Report on Quarterly Air Monitoring, Area IV, Eighth Quarter 2020

Santa Susana Field Laboratory Ventura County, California

July 2020

Prepared for:
United States Department of Energy

Prepared by:
North Wind Portage, Inc.

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July 2020

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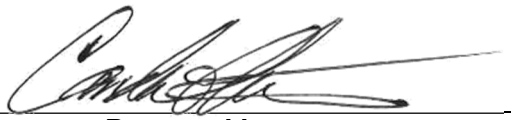
PROFESSIONAL CERTIFICATION

Report on Quarterly Air Monitoring, Area IV, Eighth Quarter 2020
Santa Susana Field Laboratory
Ventura County, California

July 2020

This report has been prepared by a team of qualified professionals under the supervision of the senior staff whose signatures appear below.



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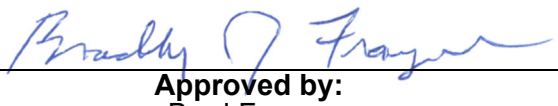

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EXECUTIVE SUMMARY

This report summarizes the United States Department of Energy (DOE) air monitoring activities conducted during the eighth quarter (Q8) of the baseline monitoring period (January 1, 2020, to March 31, 2020) at Area IV within in the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. The area specifically discussed within this report is the DOE portion, Area IV of SSFL, known as the Energy Technology Engineering Center (ETEC). Year one of the Baseline Air Monitoring Program consisted of Quarter 1 through Quarter 4. Year two consisted of Quarter 5 through Quarter 7. The program is continuing for a third year, which will consist of Quarter 8 through Quarter 11.

This quarterly report has been developed by North Wind Portage, Inc., on behalf of DOE in cooperation with The Boeing Company (Boeing) and the National Aeronautics and Space Administration (NASA), as part of a Baseline Air Monitoring Program.

The objective of the Baseline Air Monitoring Program is to evaluate baseline (that is, pre-project) conditions. In accordance with *the Final Baseline Air Monitoring Work Plan, Santa Susana Field Laboratory, Ventura County, California* (NASA 2017), the responsible parties are monitoring for particulate matter between 2.5 and 10 microns in aerodynamic diameter (PM_{10}), volatile organic compounds (VOCs), and radionuclides at air monitoring stations DOE-1, DOE-2, DOE-3, and DOE-4 encompassing the ETEC, Area IV portion of the SSFL. Determining the baseline levels for PM_{10}, VOCs, and radionuclides helps distinguish between levels that naturally occur or were previously present at the ETEC site and if onsite remediation activities produce elevated results. Air monitoring will be continued throughout remediation activities to be able to compare results from onsite remediation activities to baseline data.

The following air monitoring activities conducted during Q8 2020 by DOE within Area IV are summarized in this report:

- Collected meteorological data from one location (DOE-4);
- Collected PM_{10} data from four locations (DOE-1 through DOE-4);
- Collected air samples from four locations (DOE-1 through DOE-4) for VOC laboratory analysis; and
- Collected radionuclide samples for laboratory analysis from four locations (DOE-1 through DOE-4).

Meteorological data, PM_{10}, VOC, and radionuclide data all met the data completeness goal of 80% for Q8. The baseline air monitoring is to be continued beginning April 1, 2020 with the ninth quarter of year three baseline monitoring. Data collected during remediation activities will be compared to the baseline conditions.

The following site activities were conducted during Q8 by DOE within Area IV:

- Annual groundwater sampling event
- Deactivation of CLIN 8, 9 facilities
- Surveillance and maintenance
- Abatement activities.

Site activities were shut down on March 20, 2020, through the end of Q8, due to COVID-19.

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
µCi	microcurie(s)
µg/m^3	microgram(s) per cubic meter
Boeing	The Boeing Company
CAAQS	California Ambient Air Quality Standard
CFR	Code of Federal Regulations
DASC	Data Assessment Statistical Calculator
DOE	U.S. Department of Energy
DTSC	State of California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ETEC	Energy Technology Engineering Center
GC	gas chromatography
Hg	mercury
HHRA	Human Health Risk Assessment
mph	miles per hour
MS	mass spectrometry
m	meter(s)
m/sec	meter(s) per second
mb	millibar(s)
mL	milliliter(s)
MDC	minimum detectable concentration
NASA	National Aeronautics and Space Administration
NIST	National Institute of Standards and Technology
pCi	picocurie(s)
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
Q5	fifth quarter
Q6	sixth quarter
Q7	seventh quarter
Q8	eighth quarter
QA	quality assurance
QC	quality control
RAWS	Remote Automatic Weather Stations
RPD	relative percent difference
RSL	regional screening level
SDG	sample delivery group
SSFL	Santa Susana Field Laboratory
VOC	volatile organic compound

1. INTRODUCTION

National Aeronautics and Space Administration (NASA), The Boeing Company (Boeing), and the U.S. Department of Energy (DOE), also known as the responsible parties, are performing baseline air monitoring at the Santa Susana Field Laboratory (SSFL) site located in Ventura County, California. The SSFL is a business segment of Boeing. SSFL operates the 2,849-acre site located atop a range of hills between the Simi and San Fernando valleys, north of Los Angeles. The westernmost 290 acres of the SSFL, known as Area IV, contains both DOE and Boeing facilities. The DOE portion is mainly contained within the 90 acres known as the Energy Technology Engineering Center (ETEC).

When opened in the late 1950s, ETEC was ideally remote from population centers to enable development of security-sensitive projects. These projects supported research for DOE and its predecessor agencies for nuclear research and energy development. Area IV includes buildings that house test apparatus for large-scale heat transfer and fluid mechanics experiments, mechanical and chemical test facilities, office buildings, and auxiliary facilities.

Baseline air monitoring is being conducted in accordance with the *Final Baseline Air Monitoring Work Plan, Santa Susana Field Laboratory, Ventura County, California* (NASA 2017), which was submitted to the State of California Department of Toxic Substances Control (DTSC) on September 21, 2017. DTSC approved the Work Plan. Final locations of the air monitoring locations were approved by DTSC on January 30, 2018 (DTSC 2018).

The objective of the Baseline Air Monitoring Program is to evaluate baseline (that is, pre-project) conditions and provide a basis for determining the magnitude of deviation from those baseline conditions that may result from onsite remediation activities (project) at SSFL. Responsible parties are monitoring for particulate matter between 2.5 and 10 microns in aerodynamic diameter (PM_{10}), and volatile organic compounds (VOCs), at 14 locations at SSFL. Data were collected for four perimeter samplers (DOE-1 through DOE-4) and analyzed for gross alpha and gross beta. Individual radionuclide concentrations were determined by analysis at an offsite laboratory for these same four locations. Meteorological data are also collected as a part of the Baseline Air Monitoring Program.

Figure 1 shows the air monitoring locations for the Baseline Air Monitoring Program. These locations were selected based on the areas to be remediated, with consideration of winds in the area, topographic features, and accessibility. The air monitoring sites were also selected based on guidance obtained from the U.S. Environmental Protection Agency's (EPA's) *Quality Assurance Handbook for Air Pollution Measurement Systems*, Volume II, Ambient Air Monitoring Program (EPA 2017) and *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA 2000). Sites were evaluated per 40 Code of Federal Regulations (CFR) 58, Appendix C – Ambient Air Quality Monitoring Methodology. DOE is responsible for DOE-1, DOE-2, DOE-3, and DOE-4 of the 14 monitoring locations, represented in Figure 1. VOCs, PM_{10}, and radionuclides are monitored at the four DOE monitoring locations, and meteorological conditions are monitored at the DOE-4 location. The DOE monitoring locations DOE-1 through DOE-4 are shown in Figure 2.

This report summarizes the Q8 quarterly results and quality assurance (QA) activities performed between January 1, 2020, and March 31, 2020.

1.1 Regional Climate and Wind Direction

The climate in the SSFL area is characterized as "Mediterranean." The mean temperature during the winter months is approximately 50 degrees Fahrenheit (°F) and the mean temperature in the summer months is approximately 70°F. Based on climate data between 2018 and 2019 from Weather Atlas, average rainfall is on the order of 17.9 inches per year. The majority of the rainfall occurs between December and April.

The average hourly wind speed in Simi Valley varies significantly by season. The more turbulent part of the year lasts for 6 months, from November to April, with average western wind speeds of more than 7 miles per hour (mph). The calmer time of year lasts for 6 months, with northerly winds from May to October.

During the fall, winter, and spring, Santa Ana winds can blow from the north or northeast in excess of 35 mph.

2. SUMMARY

This report summarizes the air monitoring data collected during the Q8 reporting period (January 1, 2020, to March 31, 2020).

Quality objectives and data completeness of 80% were met for all meteorological, PM_{10}, VOC, and radionuclide data for Q8 of the Baseline Air Monitoring Program.

Urban background data compared with baseline monitoring data indicate that the PM_{10} concentrations measured at stations DOE-1, DOE-2, DOE-3, and DOE-4 during Q8 are comparable to the PM_{10} concentrations measured at stations characterizing urban background. During Q8, none of the five average daily concentrations exceeded the CAAQS of 50 $\mu g/m^3$ or the National Ambient Air Quality Standard of 150 $\mu g/m^3$.

During Q8 there were four VOC analytes detected above the EPA Residential Air RSL or the DTSC HHRA. Three analytes were detected during the March 6, 2020, sampling event and one from the March 20, 2020, sampling event. DOE-1 and DOE-3 each had one detection above the screening level and DOE-4 had two analytes detected above the screening level.

Of the 26 radiological sampling events at DOE-1, DOE-2, and DOE-4 and 27 events at DOE-3 in Q8, detections for gross alpha and gross beta that exceeded the MDC are all naturally occurring radionuclides. Detections are expected because the results are calculated at a 95% confidence level. No man-made radionuclides that are contaminants of concern at ETEC were detected.

Data collected during the Q8 reporting period agree with data collected, analyzed, and reported by the State of California Department of Toxic Substances Control, Los Angeles County Emergency Response Organization, the DOE Emergency Response organization, or other Multi-Agency Task Forces. Air monitoring at Area IV of the SSFL is to be continued starting April 1, 2020, for the ninth quarter of the Baseline Air Monitoring Program.

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3. ANALYTICAL SAMPLING EVENTS

VOCs are collected according to the EPA Toxic Compendium Method TO-15, *Determination of Volatile Organic Compounds (VOCs) Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA 1999). Twenty-four-hour time-integrated samples are collected into Summa canisters via a flow controller and sent to an offsite laboratory for analysis. VOCs are collected every other week. There were six VOC sampling events in this reporting period with one field duplicate sample collected during each sampling event.

During Q8, radionuclide samples were collected at four perimeter sampler locations, DOE-1 through DOE-4. These samples were collected on glass fiber (Type A/E) filters that are changed twice a week. After a minimum 120-hour holding time to allow the decay of short-lived radon and thoron daughter products, the samples are simultaneously counted for gross alpha and beta activity with a low-background, thin-window, gas-flow proportional-counting system continually purged with P-10 argon/methane counting gas over a preset time interval. There were 26 sampling events for air samplers DOE-1, -2, and -4 and 27 sampling events for DOE-3 during this reporting period. Following analysis for gross alpha and gross beta radiation, sample filters were combined to form one composite sample representative of each location. The four composite samples were then analyzed for individual radionuclides at an offsite laboratory.

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4. DATA

Sections 4.1 through 4.4 discuss Q8 air monitoring data.

4.1 Meteorological Data

General Summary

Meteorological data, also called weather data, is being collected as part of the ETEC cleanup and restoration effort. This information, particularly the wind direction and wind speed, can be used to help understand how dust and other air pollutants from the site are carried by the wind and possibly affect nearby public and residential areas. This is especially important when the E-BAM particulate monitors at the site detect higher than normal amounts of dust in the air. Scientific computer models can be used with this weather data in association with the particulate monitoring data to describe the air quality for the communities near the ETC site. However, before the weather data can be used with the computer models it must first be tested for completeness and accuracy. A detailed description of the weather data collection and quality testing is provided in the following paragraphs.

Monitored meteorology parameters at the DOE-4 station included wind speed, wind direction, air temperature at 2 meters (m) and 10 m, relative humidity, precipitation, barometric pressure, and solar radiation. In addition, statistical parameters provided by the data logger included delta temperature (i.e., defined as the 10-m temperature minus the 2-m temperature), maximum wind speed (i.e., wind gust), and standard deviation of wind direction. Observations were recorded at 15-minute intervals for :00, :15, :30; and :45 minutes each hour. There were 91 days in this reporting period, which covers January 1, 2020, to March 31, 2020, with a total of 8,736 possible 15-minute observations. Note that Q8 represents the start of the Year 3 baseline monitoring period. Year 2 had been abbreviated to include only three quarters: Quarter 5 (Q5) through Quarter 7 (Q7) in order to synchronize baseline monitoring years with the calendar years.

Data Validation and Statistics

Data validation screening was performed on the recorded meteorological observations pursuant to EPA's *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA 2000), Table 8-4 (Suggested Data Screening Criteria) and Table 8-3 (Suggested Quality Control Codes). Validation screening provided the basis for evaluating data completeness and for determining sensor performance and/or maintenance status. Validation was performed following each weekly data download. Data validation quality control codes applied to the meteorological observations are defined in Table 1.

