-3	1.26	2.89	15.06	7.64	14.03	15.1		9	9	Y	**11%**
Methylene Chloride	75-09-2	0.36	97.20	9.03	2.99	7.64	97.2	2.13	100	2.13	Y	**55%**
Tetrachloroethene	127-18-4	0.07	3.19	1.56	2.44	0.26	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	5.31	ND	ND	ND	5.3	0.50	60	0.50	Y	**100%**
Trichloroethene	79-01-6	0.06	1.66	3.87	0.06	0.70	3.9	0.50	60	0.50	Y	**100%**
Vinyl Chloride	75-01-4	0.05	0.61	4.60	1.92	1.84	4.6	0.11	10	0.11	Y	**93%**
											Count= 19	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 13

Minimum percentage of detections exceeding the final chronic screening value = 11%

Table E-3
Bondurant Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.29	2.03	3.51	1.75	1.33	3.5	0.45	0.9	0.45	Y	**84%**
Formaldehyde	50-00-0	1.64	1.46	3.07	1.34	1.41	3.1	181.8	0.98	0.98	Y	**47%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.35	0.4	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	0.73	ND	ND	1.82	1.8	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	2.08	2.1		0.4	0.4	Y	**100%**
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	2.16	ND	ND	ND	2.2	0.091	80	0.091	Y	**100%**
1,4-Dioxane	123-91-1	ND	1.55	ND	ND	ND	1.6	0.13	360	0.13	Y	**100%**
2,2,4-Trimethylpentane	540-84-1	ND	ND	4.62	ND	ND	4.6		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3.00	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	0.70	2.39	10.86	2.68	1.09	10.9	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.36	0.20	0.20	0.20	1.4		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.26	1.44	1.47	1.22	3.71	3.7		9	9	N	-
Methylene Chloride	75-09-2	0.36	3.19	9.03	0.36	1.81	9.0	2.13	100	2.13	Y	**83%**
Tetrachloroethene	127-18-4	0.07	1.49	2.24	0.27	0.37	2	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	3.33	0.31	0.22	1.88	3.3	0.50	60	0.50	Y	**50%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.49	0.5	0.11	10	0.11	Y	**100%**
											Count= 13	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 9

Minimum percentage of detections exceeding the final chronic screening value = 47%

Table E-4
Boulder Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.56	3.02	2.16	1.03	0.94	3.0	0.45	0.9	0.45	Y	**89%**
Formaldehyde	50-00-0	2.22	1.24	1.77	1.33	1.51	2.2	181.8	0.98	0.98	Y	**47%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	ND	ND	ND	0.24	0.2	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	0.83	0.8		0.4	0.4	Y	**100%**
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	4.47	5.75	6.39	12.77	5.43	12.8	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.13	0.20	0.20	0.20	1.1		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.26	1.16	1.47	1.44	1.49	1.5		9	9	N	-
Methylene Chloride	75-09-2	0.36	15.97	4.86	4.51	1.39	16.0	2.13	100	2.13	Y	**67%**
Tetrachloroethene	127-18-4	0.95	4.95	2.24	0.07	0.81	5	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	0.40	0.41	0.06	1.34	1.3	0.50	60	0.50	Y	**50%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.01	0.0	0.11	10	0.11	N	-
											Count= 9	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 5

Minimum percentage of detections exceeding the final chronic screening value = 47%

Table E-5
CASTNet Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	0.87	1.63	2.73	4.44	3.85	4.4	0.45	0.9	0.45	Y	**92%**
Formaldehyde	50-00-0	1.21	1.33	2.57	2.44	1.85	2.6	181.8	0.98	0.98	Y	**50%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.17	0.2	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	ND	0.49	ND	1.74	1.7	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	ND	11.21	ND	4.06	11.2		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	0.86	5.43	21.07	38.31	5.75	38.3	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.44	0.20	0.74	0.20	1.4		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.18	1.32	1.49	1.42	1.82	1.8		9	9	N	-
Methylene Chloride	75-09-2	0.36	5.55	15.62	6.25	0.36	15.6	2.13	100	2.13	Y	**100%**
Tetrachloroethene	127-18-4	0.07	74.56	0.07	0.07	1.36	75	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	0.06	0.37	0.06	3.54	3.5	0.50	60	0.50	Y	**40%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.01	0.0	0.11	10	0.11	N	-
											Count= 9	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 6

Minimum percentage of detections exceeding the final chronic screening value = 40%

Table E-6
Daniel Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Daniel Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.56	2.00	5.24	2.02	1.52	5.2	0.45	0.9	0.45	Y	**98%**
Formaldehyde	50-00-0	2.15	1.91	2.48	2.80	2.15	2.8	181.8	0.98	0.98	Y	**73%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.21	0.2	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	1.37	ND	ND	1.4	0.017		0.017	Y	**100%**
1,1-Dichloroethane	75-34-3	0.04	0.04	0.61	0.30	0.69	0.7	0.63	50	0.63	Y	**4%**
1,2-Dichloroethane	107-06-2	ND	ND	0.69	0.32	0.57	0.7	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	0.55	ND	ND	0.55	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	ND	8.40	5.60	ND	8.4		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	1.85	0.96	14.37	8.30	2.46	14.4	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.82	0.85	0.66	0.20	1.8		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.55	1.71	7.64	3.30	3.92	7.6		9	9	N	-
Methylene Chloride	75-09-2	0.36	5.21	12.15	1.98	2.29	12.2	2.13	100	2.13	Y	**22%**
Tetrachloroethene	127-18-4	0.07	2.51	1.36	0.39	0.39	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	0.06	0.06	0.06	0.06	0.1	0.50	60	0.50	N	-
Vinyl Chloride	75-01-4	0.06	0.22	1.86	0.61	0.51	1.9	0.11	10	0.11	Y	**82%**
											Count= 13	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 8

Minimum percentage of detections exceeding the final chronic screening value = 4%

Table E-7
Farson Monitoring Station, Comparison to Screening Values, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	3.16	3.24	5.59	2.73	1.01	5.6	0.45	0.9	0.45	Y	**89%**
Formaldehyde	50-00-0	1.67	1.95	3.10	2.09	1.21	3.1	181.8	0.98	0.98	Y	**54%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	1.33	ND	ND	ND	ND	1.3	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	ND	7.00	6.54	5.60	7.0		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	4.47	2.65	13.73	13.73	9.58	13.7	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.55	0.20	0.70	0.20	1.6		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	2.68	1.36	1.40	1.32	2.06	2.7		9	9	N	-
Methylene Chloride	75-09-2	0.36	6.94	5.21	1.81	4.17	6.9	2.13	100	2.13	Y	**71%**
Tetrachloroethene	127-18-4	0.75	0.62	1.42	14.23	0.38	14	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	1.13	0.31	0.40	0.06	0.15	1.1	0.50	60	0.50	Y	**20%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.04	0.0	0.11	10	0.11	N	-
											Count= 9	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 5