Table 1. Data screening quality control codes for meteorological data.

Code	Meaning	Description (as used for ETEC meteorological data validation)
0	Valid	PASS – Observation is accurate within the performance limits of the instrument (i.e., value passes all data validation screening criteria)
3	Acceptable	PASS – Observation originally failed initial quality control (QC) check (see Code 6), but additional review using other independent data and meteorological judgment support final validity.
6	Failed initial QC check	FAIL – Observation did not pass data validation screening criteria.
7	Suspect	FAIL – Observation failed initial data validation QC check (see Code 6) and could not be verified through additional review using other independent data.
8	Invalid	FAIL – Observation judged to be inaccurate or in error, and the cause is known.
9	Missing	FAIL – Observation was not collected.

The validation screening involved comparing, on an individual parameter basis, the recorded values (i.e., observations) against the EPA screening criteria shown in Table 2. The data validation procedure involved an initial automated review to apply a first level QC Code of 0 (valid), 6 (failed), or 9 (missing) as defined in Table 1. Observations initially flagged with a QC Code = 6 were then manually (i.e., second-level) reviewed by a project meteorologist. The procedure is outlined below:

- Values meeting all screening criteria for the respective meteorological parameter were automatically considered "valid" (QC Code = 0).
- Values not meeting a screening criterion were automatically flagged as "failed initial QC" (QC Code = 6). These values were subjected to second-level manual meteorological review using other available observations (e.g., 2-m vs. 10-m temperature at DOE-4 or from nearby Remote Automatic Weather Stations [RAWS] meteorological station CEEC1 in the Cheeseboro Canyon, California, area located 2.6 miles south of the DOE-4 site), and meteorological judgment:
  - Values confirmed by second-level review were deemed "acceptable" (final QC Code = 3).
  - Otherwise, the values were deemed "suspect" (final QC Code = 7).
- Observations known to be inaccurate (QC Code = 8).
- Missing observations were automatically flagged as "missing" (QC Code = 9).

Values that pass validation with a final QC Code of 0 or 3 are included in the data completeness statistics and the final validated meteorological data set. Values with a final QC Code of 7, 8, or 9 are excluded from the final dataset and counted against the data completeness percentage. Quarterly data statistics for the meteorological parameters are listed in Table 2 along with year-to-date and project-to date results. Year-to-date and Project-to-date percentages are calculated as total valid observations through the completed quarters for the year divided by the total possible observations through this same period.

The meteorological data completeness goal is 80% on an annual basis. Data completeness statistics for all completed reporting quarters in Year 3 of the baseline monitoring are presented in Table 2. In summary, the data completeness goal was achieved for all meteorological parameters in Q8.

Wind Rose

The final validated 15-minute meteorological dataset was used to develop the wind rose for Q8 as presented in Figure 3. A wind rose is a graphical representation of wind speed and direction distribution (or climatology) for the period of interest. The frequency of winds blowing from a particular direction is shown as petals on the wind rose, with the frequency of wind speeds depicted by color bands. Calm winds are identified as being less than 0.5 meters per second (m/sec).

During Q8, data capture for wind speed and direction at DOE-4 was 100%. The average and maximum wind speeds were 4.5 m/sec and 20.2 m/s, respectively. The maximum recorded wind gust was 29.2 m/sec. The primary predominant wind direction was from the north and north-northeast with a secondary peak from the east-southeast.

Table 2. Data screening summary for monitored meteorological parameters.

Meteorological Parameter	Screening Criteria (1) (for valid sensor responses)	Data Completeness Percent (%) (2)		
		Q8	Year 3 to Date	Project to Date
Wind Speed	between 0 and 25 m/sec (meters/second) > 0.1 m/sec variation over 3 hours > 0.5 m/sec variation over 12 hours	100	100	89.02
Wind Direction	between 0 and 360 degrees > 1 degree variation over 3 hours > 10 degree variation over 12 hours	100	100	89.02
Standard Deviation of Wind Direction	Inherits the completeness stats of Wind Direction	100	100	89.02
Temperature @ 2 m	≤ local record high (monthly basis) ≥ local record low (monthly basis) > 0.5 Celsius (°C) variation over 12 hours	100	100	89.01
Temperature @ 10 m	≤ local record high (monthly basis) ≥ local record low (monthly basis) > 0.5°C variation over 12 hours	100	100	89.02
Delta Temperature	≤ 0.1°C during daytime ≥ -0.1°C during nighttime between -3.0 and 5.0°C	100	100	89.01
Relative Humidity (and Dewpoint Temperature)	relative humidity between 0-100% dew point T ≤ ambient T dew point T ≤ 5.0°C variation over 1 hour dew point T > 0.5°C variation over 12 hours	100	100	76.48
Precipitation	≤ 1 inch in 1 hour ≤ 4 inches in 24 hours ≥ 2 inches in 3 months	99.84	99.84	88.99
Barometric Pressure	between 871 and 982 millibar (mb) (local) (i.e., between 940 and 1060 mb sea level) ≤ 6 mb variation over 3 hours	100	100	89.02
Solar Radiation	> 0 at night ≤ maximum possible for date and latitude	99.74	99.74	88.96

(1) Screening criteria from EPA Meteorological Monitoring Guidance (EPA 2000), Table 8-4.

(2) Data Completeness % = [Observations Passing] / [Possible Observations)].

Missing or suspect observations count against data completeness statistics.

Year Two is an abbreviated data collection year spanning the period Apr 15–Dec 31, 2019 (i.e., Quarters 5, 6, and 7). This was done to synchronize future data collection years with calendar years.

The number of possible 15-minute observations in the completed reporting periods:

- Q1 = 8,736
- Q2 = 8,832
- Q3 = 8,832
- Q4 = 8,640
- Year One = 35,040
- Q5 = 8,736
- Q6 = 8,832
- Q7 = 7,488
- Year Two = 25,056 (only 3 quarters)
- Q8 = 8,736
- Year Three = (in progress)

4.2 PM_{10} Data

PM_{10} data, defined as coarse particles between 2.5 and 10 micrometers in diameter, are measured at the ETEC site. Sources of particulate matter can be naturally occurring or caused by human activity. The air monitoring conducted at ETEC is used to determine if any suspended particles are from activities conducted onsite or if they are consistent with surrounding air quality data. Some of the naturally occurring particles can originate from high winds, forest or grass fires, burning of fossil fuels in vehicles, or stirred-up road dust.

PM_{10} data are collected with Met One E-BAM monitors at four monitoring locations. The Met One E-BAM uses the principle of beta attenuation to provide a determination of mass concentration. Twenty-four-hour concentrations are calculated from the hourly concentrations. There were 91 days in this reporting period.

- DOE-1 had 55 valid reading days (of 91), with the shortfall due to an O-ring failure on February 16, 2020, with no replacements available onsite. There is no available data from February 17, 2020, through March 24, 2020.
- DOE-2 had valid readings all 91 days.
- DOE-3 had 86 valid reading days (of 91), with the shortfall due to the following reasons. The air pump failed during Q7 and there were no replacements available onsite. DOE-3 was not repaired and returned to service until January 6, 2020. There is no available data from January 1, 2020, until January 6, 2020.
- DOE-4 had valid readings all 91 days.

Although some station units needed repair during Q8, data completeness for PM_{10} exceeded the project goal of 80% completeness for total samples collected (see Table 3). The complete table of daily averages is presented in Appendix A.

Table 3. PM_{10} data completeness for January 1, 2020, to March 31, 2020.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	55	91	65
DOE-2	91	91	100
DOE-3	86	91	95
DOE-4	91	91	100
Average Total Data Completeness			88.74

The five highest PM_{10} results identified for the reporting period are listed in Table 4 along with the California Ambient Air Quality Standard (CAAQS) for PM_{10}. PM_{10} concentrations were consistent with levels typically found in urban air. Of these top five results, two were recorded at DOE-1 and DOE-4 and one at DOE-2. All of the top five values were below the CAAQS and the National Ambient Air Quality Standard of 150 micrograms per cubic meter ($\mu g/m^3$). Two of the top five values were recorded on the same day, January 16, 2020, when winds exceeded 6 m/sec compared to the usual 0.5 to 1.5 m/sec. High winds are known to increase air particulates.

Table 4. Top five PM_{10} 24-hour average concentration days.

Date	Location	PM_{10} Value ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)
2/3/2020	DOE-4	39.75000	50
1/16/2020	DOE-4	27.62500	50
2/9/2020	DOE-1	27.50000	50
1/26/2020	DOE-1	24.62500	50
1/16/2020	DOE-2	24.41600	50

4.3 Volatile Organic Compound Data

Volatile organic compounds (VOCs) are organic chemicals that have a high vapor pressure, which causes them to evaporate quickly and enter the surrounding air. VOCs can be both naturally occurring or man-made. The VOC data collected can help distinguish between man-made detections from onsite activities or naturally existing organic chemicals. The VOC data collected are compared against screening levels. These screening levels are risk-based concentrations derived from standardized equations combining exposure information with toxicity data.

Each of the four DOE locations was sampled during the six VOC sampling events this period. Data completeness goals for VOCs exceeded the project goal of 85% (see Table 5).

Table 5. Ambient air VOC data completeness.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	6	6	100
DOE-2	6	6	100
DOE-3	6	6	100
DOE-4	6	6	100
Average Total Data Completeness			100

VOC detection results are presented in Table B-1 (Appendix B), including comparison to the April 2019 DTSC Human Health Risk Assessment (HHRA) Note 3 Screening Levels (DTSC 2019) or the May 2018 EPA Residential Air Regional Screening Levels (RSLs) (EPA 2018). There were four analytes detected above the screening levels. Three analytes were detected during the March 6, 2020, sampling event and one from the March 20, 2020, sampling event. Two of the four detections were above the EPA RSL. Ethyl acetate was detected at 170 $\mu g/m^3$ at DOE-1 and 260 $\mu g/m^3$ at DOE-4. The remaining two analytes were detected above DTSC RSL. Benzene was detected at 0.96 $\mu g/m^3$ at DOE-4 and methylene chloride was detected at 1.2 $\mu g/m^3$ at DOE-3.

Two man-made VOC analytes, dichlorodifluoromethane (Freon-12) and ethyl acetate, have been detected routinely at all four monitoring stations, during all quarterly sampling events, and in duplicate samples. Ethyl acetate had two separate recordings that exceeded the screening limits. Both of these were detected on March 6, 2020 — one recording at DOE-1 and the other at DOE-4. Based on laboratory QC data (method blanks, clean canister certifications), the sampling process and laboratory process are not the sources of the two analytes. The onsite source of the analytes is currently unknown.

4.4 Radionuclide Data

ETEC continuously monitors air at multiple locations for radioactive particles. This is performed for two reasons: (1) to determine the background airborne radioactivity concentration so that any possible releases from work activities can be detected, and (2) to detect any possible release from existing activities. As shown on the trend graphs, the background airborne radioactive contamination continued at low and stable concentrations, and there was no detected release of material.

There were 105 airborne radioactivity filter samples collected in Q8 — 26 each with DOE-1, DOE-2, and DOE-4, and 27 with DOE-3. Each sample was collected on a glass-fiber filter (as discussed in Section 3) and was analyzed using a “low background” Protean radiation counter system onsite. These samples included background radioactive materials and the potential of Area IV–specific radioactive materials.

The alpha and beta data are presented in Table C-1 (Appendix C). The onsite analysis determined only "alpha" or "beta/gamma" and did not analyze for specific isotopes. Isotopic analysis was performed later by an offsite laboratory. Each sample produced a gross alpha and beta-gamma count. The analysis compared these values with the background radiation count rates, and using the volume of air collected determined the net counts and the minimum detectable concentration (MDC) for each sampling event. Some results in Table C-1 (Appendix C) that are less than the MDC are shown as negative values (because detector background is subtracted from the result).

All alpha samples were below the MDC, and each MDC was below the airborne effluent limits specified in California regulations. There was no possibility of significant Area IV alpha radioactive material on these filters.

Although 57% of the beta samples were below MDC, the gross (background radioactive material included) samples exceeded the MDC in 43% of samples, indicating the presence of airborne radioactive material (including background materials). Similarly, 82% of the gross alpha samples were below the MDC.

Following collection and onsite analysis, the air filters were composited and analyzed for specific radionuclides by an offsite laboratory. This data is shown in Table C-2 (Appendix C). This laboratory data determined that most radioactive material present was natural in origin, consisting of beryllium-7, polonium-210, potassium-40, combined radium-226 and radium-228, thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235/236, and uranium-238.

While artificial radionuclides (e.g., Cs-137, Sr-90, Pu-239) were present in very small amounts, none of the results were above the MDC in Q8. The presence of these radionuclides is considered a part of the normal variation of global fallout and resuspension activities.

A summary of the gross air sampling data is shown below (Table 6).

Table 6. Gross alpha and beta-gamma average results for Q8.

Location	Average alpha Result (µCi/mL)	Average alpha MDC (µCi/mL)	Average beta Result (µCi/mL)	Average beta MDC (µCi/mL)
DOE 1	3.22E-15	5.93E-15	1.86E-14	2.59E-14
DOE 2	3.83E-15	6.00E-15	3.19E-14	2.63E-14
DOE 3	3.40E-15	7.76E-15	6.74E-15	3.42E-14
DOE 4	3.48E-15	5.84E-15	2.10E-14	2.55E-14

5. QA/QC ACTIVITIES

The following QA/QC activities were conducted for the PM_{10}, VOC, radionuclide, and meteorological data collection and analysis.

5.1 Field QA/QC

5.1.1 PM_{10}

The 24-hour daily averages for Q8 are presented in Appendix A along with the monthly minimum, maximum, and 95th percentile for each station location.

Flow Verifications

Functionality of the Met One E-BAM units is verified and recorded monthly during instrument audits; however, the instruments are also checked several times a week for operability. During the monthly audits, the Met One E-BAM temperature, pressure, and flow rate are verified against a National Institute of Standards and Technology (NIST) traceable flowmeter. E-BAM units are occasionally swapped out for maintenance, and preliminary audits of the new units are performed. None of the results exceeded the flow rate measurement quality objective of +/- 4%.

Complete audit reports and flow verification results for Q8 are presented in Appendix D of this document. The flow rate verifications were based on 40 CFR 58, Appendix A, 3.3.1 and 4.2.2 through 4.2.3, along with the *Guideline on the Meaning and the Use of Precision and Bias Data Required by 40 CFR Part 58 Appendix A* (EPA 2007). The *Data Assessment Statistical Calculator* (DASC) tool, which is an EPA Excel-based software application, was used to perform the necessary statistical calculations based on input audit data. Sections 2 and 2.5 of this EPA guidance document (EPA 2007) provide additional information and instruction for using the DASC tool.

5.1.2 VOCs

A minimum of 20% of the VOC results are undergoing third-party data validation. During this quarter, one of the six sample delivery groups (SDGs), SDG P2000961, underwent data validation. The data validation ensures that the required analytical measurement quality objectives are met to ensure the data are of sufficient quality for their intended purpose.

Each location had valid readings six of the six sample days for a sample completeness of 100%. Data completeness goals for VOCs exceeded the project goal of 85%.

5.1.3 Field Duplicates

Six field duplicates were collected during this reporting period, one per sampling event. Ethyl acetate (in SDGs P2000072, P2000340, P2000652, and P2000961) was detected in five field duplicates pairs, exceeding the quality objective of +/- 15% relative percent difference (RPD). For SDG P2000961 analytes MEK, THF, and toluene. For SDG P2000652 the analyte toluene was detected at levels higher than the RL in either the sample or duplicate, and in comparison, were reported as a non-detect in the associated sample or duplicate and exceeded the quality objective of +/- 15% RPD. For SDG P20001318, the analyte toluene was detected at a level less than 2 × IDL and the absolute difference between the two results was less than 2 × RDL and exceeded the quality objective of +/- 15% RPD. Fifteen sample and duplicate analyte detections were within the quality objective of +/- 15% RPD. There were no other detections associated with the samples and associated duplicates collected during this reporting period.

5.1.4 Canister Pressure

Vacuum in the canisters is measured before and after sampling with an analog pressure gauge to ensure proper function. Final canister vacuums ranged from -5 inches mercury (Hg) to -1 inches Hg during this reporting period.

5.1.5 Radiological

The detector for onsite gross alpha and beta sample analysis is calibrated annually by a third-party vendor using sources traceable to the NIST. The detector is checked in by counting alpha- and beta-emitting sources at the site when received from the vendor following calibration. This establishes an acceptable performance range for daily source checks. On each day the detector is used, performance is determined with the site source. The detector may be used if the daily check is within the acceptable performance range.

Samples analyzed at the offsite laboratory are QC-checked at the laboratory. These QC checks include blanks, laboratory replicates, matrix spikes, and matrix spike duplicates. Barium, which behaves chemically similar to radium, is used as a carrier to determine the yield of the chemical extraction.

Because the QC test associated with the laboratory radium evaluation was higher than expected, it is possible that the radium values are underreported. However, since the results were less than 0.1% of the airborne release limit, and also within typical values, there is no reason to believe that there was an airborne release approaching the limits.

A minimum of 20% of the annual radiological analytical results are undergoing third-party data validation. The SDG from this quarter underwent the annual data validation for Year 3, exceeding the minimum of 20%.

5.1.6 Meteorological

During the reporting period, a weekly data validation screening and review was performed on the monitored meteorological parameters based on the EPA guidance document *Meteorological Monitoring Guidance for Regulatory Modeling Applications* (EPA 2000), Table 8-4 – Suggested Data Screening Criteria, as outlined in Section 4.1. The data validation procedure provided the basis for evaluating data completeness and for determining sensor performance and/or maintenance status.

5.1.7 Maintenance

General maintenance was performed on the meteorological station February 25, 2020. This included inspection of the meteorological tower sensors, E-BAM monitoring unit wind sensors, and solar-powered batteries to ensure proper functioning.

5.1.8 Corrective Action

Issues and corrective actions regarding the PM_{10} monitors and the meteorological station are noted in Sections 5.1.8.1 and 5.1.8.2, respectively. No issues or corrective actions were noted regarding the remaining monitoring equipment or sampling events during this reporting period.

5.1.8.1 PM_{10} Monitors

Refer to Section 4.2 for a detailed description of PM_{10} air monitoring equipment issues.

5.1.8.2 Meteorological Station

Although there were no unresolved data quality issues impacting the data completion goal during Q8, the solar radiometer occasionally has readings that exceed the daily screening criteria and an improperly programmed data logger has continued to affect the calculation of delta temperature (i.e., temperature difference between 2 m and 10 m).

Delta Temperature Calculation – As stated in the corrective actions section of the Q3 air monitoring report (North Wind, Inc. 2019), the new data logger installed in December 2018 (due to Woolsey Fire wildfire damage on November 8, 2018) was programmed to calculate delta temperature inversely to how it had been calculated in the original data logger. Consequently, the delta temperature observations are now being calculated with an opposite sign compared to the values from the original data logger.

The equations below represent the before and after delta temperature calculations:

- Prior to November 7, 2018:

  Delta Temperature = [Temperature @ 10 m] minus [Temperature @ 2 m] (Eq. 4-1)

- November 7 to December 18, 2018:

  Station DOE-4 inoperable due to wildfire damage

- After December 18, 2018:

  Delta Temperature = [Temperature @ 2 m] minus [Temperature @ 10 m] (Eq. 4-2)

For consistency with the initial data collection quarters, the delta temperature calculations from the new data logger continue to be adjusted through postprocessing to conform with Equation 4-1. The adjustment is simply a multiplication factor of "-1" applied to the delta temperature values from the new data logger prior to performing the data validation.

Meteorological Data Sensor Maintenance – Although not a corrective action, the manufacturer's recommended maintenance frequency for meteorological sensors is presented below. Proper and timely maintenance of the meteorological sensors is critical for ensuring that the data are not only valid (based on screening criteria) but also accurate. Schedules for maintenance and calibration are listed in the sensor user manuals and are based on the service time of the sensor. Table 7 lists the maintenance schedules for the Met One sensors installed at the DOE-4 meteorological station.

Table 7. Meteorological sensor recommended maintenance frequency (Met One).

Sensor	Frequency	Maintenance
WS	6–12 Month	Inspect for proper operation (manual check of pulses per revolution, bearing condition, anemometer cup condition, and bearing replacement if warranted)
	12–24 Month	Return to Met One for complete overhaul
WD	6–12 Month	Inspect for proper operation (manual check of sensor readings through 360°)
	6–12 Month	Field calibration
	12–24 month	Replace bearings & potentiometer
T	6–12 Month	Inspect sensor for proper operation (field comparison sensor reading against a precision mercury thermometer)
RH	6–12 Month	Inspect sensor for proper operation (compare sensor reading against local weather service or field psychrometer)
	12 Month	Return sensor to Met One for calibration and replacement of O-rings and filter membrane
Rain Gauge	6 Month	Clean sensor and bucket and field verify proper operation
Pressure	12 Month	Return sensor to Met One for calibration and replacement of O-rings and filter membrane
Radiometer	Monthly	Clean sensor glass dome with clean rag/tissue

Note: Maintenance schedules as specified in the respective Met One sensor user manuals.

5.2 Laboratory QA/QC

This report covers 30 air monitoring samples for VOCs collected and analyzed according to the EPA Toxic Compendium Method TO-15, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA 1999). These samples were reported under six SDGs by the laboratory. All six SDG analyses were performed by ALS in Simi Valley, CA. For each SDG, the laboratory ran continuing calibration verification, a method blank, and laboratory control samples, and verified surrogate recoveries for each sample.

The laboratory provided certified clean canisters for the sampling events. The certification of the canister batch is considered the equipment blank for each sampling event. The ALS case narrative discusses the cleaning of the canisters.

5.3 Audit Results

The PM_{10} instruments were calibrated at the manufacturer and were functioning properly upon installation. The PM_{10} instruments were audited monthly with a secondary NIST traceable flow meter. Although audits occur only monthly, the instruments were checked several times a week to ensure that they were functioning. Table 8 lists the dates for audits conducted in January through March. No flow rate comparisons exceeded the project's acceptance criterion of +/- 4. Complete audit reports are presented in Appendix D.

Table 8. PM_{10} audit completeness.

Location	Met One E-BAM Serial Number	Parameter	Date
DOE-1	X16067	PM_{10}	1/07/2020
DOE-2	Y12096	PM_{10}	1/07/2020
DOE-3	W23313	PM_{10}	1/07/2020
DOE-4	W23310	PM_{10}	1/07/2020
DOE-1	X16067	PM_{10}	2/11/2020
DOE-2	Y12096	PM_{10}	2/11/2020
DOE-3	W23313	PM_{10}	2/11/2020
DOE-4	W23310	PM_{10}	2/11/2020
*DOE-4	W23314	PM_{10}	2/12/2020
DOE-1	W23310	PM_{10}	3/25/2020
DOE-2	Y12096	PM_{10}	3/18/2020
DOE-3	W23313	PM_{10}	3/18/2020
DOE-4	W23314	PM_{10}	3/18/2020

*Audit conducted after E-BAM replaced.

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6. REFERENCES

10 Code of Federal Regulations (CFR) 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," Table 2.

40 CFR 58, Appendix C –Ambient Air Quality Monitoring Methodology.

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California Environmental Protection Agency, DTSC. 2019. Human and Ecological Risk Office Human Health Risk Assessment Note Number 3, DTSC-modified Screening Levels. April. https://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-April-2019.pdf.

National Aeronautics and Space Administration (NASA). 2017. *Santa Susana Field Laboratory Baseline Air Monitoring Report Work Plan Report.* Prepared for California Department of Toxic Substances Control. Prepared on behalf of National Aeronautics and Space Administration, George C. Marshall Space Flight Center, The Boeing Company, and Department of Energy, Energy Technology and Engineering Center. September. Available online at:https://www.dtsc-ssfl.com/files/lib_air_monitor/work_plan/67496_SSFL_AirMonitoringWorkPlan_Final.pdf

North Wind, Inc. 2019. *Report on Quarterly Air Monitoring , Area IV, Third Quarter 2018–2019, Santa Susana Field Laboratory, Ventura County, California.* Prepared for United States Department of Energy. May.

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U.S. Environmental Protection Agency (EPA). 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications, United State Environmental Protection Agency, Office of Air Quality Planning and Standards*. EPA-454/R-99-005. February.

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U.S. Environmental Protection Agency (EPA). 2018. Regional Screening Levels – Generic Tables. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables. May.

Solar Energy Research Institute (SERI). 1981. *A Simplified Clear Sky Model for Direct and Diffuse Insolation on Horizontal Surfaces*. SERI/TR-642-761, February 1981.