Minimum percentage of detections exceeding the final chronic screening value = 20%

Table E-8
La Barge #1 Monitoring Station, Comparison to Screening Values, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1 Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.73	2.32	3.03	2.36	2.37	3.0	0.45	0.9	0.45	Y	**100%**
Formaldehyde	50-00-0	1.83	1.92	3.33	3.82	2.96	3.8	181.8	0.98	0.98	Y	**91%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	0.34	ND	ND	ND	0.3	0.017		0.017	Y	**100%**
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	ND	0.17	0.12	1.25	1.3	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	1.62	1.6	0.13	360	0.13	Y	**100%**
2,2,4-Trimethylpentane	540-84-1	ND	ND	45.76	4.58	8.87	45.8		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	2.71	5.75	17.88	7.02	13.09	17.9	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.51	0.20	0.20	0.20	1.5		0.5	0.50	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.14	1.32	1.69	1.88	1.44	1.9		9	9	N	-
Methylene Chloride	75-09-2	0.36	3.09	7.64	1.04	1.11	7.6	2.13	100	2.13	Y	**57%**
Tetrachloroethene	127-18-4	0.25	2.64	1.49	0.62	1.36	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	2.59	ND	ND	2.6	0.50	60	0.50	Y	**100%**
Trichloroethene	79-01-6	0.06	0.06	0.75	0.06	3.17	3.2	0.50	60	0.50	Y	**43%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.01	0.0	0.11	10	0.11	N	-
											Count= 12	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 9

Minimum percentage of detections exceeding the final chronic screening value = 43%

Table E-9
La Barge #2 Monitoring Station, Comparison to Screening Values, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #2 Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.44	2.54	3.31	2.51	2.84	3.3	0.45	0.9	0.45	Y	**100%**
Formaldehyde	50-00-0	3.13	1.96	3.12	3.76	3.41	3.8	181.8	0.98	0.98	Y	**94%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	0.57	ND	ND	ND	0.6	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	1.98	3.46	ND	1.76	3.5	0.13	360	0.13	Y	**100%**
2,2,4-Trimethylpentane	540-84-1	ND	ND	9.81	ND	8.40	9.8		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	2.81	5.43	20.43	5.75	12.45	20.4	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.86	0.20	0.20	0.20	1.9		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.18	1.44	1.59	1.22	1.32	1.6		9	9	N	-
Methylene Chloride	75-09-2	0.36	2.60	13.54	2.57	1.25	13.5	2.13	100	2.13	Y	**67%**
Tetrachloroethene	127-18-4	0.28	2.78	1.49	0.64	0.46	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	3.54	ND	ND	3.5	0.50	60	0.50	Y	**100%**
Trichloroethene	79-01-6	0.39	0.06	1.18	0.06	0.49	1.2	0.50	60	0.50	Y	**20%**
Vinyl Chloride	75-01-4	0.01	0.01	0.18	0.01	0.01	0.2	0.11	10	0.11	Y	**100%**
											Count= 12	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 9

Minimum percentage of detections exceeding the final chronic screening value = 20%

Table E-10
Marbleton East Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	4.75	1.94	5.96	1.48	1.36	6.0	0.45	0.9	0.45	Y	**91%**
Formaldehyde	50-00-0	2.46	1.29	3.35	1.34	1.68	3.4	181.8	0.98	0.98	Y	**60%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.06	0.1	0.063	40	0.063	N	-
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.04	0.04	0.04	0.04	0.0	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	0.17	ND	ND	ND	0.2	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	ND	ND	ND	0.00	0.033	0.2	0.033	N	-
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	6.54	ND	ND	8.87	8.9		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	1.05	1.05	1.05	1.1		3	3	N	-
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	3.13	12.77	2.78	5.11	13.09	13.1	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.20	0.20	0.20	0.20	1.2		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.83	0.25	0.25	0.25	0.8		9.8	9.8	N	-
Chloromethane	74-87-3	1.09	1.32	1.57	1.14	1.98	2.0		9	9	N	-
Methylene Chloride	75-09-2	0.36	6.25	4.17	1.18	2.01	6.3	2.13	100	2.13	Y	**40%**
Tetrachloroethene	127-18-4	0.07	2.51	2.37	0.22	0.07	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.81	3.87	0.75	0.33	0.47	3.9	0.50	60	0.50	Y	**63%**
Vinyl Chloride	75-01-4	0.01	0.01	0.01	0.01	0.01	0.0	0.11	10	0.11	N	-
											Count= 9	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 5

Minimum percentage of detections exceeding the final chronic screening value = 40%

Table E-11
Marbleton Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.38	2.46	3.71	2.00	2.61	3.7	0.45	0.9	0.45	Y	**100%**
Formaldehyde	50-00-0	3.30	2.90	5.08	3.15	3.44	5.1	181.8	0.98	0.98	Y	**89%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.20	0.06	0.06	0.2	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	ND	ND	ND	0.0	0.017		0.017	N	-
1,1-Dichloroethane	75-34-3	0.04	0.49	0.81	0.57	0.27	0.8	0.63	50	0.63	Y	**21%**
1,2-Dichloroethane	107-06-2	ND	0.65	0.77	0.31	0.27	0.8	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	0.42	ND	ND	ND	0.42	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	6.07	ND	4.30	4.02	6.1		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	4.09	1.05	1.05	4.1		3	3	Y	**100%**
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	1.31	7.98	2.52	7.66	6.39	8.0	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	2.06	0.93	1.09	0.20	2.1		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.22	4.13	5.98	2.89	2.89	6.0		9	9	N	-
Methylene Chloride	75-09-2	0.36	22.57	4.51	1.91	1.49	22.6	2.13	100	2.13	Y	**46%**
Tetrachloroethene	127-18-4	0.07	1.69	1.29	0.35	2.78	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	9.14	ND	ND	ND	9.1	0.50	60	0.50	Y	**100%**
Trichloroethene	79-01-6	0.06	0.30	0.64	0.06	4.19	4.2	0.50	60	0.50	Y	**75%**
Vinyl Chloride	75-01-4	0.01	1.10	1.71	0.59	0.46	1.7	0.11	10	0.11	Y	**90%**
											Count= 15	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 10

Minimum percentage of detections exceeding the final chronic screening value = 21%

Table E-12
Pinedale #1 Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1 Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.52	2.62	5.16	3.02	1.78	5.2	0.45	0.9	0.45	Y	**95%**
Formaldehyde	50-00-0	2.17	1.57	3.77	2.32	2.33	3.8	181.8	0.98	0.98	Y	**77%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.29	0.06	0.43	0.4	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	0.69	2.61	ND	ND	2.6	0.017		0.017	Y	**100%**
1,1-Dichloroethane	75-34-3	0.04	0.20	1.13	1.46	1.09	1.5	0.63	50	0.63	Y	**23%**
1,2-Dichloroethane	107-06-2	ND	0.40	1.58	1.38	0.81	1.6	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	1.34	0.92	ND	1.3		0.4	0.4	Y	**100%**
1,3-Butadiene	106-99-0	ND	ND	0.69	ND	ND	0.69	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	**-**
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	**-**
2,2,4-Trimethylpentane	540-84-1	ND	7.94	7.47	ND	5.60	7.9		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	5.73	1.05	1.05	5.7		3	3	Y	**100%**
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	**-**
Benzene	71-43-2	1.82	19.80	14.37	1.92	8.94	19.8	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.51	0.20	0.74	0.20	1.5		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	39.61	ND	ND	ND	39.6	0.07	19	0.07	Y	**100%**
Chloroform	67-66-3	0.25	10.25	0.25	0.25	0.25	10.3		9.8	9.8	Y	**100%**
Chloromethane	74-87-3	1.22	2.68	12.79	7.02	7.64	12.8		9	9	Y	**3%**
Methylene Chloride	75-09-2	0.36	9.37	10.76	3.82	5.55	10.8	2.13	100	2.13	Y	**45%**
Tetrachloroethene	127-18-4	0.07	2.71	0.42	0.07	0.57	3	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	**-**
Trichloroethene	79-01-6	0.06	0.06	0.06	0.06	0.06	0.1	0.50	60	0.50	N	**-**
Vinyl Chloride	75-01-4	0.04	0.72	3.07	1.43	1.38	3.1	0.11	10	0.11	Y	**91%**
											Count= 18	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 12

Minimum percentage of detections exceeding the final chronic screening value = 3%

Table E-13
Pinedale #2 Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2 Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concen-tration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	1.53	1.84	3.16	1.93	1.84	3.2	0.45	0.9	0.45	Y	**94%**
Formaldehyde	50-00-0	2.14	1.24	2.42	2.89	2.41	2.9	181.8	0.98	0.98	Y	**70%**
1,1,2-Trichloroethane	79-00-5	0.06	0.17	0.23	0.06	0.17	0.2	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	1.03	ND	ND	1.0	0.017		0.017	Y	**100%**
1,1-Dichloroethane	75-34-3	0.04	0.77	0.77	0.32	0.61	0.8	0.63	50	0.63	Y	**11%**
1,2-Dichloroethane	107-06-2	ND	0.89	1.94	0.28	0.33	1.9	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	0.40	0.57	ND	ND	0.57	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	ND	ND	ND	ND	0.0	0.13	360	0.13	N	-
2,2,4-Trimethylpentane	540-84-1	ND	ND	ND	7.94	74.70	74.7		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	4.91	1.05	1.05	4.9		3	3	Y	**100%**
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	1.66	5.75	5.75	14.69	10.54	14.7	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	2.99	0.85	0.20	0.20	3.0		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	3.65	ND	ND	ND	3.7	0.07	19	0.07	Y	**100%**
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	9.8	N	-
Chloromethane	74-87-3	1.20	4.54	6.19	2.68	6.81	6.8		9	9	N	-
Methylene Chloride	75-09-2	0.36	48.60	3.82	4.86	2.57	48.6	2.13	100	2.13	Y	**52%**
Tetrachloroethene	127-18-4	0.07	2.44	0.56	0.07	0.27	2	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	0.75	1.34	0.06	0.27	1.3	0.50	60	0.50	Y	**38%**
Vinyl Chloride	75-01-4	0.04	1.69	1.56	0.38	0.95	1.7	0.11	10	0.11	Y	**88%**
											Count= 16	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 10

Minimum percentage of detections exceeding the final chronic screening value = 11%

Table E-14
Sand Draw Monitoring Station, Comparison to Screening Values, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Sand Draw Maximum Observed Quarterly Concentration (µg/m^3)					Maximum Observed Concentration (µg/m^3)	Chronic Screening Value[a,b] (µg/m^3)			Is Maximum Observed Concentration >= Final Chronic Screening Value (Y or N)	Percent Detections Exceeding Final Chronic Screening Value (%)
		February - March 2009	April - June 2009	July - September 2009	October - December 2009	January -March 2010		Cancer	Non-Cancer[c]	Final		
Acetaldehyde	75-07-0	2.28	1.89	3.65	4.94	2.67	4.9	0.45	0.9	0.45	Y	**97%**
Formaldehyde	50-00-0	3.47	1.96	3.16	3.88	2.78	3.9	181.8	0.98	0.98	Y	**93%**
1,1,2-Trichloroethane	79-00-5	0.06	0.06	0.06	0.06	0.19	0.2	0.063	40	0.063	Y	**100%**
1,1,2,2-Tetrachloroethane	79-34-5	ND	0.32	ND	ND	ND	0.3	0.017		0.017	Y	**100%**
1,1-Dichloroethane	75-34-3	0.04	0.04	0.53	0.38	0.57	0.6	0.63	50	0.63	N	-
1,2-Dichloroethane	107-06-2	ND	0.37	0.73	0.53	0.40	0.7	0.038	240	0.038	Y	**100%**
1,2-Dichloropropane	78-87-5	ND	ND	ND	ND	ND	0.0		0.4	0.4	N	-
1,3-Butadiene	106-99-0	ND	ND	0.53	ND	ND	0.53	0.033	0.2	0.033	Y	**100%**
1,4-Dichlorobenzene	106-46-7	ND	ND	ND	ND	ND	0.0	0.091	80	0.091	N	-
1,4-Dioxane	123-91-1	ND	0.83	ND	ND	ND	0.8	0.13	360	0.13	Y	**100%**
2,2,4-Trimethylpentane	540-84-1	ND	7.00	ND	7.47	ND	7.5		0.4	0.4	Y	**100%**
2-Hexanone	591-78-6	1.05	1.05	4.91	1.05	1.05	4.9		3	3	Y	**100%**
alpha-Chlorotoluene	100-44-7	ND	ND	ND	ND	ND	0.0	0.02		0.02	N	-
Benzene	71-43-2	5.75	9.90	8.94	22.03	4.79	22.0	0.13	3	0.13	Y	**100%**
Bromomethane	74-83-9	0.20	1.36	0.20	0.20	0.20	1.4		0.5	0.5	Y	**100%**
Carbon Tetrachloride	56-23-5	ND	ND	ND	ND	ND	0.0	0.07	19	0.07	N	-
Chloroform	67-66-3	0.25	0.25	0.25	0.25	0.25	0.3		9.8	10	N	-
Chloromethane	74-87-3	1.26	1.75	7.43	4.95	4.75	7.4		9	9	N	-
Methylene Chloride	75-09-2	0.36	45.13	6.94	4.86	2.46	45.1	2.13	100	2.13	Y	**29%**
Tetrachloroethene	127-18-4	0.07	10.17	1.02	5.22	1.08	10	0.17	27	0.17	Y	**100%**
Tetrahydrofuran	109-99-9	ND	ND	ND	ND	ND	0.0	0.50	60	0.50	N	-
Trichloroethene	79-01-6	0.06	0.86	0.27	0.35	0.75	0.9	0.50	60	0.50	Y	**33%**
Vinyl Chloride	75-01-4	0.01	0.38	1.76	0.92	0.56	1.8	0.11	10	0.11	Y	**87%**
											Count= 15	