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Figure 1 – SSFL Air Monitoring Locations

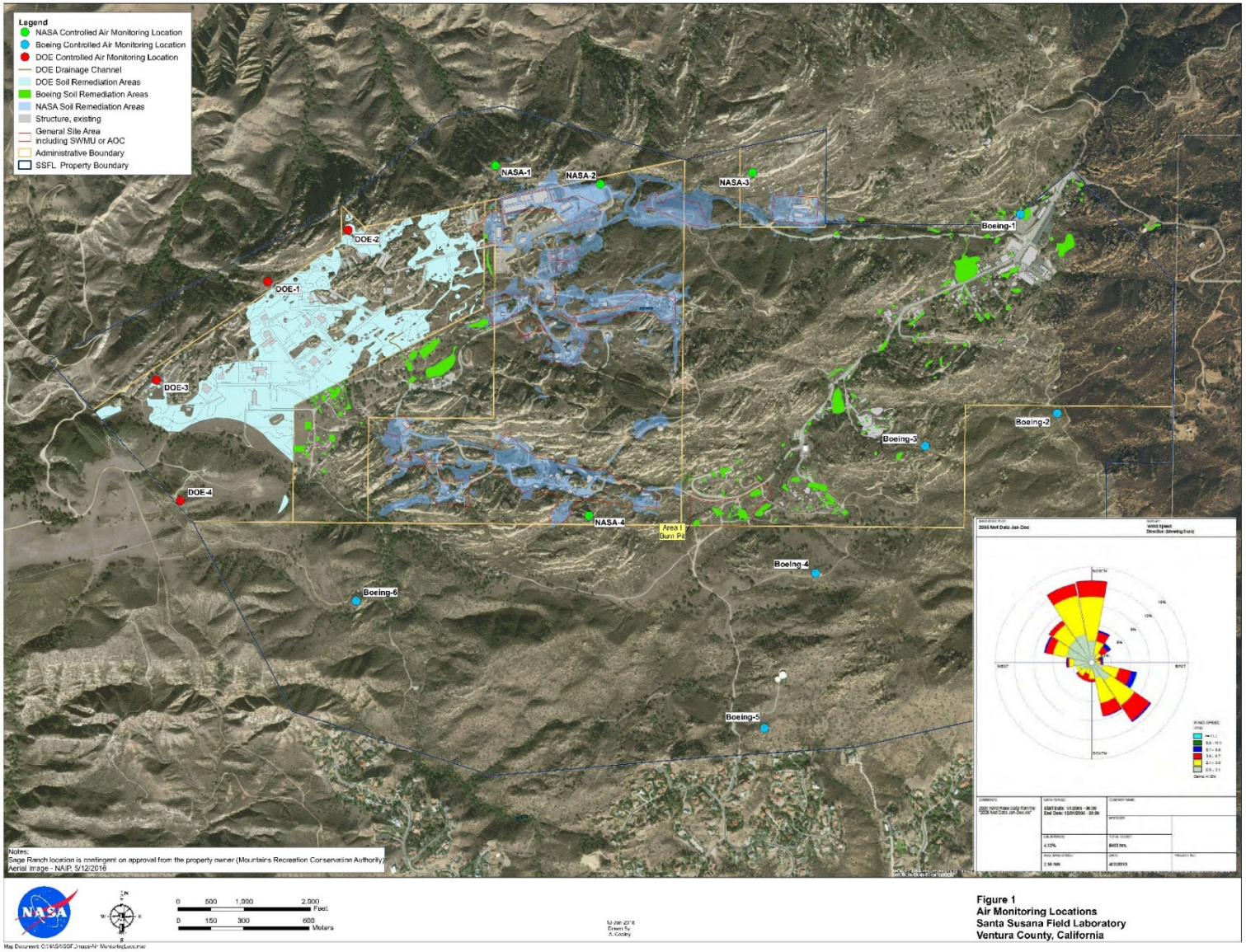


Figure 2 – DOE Air Monitoring Locations

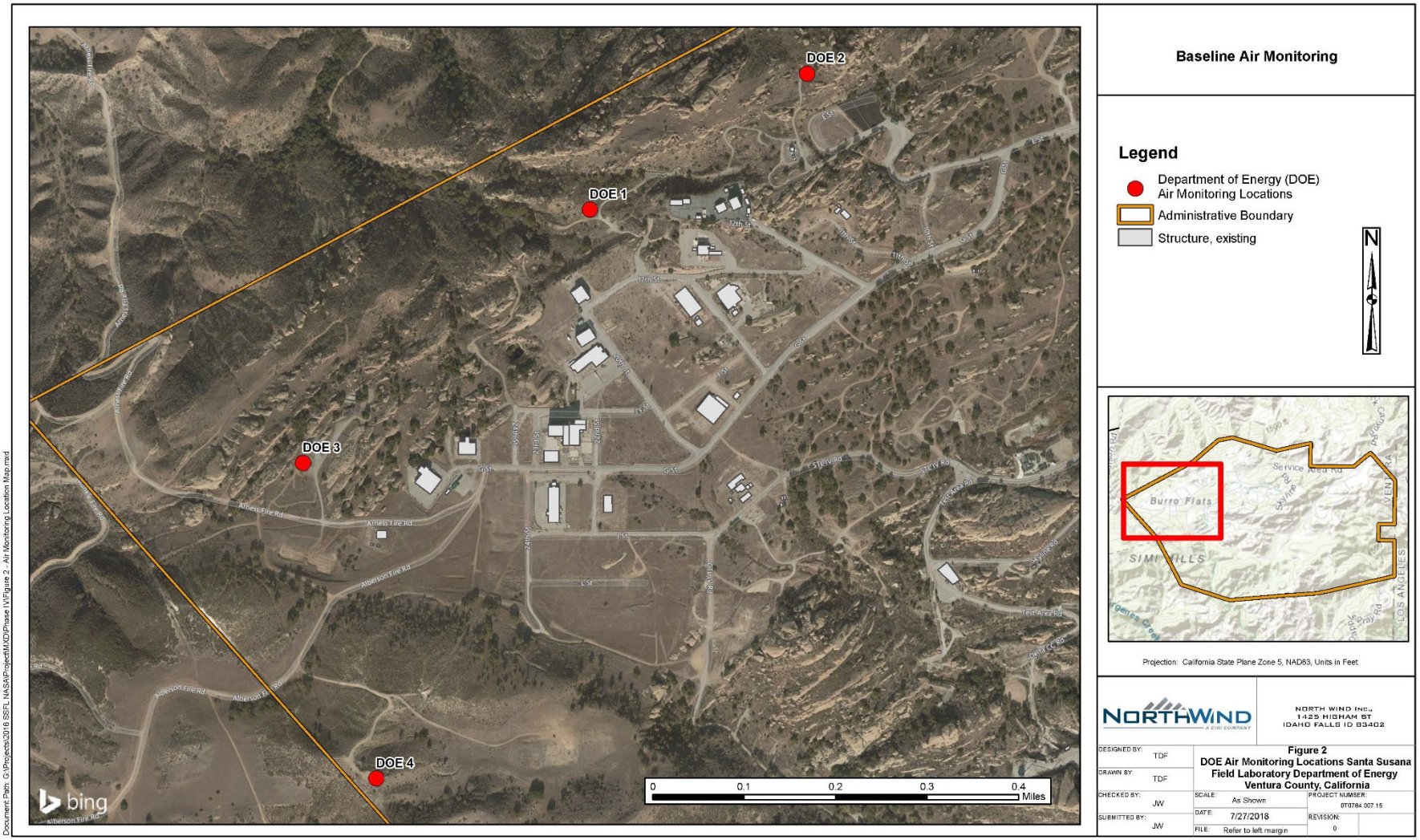
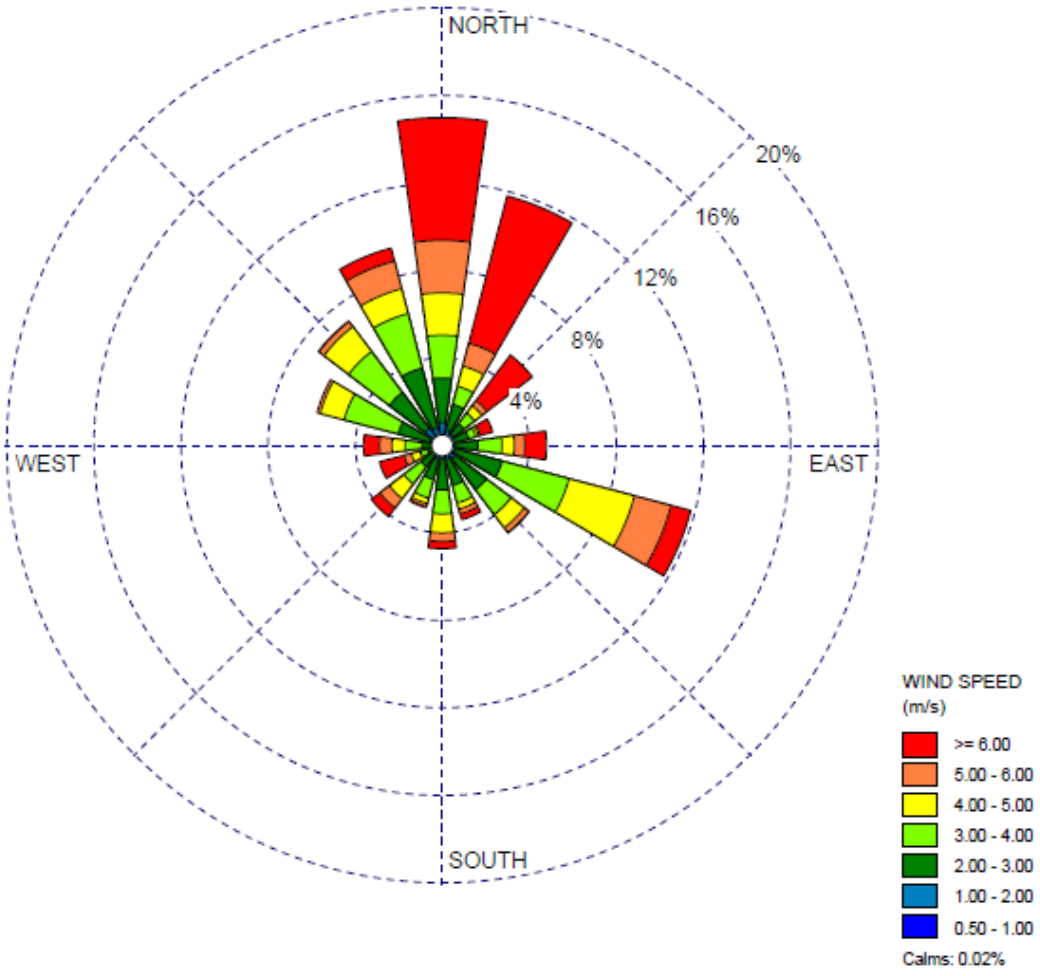


Figure 3 – DOE Quarterly Wind Rose

WIND ROSE PLOT:
SANTA SUSANA FIELD LABORATORY / Station ID: DOE-4

DISPLAY: • **Wind Speed (m/s)**
• **Direction (blowing from)**



COMMENTS: **ETEC BAM Quarter #8** • **Start: 01-Jan-2020** • **End: 31-Mar-2020**	DATA PERIOD: **Start: 01/01/2020** **End: 03/31/2020**	COMPANY NAME: **North Wind Portage, Inc.**	
		OBSERVATION BASIS: **15-minute averages**	NORTHWIND PORTAGE, INC.
	CALM WINDS: **0.02%**	TOTAL COUNT: **8736 observations (100%)**	
	AVG. WIND SPEED: **4.51 m/s**	DATE: **7/2/2020**	PROJECT NO.: **080153.007.02**

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APPENDIX A

PM_{10} Daily Averages and Monthly Statistics

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PM_{10} Daily Averages

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)
01/01/20	9.00000	5.62500		12.37500
01/02/20	1.45800	3.12500		1.91600
01/03/20	5.79100	4.16600		3.79100
01/04/20	8.50000	5.25000		5.37500
01/05/20	2.79100	4.66600		3.54100
01/06/20	1.33300	3.12500		2.83300
01/07/20	0.70800	2.45800	0.38400	1.08300
01/08/20	20.16600	10.04100	10.50000	19.25000
01/09/20	5.29100	2.54100	2.37500	4.41600
01/10/20	3.16600	4.37500	3.95800	4.00000
01/11/20	10.66600	7.00000	6.83300	9.91600
01/12/20	7.12500	6.45800	6.75000	7.29100
01/13/20	10.70800	11.41600	11.87500	13.25000
01/14/20	17.45800	15.79100	16.00000	18.04100
01/15/20	19.62500	20.87500	18.45800	24.16600
01/16/20	21.66600	24.41600	22.20800	27.62500
01/17/20	1.70800	2.20800	1.20800	3.25000
01/18/20	0.58300	1.41600	1.12500	0.87500
01/19/20	1.20800	2.70800	1.29100	1.25000
01/20/20	13.33300	8.75000	8.54100	15.04100
01/21/20	16.75000	4.70800	3.54100	10.20800
01/22/20	5.75000	5.58300	3.83300	5.33300
01/23/20	2.04100	4.70800	2.41600	2.83300
01/24/20	2.91600	4.37500	2.87500	3.95800
01/25/20	7.75000	7.62500	7.50000	8.70800
01/26/20	24.62500	14.041	12.04100	19.54100
01/27/20	5.58300	4.333	3.91600	4.70800
01/28/20	1.87500	4.958	2.25000	3.79100
01/29/20	9.08300	10.208	9.16600	10.75000
01/30/20	4.08300	7.583	4.45800	4.25000
01/31/20	0.62500	2.66600	1.16600	1.20800
02/01/20	1.45800	3.83300	1.33300	1.04100
02/02/20	13.16600	8.29100	7.58300	10.45800
02/03/20	13.00000	22.20800	13.37500	39.75000
02/04/20	6.91600	7.50000	6.41600	7.58300
02/05/20	5.66600	5.66600	3.79100	5.95800