[a] USEPA. A preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[b] Blank means none exists.

[c] The non-cancer chronic screening value is set at one-tenth of the EPA chronic reference level

Number of TACs with 100% detections exceeding the final chronic screening value = 10

Minimum percentage of detections exceeding the final chronic screening value = 29%

Appendix F

Potential Toxic Air Contaminants Health Impacts

This appendix contains 14 tables presenting the potential toxic air contaminant health impacts for each monitoring station as follows:

- Toxic air contaminant
- CAS number
- 12-month Average (April 2009 – March 2010) detected concentration
- Federal (EPA) Health Values
    - Cancer
        - Unit risk factor
        - Cancer risk (in one million)
    - Non-cancer
        - Chronic Rf (reference concentration)
        - Chronic health hazard index

Table F-1
Potential Toxic Air Contaminants Health Impacts, Bargerville Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.25	2.2E-06	2.757	9	1.4E-01
Formaldehyde	50-00-0	1.38	5.5E-09	0.008	9.8	1.4E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.86	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.67	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	19.26	-	-	-	-
4-Ethyltoluene	622-96-8	0.74	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	9.78	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.64	7.8E-06	12.817	30	5.5E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.94	-	-	90	1.0E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.31	-	-	6000 (d)	5.2E-05
Ethanol	64-17-5	8.66	-	-	-	-
Ethyl Benzene	100-41-4	0.78	-	-	1000	7.8E-04
Freon 11	75-69-4	0.97	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.08	-	-	-	-
Heptane	142-82-5	0.55	-	-	-	-
Hexane	110-54-3	1.15	-	-	700	1.6E-03
m,p-Xylene	108-38-3/ 106-42-3	3.32	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	0.81	4.7E-07	0.379	1000	8.1E-04
o-Xylene	95-47-6	0.97	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-1
Potential Toxic Air Contaminants Health Impacts, Bargerville Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bargerville 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	-	5.9E-06	-	270	-
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	5.41	-	-	5000	1.1E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	63.54	-	16	-	0.35

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-2
Potential Toxic Air Contaminants Health Impacts, Big Sandy Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	0.97	2.2E-06	2.138	9	1.1E-01
Formaldehyde	50-00-0	1.09	5.5E-09	0.006	9.8	1.1E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	0.15	1.6E-05	2.452	400	3.8E-04
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.49	1.6E-06	0.782	500	9.8E-04
1,1-Dichloroethene	75-35-4	0.04	-	-	200	2.2E-04
1,2,4-Trimethylbenzene	95-63-6	1.14	-	-	-	-
1,2-Dichloroethane	107-06-2	0.51	2.6E-05	13.224	2400	2.1E-04
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	32.76	-	-	-	-
2-Hexanone	591-78-6	1.67	-	-	30 (d)	5.6E-02
2-Propanol	67-63-0	20.62	-	-	-	-
4-Ethyltoluene	622-96-8	0.98	-	-	-	-
4-Methyl-2-pentanone	108-10-1	1.14	-	-	3000	3.8E-04
Acetone	67-64-1	197.41	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	2.53	7.8E-06	19.744	30	8.4E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	7.59	-	-	10000	7.6E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	4.28	-	-	90	4.8E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.45	-	-	6000 (d)	7.4E-05
Ethanol	64-17-5	19.44	-	-	-	-
Ethyl Benzene	100-41-4	1.56	-	-	1000	1.6E-03
Freon 11	75-69-4	1.00	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.11	-	-	-	-
Heptane	142-82-5	4.67	-	-	-	-
Hexane	110-54-3	2.13	-	-	700	3.0E-03
m,p-Xylene	108-38-3/ 106-42-3	6.16	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	3.80	4.7E-07	1.785	1000	3.8E-03
o-Xylene	95-47-6	1.95	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-2
Potential Toxic Air Contaminants Health Impacts, Big Sandy Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Big Sandy 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.31	5.9E-06	1.850	270	1.2E-03
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	8.92	-	-	5000	1.8E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	0.97	8.8E-06	8.518	100	9.7E-03
Totals:	-	326.85	-	50	-	0.43

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-3
Potential Toxic Air Contaminants Health Impacts, Bondurant Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.16	2.2E-06	2.543	9	1.3E-01
Formaldehyde	50-00-0	1.06	5.5E-09	0.006	9.8	1.1E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.69	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.74	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	18.23	-	-	-	-
4-Ethyltoluene	622-96-8	0.60	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	13.09	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.30	7.8E-06	10.167	30	4.3E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.99	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	-	-	-	6000 (d)	-
Ethanol	64-17-5	8.13	-	-	-	-
Ethyl Benzene	100-41-4	0.69	-	-	1000	6.9E-04
Freon 11	75-69-4	1.03	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.19	-	-	-	-
Heptane	142-82-5	-	-	-	-	-
Hexane	110-54-3	0.77	-	-	700	1.1E-03
m,p-Xylene	108-38-3/ 106-42-3	2.63	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	0.78	4.7E-07	0.369	1000	7.8E-04
o-Xylene	95-47-6	0.78	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-3
Potential Toxic Air Contaminants Health Impacts, Bondurant Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Bondurant 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.19	5.9E-06	1.148	270	7.2E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	6.81	-	-	5000	1.4E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	63.87	-	14	-	0.30

[a] USEPA. A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.

[b] A blank or dash means none exists.

[c] Rf = Reference concentration. A blank or dash means none exists.

[d] USEPA. Integrated Risk Information System, http://www.epa.gov/iris/subst/

Table F-4
Potential Toxic Air Contaminants Health Impacts, Boulder Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	0.92	2.2E-06	2.028	9	1.0E-01
Formaldehyde	50-00-0	0.92	5.5E-09	0.005	9.8	9.4E-02
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.65	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.77	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	13.65	-	-	-	-
4-Ethyltoluene	622-96-8	0.56	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	11.13	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	2.05	7.8E-06	15.999	30	6.8E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.95	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.58	-	-	6000 (d)	9.6E-05
Ethanol	64-17-5	12.27	-	-	-	-
Ethyl Benzene	100-41-4	0.79	-	-	1000	7.9E-04
Freon 11	75-69-4	0.92	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.08	-	-	-	-
Heptane	142-82-5	0.69	-	-	-	-
Hexane	110-54-3	1.34	-	-	700	1.9E-03
m,p-Xylene	108-38-3/ 106-42-3	3.47	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.06	4.7E-07	0.498	1000	1.1E-03
o-Xylene	95-47-6	0.99	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	0.41	-	-	1000	4.1E-04

Table F-4
Potential Toxic Air Contaminants Health Impacts, Boulder Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Boulder 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.29	5.9E-06	1.688	270	1.1E-03
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	6.46	-	-	5000	1.3E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	64.94	-	20	-	0.28

[a] USEPA. A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.

[b] A blank or dash means none exists.

[c] Rf = Reference concentration. A blank or dash means none exists.

[d] USEPA. Integrated Risk Information System, http://www.epa.gov/iris/subst/

Table F-5
Potential Toxic Air Contaminants Health Impacts, CASTNet Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] Cancer Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Non-Cancer Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.14	2.2E-06	2.501	9	1.3E-01
Formaldehyde	50-00-0	1.11	5.5E-09	0.006	9.8	1.1E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	1.04	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	3.56	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	90.53	-	-	-	-
4-Ethyltoluene	622-96-8	0.88	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	11.67	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	2.42	7.8E-06	18.882	30	8.1E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.98	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	-	-	-	6000 (d)	-
Ethanol	64-17-5	26.54	-	-	-	-
Ethyl Benzene	100-41-4	1.10	-	-	1000	1.1E-03
Freon 11	75-69-4	0.99	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.13	-	-	-	-
Heptane	142-82-5	0.74	-	-	-	-
Hexane	110-54-3	1.95	-	-	700	2.8E-03
m,p-Xylene	108-38-3/ 106-42-3	4.79	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.09	4.7E-07	0.514	1000	1.1E-03
o-Xylene	95-47-6	1.33	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	0.44	-	-	1000	4.4E-04

Table F-5
Potential Toxic Air Contaminants Health Impacts, CASTNet Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	CASTNet 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] Cancer Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Non-Cancer Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	-	5.9E-06	-	270	-
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	8.94	-	-	5000	1.8E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	163.38	-	22	-	0.34

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-6
Potential Toxic Air Contaminants Health Impacts, Daniel Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Daniel 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.24	2.2E-06	2.726	9	1.4E-01
Formaldehyde	50-00-0	1.32	5.5E-09	0.007	9.8	1.3E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.14	1.6E-06	0.218	500	2.7E-04
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.52	-	-	-	-
1,2-Dichloroethane	107-06-2	0.15	2.6E-05	3.799	2400	6.1E-05
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	17.58	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	13.74	-	-	-	-
4-Ethyltoluene	622-96-8	-	-	-	-	-
4-Methyl-2-pentanone	108-10-1	0.62	-	-	3000	2.1E-04
Acetone	67-64-1	162.36	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.26	7.8E-06	9.809	30	4.2E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	2.62	-	-	10000	2.6E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	2.11	-	-	90	2.3E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.25	-	-	6000 (d)	4.1E-05
Ethanol	64-17-5	12.46	-	-	-	-
Ethyl Benzene	100-41-4	0.58	-	-	1000	5.8E-04
Freon 11	75-69-4	1.01	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.13	-	-	-	-
Heptane	142-82-5	2.09	-	-	-	-
Hexane	110-54-3	0.95	-	-	700	1.4E-03
m,p-Xylene	108-38-3/ 106-42-3	2.25	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.11	4.7E-07	0.522	1000	1.1E-03
o-Xylene	95-47-6	0.75	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-6
Potential Toxic Air Contaminants Health Impacts, Daniel Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Daniel 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] Cancer Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Non-Cancer Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.20	5.9E-06	1.177	270	7.4E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	4.65	-	-	5000	9.3E-04
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	0.33	8.8E-06	2.932	100	3.3E-03
Totals:	-	232.38	-	21	-	0.35

[a] USEPA. A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. Integrated Risk Information System, http://www.epa.gov/iris/subst/

Table F-7
Potential Toxic Air Contaminants Health Impacts, Farson Monitoring Station, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.54	2.2E-06	3.379	9	1.7E-01
Formaldehyde	50-00-0	1.33	5.5E-09	0.007	9.8	1.4E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	2.03	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.26	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	23.72	-	-	-	-
4-Ethyltoluene	622-96-8	1.30	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	9.47	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.85	7.8E-06	14.431	30	6.2E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.95	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.47	-	-	6000 (d)	7.9E-05
Ethanol	64-17-5	14.02	-	-	-	-
Ethyl Benzene	100-41-4	0.87	-	-	1000	8.7E-04
Freon 11	75-69-4	0.96	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.09	-	-	-	-
Heptane	142-82-5	0.59	-	-	-	-
Hexane	110-54-3	1.34	-	-	700	1.9E-03
m,p-Xylene	108-38-3/ 106-42-3	4.35	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	0.79	4.7E-07	0.373	1000	7.9E-04
o-Xylene	95-47-6	1.31	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	0.45	-	-	1000	4.5E-04

Table F-7
Potential Toxic Air Contaminants Health Impacts, Farson Monitoring Station, Sweetwater County, Wyoming