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)	PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)
02/06/20	10.50000	8.50000	7.45800	10.20800
02/07/20	15.45800	16.29100	16.54100	14.29100
02/08/20	16.95800	19.66600	20.75000	23.58300
02/09/20	27.50000	13.66600	14.58300	21.79100
02/10/20	12.58300	15.41600	12.58300	16.66600
02/11/20	5.08300	5.66600	5.75000	4.75000
02/12/20	10.12500	12.37500	12.41600	11.42100
02/13/20	15.37500	18.66600	17.62500	16.54100
02/14/20	21.54100	16.83300	16.79100	15.20800
02/15/20	15.50000	15.50000	15.62500	12.91600
02/16/20	18.29100	14.91600	14.70800	13.33300
02/17/20		10.95800	9.25000	7.66600
02/18/20		15.91600	14.54100	13.16600
02/19/20		22.04100	21.50000	16.00000
02/20/20		14.25000	16.00000	12.62500
02/21/20		12.83300	13.29100	11.41600
02/22/20		8.95800	8.16600	7.12500
02/23/20		12.25000	9.54100	9.08300
02/24/20		13.41600	11.45800	10.70800
02/25/20		6.70800	4.45800	5.79100
02/26/20		6.54100	5.00000	5.37500
02/27/20		5.79100	4.58300	4.33300
02/28/20		4.70800	4.50000	3.50000
02/29/20		11.16600	12.79100	8.91600
03/01/20		14.75000	10.79100	8.33300
03/02/20		8.33300	8.87500	6.45800
03/03/20		6.37500	4.54100	24.25000
03/04/20		18.66600	21.87500	20.00000
03/05/20		18.58300	17.12500	18.29100
03/06/20		13.83300	15.41600	13.08300
03/07/20		4.33300	5.75000	2.83300
03/08/20		2.75000	1.16600	0.91600
03/09/20		6.25000	4.87500	2.45800
03/10/20		4.75000	2.50000	0.25000
03/11/20		6.04100	3.45800	2.37500
03/12/20		5.87500	3.41600	3.79100
03/13/20		0.75000	0.75000	0.83300

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	**PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)**	**PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)**	**PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)**	**PM_{10} (µg/m^3) (CAAQS 50 µg/m^3)**
03/14/20		0.45800	3.25000	0.37500
03/15/20		4.04100	4.25000	3.54100
03/16/20		4.33300	3.29100	2.16600
03/17/20		2.33300	1.75000	1.25000
03/18/20		9.45800	7.08300	4.12500
03/19/20		6.04100	3.08300	3.70800
03/20/20		3.08300	3.91600	2.45800
03/21/20		7.33300	3.41600	4.33300
03/22/20		2.95800	2.75000	2.29100
03/23/20		2.29100	2.45800	1.12500
03/24/20		4.70800	3.08300	2.08300
03/25/20	7.07100	3.62500	2.95800	3.04100
03/26/20	4.50000	4.75000	3.45800	3.79100
03/27/20	5.91600	5.79100	5.66600	5.50000
03/28/20	13.87500	11.12500	11.91600	9.58300
03/29/20	13.37500	12.33300	9.50000	8.25000
03/30/20	5.08300	7.83300	5.83300	3.83300
03/31/20	5.50000	11.00000	7.37500	5.187

Note: Gray-shaded boxes indicate Instrument not working. Please see section 4.2

PM_{10} Monthly Statistics

Location ID	January 2020			February 2020			March 2020		
	PM_{10}			PM_{10}			PM_{10}		
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL
DOE-1	24.6250	0.58300	20.91600	27.50000	0.00000	22.73280	13.87500	4.50000	13.72500
DOE-2	24.4160	1.41600	18.33300	22.20800	3.83300	21.09100	18.66600	0.45800	16.66650
DOE-3	22.2080	0.00000	17.84350	21.50000	1.33300	19.50000	21.87500	0.75000	16.27050
DOE-4	27.6250	0.87500	21.85350	39.75000	1.04100	22.86620	24.25000	0.25000	19.14550

PCTL = percentile

APPENDIX B

Analytical Results for Ambient Air VOCs

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Table B-1. Ambient air VOC detection results compared to RSLs.

Location ID	Sample Date	Analyte	Result (µg/m^3)	Screening Level Value (µg/m^3)	SL Source
DOE-1	01/07/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-1	01/07/2020	Ethyl acetate	43	73	US EPA RSL
DOE-1	01/07/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-2	01/07/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-2	01/07/2020	Ethyl acetate	37	73	US EPA RSL
DOE-2	01/07/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-3	01/07/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-3	01/07/2020	Ethyl acetate	25	73	US EPA RSL
DOE-3	01/07/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-4	01/07/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-4	01/07/2020	Ethyl acetate	27	73	US EPA RSL
DOE-4	01/07/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-1	01/21/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-1	01/21/2020	Ethyl acetate	3.6	73	US EPA RSL
DOE-1	01/21/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-2	01/21/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-2	01/21/2020	Ethyl acetate	5.7	73	US EPA RSL
DOE-2	01/21/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-3	01/21/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-3	01/21/2020	Ethyl acetate	19	73	US EPA RSL
DOE-3	01/21/2020	Tetrahydrofuran	0.98	2100	US EPA RSL
DOE-3	01/21/2020	Toluene	0.83	310	DTSC HHRA NOTE 3
DOE-3	01/21/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-4	01/21/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-4	01/21/2020	Ethyl acetate	3.3	73	US EPA RSL
DOE-4	01/21/2020	Toluene	0.75	310	DTSC HHRA NOTE 3
DOE-4	01/21/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-1	02/05/2020	Dichlorodifluoromethane	3.0	100	US EPA RSL
DOE-1	02/05/2020	Ethyl acetate	8.3	73	US EPA RSL
DOE-1	02/05/2020	Hexane, n-	2.7	730	US EPA RSL
DOE-1	02/05/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3

Location ID	Sample Date	Analyte	Result ($\mu g/m^3$)	Screening Level Value ($\mu g/m^3$)	SL Source
DOE-2	02/05/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-2	02/05/2020	Ethyl acetate	7.2	73	US EPA RSL
DOE-2	02/05/2020	Hexane, n-	2.1	730	US EPA RSL
DOE-2	02/05/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-3	02/05/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-3	02/05/2020	Ethyl acetate	8.6	73	US EPA RSL
DOE-3	02/05/2020	Hexane, n-	1.8	730	US EPA RSL
DOE-3	02/05/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-4	02/05/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-4	02/05/2020	Ethyl acetate	8.5	73	US EPA RSL
DOE-4	02/05/2020	Hexane, n-	1.7	730	US EPA RSL
DOE-4	02/05/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-1	02/20/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-1	02/20/2020	Ethyl acetate	43	73	US EPA RSL
DOE-1	02/20/2020	Toluene	0.98	310	DTSC HHRA NOTE 3
DOE-1	02/20/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-2	02/20/2020	Benzene	0.78	0.097	DTSC HHRA NOTE 3
DOE-2	02/20/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-2	02/20/2020	Ethyl acetate	29	73	US EPA RSL
DOE-2	02/20/2020	Toluene	0.99	310	DTSC HHRA NOTE 3
DOE-2	02/20/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-3	02/20/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-3	02/20/2020	Ethyl acetate	19	73	US EPA RSL
DOE-3	02/20/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-4	02/20/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-4	02/20/2020	Ethyl acetate	29 ;J	73	US EPA RSL
DOE-4	02/20/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-1	03/06/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-1	03/06/2020	Ethyl acetate	**170**	73	US EPA RSL
DOE-1	03/06/2020	Toluene	2.5	310	DTSC HHRA NOTE 3
DOE-1	03/06/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-2	03/06/2020	2-butanone	1.9	5200	US EPA RSL
DOE-2	03/06/2020	Dichlorodifluoromethane	2.3	100	US EPA RSL

Location ID	Sample Date	Analyte	Result ($\mu g/m^3$)	Screening Level Value ($\mu g/m^3$)	SL Source
DOE-2	03/06/2020	Ethyl acetate	15	73	US EPA RSL
DOE-2	03/06/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-3	03/06/2020	Dichlorodifluoromethane	2.3	100	US EPA RSL
DOE-3	03/06/2020	Ethyl acetate	39	73	US EPA RSL
DOE-3	03/06/2020	Toluene	1.0	310	DTSC HHRA NOTE 3
DOE-3	03/06/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-4	03/06/2020	Benzene	**0.96**	0.097	DTSC HHRA NOTE 3
DOE-4	03/06/2020	Dichlorodifluoromethane	2.3	100	US EPA RSL
DOE-4	03/06/2020	Ethyl acetate	**260**	73	US EPA RSL
DOE-4	03/06/2020	Toluene	3.7	310	DTSC HHRA NOTE 3
DOE-4	03/06/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-1	03/20/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-1	03/20/2020	Trichlorofluoromethane	1.4	1300	DTSC HHRA NOTE 3
DOE-2	03/20/2020	Dichlorodifluoromethane	2.6	100	US EPA RSL
DOE-2	03/20/2020	Trichlorofluoromethane	1.4	1300	DTSC HHRA NOTE 3
DOE-3	03/20/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-3	03/20/2020	Ethyl acetate	8.2	73	US EPA RSL
DOE-3	03/20/2020	Isopropanol	7.8	210	US EPA RSL
DOE-3	03/20/2020	Methylene chloride	**1.2**	1	DTSC HHRA NOTE 3
DOE-3	03/20/2020	Tetrahydrofuran	1.6	2100	US EPA RSL
DOE-3	03/20/2020	Toluene	0.86	310	DTSC HHRA NOTE 3
DOE-3	03/20/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-4	03/20/2020	Dichlorodifluoromethane	2.6	100	US EPA RSL
DOE-4	03/20/2020	Trichlorofluoromethane	1.4	1300	DTSC HHRA NOTE 3

Note: The bold numbers are above the screening levels.

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APPENDIX C

Radionuclide Results

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Table C-1. Gross alpha and gross beta air sample results for air samplers.

Air Station ID	Sample Collection Date	Gross Alpha (µCi/mL)	Gross Alpha MDC (µCi/mL)	Gross Beta (µCi/mL)	Gross Beta MDC (µCi/mL)
Sample Location – DOE-1					
DOE-1	1/3/2020	4.09E-15	5.10E-15	5.31E-14	2.09E-14
DOE-1	1/7/2020	-3.64E-15	5.11E-15	4.16E-14	2.10E-14
DOE-1	1/10/2020	3.06E-15	6.82E-15	1.61E-14	2.80E-14
DOE-1	1/13/2020	6.39E-16	6.73E-15	2.88E-14	2.76E-14
DOE-1	1/16/2020	7.28E-15	6.90E-15	4.14E-14	2.83E-14
DOE-1	1/20/2020	-1.04E-15	4.99E-15	1.58E-14	2.05E-14
DOE-1	1/23/2020	-2.79E-15	6.81E-15	3.46E-14	2.80E-14
DOE-1	1/27/2020	2.28E-16	5.12E-15	7.22E-15	2.10E-14
DOE-1	1/30/2020	-2.47E-15	6.86E-15	-3.80E-15	2.82E-14
DOE-1	2/3/2020	6.91E-15	4.95E-15	9.91E-15	2.23E-14
DOE-1	2/6/2020	3.63E-15	6.59E-15	-1.96E-14	2.98E-14
DOE-1	2/10/2020	6.87E-15	4.91E-15	5.80E-14	2.22E-14
DOE-1	2/13/2020	4.63E-15	6.53E-15	3.87E-14	2.95E-14
DOE-1	2/17/2020	1.20E-14	4.88E-15	6.56E-14	2.20E-14
DOE-1	2/20/2020	1.40E-14	6.56E-15	6.77E-14	2.96E-14
DOE-1	2/24/2020	7.98E-15	4.96E-15	6.06E-14	2.24E-14
DOE-1	2/27/2020	4.38E-15	6.67E-15	1.20E-14	3.02E-14
DOE-1	3/2/2020	4.04E-15	4.66E-15	3.50E-14	2.10E-14
DOE-1	3/5/2020	7.98E-15	7.04E-15	-1.05E-14	3.18E-14
DOE-1	3/9/2020	1.42E-15	4.98E-15	-3.17E-16	2.25E-14
DOE-1	3/12/2020	1.53E-15	6.58E-15	-2.03E-14	2.97E-14
DOE-1	3/16/2020	1.15E-15	4.94E-15	-8.95E-15	2.23E-14
DOE-1	3/19/2020	1.77E-16	8.34E-15	-2.48E-14	3.77E-14
DOE-1	3/23/2020	1.31E-15	5.64E-15	-1.95E-14	2.55E-14
DOE-1	3/26/2020	-8.98E-16	6.53E-15	-8.02E-15	2.95E-14
DOE-1	3/30/2020	1.15E-15	4.93E-15	1.22E-14	2.23E-14
Sample Location – DOE-2					
DOE-2	1/3/2020	4.09E-15	5.10E-15	4.87E-14	2.09E-14
DOE-2	1/7/2020	3.06E-15	5.10E-15	6.27E-14	2.10E-14
DOE-2	1/10/2020	-2.45E-15	6.81E-15	6.07E-14	2.80E-14
DOE-2	1/13/2020	-3.09E-15	6.72E-15	5.65E-14	2.76E-14
DOE-2	1/16/2020	2.05E-15	6.91E-15	6.33E-14	2.84E-14
DOE-2	1/20/2020	2.74E-15	4.99E-15	3.34E-14	2.05E-14
DOE-2	1/23/2020	-3.84E-16	6.80E-15	6.67E-14	2.79E-14
DOE-2	1/27/2020	1.52E-15	5.13E-15	-3.36E-15	2.11E-14
DOE-2	1/30/2020	-3.85E-15	6.86E-15	1.42E-14	2.82E-14
DOE-2	2/3/2020	5.87E-15	4.95E-15	6.50E-15	2.24E-14