Toxic Air Contaminant	CAS Number	Farson 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] — Cancer: Unit Risk Factor[b] (per µg/m^3)	Cancer: Cancer Risk (in one million)	Non-Cancer: Chronic Rf[c] (µg/m^3)	Non-Cancer: Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	-	5.9E-06	-	270	-
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	6.40	-	-	5000	1.3E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	78.07	-	18	-	0.38

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-8
Potential Toxic Air Contaminants Health Impacts, La Barge #1 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.55	2.2E-06	3.418	9	1.7E-01
Formaldehyde	50-00-0	1.90	5.5E-09	0.010	9.8	1.9E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	1.44	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.60	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	21.75	-	-	-	-
4-Ethyltoluene	622-96-8	1.30	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	9.79	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	3.70	7.8E-06	28.869	30	1.2E-01
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	1.00	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	5.19	-	-	6000 (d)	8.6E-04
Ethanol	64-17-5	10.88	-	-	-	-
Ethyl Benzene	100-41-4	2.01	-	-	1000	2.0E-03
Freon 11	75-69-4	1.01	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.15	-	-	-	-
Heptane	142-82-5	3.39	-	-	-	-
Hexane	110-54-3	5.80	-	-	700	8.3E-03
m,p-Xylene	108-38-3/ 106-42-3	9.01	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	0.75	4.7E-07	0.351	1000	7.5E-04
o-Xylene	95-47-6	2.45	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-

Table F-8
Potential Toxic Air Contaminants Health Impacts, La Barge #1 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	La Barge #1 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Styrene	100-42-5	0.50	-	-	1000	5.0E-04
Tetrachloroethene	127-18-4	0.32	5.9E-06	1.897	270	1.2E-03
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	16.30	-	-	5000	3.3E-03
Trichloroethene	79-01-6	0.16	2.0E-06	0.315	600	2.6E-04
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	104.97	-	35	-	0.52

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.

[b] A blank or dash means none exists.

[c] Rf = Reference concentration. A blank or dash means none exists.

[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-9
Potential Toxic Air Contaminants Health Impacts, La Barge #2 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station

Toxic Air Contaminant	CAS Number	La Barge #2	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.62	2.2E-06	3.570	9	1.8E-01
Formaldehyde	50-00-0	1.89	5.5E-09	0.010	9.8	1.9E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.95	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	1.76	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	22.25	-	-	-	-
4-Ethyltoluene	622-96-8	0.84	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	8.91	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	3.79	7.8E-06	29.561	30	1.3E-01
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	1.00	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	5.32	-	-	6000 (d)	8.9E-04
Ethanol	64-17-5	14.56	-	-	-	-
Ethyl Benzene	100-41-4	1.64	-	-	1000	1.6E-03
Freon 11	75-69-4	1.03	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.16	-	-	-	-
Heptane	142-82-5	3.64	-	-	-	-
Hexane	110-54-3	6.06	-	-	700	8.7E-03
m,p-Xylene	108-38-3/ 106-42-3	7.82	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	-	4.7E-07	-	1000	-
o-Xylene	95-47-6	1.90	-	-	-	-

Table F-9
Potential Toxic Air Contaminants Health Impacts, La Barge #2 Monitoring Station, Lincoln County, Wyoming (collocated with La Barge #1 Monitoring Station

Toxic Air Contaminant	CAS Number	La Barge #2 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	0.48	-	-	1000	4.8E-04
Tetrachloroethene	127-18-4	0.25	5.9E-06	1.453	270	9.1E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	14.97	-	-	5000	3.0E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	102.85	-	35	-	0.53

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-10
Potential Toxic Air Contaminants Health Impacts, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.35	2.2E-06	2.969	9	1.5E-01
Formaldehyde	50-00-0	1.26	5.5E-09	0.007	9.8	1.3E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	-	1.6E-06	-	500	-
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.77	-	-	-	-
1,2-Dichloroethane	107-06-2	-	2.6E-05	-	2400	-
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	2.21	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	17.10	-	-	-	-
4-Ethyltoluene	622-96-8	0.70	-	-	-	-
4-Methyl-2-pentanone	108-10-1	-	-	-	3000	-
Acetone	67-64-1	10.52	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.97	7.8E-06	15.344	30	6.6E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	-	-	-	10000	-
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	0.95	-	-	90	1.1E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.78	-	-	6000 (d)	1.3E-04
Ethanol	64-17-5	12.79	-	-	-	-
Ethyl Benzene	100-41-4	0.90	-	-	1000	9.0E-04
Freon 11	75-69-4	0.94	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.16	-	-	-	-
Heptane	142-82-5	0.80	-	-	-	-
Hexane	110-54-3	2.10	-	-	700	3.0E-03
m,p-Xylene	108-38-3/ 106-42-3	4.01	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	0.76	4.7E-07	0.359	1000	7.6E-04
o-Xylene	95-47-6	1.03	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-10
Potential Toxic Air Contaminants Health Impacts, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton East 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] Cancer Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Non-Cancer Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.23	5.9E-06	1.343	270	8.4E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	7.36	-	-	5000	1.5E-03
Trichloroethene	79-01-6	0.16	2.0E-06	0.328	600	2.7E-04
Vinyl Chloride	75-01-4	-	8.8E-06	-	100	-
Totals:	-	70.86	-	20	-	0.36

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-11
Potential Toxic Air Contaminants Health Impacts, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.61	2.2E-06	3.536	9	1.8E-01
Formaldehyde	50-00-0	1.88	5.5E-09	0.010	9.8	1.9E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.22	1.6E-06	0.352	500	4.4E-04
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.84	-	-	-	-
1,2-Dichloroethane	107-06-2	0.25	2.6E-05	6.428	2400	1.0E-04
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	21.88	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	15.23	-	-	-	-
4-Ethyltoluene	622-96-8	0.70	-	-	-	-
4-Methyl-2-pentanone	108-10-1	0.51	-	-	3000	1.7E-04
Acetone	67-64-1	167.63	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.49	7.8E-06	11.637	30	5.0E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	4.19	-	-	10000	4.2E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	2.48	-	-	90	2.8E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.42	-	-	6000 (d)	7.0E-05
Ethanol	64-17-5	12.88	-	-	-	-
Ethyl Benzene	100-41-4	1.14	-	-	1000	1.1E-03
Freon 11	75-69-4	1.07	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.13	-	-	-	-
Heptane	142-82-5	2.92	-	-	-	-
Hexane	110-54-3	1.35	-	-	700	1.9E-03
m,p-Xylene	108-38-3/ 106-42-3	4.30	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.50	4.7E-07	0.707	1000	1.5E-03
o-Xylene	95-47-6	1.24	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-