Air Station ID	Sample Collection Date	Gross Alpha (µCi/mL)	Gross Alpha MDC (µCi/mL)	Gross Beta (µCi/mL)	Gross Beta MDC (µCi/mL)
DOE-2	2/6/2020	4.67E-15	6.58E-15	-1.12E-15	2.97E-14
DOE-2	2/10/2020	1.10E-14	4.92E-15	3.43E-14	2.22E-14
DOE-2	2/13/2020	8.08E-15	6.52E-15	1.51E-14	2.95E-14
DOE-2	2/17/2020	1.25E-14	4.88E-15	6.58E-14	2.20E-14
DOE-2	2/20/2020	1.33E-14	6.56E-15	5.84E-14	2.97E-14
DOE-2	2/24/2020	9.82E-15	4.96E-15	8.53E-14	2.24E-14
DOE-2	2/27/2020	5.79E-15	6.67E-15	5.93E-14	3.01E-14
DOE-2	3/2/2020	6.27E-15	4.66E-15	3.43E-14	2.11E-14
DOE-2	3/5/2020	6.11E-15	7.03E-15	4.09E-14	3.18E-14
DOE-2	3/9/2020	5.90E-15	4.98E-15	2.63E-14	2.25E-14
DOE-2	3/12/2020	2.87E-15	7.34E-15	1.09E-15	3.32E-14
DOE-2	3/16/2020	-1.30E-15	6.83E-15	8.25E-15	3.09E-14
DOE-2	3/19/2020	1.94E-15	8.34E-15	1.45E-14	3.77E-14
DOE-2	3/23/2020	1.93E-15	4.92E-15	4.38E-15	2.22E-14
DOE-2	3/26/2020	4.84E-16	6.53E-15	-2.57E-14	2.95E-14
DOE-2	3/30/2020	6.27E-16	4.93E-15	-5.23E-17	2.23E-14
Sample Location – DOE-3					
DOE-3	1/3/2020	2.54E-15	5.09E-15	2.08E-14	2.09E-14
DOE-3	1/7/2020	-2.09E-15	5.11E-15	2.62E-14	2.10E-14
DOE-3	1/10/2020	3.40E-15	6.81E-15	3.60E-14	2.80E-14
DOE-3	1/13/2020	3.01E-15	6.71E-15	2.30E-14	2.76E-14
DOE-3	1/16/2020	6.57E-16	6.92E-15	3.14E-14	2.84E-14
DOE-3	1/20/2020	4.72E-16	4.98E-15	5.01E-15	2.04E-14
DOE-3	1/23/2020	-4.11E-17	6.79E-15	3.35E-14	2.79E-14
DOE-3	1/27/2020	4.87E-16	5.13E-15	4.57E-14	2.11E-14
DOE-3	1/30/2020	1.69E-15	6.87E-15	-6.91E-15	2.82E-14
DOE-3	2/3/2020	-9.44E-16	4.96E-15	9.66E-15	2.24E-14
DOE-3	2/6/2020	2.93E-15	6.58E-15	-2.51E-15	2.97E-14
DOE-3	2/10/2020	8.95E-15	4.92E-15	3.20E-14	2.22E-14
DOE-3	2/13/2020	5.67E-15	6.53E-15	2.14E-14	2.95E-14
DOE-3	2/17/2020	7.07E-15	4.87E-15	5.37E-14	2.20E-14
DOE-3	2/20/2020	1.16E-14	6.57E-15	6.15E-14	2.97E-14
DOE-3	2/24/2020	9.56E-15	4.96E-15	5.38E-14	2.24E-14
DOE-3	2/27/2020	4.03E-15	6.67E-15	-5.37E-15	3.01E-14
DOE-3	3/2/2020	3.80E-15	4.66E-15	2.17E-14	2.11E-14
DOE-3	3/5/2020	-5.95E-16	7.03E-15	-7.52E-15	3.17E-14
DOE-3	3/9/2020	1.42E-15	4.98E-15	8.13E-15	2.25E-14
DOE-3	3/12/2020	3.27E-15	6.58E-15	-1.12E-14	2.97E-14
DOE-3	3/16/2020	6.28E-16	4.94E-15	-1.13E-14	2.23E-14

Air Station ID	Sample Collection Date	Gross Alpha (µCi/mL)	Gross Alpha MDC (µCi/mL)	Gross Beta (µCi/mL)	Gross Beta MDC (µCi/mL)
DOE-3	3/17/2020	1.55E-14	5.43E-14	-2.40E-13	2.45E-13
DOE-3	3/19/2020	5.07E-15	1.02E-14	6.91E-15	4.60E-14
DOE-3	3/23/2020	3.67E-16	4.95E-15	-1.66E-14	2.24E-14
DOE-3	3/26/2020	1.87E-15	6.55E-15	-1.95E-14	2.96E-14
DOE-3	3/30/2020	1.41E-15	4.94E-15	1.22E-14	2.23E-14
Sample Location – DOE-4					
DOE-4	1/3/2020	3.83E-15	5.10E-15	2.80E-14	2.09E-14
DOE-4	1/7/2020	-2.89E-16	5.11E-15	1.21E-14	2.10E-14
DOE-4	1/10/2020	-7.29E-16	6.81E-15	8.22E-15	2.80E-14
DOE-4	1/13/2020	2.67E-15	6.71E-15	2.87E-14	2.76E-14
DOE-4	1/16/2020	3.80E-15	6.93E-15	3.77E-14	2.84E-14
DOE-4	1/20/2020	-1.03E-15	4.97E-15	1.63E-14	2.04E-14
DOE-4	1/23/2020	1.33E-15	6.80E-15	3.25E-14	2.79E-14
DOE-4	1/27/2020	2.04E-15	5.13E-15	2.01E-14	2.11E-14
DOE-4	1/30/2020	1.69E-15	6.87E-15	9.69E-15	2.82E-14
DOE-4	2/3/2020	4.83E-15	4.96E-15	-2.42E-15	2.24E-14
DOE-4	2/6/2020	2.58E-15	6.58E-15	5.86E-15	2.97E-14
DOE-4	2/10/2020	1.92E-15	4.91E-15	5.67E-14	2.22E-14
DOE-4	2/13/2020	1.22E-14	6.52E-15	4.11E-14	2.95E-14
DOE-4	2/17/2020	2.43E-15	4.88E-15	6.15E-15	2.20E-14
DOE-4	2/20/2020	1.09E-14	6.57E-15	8.80E-14	2.97E-14
DOE-4	2/24/2020	6.66E-15	4.96E-15	4.67E-14	2.24E-14
DOE-4	2/27/2020	1.25E-14	6.67E-15	1.06E-13	3.02E-14
DOE-4	3/2/2020	2.07E-15	4.67E-15	1.33E-14	2.11E-14
DOE-4	3/5/2020	6.47E-15	7.02E-15	2.45E-14	3.17E-14
DOE-4	3/9/2020	8.97E-16	4.98E-15	-1.56E-14	2.25E-14
DOE-4	3/12/2020	3.37E-15	6.78E-15	-1.77E-14	3.06E-14
DOE-4	3/16/2020	3.24E-15	4.94E-15	1.07E-14	2.23E-14
DOE-4	3/19/2020	4.24E-15	6.45E-15	-1.72E-14	2.92E-14
DOE-4	3/23/2020	-1.57E-16	4.95E-15	3.35E-15	2.23E-14
DOE-4	3/26/2020	1.18E-15	6.56E-15	-1.82E-14	2.96E-14
DOE-4	3/30/2020	1.67E-15	4.94E-15	2.12E-14	2.23E-14

Note: Some values are negative after background subtraction

Table C-2. Individual radionuclide analysis for the composite filter samples.

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Location DOE-1 – Air volume/sample = 9.71E8 mL				
Cesium-137	0.163	6.47	U U	1.005E-12
Strontium-90	-1.07	2.92	U U	-6.596E-12
Cobalt-60	-0.514	6.78	U U	-3.169E-12
Potassium-40	112	59.2		6.905E-10
Beryllium-7	0	107	UI U	0.000E+0
Plutonium-238	-0.0361	0.306	U U	-2.225E-13
Polonium-210	9.95	0.922		6.134E-11
Plutonium-241	3.77	15.5	U U	2.324E-11
Thorium-230	2.26	0.972	UJ	1.393E-11
Thorium-228	0.186	1.82	U U	1.147E-12
Actinium-228	-17.6	32.9	U U	-1.085E-10
Americium-241	0.0927	0.587	U UJ	5.715E-13
Plutonium-239	-0.144	0.462	U UJ	-8.877E-13
Ra-228 – total	-0.177	4.23	U U	-1.091E-12
Radium-226, -228 combined	0.896	4.17	U U	5.524E-12
Thorium-232	-0.0754	1.28	U U	-4.648E-13
Uranium-238	0.937	0.153	UJ	5.776E-12
Uranium-233/234	0.763	0.186	UJ	4.704E-12
Uranium-235/236	0.117	0.149	U U	7.213E-13
Location DOE-2 – Air volume/sample = 9.62E8 mL				
Cesium-137	2.17	7.57	U U	1.338E-11
Strontium-90	0.19	2.04	U U	1.171E-12
Cobalt-60	2.74	10.1	U U	1.689E-11
Potassium-40	0	58.2	UI U	0.000E+0
Beryllium-7	129	89.8		7.953E-10
Plutonium-238	0.00706	0.154	U U	4.352E-14
Polonium-210	11.2	0.541		6.905E-11
Plutonium-241	6.09	11.4	U U	3.754E-11
Thorium-230	0.978	0.459	UJ	6.029E-12
Thorium-228	0.772	0.3		4.759E-12
Actinium-228	9.28	37.8	U U	5.721E-11
Americium-241	0.00291	0.224	U U	1.794E-14
Plutonium-239	-0.0111	0.186	U UJ	-6.843E-14
Ra-228 – total	2.13	2.08		1.313E-11
Radium-226, -228 combined	3.32	5.31	U U	2.047E-11
Thorium-232	0.443	0.396	UJ	2.731E-12
Uranium-238	0.64	0.148	UJ	3.945E-12

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Uranium-233/234	0.781	0.271	UJ	4.815E-12
Uranium-235/236	0.096	0.211	U U	5.918E-13
Location DOE-3 – Air volume/sample = 9.76E8 mL				
Cesium-137	1.25	6.65	U U	7.706E-12
Strontium-90	-0.132	1.64	U U	-8.137E-13
Cobalt-60	0.0117	6.53	U U	7.213E-14
Potassium-40	77.2	87.6	U U	4.759E-10
Beryllium-7	140	75.7		8.631E-10
Plutonium-238	0.0702	0.227	U U	4.328E-13
Polonium-210	11.8	0.589		7.274E-11
Plutonium-241	2.07	13.1	U U	1.276E-11
Thorium-230	0.66	0.552	UJ	4.069E-12
Thorium-228	0.261	0.503	U U	1.609E-12
Actinium-228	6.58	30.1	U U	4.056E-11
Americium-241	0.0563	0.151	U U	3.471E-13
Plutonium-239	-0.0825	0.298	U UJ	-5.086E-13
Ra-228 – total	0.79	3.24	U U	4.870E-12
Radium-226, -228 combined	3.48	2.02	UJ	2.145E-11
Thorium-232	0.631	0.383	UJ	3.890E-12
Uranium-238	0.591	0.291	UJ	3.643E-12
Uranium-233/234	0.408	0.442	U U	2.515E-12
Uranium-235/236	-0.0083	0.291	U U	-5.117E-14
Location DOE-4 – Air volume/sample = 9.83E8 mL				
Cesium-137	3.21	5.63	U U	1.979E-11
Strontium-90	-0.194	1.41	U U	-1.196E-12
Cobalt-60	-1.84	7.42	U U	-1.134E-11
Potassium-40	0	61.5	UI U	0.000E+0
Beryllium-7	0	81.9	UI U	0.000E+0
Plutonium-238	0.00915	0.228	U U	5.641E-14
Polonium-210	10.4	0.655		6.411E-11
Plutonium-241	3.52	10.6	U U	2.170E-11
Thorium-230	0.713	0.391	UJ	4.395E-12
Thorium-228	0.221	0.659	U U	1.362E-12
Actinium-228	-17.9	24.9	U U	-1.103E-10
Americium-241	0.0291	0.218	U U	1.794E-13
Plutonium-239	0.0518	0.167	U UJ	3.193E-13
Ra-228 – total	1.76	2.03	U U	1.085E-11
Radium-226, -228 combined	2.67	3.84	U U	1.646E-11
Thorium-232	0.659	0.25	UJ	4.063E-12

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Uranium-238	0.747	0.11	UJ	4.605E-12
Uranium-233/234	0.517	0.158	J	3.187E-12
Uranium-235/236	0.0492	0.0738	U U	3.033E-13

APPENDIX D

PM_{10} Monthly Audit Reports and Flow Verification Results

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NORTHWIND PORTAGE, INC.

One-Point Flow Rate Bias Estimate

Site ID: DOE-1	E-BAM Serial #: X16067 / W23310	Pollutant type: PM10	Bias (%)

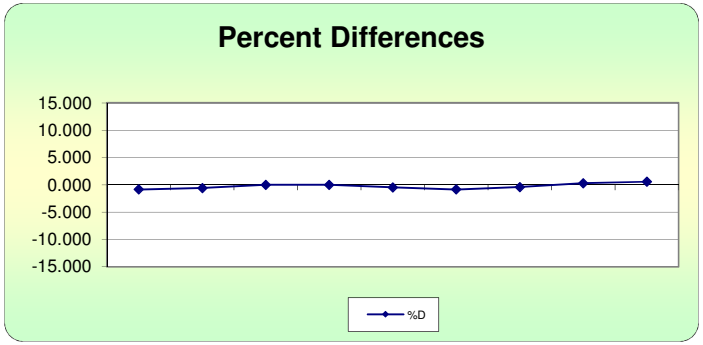
Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d^2	|d|	$\|d\|^2$
8	1/7/2020	14.00	14.12	-0.850		0.722	0.850	0.722
	(X16067)	16.70	16.80	-0.595	**25th**	0.354	0.595	0.354
		17.50	17.50	0.000	-0.595	0.000	0.000	0.000
8	2/11/2020	14.00	14.00	0.000		0.000	0.000	0.000
	(X16067)	16.70	16.78	-0.477	**75th**	0.227	0.477	0.227
		17.50	17.65	-0.850	0.000	0.722	0.850	0.722
8	3/25/2020	14.00	14.06	-0.427		0.182	0.427	0.182
	(W23310)	16.70	16.65	0.300		0.090	0.300	0.090
		17.50	17.40	0.575		0.330	0.575	0.330

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	4.073	0.453
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	2.629	0.313

Bias (%) (Eqn 3)	Both Signs Positive
0.65	FALSE
Signed Bias (%)	Both Signs Negative
-0.65	TRUE

Note: Unit W23310 replaced Unit X16067 which was taken out of service for maintenance on 3/25/2020.

Return to Main Menu | Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statisical Calculator - Software to calculate precision and bias statistics (MS Excel) - 11/3/2017 (dasc_11_3_17.xls)
https://www3.epa.gov/ttn/amtic/qareport.html

NORTHWIND PORTAGE, INC.

One-Point Flow Rate Bias Estimate

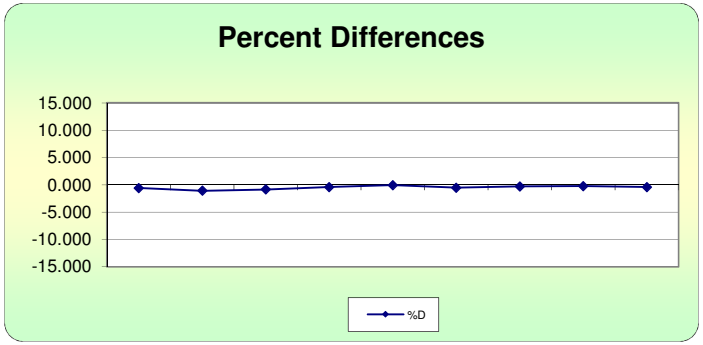
Site ID: DOE-2	E-BAM Serial #: Y12096	Pollutant type: PM10	Bias (%)

Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d^2	|d|	$\|d\|^2$
8	1/7/2020	14.00	14.08	-0.568		0.323	0.568	0.323
		16.70	16.88	-1.066	**25th**	1.137	1.066	1.137
		17.50	17.65	-0.850	-0.568	0.722	0.850	0.722
8	2/11/2020	14.00	14.06	-0.427		0.182	0.427	0.182
		16.70	16.71	-0.060	**75th**	0.004	0.060	0.004
		17.50	17.59	-0.512	-0.285	0.262	0.512	0.262
8	3/18/2020	14.00	14.04	-0.285		0.081	0.285	0.081
		16.70	16.74	-0.239		0.057	0.239	0.057
		17.50	17.57	-0.398		0.159	0.398	0.159

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	4.405	0.489
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	2.927	0.310

Bias (%) (Eqn 3)	Both Signs Positive
0.68	FALSE
Signed Bias (%)	Both Signs Negative
-0.68	TRUE

Return to Main Menu Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statisical Calculator - Software to calculate precision and bias statistics (MS Excel) - 11/3/2017 (dasc_11_3_17.xls)
https://www3.epa.gov/ttn/amtic/qareport.html

NORTHWIND PORTAGE, INC.

One-Point Flow Rate Bias Estimate

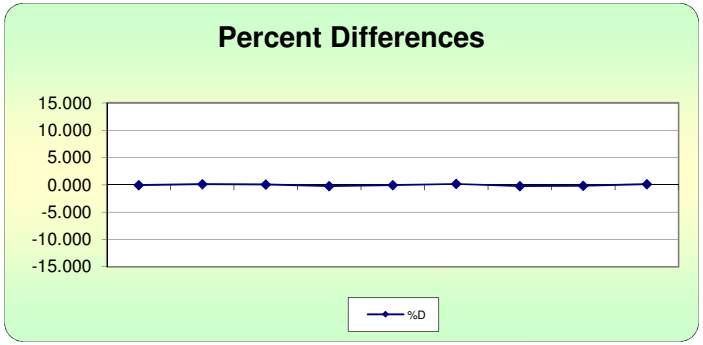
Site ID: DOE-3	E-BAM Serial #: W23313	Pollutant type: PM10	Bias (%)

Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d^2	$\|d\|$	$\|d\|^2$
8	1/7/2020	14.00	14.01	-0.071		0.005	0.071	0.005
		16.70	16.68	0.120	**25th**	0.014	0.120	0.014
		17.50	17.49	0.057	-0.179	0.003	0.057	0.003
8	2/11/2020	14.00	14.03	-0.214		0.046	0.214	0.046
		16.70	16.71	-0.060	**75th**	0.004	0.060	0.004
		17.50	17.47	0.172	0.114	0.029	0.172	0.029
8	3/18/2020	14.00	14.03	-0.214		0.046	0.214	0.046
		16.70	16.73	-0.179		0.032	0.179	0.032
		17.50	17.48	0.114		0.013	0.114	0.013

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	1.201	0.133
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	0.193	0.063

Bias (%) (Eqn 3)	Both Signs Positive
0.17	FALSE
Signed Bias (%)	Both Signs Negative
+/-0.17	FALSE

Return to Main Menu Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statisical Calculator - Software to calculate precision and bias statistics (MS Excel) - 11/3/2017 (dasc_11_3_17.xls)
https://www3.epa.gov/ttn/amtic/qareport.html

NORTHWIND PORTAGE, INC.

One-Point Flow Rate Bias Estimate

Site ID: DOE-4	E-BAM Serial #: W23310 / W23314	Pollutant type: PM10	Bias (%)

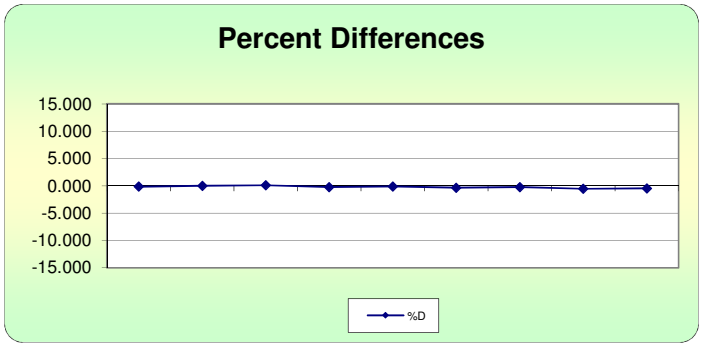
Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d^2	|d|	$\|d\|^2$
8	1/7/2020	14.00	14.02	-0.143		0.020	0.143	0.020
	(W23310)	16.70	16.70	0.000	**25th**	0.000	0.000	0.000
		17.50	17.48	0.114	-0.342	0.013	0.114	0.013
8	2/12/2020	14.00	14.03	-0.214		0.046	0.214	0.046
	(W23314)	16.70	16.72	-0.120	**75th**	0.014	0.120	0.014
		17.50	17.56	-0.342	-0.120	0.117	0.342	0.117
8	3/18/2020	14.00	14.03	-0.214		0.046	0.214	0.046
	(W23314)	16.70	16.79	-0.536		0.287	0.536	0.287
		17.50	17.58	-0.455		0.207	0.455	0.207

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	2.137	0.237
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	0.750	0.174

Bias (%) (Eqn 3)	Both Signs Positive
0.35	FALSE
Signed Bias (%)	Both Signs Negative
-0.35	TRUE

Note: Unit W23310 sent to Met-One for repair on 2/12/2020.

Return to Main Menu Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statisical Calculator - Software to calculate precision and bias statistics (MS Excel) - 11/3/2017 (dasc_11_3_17.xls)
https://www3.epa.gov/ttn/amtic/qareport.html

NORTHWIND INC.

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-1 Serial # X16067

Audit Date: 1/7/2020 Audited By: TW. Hilford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.5 as left: 0.5

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	17.6 °C	17.3 °C	as left:	17.6 °C	17.3 °C
Barometric Pressure:	as found:	718.3 mmHg	715.5 mmHg	as left:	718.3 mmHg	715.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.8 lpm	as left:	16.7 lpm	16.8 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.12 lpm	as left:	14.0 lpm	14.12 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.5 lpm	as left:	17.5 lpm	17.5 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm2) : 0.906	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) : 0.900			
Difference (mg/cm2) : 0.006			
% Difference / (Pass) or Fail: 0.66% PASS	14.3	402.5	Good to Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1005	1005	Analog Mode	Hourly	hourly	Flow Type	Actual	Act
Location	1	1	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5v
Tape Advance	24 hrs	24 hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60 min	Delta T Setpoint	15 C	15C	DAC	8.0 v	8.0v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0v	Flow Setpoint	16.7	16.7	Pump Protect	Off	off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	1/7/20	1010	4			
2				5			
3				6			

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # Y12096

Audit Date: 1/7/2020 Audited By : TSW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.5 as left: 0.5

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	18.8 °C	18.8 °C	as left:	18.8 °C	18.8 °C
Barometric Pressure:	as found:	712.5 mmHg	712.5 mmHg	as left:	712.5 mmHg	712.5 mmHg
16.7 lpm Flow Rate	as found:	14.7 lpm	16.88 lpm	as left:	16.7 lpm	16.88 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.08 lpm	as left:	14.0 lpm	14.08 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.65 lpm	as left:	17.5 lpm	17.65 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2) : 0.848

Measured Span Mass (mg/cm2) : 0.881

Difference (mg/cm2) : 0.033

% Difference / ~~Pass~~ or Fail: ~~3.8% 0.033~~ 3.8% PASS TSW

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.2	403.0	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1128	1128	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	2	2	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5v
Tape Advance	24 hrs	24	RH Setpoint	45%	45%	Std Cond Temp	25 C	25.C
Realtime Avg	60 mins	60mm	Delta T Setpoint	15 C	15°C	DAC	8.0 v	8.0v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	Off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	1/7/20	1131	4			
2				5			
3				6			

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3 Serial # W23313

Audit Date: 1/7/2020 Audited By: TS Williford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.7 as left: 0.7

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	20.0 °C	19.4 °C	as left:	20.0 °C	19.4 °C
Barometric Pressure:	as found:	713.2 mmHg	712.5 mmHg	as left:	713.2 mmHg	712.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.68 lpm	as left:	16.7 lpm	16.68 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.01 lpm	as left:	14.0 lpm	14.01 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.49 lpm	as left:	17.5 lpm	17.49 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2): 0.885

Measured Span Mass (mg/cm2): 0.883

Difference (mg/cm2): 0.002

% Difference / Pass or Fail: 0.22% Pass

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.7	424.0	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1325	1325	Analog Mode	Hourly	hourly	Flow Type	Actual	Act
Location	3	3	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5V
Tape Advance	24 hrs	24hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60mn	Delta T Setpoint	15 C	15C	DAC	8.0 v	8.0V
Machine Type	PM-10	PM-10	RH Control	On	ON	RH Connect	No	NO
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	1/7/20	1330	4			
2				5			
3				6			

Audit Notes:

* Initial Audit for W23313 after repairs and before put back into service

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23310

Audit Date: 1/7/2020 Audited By : TSWilliford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.7 as left: 0.7

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	18.6 °C	18.7 °C	as left:	18.6 °C	18.7 °C
Barometric Pressure:	as found:	705.0 mmHg	704.5 mmHg	as left:	705.0 mmHg	704.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.7 lpm	as left:	16.7 lpm	16.7 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.02 lpm	as left:	14.0 lpm	14.0 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.48 lpm	as left:	17.5 lpm	17.48 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2) :	0.915
Measured Span Mass (mg/cm2) :	0.914
Difference (mg/cm2) :	0.001
% Difference / Pass or Fail:	0.12%

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.7	421.1	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1415	1415	Analog Mode	Hourly	hourly	Flow Type	Actual	Act
Location	4	4	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5
Tape Advance	24 hrs	24 hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25.C
Realtime Avg	60 mins	60 min	Delta T Setpoint	15 C	15 C	DAC	8.0 v	8.0 v
Machine Type	PM-10	PM-10	RH Control	On	on	RH Connect	No	No
Analog FS	1.0 v	1.0 V	Flow Setpoint	16.7	16.7	Pump Protect	Off	Off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	1/7/20	1420	4			
2				5			
3				6			

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-1 Serial # X16067

Audit Date: 2/11/2020 Audited By : TRW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: ~~1/21/2019~~ TRW

Leak Check Value: as found: 0.5 as left: 0.5 2/6/2020

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	18.1 °C	17.90 °C	as left:	18.1 °C	17.90 °C
Barometric Pressure:	as found:	715.6 mmHg	714.0 mmHg	as left:	715.6 mmHg	714.0 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.78 lpm	as left:	16.7 lpm	16.78 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.0 lpm	as left:	14.0 lpm	14.0 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.65 lpm	as left:	17.5 lpm	17.65 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2) : 0.906

Measured Span Mass (mg/cm2) 0.917 TRW

Difference (mg/cm2) : ~~0.906~~ 0.011

% Difference / (Pass) or Fail: 1.2%

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.7	411.1	Good

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1226	1226	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	1	1	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5V
Tape Advance	24 hrs	24 hrs	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60 mm	Delta T Setpoint	15 C	15C	DAC	8.0 v	8.0V
Machine Type	PM-10	PM-10	RH Control	On	on	RH Connect	No	No
Analog FS	1.0 v	1.0 v	Flow Setpoint	16.7	16.7	Pump Protect	Off	Off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	2/11/20	1235	4			
2				5			
3				6			

Audit Notes:

* Cleaned Nozzle and Sampling Vane.