Table F-11
Potential Toxic Air Contaminants Health Impacts, Marbleton Monitoring Station, Sublette County, Wyoming

Toxic Air Contaminant	CAS Number	Marbleton 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a]			
			Cancer		Non-Cancer	
			Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Tetrachloroethene	127-18-4	0.24	5.9E-06	1.421	270	8.9E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	5.11	-	-	5000	1.0E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	0.52	8.8E-06	4.549	100	5.2E-03
Totals:	-	253.73	-	29	-	0.46

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-12
Potential Toxic Air Contaminants Health Impacts, Pinedale #1 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.54	2.2E-06	3.381	9	1.7E-01
Formaldehyde	50-00-0	1.57	5.5E-09	0.009	9.8	1.6E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	0.09	1.6E-05	1.361	400	2.1E-04
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.34	1.6E-06	0.542	500	6.8E-04
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	1.64	-	-	-	-
1,2-Dichloroethane	107-06-2	0.34	2.6E-05	8.966	2400	1.4E-04
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	22.45	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	20.49	-	-	-	-
4-Ethyltoluene	622-96-8	1.33	-	-	-	-
4-Methyl-2-pentanone	108-10-1	0.93	-	-	3000	3.1E-04
Acetone	67-64-1	174.72	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	2.11	7.8E-06	16.493	30	7.0E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	6.32	-	-	10000	6.3E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	3.40	-	-	90	3.8E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.29	-	-	6000 (d)	4.8E-05
Ethanol	64-17-5	15.21	-	-	-	-
Ethyl Benzene	100-41-4	1.06	-	-	1000	1.1E-03
Freon 11	75-69-4	0.91	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.11	-	-	-	-
Heptane	142-82-5	3.39	-	-	-	-
Hexane	110-54-3	1.59	-	-	700	2.3E-03
m,p-Xylene	108-38-3/ 106-42-3	5.09	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.95	4.7E-07	0.916	1000	1.9E-03
o-Xylene	95-47-6	1.92	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-

Table F-12
Potential Toxic Air Contaminants Health Impacts, Pinedale #1 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #2 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #1	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Styrene	100-42-5	-	-	-	1000	-
Tetrachloroethene	127-18-4	0.17	5.9E-06	0.993	270	6.2E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	6.90	-	-	5000	1.4E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	0.70	8.8E-06	6.133	100	7.0E-03
Totals:	-	278.56	-	39	-	0.46

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-13
Potential Toxic Air Contaminants Health Impacts, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.18	2.2E-06	2.596	9	1.3E-01
Formaldehyde	50-00-0	1.31	5.5E-09	0.007	9.8	1.3E-01
1,1,1-Trichloroethane	71-55-6	0.11	-	-	1000	1.1E-04
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.27	1.6E-06	0.430	500	5.4E-04
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.77	-	-	-	-
1,2-Dichloroethane	107-06-2	0.27	2.6E-05	7.055	2400	1.1E-04
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	24.30	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	33.07	-	-	-	-
4-Ethyltoluene	622-96-8	0.66	-	-	-	-
4-Methyl-2-pentanone	108-10-1	0.78	-	-	3000	2.6E-04
Acetone	67-64-1	177.61	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	1.84	7.8E-06	14.349	30	6.1E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	4.72	-	-	10000	4.7E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	2.90	-	-	90	3.2E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.33	-	-	6000 (d)	5.6E-05
Ethanol	64-17-5	22.41	-	-	-	-
Ethyl Benzene	100-41-4	0.98	-	-	1000	9.8E-04
Freon 11	75-69-4	1.00	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.08	-	-	-	-
Heptane	142-82-5	3.84	-	-	-	-
Hexane	110-54-3	1.64	-	-	700	2.3E-03
m,p-Xylene	108-38-3/ 106-42-3	3.85	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	2.28	4.7E-07	1.072	1000	2.3E-03
o-Xylene	95-47-6	1.20	-	-	-	-
Propylbenzene	103-65-1	-	-	-	-	-

Table F-13
Potential Toxic Air Contaminants Health Impacts, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Pinedale #2	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Styrene	100-42-5	-	-	-	1000	-
Tetrachloroethene	127-18-4	0.25	5.9E-06	1.465	270	9.2E-04
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	7.82	-	-	5000	1.6E-03
Trichloroethene	79-01-6	0.11	2.0E-06	0.225	600	1.9E-04
Vinyl Chloride	75-01-4	0.57	8.8E-06	5.042	100	5.7E-03
Totals:	-	298.15	-	32	-	0.37

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.

[b] A blank or dash means none exists.

[c] Rf = Reference concentration. A blank or dash means none exists.

[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Table F-14
Potential Toxic Air Contaminants Health Impacts, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Sand Draw	Federal (EPA) Health Values[a]			
		12-Month Average (April 2009 - March 2010) Detected Concentration[b]	Cancer		Non-Cancer	
		(µg/m3)	Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Acetaldehyde	75-07-0	1.45	2.2E-06	3.185	9	1.6E-01
Formaldehyde	50-00-0	1.80	5.5E-09	0.010	9.8	1.8E-01
1,1,1-Trichloroethane	71-55-6	-	-	-	1000	-
1,1,2-Trichloroethane	79-00-5	-	1.6E-05	-	400	-
1,1,2,2-Tetrachloroethane	79-34-5	-	5.8E-05	-	-	-
1,1-Dichloroethane	75-34-3	0.17	1.6E-06	0.272	500	3.4E-04
1,1-Dichloroethene	75-35-4	-	-	-	200	-
1,2,4-Trimethylbenzene	95-63-6	0.95	-	-	-	-
1,2-Dichloroethane	107-06-2	0.20	2.6E-05	5.295	2400	8.5E-05
1,2-Dichloropropane	78-87-5	-	-	-	4 (d)	-
1,3,5-Trimethylbenzene	108-67-8	-	-	-	-	-
1,3-Butadiene	106-99-0	-	3.0E-05	-	2	-
1,4-Dichlorobenzene	106-46-7	-	1.1E-05	-	800	-
1,4-Dioxane	123-91-1	-	7.7E-06	-	3600	-
2,2,4-Trimethylpentane	540-84-1	-	-	-	4 (d)	-
2-Butanone (Methyl Ethyl Ketone)	78-93-3	19.71	-	-	-	-
2-Hexanone	591-78-6	-	-	-	30 (d)	-
2-Propanol	67-63-0	46.12	-	-	-	-
4-Ethyltoluene	622-96-8	0.78	-	-	-	-
4-Methyl-2-pentanone	108-10-1	0.92	-	-	3000	3.1E-04
Acetone	67-64-1	170.48	-	-	-	-
alpha-Chlorotoluene	100-44-7	-	4.9E-05	-	-	-
Benzene	71-43-2	2.45	7.8E-06	19.102	30	8.2E-02
Bromomethane	74-83-9	-	-	-	5	-
Carbon Disulfide	75-15-0	-	-	-	700	-
Carbon Tetrachloride	56-23-5	-	1.5E-05	-	190	-
Chlorobenzene	108-90-7	-	-	-	-	-
Chloroethane	75-00-3	3.02	-	-	10000	3.0E-04
Chloroform	67-66-3	-	-	-	98	-
Chloromethane	74-87-3	2.50	-	-	90	2.8E-02
cis-1,2-Dichloroethene	156-59-2	-	-	-	-	-
Cumene	98-82-8	-	-	-	400	-
Cyclohexane	110-82-7	0.87	-	-	6000 (d)	1.4E-04
Ethanol	64-17-5	17.71	-	-	-	-
Ethyl Benzene	100-41-4	1.03	-	-	1000	1.0E-03
Freon 11	75-69-4	0.94	-	-	-	-
Freon 113	76-13-1	-	-	-	-	-
Freon 12	75-71-8	2.10	-	-	-	-
Heptane	142-82-5	3.29	-	-	-	-
Hexane	110-54-3	2.26	-	-	700	3.2E-03
m,p-Xylene	108-38-3/ 106-42-3	4.59	-	-	-	-
Methyl tert-butyl ether	1634-04-4	-	2.6E-07	-	3000	-
Methylene Chloride	75-09-2	1.98	4.7E-07	0.930	1000	2.0E-03
o-Xylene	95-47-6	1.34	-	-	-	-

Table F-14
Potential Toxic Air Contaminants Health Impacts, Pinedale #2 Monitoring Station, Sublette County, Wyoming (collocated with Pinedale #1 Monitoring Station)

Toxic Air Contaminant	CAS Number	Sand Draw 12-Month Average (April 2009 - March 2010) Detected Concentration[b] (µg/m3)	Federal (EPA) Health Values[a] Cancer Unit Risk Factor[b] (per µg/m^3)	Cancer Risk (in one million)	Non-Cancer Chronic Rf[c] (µg/m^3)	Chronic Health Hazard Index (-)
Propylbenzene	103-65-1	-	-	-	-	-
Styrene	100-42-5	-	-	-	1000	-
Tetrachloroethene	127-18-4	0.50	5.9E-06	2.942	270	1.8E-03
Tetrahydrofuran	109-99-9	-	2.0E-06	-	600	-
Toluene	108-88-3	8.40	-	-	5000	1.7E-03
Trichloroethene	79-01-6	-	2.0E-06	-	600	-
Vinyl Chloride	75-01-4	0.41	8.8E-06	3.588	100	4.1E-03
Totals:	-	295.95	-	35	-	0.47

[a] USEPA. *A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets,* EPA-904-B-06-001, Table 1 - Prioritized Chronic Dose-Response Values for Screening Risk Assessments (as of 6/12/2007) for cancer unit risk factors, and Table 2 - Acute Dose-Response Values for Screening Risk Assessments (as of 6/12/2007), and USEPA, http://www.epa.gov/oppt/aegl/pubs/compiled_aegls_050409.pdf for non-cancer AEGLs and chronic reference concentrations.
[b] A blank or dash means none exists.
[c] Rf = Reference concentration. A blank or dash means none exists.
[d] USEPA. *Integrated Risk Information System,* http://www.epa.gov/iris/subst/

Appendix G

Calculation of Health Impacts

This appendix discusses the methodology for calculating excess cancer risk and chronic and acute non-cancer health impacts.

Assessment of Potential Health Impacts

Excess Cancer Risk

In this screening health risk assessment, excess cancer risk attributable to each carcinogenic TAC is calculated as the product of the unit risk factor for each specific TAC and the 12-month average concentration monitored for that TAC. The unit risk factors are from the U.S. EPA[80] and CARB[81]. The cancer risks for all carcinogenic TACs measured at each monitoring station are summed to obtain the total cancer risk associated with that monitoring station.

Chronic and Acute Non-Cancer Health Hazard Indices

Non-cancer health effects can be either long-term (chronic) or short-term (acute). In determining potential non-cancer health impacts from air toxics, it is assumed there is a dose of the TAC below which there would be no impact on human health. The air concentration corresponding to this dose is called the Reference Concentration (Rf). A non-cancer health impact is measured in terms of a health hazard quotient, which is the calculated exposure (concentration) of each TAC divided by its Rf. Health hazard quotients for TACs affecting the same target organ are summed with the resulting totals expressed as health hazard indices for each organ system, or even more conservatively for all organ systems taken together, as is done in this assessment. A health hazard index of less than 1.0 is considered to be a less-than-significant health impact.[82,83]

For completeness, acute health hazard is also discussed here, although maximum concentrations of the TACs measured in the study did not exceed the acute screening levels, except for the 2-propanol outlier. Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. The maximum short-term (e.g., one-hour or 24-hour) average concentration of each TAC with acute health effects is divided by that TAC's acute reference concentration to obtain the health hazard quotient for health effects caused by a relatively high, short-term exposure to that TAC. Although acutely toxic chemicals have identified target organs, acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures. Hence, all acute health hazard quotients for the various target organs would be conservatively summed to calculate the acute health hazard index. This method leads to an upper bound assessment.

---

[80] U.S. EPA. "A Preliminary Risk-Based Screening Approach for Air Toxics Monitoring Data Sets, Report EPA-904-B-06-001, Version 1.2, Appendix A, February 2006, http://www.epa.gov/region4/air/airtoxic/Screening-041106-KM.pdf.

[81] CARB. Consolidated Table of OEHHA/ARB-Approved Risk Assessment Health Values, February 9, 2009, http://www.arb.ca.gov/toxics/healthval/contable.pdf.

[82] U.S. EPA. "Risk Characterization, a Science Policy Council Handbook," Report EPA 100-B-00-002, page E-7, December 2000.

[83] BAAQMD. "California Environmental Quality Act Air Quality Guidelines," Table 2-1, page 2-2, June 2010.