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # Y12096

Audit Date: 2/11/2020 Audited By : TSW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	17.6 °C	17.1 °C	as left:	17.6 °C	17.1 °C
Barometric Pressure:	as found:	~~710.7~~ 710.2 mmHg	710.5 mmHg	as left:	710.2 mmHg	710.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.71 lpm	as left:	16.7 lpm	16.71 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.06 lpm	as left:	14.0 lpm	14.06 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.59 lpm	as left:	17.5 lpm	17.59 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found		as left	
Tape support vane clean:	as found		as left	
Tape spool covers tight:	as found		as left	
PM10 particle trap clean:	as found		as left	
PM10 drip jar empty:	as found		as left	
PM10 bug screen clear:	as found		as left	

Manual Span Membrane Test

Expected Span Mass (mg/cm2) : 0.848

Measured Span Mass (mg/cm2) : 0.870

Difference (mg/cm2) : 0.022

% Difference / Pass or Fail: TSW ~~0.022~~ 2.5% Pass

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.4	406.6	Good

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1331	1331	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	2	2	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5V
Tape Advance	24 hrs	24hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25°C
Realtime Avg	60 mins	60 min	Delta T Setpoint	15 C	15°C	DAC	8.0 v	8.0V
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	~~Off~~

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	2/11/20	1337	4			
2				5			
3				6			

Audit Notes:

NORTHWIND INC

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3 Serial # W23313

Audit Date: 2/11/2020 Audited By : TSW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.6 as left: 0.6

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	19.0 °C	18.6 °C	as left:	19.0 °C	18.6 °C
Barometric Pressure:	as found:	711.6 mmHg	712.0 mmHg	as left:	711.6 mmHg	712.0 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.71 lpm	as left:	16.7 lpm	16.71 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.03 lpm	as left:	14.0 lpm	14.03 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.47 lpm	as left:	17.5 lpm	17.47 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2) : 0.885

Measured Span Mass (mg/cm2) : 0.869

Difference (mg/cm2) : 0.016

% Difference (Pass or Fail): 1.8 % (Pass)

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.5	409.5	Good

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1428	1428	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	3	3	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5V
Tape Advance	24 hrs	24hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25°C
Realtime Avg	60 mins	60 min	Delta T Setpoint	15 C	15°C	DAC	8.0 v	8.0V
Machine Type	PM-10	PM-10	RH Control	On	on	RH Connect	No	NO
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	Off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	2/11/2020	14:35	4			
2				5			
3				6			

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23310

Audit Date: 2/11/2020 Audited By : T. Stewart Williford

Flow Audit								
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047	Calibration Date:	1/21/2019			
Leak Check Value:	as found:			as left:				
		E-BAM	Ref. Std.			E-BAM	Ref. Std.	
Ambient Temperature:	as found:	°C	°C	as left:		°C	°C	
Barometric Pressure:	as found:	mmHg	mmHg	as left:		mmHg	mmHg	
16.7 lpm Flow Rate	as found:	lpm	lpm	as left:		lpm	lpm	
14.0 lpm Flow Rate	as found:	lpm	lpm	as left:		lpm	lpm	
17.5 lpm Flow Rate	as found:	lpm	lpm	as left:		lpm	lpm	

Mechanical Audits (Y = Yes N = No)				
Sample nozzle clean:	as found		as left	
Tape support vane clean:	as found		as left	
Tape spool covers tight:	as found		as left	
PM10 particle trap clean:	as found		as left	
PM10 drip jar empty:	as found		as left	
PM10 bug screen clear:	as found		as left	

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm2) :	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) :			
Difference (mg/cm2) :			
% Difference / Pass or Fail:			

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock			Analog Mode	Hourly		Flow Type	Actual	
Location			Baud Rate	9600		Restart Voltage	12.5 v	
Tape Advance	24 hrs		RH Setpoint	45%		Std Cond Temp	25 C	
Realtime Avg	60 mins		Delta T Setpoint	15 C		DAC	8.0 v	
Machine Type	PM-10		RH Control	On		RH Connect	No	
Analog FS	1.0 v		Flow Setpoint	16.7		Pump Protect	Off	

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
1			4		
2			5		
3			6		

Audit Notes:

** When I tried to Audit the flow rate the unit kept turning off when I turned the unit back on it would return back to the original Start Up menue ~~and the same~~ When I would try to start up the unit again it would turn off again. Took unit down and will send into met One.

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23314

Audit Date: 2/12/2020 Audited By: TBW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019

Leak Check Value: as found: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	11.3 °C	10.9 °C	as left:	11.3 °C	10.9 °C
Barometric Pressure:	as found:	707.3 mmHg	705.0 mmHg	as left:	707.3 mmHg	705.0 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.72 lpm	as left:	16.7 lpm	16.72 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.03 lpm	as left:	14.0 lpm	14.03 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.56 lpm	as left:	17.5 lpm	17.56 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test

Expected Span Mass (mg/cm2): 0.919

Measured Span Mass (mg/cm2): 0.927

Difference (mg/cm2): ~~0.919~~ 0.008

% Difference / (Pass) or Fail: TBW 0.87% Pass

Pump Test

Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
14.1	420.3	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	0903	0903	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	4	4	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5 v
Tape Advance	24 hrs	24 hrs	RH Setpoint	45%	45%	Std Cond Temp	25 C	25°C
Realtime Avg	60 mins	60 mins	Delta T Setpoint	15 C	15°C	DAC	8.0 v	8.0 v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0 v	Flow Setpoint	16.7	16.7	Pump Protect	Off	Off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	2/12/20	0945	4			
2				5			
3				6			

Audit Notes:

Initial Audit for W23314 Replaced W23310

NORTHWIND INC.

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-1 Serial # W23310

Audit Date: 3/25/2020 Audited By : TS Williford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/5/2020

Leak Check Value: as found: _____ as left: _____

		E-BAM		Ref. Std.			E-BAM		Ref. Std.	
Ambient Temperature:	as found:	11.5	°C	12.0	°C	as left:	11.5	°C	12.0	°C
Barometric Pressure:	as found:	714	mmHg	713.6	mmHg	as left:	714	mmHg	713.6	mmHg
16.7 lpm Flow Rate	as found:	16.7	lpm	16.65	lpm	as left:	16.7	lpm	16.65	lpm
14.0 lpm Flow Rate	as found:	14.0	lpm	14.06	lpm	as left:	14.0	lpm	14.06	lpm
17.5 lpm Flow Rate	as found:	17.5	lpm	17.40	lpm	as left:	17.5	lpm	17.40	lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm2) : 0.915	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) : 0.921			
Difference (mg/cm2) : 0.006			
% Difference / (Pass) or Fail: 0.65%	14.0	406.8	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1015	1115	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	1	1	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5V
Tape Advance	24 hrs	24	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60	Delta T Setpoint	15 C	15C	DAC	8.0 v	8.0V
Machine Type	PM-10	PM-10	RH Control	On	on	RH Connect	No	No
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	~~Off~~

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
1 No New Messages	3/25/20	12:10	4		
2			5		
3			6		

Audit Notes:

* Initial Audit for W23310 after ~~receiving~~ recieving from met one.

NORTHWIND INC.

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # Y12096

Audit Date: 3/18/2020 Audited By : T.S. Williford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/5/2020

Leak Check Value: as found: 0.5 as left: 0.5

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	11.4 °C	11.1 °C	as left:	11.4 °C	11.1 °C
Barometric Pressure:	as found:	704.5 mmHg	704.5 mmHg	as left:	704.5 mmHg	704.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.74 lpm	as left:	16.7 lpm	16.74 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.04 lpm	as left:	14.0 lpm	14.04 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.57 lpm	as left:	17.5 lpm	17.57 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test		Pump Test		
Expected Span Mass (mg/cm2) :	0.848	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) :	0.877			
Difference (mg/cm2) :	0.029			
% Difference / (Pass) or Fail:	3.4%	14.3	406.9	Good / Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1040	1040	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	2	2	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5 v
Tape Advance	24 hrs	24 hrs	RH Setpoint	45%	45%	Std Cond Temp	25 C	25 C
Realtime Avg	60 mins	60	Delta T Setpoint	15 C	15 C	DAC	8.0 v	8.0 v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0 v	Flow Setpoint	16.7	16.7	Pump Protect	Off	off

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
1 No New Message	3/18/20	1143	4		
2			5		
3			6		

Audit Notes:

NORTHWIND INC.

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3 Serial # 4/23313

Audit Date: 3/18/2020 Audited By : T.S. Williford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/5/2020

Leak Check Value: as found: 0.6 as left: 0.6

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	13.3 °C	12.7 °C	as left:	13.3 °C	12.7 °C
Barometric Pressure:	as found:	706.0 mmHg	706.0 mmHg	as left:	706.0 mmHg	706.0 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.73 lpm	as left:	16.7 lpm	16.73 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.03 lpm	as left:	14.0 lpm	14.03 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.48 lpm	as left:	17.5 lpm	17.48 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test		Pump Test		
Expected Span Mass (mg/cm2) :	0.885	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) :	0.883			
Difference (mg/cm2) :	0.002			
% Difference / Pass or Fail:	0.23%	14.4	415.7	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1131	1131	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	3	3	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5v
Tape Advance	24 hrs	24 hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60min	Delta T Setpoint	15 C	15 C	DAC	8.0 v	8.0v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0 V	Flow Setpoint	16.7	16.7	Pump Protect	Off	off

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
1 No New Messages	3/18/20	1241	4		
2			5		
3			6		

Audit Notes:

NORTHWIND INC.

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23314

Audit Date: 3/18/2020 Audited By : T. S. Williford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/5/2020

Leak Check Value: as found: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	13.7 °C	12.5 °C	as left:	13.7 °C	12.5 °C
Barometric Pressure:	as found:	699.0 mmHg	698.0 mmHg	as left:	699.0 mmHg	698.0 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.79 lpm	as left:	16.7 lpm	16.79 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.03 lpm	as left:	14.0 lpm	14.0 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.58 lpm	as left:	17.5 lpm	17.5 lpm

Mechanical Audits (Y = Yes N = No)

Sample nozzle clean:	as found	Y	as left	Y
Tape support vane clean:	as found	Y	as left	Y
Tape spool covers tight:	as found	Y	as left	Y
PM10 particle trap clean:	as found	Y	as left	Y
PM10 drip jar empty:	as found	Y	as left	Y
PM10 bug screen clear:	as found	Y	as left	Y

Manual Span Membrane Test		Pump Test		
Expected Span Mass (mg/cm2) :	0.919	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2) :	0.926			
Difference (mg/cm2) :	0.007			
% Difference (Pass) or Fail:	0.75%	14.8	419.1	Marginal

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1229	1229	Analog Mode	Hourly	Hourly	Flow Type	Actual	Act
Location	4	4	Baud Rate	9600	9600	Restart Voltage	12.5 v	12.5v
Tape Advance	24 hrs	24hrs	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60mm	Delta T Setpoint	15 C	15C	DAC	8.0 v	8.0v
Machine Type	PM-10	PM-10	RH Control	On	On	RH Connect	No	NO
Analog FS	1.0 v	1.0V	Flow Setpoint	16.7	16.7	Pump Protect	Off	off

Last 6 Errors in E-BAM Error Log

	Error	Date	Time		Error	Date	Time
1	No New Messages	1340	3/10/20	4			
2				5			
3				6			

Audit Notes: