

***Report on Quarterly Air Monitoring,  
Area IV, Tenth Quarter 2020***

***Santa Susana Field Laboratory  
Ventura County, California***



January 2021  
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***Prepared for:  
United States  
Department of Energy***

***Prepared by:  
North Wind Portage, Inc.***

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Tenth Quarter 2020**

**Santa Susana Field Laboratory  
Ventura County, CA**

**January 2021**

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# PROFESSIONAL CERTIFICATION

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

January 2021

**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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## EXECUTIVE SUMMARY

This report summarizes the United States Department of Energy (DOE) air monitoring activities conducted during the tenth quarter (Q10) of the monitoring period (July 1, 2020, to September 30, 2020) at Area IV within 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 consists 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 the Baseline Air Monitoring Program.

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<sub>10</sub>), 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. Having developed the baseline levels for PM<sub>10</sub>, 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 in the Annual Air Monitoring Reports.

The following air monitoring activities conducted during Q10 2020 by DOE within Area IV are summarized in this reports:

- Collected meteorological data from one location (DOE-4);
- Collected PM<sub>10</sub> 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<sub>10</sub>, and radionuclide data all met the data completeness goal of 80% and VOC data met the completeness goal of 85% for Q10. The air monitoring is to be continued beginning October 1, 2020, with the eleventh quarter of year three air monitoring. Data collected during remediation activities will be compared to the baseline conditions.

The following site activities were conducted during Q10 by DOE within Area IV:

- Groundwater level monitoring
- Deactivation of CLIN 8, 9 facilities
- Demolition of CLIN 10 and 12 facilities
- Installation of new groundwater monitoring wells by CDM Smith
- Surveillance and maintenance.

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## ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
μCi	microcurie(s)
μg/m <sup>3</sup>	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 <sub>2.5</sub>	particulate matter less than 2.5 microns in aerodynamic diameter
PM <sub>10</sub>	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
Q9	ninth quarter
Q10	tenth 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 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.

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 Air Monitoring Program is to evaluate 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<sub>10</sub>), 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 Air Monitoring Program.

Figure 1 shows the air monitoring locations for the 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<sub>10</sub>, 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 Q10 quarterly results and quality assurance (QA) activities performed between July 1, 2020, to September 30, 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 Q10 reporting period (July 1, 2020, to September 30, 2020). Elevated air sampling levels were recorded during Q10. This slight increase can be contributed to the California wild fires as well as the fireworks from July 4<sup>th</sup>.

Quality objectives and data completeness of 80% were met for all meteorological, PM<sub>10</sub>, and radionuclide data for Q10, and VOC data met the completeness goal of 85% for Q10 of the Air Monitoring Program.

Urban background data compared with air monitoring data indicate that the PM<sub>10</sub> concentrations measured at stations DOE-1, DOE-2, DOE-3, and DOE-4 during Q10 are comparable to the PM<sub>10</sub> concentrations measured at stations characterizing urban background. During Q10, all top five average daily concentrations exceeded the CAAQS of 50 µg/m<sup>3</sup>, but were below the National Ambient Air Quality Standard of 150 µg/m<sup>3</sup>.

During Q10 two VOC analytes were detected above the EPA Residential Air RSL or the DTSC HHRA. One analyte was detected during the July 23, 2020 sampling event and one during the August 18, 2020 sampling event. DOE-3 and DOE-4 both had two analytes detected above the screening level.

Of the 26 radiological sampling events at DOE-1, DOE-2, DOE-3 and DOE-4 in Q10, all of the detections for gross alpha and gross beta that exceeded the minimum detectable concentration (MDC) are naturally occurring radionuclides. Detections are expected because naturally occurring radioactive materials are always present. No man-made radionuclides that are contaminants of concern at ETEC were detected.

Data collected during the Q10 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 October 1, 2020, for the eleventh quarter of the 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 six field duplicate samples collected during this reporting period.

During Q10, 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, -3 and -4 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 Q10 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 ETEC 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 92 days in this reporting period (Q10), which covers July 1, 2020, to September 30, 2020, with a total of 8,832 possible 15-minute observations.

#### 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 air monitoring are presented in Table 2. In summary, the data completeness goal was achieved for all meteorological parameters in Q10.

### **Wind Rose**

The final validated 15-minute meteorological dataset was used to develop the wind rose for Q10 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 Q10, data capture for wind speed and direction at DOE-4 was 100%. The average and maximum wind speeds were 3.5 m/sec and 11.3 m/s, respectively. The maximum recorded wind gust was 15.7 m/sec. There are two predominant wind directions: the first from the east-southeast and a second that is clustered around the northwest.

Table 2. Data screening summary for monitored meteorological parameters.

Meteorological Parameter	Screening Criteria <sup>(1)</sup> (for valid sensor responses)	Data Completeness Percent (%) <sup>(2)</sup>				
		Q8	Q9	Q10	Year 3 to Date	Project to Date
Wind Speed	between 0 and 25 m/sec	100	100	100	100	91.25
	> 0.1 m/sec variation over 3 hours					
	> 0.5 m/sec variation over 12 hours					
Wind Direction	between 0 and 360 degrees	100	100	100	100	91.25
	> 1 degree variation over 3 hours					
	> 10 degree variation over 12 hours					
Standard Deviation of Wind Direction	Inherits the completeness stats of Wind Direction	100	100	100	100	91.25
Temperature @ 2 m	≤ local record high (monthly basis)	100	100	100	100	91.25
	≥ local record low (monthly basis)					
	> 0.5°C variation over 12 hours					
Temperature @ 10 m	≤ local record high (monthly basis)	100	100	100	100	91.25
	≥ local record low (monthly basis)					
	> 0.5°C variation over 12 hours					
Delta Temperature	≤ 0.1°C during daytime	100	100	100	100	91.25
	≥ -0.1°C during nighttime					
	between -3.0 and 5.0°C					
Relative Humidity (and Dewpoint Temperature)	relative humidity between 0-100%	100	100	100	100	81.27
	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					
Precipitation	≤ 1 inch in 1 hour	99.84	100	100	99.95	91.23
	≤ 4 inches in 24 hours					
	≥ 2 inches in 3 months					
Barometric Pressure	between 871 and 982 mb (local)	100	100	100	100	91.25
	(i.e., between 940 and 1060 mb sea level)					
	≤ 6 mb variation over 3 hours					
Solar Radiation	> 0 at night	99.74	99.31	99.69	99.58	91.10
	≤ maximum possible for date and latitude					

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

(3) 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      (only 3 quarters)      • Year Two = 25,056 (abbreviated)
- Q8 = 8,736      • Q9 = 8,736      • Q10 = 8,832      • Year Three = (in progress)

## 4.2 PM<sub>10</sub> Data

PM<sub>10</sub> data, defined as coarse particles between 2.5 and 10 microns in aerodynamic 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<sub>10</sub> 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 92 days in this reporting period.

- DOE-1 had valid readings all 92 days.
- DOE-2 had valid readings all 92 days.
- DOE-3 had valid readings all 92 days.
- DOE-4 had valid readings 91 of 92 days.

Three of the four station units had 100% data completeness for PM<sub>10</sub> for Q10, with a total data completeness of 99.72%, exceeding 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<sub>10</sub> data completeness for July1, 2020, to September 30, 2020.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	92	92	100
DOE-2	92	92	100
DOE-3	92	92	100
DOE-4	91	92	98.91
Average Total Data Completeness			99.72

The five highest PM<sub>10</sub> results identified for the reporting period are listed in Table 4 along with the California Ambient Air Quality Standard (CAAQS) for PM<sub>10</sub>. PM<sub>10</sub> concentrations were consistent with levels typically found in urban air. Of these top five results, three were recorded at DOE-3 and the remaining two at DOE-4. All five values were above the CAAQS, but below the National Ambient Air Quality Standard of 150 micrograms per cubic meter (µg/m<sup>3</sup>). Wildfires, high winds and the fourth of July all occurred during this recording period and are known to increase air particulates.

Table 4. Top five PM<sub>10</sub> 24-hour average concentration days.

Date	Location	PM <sub>10</sub> Value (µg/m <sup>3</sup> )	CAAQS (µg/m <sup>3</sup> )
7/5/2020	DOE-3	<b>92.29100</b>	50
7/31/2020	DOE-3	<b>77.33300</b>	50
9/6/2020	DOE-4	<b>66.25000</b>	50
9/7/2020	DOE-4	<b>57.91600</b>	50
7/6/2020	DOE-3	<b>54.91600</b>	50

Note: The bold number is above CAAQS screening level.

### 4.3 Volatile Organic Compound Data

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.

All four DOE locations were 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). Two analytes were detected above the screening levels in Q10. One analyte was detected during the July 23, 2020 sampling event and one during the August 18, 2020 sampling event. Benzene was detected at 0.91  $\mu\text{g}/\text{m}^3$  at DOE-3 on July 23, 2020. Tetrachloroethene was detected at 4.8  $\mu\text{g}/\text{m}^3$  on August 18, 2020 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. 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 104 airborne radioactivity filter samples collected in Q10 — 26 each with DOE-1, DOE-2, DOE-3 and DOE-4. 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 MDC for each sampling event. Some results in Table C-1 (Appendix C) are shown as negative values (because detector background is subtracted from the result).

All but seventeen alpha sample 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. The single alpha sample greater than the MDC was only slightly above the MDC, and was well below the effluent limits specified in California regulations.

Only 3% of the beta samples were below MDC, the gross (background radioactive material included) samples exceeded the MDC in 97% of samples, indicating the presence of airborne radioactive material (including background materials). The beta-gamma samples greater than the MDC were only slightly above the MDC, and were well below the effluent limits specified in California regulations. The elevated (but still low) results correlate to the increased dust and smoke associated with the California fires in the third quarter of 2020 (Q10).

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 Q10. 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 in Table 6.

Table 6. Gross alpha and beta-gamma average results for Q10.

Location	Average alpha Result ( $\mu\text{Ci/mL}$ )	Average alpha MDC ( $\mu\text{Ci/mL}$ )	Average beta Result ( $\mu\text{Ci/mL}$ )	Average beta MDC ( $\mu\text{Ci/mL}$ )
DOE 1	5.19E-16	6.39E-15	3.81E-14	2.46E-14
DOE 2	2.42E-16	6.39E-15	4.00E-14	2.46E-14
DOE 3	8.02E-17	6.37E-15	2.52E-14	2.45E-14
DOE 4	8.7E-16	6.31E-15	3.76E-14	2.43E-14
Average	4.28 E-16	6.37E-15	3.5E-14	2.45E-14

## 5. QA/QC ACTIVITIES

The following QA/QC activities were conducted for the PM<sub>10</sub>, VOC, radionuclide, and meteorological data collection and analysis.

### 5.1 Field QA/QC

#### 5.1.1 PM<sub>10</sub>

The 24-hour daily averages for Q10 are presented in Appendix A along with the monthly minimum, maximum, and 95<sup>th</sup> 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. The audit results for the four E-BAM units for Q10 ranged from -1.53 to +0.28. None of the results exceeded the flow rate measurement quality objective of +/- 4%.

Complete audit reports and flow verification results for Q10 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, annually. During this quarter, two of the six sample delivery groups (SDGs), SDG P2003842 and P2005155, 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 on all 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. The following analytes, Ethyl Acetate in SDGs P2004095, P2004626, and P2005155, CFC 11 in SDG P2004626, and Toluene in SDG P2004879 were detected in four field duplicates pairs exceeded the quality objective of +/- 15% relative percent difference (RPD). For SDG P2004333 the analytes Trichloroethene and Tetrachloroethene and in SDG P2004626 the analytes Bromoform and total Xylenes were detected at levels higher than the RL 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. Sixteen 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 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.

A minimum of 20% of the annual radiological analytical results are undergoing third-party data validation. The SDG from Q8 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**

Routine visual checks were performed on the meteorological station during weekly data downloading site visits. 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<sub>10</sub> 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<sub>10</sub> Monitors**

Refer to Section 4.2 for a detailed description of PM<sub>10</sub> air monitoring equipment issues.

##### **5.1.8.2 Meteorological Station**

Although there were no unresolved data quality issues impacting the data completion goal during Q10, the solar radiometer continues to record values that exceed the daily screening criteria. Also, the improperly programmed data logger continues to affect the calculation of delta temperature (i.e., temperature difference between 2 m and 10 m).

Solar Radiometer – The solar radiometer continues to occasionally record observations that exceed the maximum possible for the date, latitude, and time of day (i.e., the Level 1 screening criteria from Table 2). These exceedances continue to occur within 1 hour before and after solar noon. The maximum possible values are determined from the Bird Clear Sky Radiation Model (SERI 1981) and represent theoretical maximums that can occur under the clearest sky conditions. Level 2 screening has been unable to resolve these recurring events. These observations are flagged with QC Code = 7 (i.e., suspect) and excluded from the final validated dataset. Site investigations performed during this and previous quarters have not identified the cause. Since this has not yet resulted in a negative impact on achieving the data completeness goal, no further corrective actions are being considered at this time. However, North Wind continues to monitor this situation with each weekly data download and review. Should the situation worsen, a sensor audit with an NIST-traceable standard and/or sensor replacement will be considered.

Delta Temperature Calculation – As stated in the corrective actions section of the Q3 air monitoring report (North Wind, Inc. 2019), the replacement data logger installed in December 2018 (due to Woolsey Fire wildfire damage on November 8, 2018) was improperly 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 (correct calculation):

$$\text{Delta Temperature} = [\text{Temperature @ 10 m}] \text{ minus } [\text{Temperature @ 2 m}] \quad (\text{Eq. 4-1})$$

- November 7 to December 18, 2018:

*Station DOE-4 inoperable due to wildfire damage*

- After December 18, 2018 (incorrect calculation):

$$\text{Delta Temperature} = [\text{Temperature @ 2 m}] \text{ minus } [\text{Temperature @ 10 m}] \quad (\text{Eq. 4-2})$$

For consistency with the initial data collection quarters when delta temperature was correctly recorded by the original data logger, the incorrect delta temperature calculations from the replacement 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<sub>10</sub> instruments were calibrated at the manufacturer and were functioning properly upon installation. The PM<sub>10</sub> 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 July through September. No flow rate comparisons exceeded the project’s acceptance criterion of +/- 4, however the sample dots got darker/black due to smoke in the area. The sample nozzles and support vanes were cleaned as needed. Complete audit reports are presented in Appendix D.

Table 8. PM<sub>10</sub> audit completeness.

Location	Met One E-BAM Serial Number	Parameter	Date
DOE-1	W23310	PM <sub>10</sub>	07/15/2020
DOE-2	Y12096	PM <sub>10</sub>	07/15/2020
DOE-3	W23313	PM <sub>10</sub>	07/15/2020
DOE-4	W23314	PM <sub>10</sub>	07/15/2020
DOE-1	W23310	PM <sub>10</sub>	08/25/2020
DOE-2	Y12096	PM <sub>10</sub>	08/25/2020
DOE-3	W23313	PM <sub>10</sub>	08/25/2020
DOE-4	W23314	PM <sub>10</sub>	08/25/2020
DOE-1	W23310	PM <sub>10</sub>	09/23/2020
DOE-2	X16067*	PM <sub>10</sub>	09/23/2020
DOE-3	W23313	PM <sub>10</sub>	09/23/2020
DOE-4	W23314	PM <sub>10</sub>	09/23/2020

\*Unit Y12096 was swapped out for X16067 September 2020

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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.
- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). 2018. *Approval of the Final Air Monitoring Station Locations for the Santa Susana Field Laboratory, Ventura County, California*. January.
- 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>.
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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). 2007. *Guideline on the Meaning and the Use of Precision and Bias Data Required by 40 CFR Part 58 Appendix A, Version 1.1*. EPA-454/B-07-001. October 2007.
- U.S. Environmental Protection Agency (EPA). 2017. *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Monitoring Program*. EPA-454/B-17-001. January.
- 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

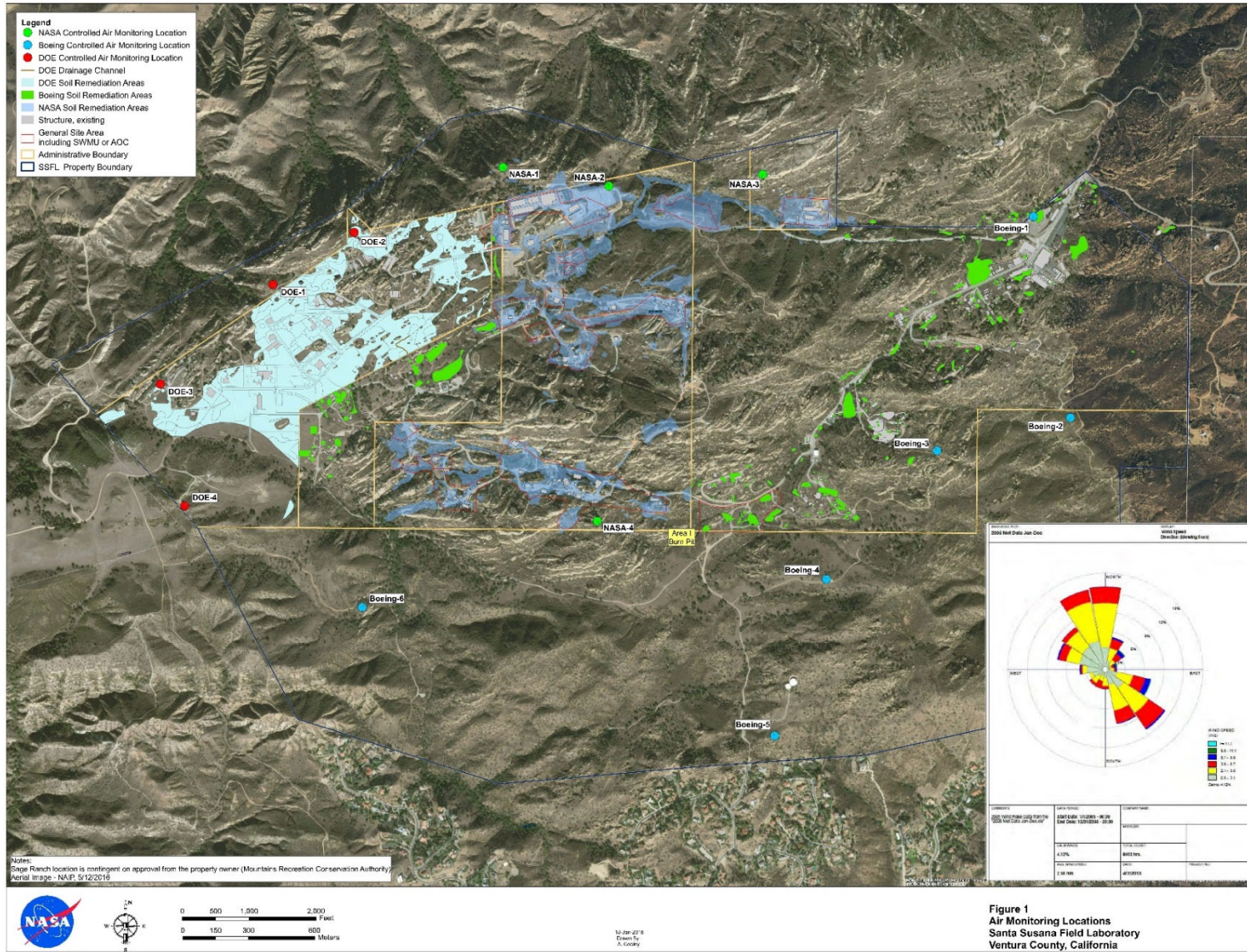
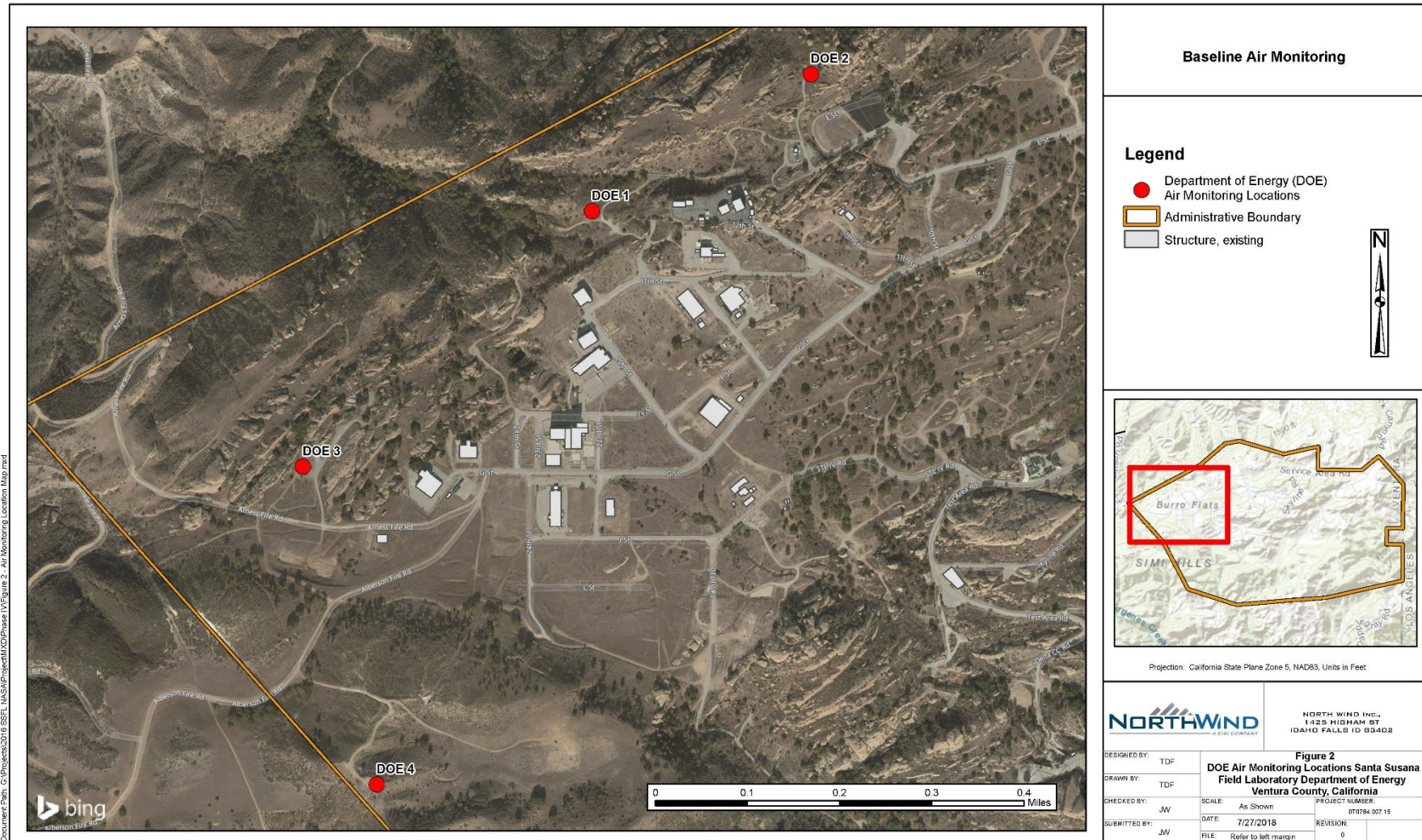
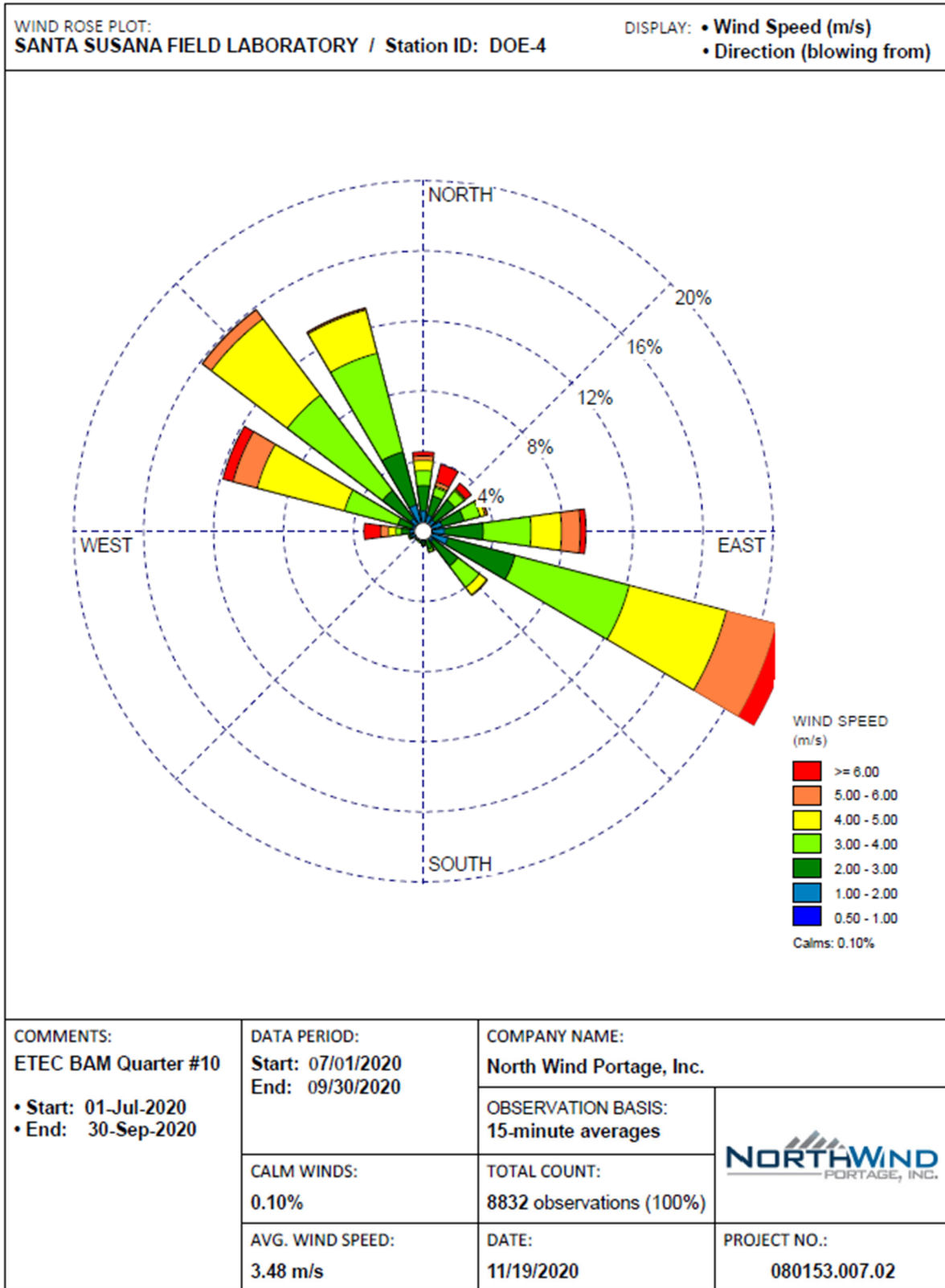


Figure 2 – DOE Air Monitoring Locations



**Figure 3 – DOE Quarterly Wind Rose**



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## **APPENDIX A**

### **PM<sub>10</sub> Daily Averages and Monthly Statistics**

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**PM<sub>10</sub> Daily Averages**

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )
07/01/20	20.714	15.928	21.642	16.642
07/02/20	16	17.208	18.666	11.916
07/03/20	13.583	14.5	14.291	13.875
07/04/20	7.916	7.916	7.791	6.291
07/05/20	35.291	33.75	92.291	31.166
07/06/20	20.125	19.041	54.916	17.375
07/07/20	20.708	18.5	20.291	18.291
07/08/20	24.166	21.791	23.75	23
07/09/20	24.958	22.833	21	21.458
07/10/20	17.416	17.041	17.791	16
07/11/20	9.958	9.541	9.208	7.5
07/12/20	13.083	11.875	11.958	12.958
07/13/20	31	26.041	28.125	24.833
07/14/20	20.916	18.75	11.041	17.291
07/15/20	21.625	16.25	17.833	15.625
07/16/20	20.25	15.125	15.791	14.75
07/17/20	20.125	16.166	13.416	13.791
07/18/20	14.333	18.666	11.458	14.25
07/19/20	11.875	16.25	8.583	7.5
07/20/20	16.25	16.416	13.916	15.583
07/21/20	22.5	18.208	14.25	21.666
07/22/20	15.125	16.375	13.75	16.041
07/23/20	16.958	16.916	16.791	13.833
07/24/20	14.416	18.291	13.083	16.833
07/25/20	15.916	15.541	12.125	13.916
07/26/20	11.791	29.416	11.75	11.166
07/27/20	18.291	15.541	12.958	12.291
07/28/20	20.708	19.958	16.375	16.875
07/29/20	19.041	20.5	17.958	18.125
07/30/20	17.208	17.375	15.5	14.958
07/31/20	9.25	37.166	77.333	9.125
08/01/20	20.125	37.875	19.416	18.583
08/02/20	21.833	21.625	16.25	15.166
08/03/20	20.291	18	16.625	19.333
08/04/20	27.083	20.791	20.541	23.708
08/05/20	21	13.958	17.458	23.333

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )
08/06/20	21.791	13.625	15.375	21
08/07/20	19.125	14.875	16.375	24.416
08/08/20	18.333	28.666	15.75	14.458
08/09/20	19.083	24.75	12.791	13.166
08/10/20	13.875	12.75	10.416	10.625
08/11/20	8.458	11.5	8.125	7.208
08/12/20	9.416	9.583	7.541	8.333
08/13/20	10.833	8.041	7	9.041
08/14/20	10	8.125	5.875	9.333
08/15/20	9.416	9.791	9.041	8.458
08/16/20	20.875	14.333	19.583	18.333
08/17/20	24.708	18.416	22.25	22
08/18/20	30.833	41.375	29.166	26.5
08/19/20	27.833	23.916	25.916	27.041
08/20/20	34.833	30.416	34.25	39.875
08/21/20	37.875	32.125	34.916	38.708
08/22/20	26.375	22.958	28.083	26.791
08/23/20	27.958	18.833	22	27
08/24/20	26.916	16.458	19.666	19
08/25/20	14.125	7.041	7	10.5
08/26/20	14.458	11.333	10.875	12.125
08/27/20	22.541	21.25	22.666	20.166
08/28/20	22.083	16.208	17.666	17.75
08/29/20	21.541	10.916	13.291	12.541
08/30/20	22.541	13.083	18.208	19.125
08/31/20	23.416	10.75	12.708	14.25
09/01/20	23.041	13.083	18.791	20.833
09/02/20	20.083	14.75	17.208	21.166
09/03/20	25.208	17.041	20.291	21.708
09/04/20	26.166	15.291	27.291	28.25
09/05/20	18.666	0	29	17.416
09/06/20	17.125	0	29	66.25
09/07/20	51.041	0	29	57.916
09/08/20	31.5	24.857	35.125	28.416
09/09/20	28.541	24.416	28.375	29.083
09/10/20	34.708	33	36.416	35.291
09/11/20	25.708	24.041	26.583	24.208

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> ) (CAAQS 50 µg/m <sup>3</sup> )
09/12/20	45.375	45.916	16	41.875
09/13/20	40.791	42.958	16	46.291
09/14/20	37.25	36.708	28	38.708
09/15/20	34.291	34.083	35.333	36.166
09/16/20	20.083	20.458	24.625	23.875
09/17/20	14.458	14.666	16.916	14.208
09/18/20	30.125	29.375	29.916	25.583
09/19/20	24.291	25.75	25.5	24.041
09/20/20	20.875	21.75	21.166	20.083
09/21/20	21.75	20.333	21.333	18.791
09/22/20	23.541	19.583	18.958	17
09/23/20	12	12.083	12.916	12.625
09/24/20	27.708	28.25	29.25	27.833
09/25/20	24.083	23.541	23.125	22.583
09/26/20	26.625	25	22.875	23.5
09/27/20	35.583	24.666	22.833	21.583
09/28/20	27.458	26.208	25.041	23.5
09/29/20	13.625	14.166	12.041	11.583
09/30/20	15.6	15.5	8	---

## PM<sub>10</sub> Monthly Statistics

Location ID	July 2020			August 2020			September 2020		
	PM <sub>10</sub>			PM <sub>10</sub>			PM <sub>10</sub>		
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL
DOE-1	35.29100	7.91600	28.28110	37.87500	8.45800	32.83300	51.04100	12.00000	43.08300
DOE-2	33.75000	7.91600	27.89725	41.37500	7.04100	37.52050	45.91600	0.00000	39.83300
DOE-3	92.29100	7.79100	42.86005	77.33300	5.87500	34.58300	36.41600	8.00000	35.22900
DOE-4	31.16600	6.29100	24.00815	39.87500	7.20800	32.87450	66.25000	11.58300	52.68475

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 <sup>3</sup> )	Screening Level Value (µg/m <sup>3</sup> )	SL Source
DOE-1	07/10/2020	Dichlorodifluoromethane	2	100	US EPA RSL
DOE-1	07/10/2020	Ethyl acetate	52	73	US EPA RSL
DOE-1	07/10/2020	Toluene	1	310	DTSC HHRA NOTE 3
DOE-1	07/10/2020	Trichlorofluoromethane	1	1300	DTSC HHRA NOTE 3
DOE-2	07/10/2020	Dichlorodifluoromethane	2	100	US EPA RSL
DOE-2	07/10/2020	Ethyl acetate	12	73	US EPA RSL
DOE-2	07/10/2020	Trichlorofluoromethane	1	1300	DTSC HHRA NOTE 3
DOE-3	07/10/2020	Dichlorodifluoromethane	1.9	100	US EPA RSL
DOE-3	07/10/2020	Ethyl acetate	11	73	US EPA RSL
DOE-3	07/10/2020	Trichlorofluoromethane	1	1300	DTSC HHRA NOTE 3
DOE-4	07/10/2020	Dichlorodifluoromethane	2	100	US EPA RSL
DOE-4	07/10/2020	Ethyl acetate	11	73	US EPA RSL
DOE-4	07/10/2020	Trichlorofluoromethane	1	1300	DTSC HHRA NOTE 3
DOE-1	07/23/2020	Dichlorodifluoromethane	2.6	100	US EPA RSL
DOE-1	07/23/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-2	07/23/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-2	07/23/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-3	07/23/2020	Benzene	<b>0.91</b>	0.097	DTSC HHRA NOTE 3
DOE-3	07/23/2020	Dichlorodifluoromethane	2.6	100	US EPA RSL
DOE-3	07/23/2020	Ethyl acetate	1.6	73	US EPA RSL
DOE-3	07/23/2020	Trichlorofluoromethane	1.5	1300	DTSC HHRA NOTE 3
DOE-4	07/23/2020	2-butanone	2.3	5200	US EPA RSL
DOE-4	07/23/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-4	07/23/2020	Ethyl acetate	7.2	73	US EPA RSL
DOE-4	07/23/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-1	08/05/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-1	08/05/2020	Ethyl acetate	37	73	US EPA RSL
DOE-1	08/05/2020	Toluene	1.4	310	DTSC HHRA NOTE 3
DOE-1	08/05/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-2	08/05/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-2	08/05/2020	Ethyl acetate	31	73	US EPA RSL
DOE-2	08/05/2020	Toluene	1.2	310	DTSC HHRA NOTE 3
DOE-2	08/05/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-3	08/05/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-3	08/05/2020	Ethyl acetate	28	73	US EPA RSL
DOE-3	08/05/2020	Toluene	1.1	310	DTSC HHRA NOTE 3
DOE-3	08/05/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-4	08/05/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-4	08/05/2020	Ethyl acetate	19	73	US EPA RSL
DOE-4	08/05/2020	Toluene	1.1	310	DTSC HHRA NOTE 3
DOE-4	08/05/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-1	08/18/2020	Dichlorodifluoromethane	2.3	100	US EPA RSL
DOE-1	08/18/2020	Ethyl acetate	2.2	73	US EPA RSL
DOE-1	08/18/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3

Location ID	Sample Date	Analyte	Result (µg/m <sup>3</sup> )	Screening Level Value (µg/m <sup>3</sup> )	SL Source
DOE-2	08/18/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-2	08/18/2020	Ethyl acetate	2.9	73	US EPA RSL
DOE-2	08/18/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-3	08/18/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-3	08/18/2020	Ethyl acetate	7.2	73	US EPA RSL
DOE-3	08/18/2020	N-octane	1.6	100	US EPA RSL
DOE-3	08/18/2020	Tetrachloroethene	<b>4.8</b>	0.46	DTSC HHRA NOTE 3
DOE-3	08/18/2020	Toluene	1.1	310	DTSC HHRA NOTE 3
DOE-3	08/18/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-4	08/18/2020	2-butanone	1.8	5200	US EPA RSL
DOE-4	08/18/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-4	08/18/2020	Ethyl acetate	17	73	US EPA RSL
DOE-4	08/18/2020	Trichlorofluoromethane	1.3	1300	DTSC HHRA NOTE 3
DOE-1	09/01/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-1	09/01/2020	Ethyl acetate	31	73	US EPA RSL
DOE-1	09/01/2020	Toluene	0.84	310	DTSC HHRA NOTE 3
DOE-1	09/01/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-2	09/01/2020	Dichlorodifluoromethane	2.2	100	US EPA RSL
DOE-2	09/01/2020	Ethyl acetate	42	73	US EPA RSL
DOE-2	09/01/2020	Toluene	1	310	DTSC HHRA NOTE 3
DOE-2	09/01/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-3	09/01/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-3	09/01/2020	Ethyl acetate	28	73	US EPA RSL
DOE-3	09/01/2020	Trichlorofluoromethane	1.1	1300	DTSC HHRA NOTE 3
DOE-4	09/01/2020	Dichlorodifluoromethane	2.1	100	US EPA RSL
DOE-4	09/01/2020	Ethyl acetate	36	73	US EPA RSL
DOE-4	09/01/2020	Toluene	0.9	310	DTSC HHRA NOTE 3
DOE-4	09/01/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-1	09/16/2020	2-butanone	1.8	5200	US EPA RSL
DOE-1	09/16/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-1	09/16/2020	Isopropanol	3.7	210	US EPA RSL
DOE-1	09/16/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-2	09/16/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-2	09/16/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-3	09/16/2020	Dichlorodifluoromethane	2.4	100	US EPA RSL
DOE-3	09/16/2020	Ethyl acetate	2	73	US EPA RSL
DOE-3	09/16/2020	Trichlorofluoromethane	1.2	1300	DTSC HHRA NOTE 3
DOE-4	09/16/2020	2-butanone	2.1	5200	US EPA RSL
DOE-4	09/16/2020	Dichlorodifluoromethane	2.5	100	US EPA RSL
DOE-4	09/16/2020	Ethyl acetate	16	73	US EPA RSL
DOE-4	09/16/2020	Trichlorofluoromethane	1.2	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.

Sample collection date	Result Alpha (μCi/ml)	MDC - Alpha (μCi/ml)	Result Beta (μCi/ml)	MDC - Beta (μCi/ml)
Sample location DOE-1				
7/2/2020	9.42E-16	6.74E-15	3.42E-14	2.80E-14
7/6/2020	2.01E-15	5.01E-15	4.25E-14	2.08E-14
7/9/2020	2.38E-16	6.69E-15	5.12E-14	2.78E-14
7/13/2020	2.27E-15	5.02E-15	7.40E-14	2.09E-14
7/16/2020	3.08E-15	6.81E-15	6.78E-14	2.83E-14
7/20/2020	2.53E-15	5.00E-15	5.98E-14	2.08E-14
7/23/2020	1.99E-15	6.73E-15	7.23E-14	2.80E-14
7/27/2020	1.49E-15	5.03E-15	5.28E-14	2.10E-14
7/30/2020	4.43E-15	6.70E-15	5.16E-14	2.79E-14
8/3/2020	6.25E-15	4.91E-15	8.22E-14	2.07E-14
8/6/2020	2.14E-15	6.59E-15	5.32E-14	2.78E-14
8/10/2020	-7.31E-16	4.89E-15	3.97E-14	2.06E-14
8/13/2020	3.19E-15	6.60E-15	3.63E-14	2.79E-14
8/17/2020	1.33E-15	4.89E-15	5.63E-14	2.07E-14
8/20/2020	5.55E-15	6.52E-15	8.76E-14	2.76E-14
8/24/2020	3.90E-15	4.89E-15	8.95E-14	2.07E-14
8/27/2020	5.98E-15	6.61E-15	3.85E-14	2.79E-14
8/31/2020	2.35E-15	4.87E-15	3.30E-14	2.06E-14
9/3/2020	4.15E-15	7.02E-15	1.06E-13	2.71E-14
9/8/2020	3.70E-15	4.16E-15	1.04E-13	1.61E-14
9/11/2020	5.23E-15	7.07E-15	6.88E-14	2.73E-14
9/14/2020	1.07E-14	6.95E-15	1.48E-13	2.69E-14
9/17/2020	4.51E-15	7.04E-15	1.40E-13	2.72E-14
9/21/2020	3.07E-15	5.18E-15	6.54E-14	2.00E-14
9/24/2020	2.76E-15	7.03E-15	5.87E-14	2.72E-14
9/28/2020	1.27E-15	5.19E-15	7.93E-14	2.01E-14
Sample location DOE-2				
7/2/2020	-4.64E-16	6.73E-15	-9.06E-16	2.80E-14
7/6/2020	5.41E-15	5.01E-15	4.81E-14	2.09E-14
7/9/2020	6.53E-15	6.69E-15	5.86E-14	2.79E-14

Sample collection date	Result Alpha (μCi/ml)	MDC - Alpha (μCi/ml)	Result Beta (μCi/ml)	MDC - Beta (μCi/ml)
7/13/2020	9.63E-16	5.02E-15	8.74E-14	2.09E-14
7/16/2020	1.31E-15	6.81E-15	3.24E-14	2.83E-14
7/20/2020	-2.17E-15	5.00E-15	4.43E-14	2.08E-14
7/23/2020	9.39E-16	6.71E-15	5.42E-14	2.79E-14
7/27/2020	2.28E-15	5.04E-15	3.46E-14	2.10E-14
7/30/2020	9.38E-16	6.70E-15	8.12E-14	2.79E-14
8/3/2020	4.41E-15	4.88E-15	8.13E-14	2.06E-14
8/6/2020	2.83E-15	6.59E-15	5.78E-14	2.79E-14
8/10/2020	4.42E-15	4.88E-15	6.90E-14	2.06E-14
8/13/2020	-6.40E-16	6.60E-15	7.84E-14	2.79E-14
8/17/2020	5.57E-16	4.89E-15	7.02E-14	2.07E-14
8/20/2020	5.21E-15	6.52E-15	1.01E-13	2.76E-14
8/24/2020	6.99E-15	4.89E-15	1.11E-13	2.06E-14
8/27/2020	4.93E-15	6.61E-15	6.40E-14	2.79E-14
8/31/2020	4.10E-17	4.86E-15	4.84E-14	2.06E-14
9/3/2020	2.06E-15	7.02E-15	8.16E-14	2.71E-14
9/8/2020	6.38E-15	4.16E-15	1.18E-13	1.61E-14
9/11/2020	6.74E-16	7.07E-15	7.86E-14	2.73E-14
9/14/2020	6.52E-15	6.94E-15	1.49E-13	2.68E-14
9/17/2020	3.12E-15	7.04E-15	1.54E-13	2.72E-14
9/21/2020	3.84E-15	5.18E-15	7.82E-14	2.00E-14
9/24/2020	2.07E-15	7.03E-15	8.87E-14	2.72E-14
9/28/2020	1.01E-15	5.18E-15	8.95E-14	2.00E-14
Sample location DOE-3				
7/2/2020	-8.16E-16	6.74E-15	6.18E-15	2.80E-14
7/6/2020	4.10E-15	5.01E-15	5.25E-14	2.08E-14
7/9/2020	6.19E-15	6.71E-15	3.72E-14	2.79E-14
7/13/2020	2.53E-15	5.00E-15	5.30E-14	2.08E-14
7/16/2020	1.67E-15	6.83E-15	4.01E-14	2.84E-14
7/20/2020	4.37E-16	4.99E-15	2.82E-14	2.08E-14
7/23/2020	3.75E-15	6.73E-15	4.16E-14	2.80E-14
7/27/2020	3.59E-15	5.03E-15	4.38E-14	2.09E-14
7/30/2020	4.80E-15	6.72E-15	4.50E-14	2.80E-14
8/3/2020	5.64E-15	4.83E-15	6.87E-14	2.07E-14
8/6/2020	8.33E-15	6.55E-15	8.73E-14	2.80E-14
8/10/2020	8.05E-16	4.83E-15	5.53E-14	2.07E-14

Sample collection date	Result Alpha (μCi/ml)	MDC - Alpha (μCi/ml)	Result Beta (μCi/ml)	MDC - Beta (μCi/ml)
8/13/2020	4.55E-15	6.56E-15	3.94E-14	2.81E-14
8/17/2020	1.21E-15	5.23E-15	4.16E-14	2.08E-14
8/20/2020	5.42E-15	7.00E-15	7.90E-14	2.79E-14
8/24/2020	2.50E-15	5.23E-15	9.73E-14	2.08E-14
8/27/2020	2.69E-15	7.09E-15	7.34E-14	2.82E-14
8/31/2020	6.89E-16	5.20E-15	4.63E-14	2.07E-14
9/3/2020	1.29E-14	7.04E-15	7.51E-14	2.72E-14
9/8/2020	5.14E-15	4.15E-15	9.93E-14	1.61E-14
9/11/2020	7.71E-15	7.08E-15	7.03E-14	2.74E-14
9/14/2020	7.20E-15	6.94E-15	1.41E-13	2.68E-14
9/17/2020	5.92E-15	7.05E-15	1.30E-13	2.73E-14
9/21/2020	3.32E-15	5.18E-15	6.47E-14	2.00E-14
9/24/2020	4.52E-15	7.05E-15	6.97E-14	2.73E-14
9/28/2020	4.88E-16	5.12E-15	6.26E-14	2.00E-14
Sample location DOE-4				
7/2/2020	-8.16E-16	6.74E-15	6.18E-15	2.80E-14
7/6/2020	4.10E-15	5.01E-15	5.25E-14	2.08E-14
7/9/2020	6.19E-15	6.71E-15	3.72E-14	2.79E-14
7/13/2020	2.53E-15	5.00E-15	5.30E-14	2.08E-14
7/16/2020	1.67E-15	6.83E-15	4.01E-14	2.84E-14
7/20/2020	4.37E-16	4.99E-15	2.82E-14	2.08E-14
7/23/2020	3.75E-15	6.73E-15	4.16E-14	2.80E-14
7/27/2020	3.59E-15	5.03E-15	4.38E-14	2.09E-14
7/30/2020	4.80E-15	6.72E-15	4.50E-14	2.80E-14
8/3/2020	5.64E-15	4.83E-15	6.87E-14	2.07E-14
8/6/2020	8.33E-15	6.55E-15	8.73E-14	2.80E-14
8/10/2020	8.05E-16	4.83E-15	5.53E-14	2.07E-14
8/13/2020	4.55E-15	6.56E-15	3.94E-14	2.81E-14
8/17/2020	1.21E-15	5.23E-15	4.16E-14	2.08E-14
8/20/2020	5.42E-15	7.00E-15	7.90E-14	2.79E-14
8/24/2020	2.50E-15	5.23E-15	9.73E-14	2.08E-14
8/27/2020	2.69E-15	7.09E-15	7.34E-14	2.82E-14
8/31/2020	6.89E-16	5.20E-15	4.63E-14	2.07E-14
9/3/2020	1.29E-14	7.04E-15	7.51E-14	2.72E-14
9/8/2020	5.14E-15	4.15E-15	9.93E-14	1.61E-14
9/11/2020	7.71E-15	7.08E-15	7.03E-14	2.74E-14

Sample collection date	Result Alpha (μCi/ml)	MDC - Alpha (μCi/ml)	Result Beta (μCi/ml)	MDC - Beta (μCi/ml)
9/14/2020	7.20E-15	6.94E-15	1.41E-13	2.68E-14
9/17/2020	5.92E-15	7.05E-15	1.30E-13	2.73E-14
9/21/2020	3.32E-15	5.18E-15	6.47E-14	2.00E-14
9/24/2020	4.52E-15	7.05E-15	6.97E-14	2.73E-14
9/28/2020	4.88E-16	5.12E-15	6.26E-14	2.00E-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 ( $\mu$ Ci/mL)
<b>Location DOE-1 – Air volume/sample = 9.76E8 mL</b>				
Cesium-137	-0.544	5.72	U	-3.350E-12
Strontium-90	0.728	2.98	U	4.483E-12
Cobalt-60	2.38	7.14	U	1.465E-11
Potassium-40	120	61.6		7.389E-10
Beryllium-7	260	50.3		1.601E-9
Plutonium-238	0.315	0.860	U	1.940E-12
Polonium-210	15.0	0.282		9.236E-11
Plutonium-241	-3.17	59.7	U	-1.952E-11
Thorium-230	0.648	1.12	U	3.990E-12
Thorium-228	0.174	1.16	U	1.071E-12
Actinium-228	-8.45	25.4	U	-5.203E-11
Americium-241	0.0494	0.160	U	3.042E-13
Plutonium-239	0.388	0.676	U	2.389E-12
Ra-228 - total	0.552	8.07	U	3.399E-12
Radium-226, -228 combined	0.779	0.451		4.797E-12
Thorium-232	-0.00238	0.831	U	-1.465E-14
Uranium-238	1.13	0.206		6.958E-12
Uranium-233/234	0.291	0.236		1.792E-12
Uranium-235/236	0.000	0.116	U	0.000E+0
<b>Location DOE-2 – Air volume/sample = 9.76E8 mL</b>				
Cesium-137	1.31	5.70	U	8.064E-12
Strontium-90	0.440	2.86	U	2.709E-12
Cobalt-60	2.35	6.09	U	1.447E-11
Potassium-40	22.2	43.2	U	1.367E-10
Beryllium-7	116	53.7		7.141E-10
Plutonium-238	0.0865	0.278	U	5.325E-13
Polonium-210	12.6	0.433		7.756E-11
Plutonium-241	2.88	23.4	U	1.773E-11
Thorium-230	1.23	0.425		7.572E-12
Thorium-228	0.390	0.628	U	2.401E-12
Actinium-228	1.05	25.0	U	6.464E-12
Americium-241	0.0435	0.207	U	2.678E-13
Plutonium-239	0.187	0.295	U	1.151E-12
Ra-228 - total	-2.86	13.2	U	-1.761E-11
Radium-226, -228 combined	1.05	0.403		6.464E-12
Thorium-232	0.495	0.329		3.047E-12
Uranium-238	0.730	0.229		4.494E-12

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration ( $\mu$ Ci/mL)
Uranium-233/234	0.759	0.232		4.672E-12
Uranium-235/236	-0.0103	0.206	U	-6.340E-14
<b>Location DOE-3 – Air volume/sample = 9.78E8 mL</b>				
Cesium-137	2.74	6.86	U	1.687E-11
Strontium-90	0.455	2.95	U	2.801E-12
Cobalt-60	-0.245	6.92	U	-1.508E-12
Potassium-40	204	81.4		1.256E-9
Beryllium-7	173	75.2		1.065E-9
Plutonium-238	0.119	0.593	U	7.326E-13
Polonium-210	12.1	0.438		7.449E-11
Plutonium-241	-3.58	48.2	U	-2.204E-11
Thorium-230	0.836	1.05	U	5.147E-12
Thorium-228	0.626	1.09	U	3.854E-12
Actinium-228	6.89	34.6	U	4.242E-11
Americium-241	-0.0323	0.189	U	-1.989E-13
Plutonium-239	0.0941	0.639	U	5.793E-13
Ra-228 - total	1.43	9.11	U	8.804E-12
Radium-226, -228 combined	1.09	0.568		6.711E-12
Thorium-232	0.682	0.707	U	4.199E-12
Uranium-238	0.740	0.340		4.556E-12
Uranium-233/234	0.606	0.376		3.731E-12
Uranium-235/236	0.0193	0.421	U	1.188E-13
<b>Location DOE-4 – Air volume/sample = 9.84E8 mL</b>				
Cesium-137	1.90	6.88	U	1.170E-11
Strontium-90	-1.08	2.81	U	-6.649E-12
Cobalt-60	-0.317	8.04	U	-1.952E-12
Potassium-40	0.000	64.2	UI	0.000E+0
Beryllium-7	260	70.9		1.601E-9
Plutonium-238	-0.134	0.849	U	-8.250E-13
Polonium-210	11.0	0.287		6.772E-11
Plutonium-241	5.37	49.3	U	3.306E-11
Thorium-230	1.61	0.491		9.912E-12
Thorium-228	0.800	0.429		4.925E-12
Actinium-228	13.7	38.1	U	8.434E-11
Americium-241	0.0510	0.139	U	3.140E-13
Plutonium-239	-0.00456	0.849	U	-2.807E-14
Ra-228 - total	7.27	8.74	U	4.476E-11
Radium-226, -228 combined	1.20	0.516		7.388E-12
Thorium-232	0.892	0.416		5.491E-12

<b>Radionuclide</b>	<b>Result (pCi/sample)</b>	<b>MDC (pCi/sample)</b>	<b>Data Qualifier</b>	<b>Airborne Concentration (<math>\mu</math>Ci/mL)</b>
Uranium-238	0.868	0.228		5.344E-12
Uranium-233/234	0.978	0.334		6.021E-12
Uranium-235/236	0.0240	0.255	U	1.478E-13

## **APPENDIX D**

### **PM<sub>10</sub> Monthly Audit Reports and Flow Verification Results**

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### One-Point Flow Rate Bias Estimate

<b>Site ID: DOE-1</b>	<b>E-BAM Serial #: W23310</b>	<b>Pollutant type: PM10</b>	<b>Bias (%)</b>
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Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d <sup>2</sup>	d	d  <sup>2</sup>
10	7/15/2020	14.00	14.06	-0.427	25th	0.182	0.427	0.182
		16.70	16.71	-0.060		0.004	0.060	0.004
		17.50	17.49	0.057		-0.060	0.003	0.057
10	8/25/2020	14.00	14.00	0.000	75th	0.000	0.000	0.000
		16.70	16.68	0.120		0.014	0.120	0.014
		17.50	17.45	0.287		0.120	0.082	0.287
10	9/23/2020	14.00	14.03	-0.214	0.120	0.046	0.214	0.046
		16.70	16.68	0.120		0.014	0.120	0.014
		17.50	17.43	0.402		0.161	0.402	0.161

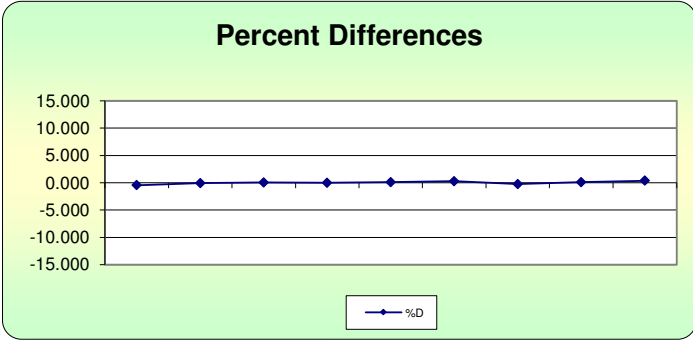
n	Σ d	"AB" (Eqn 4)
9	1.686	0.187
n-1	Σ d  <sup>2</sup>	"AS" (Eqn 5)
8	0.507	0.155

<b>Bias (%) (Eqn 3)</b>	Both Signs Positive
0.28	FALSE
<b>Signed Bias (%)</b>	Both Signs Negative
+/-0.28	FALSE

**Note:** No issues encountered with this E-BAM unit during this quarter.

Return to Main Menu

Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC) Quality Indicator Assessment Reports  
 Data Assessment Statistical 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>



### One-Point Flow Rate Bias Estimate

<b>Site ID: DOE-2</b>	E-BAM Serial #: Y12096 / X16067	<b>Pollutant type: PM10</b>	<b>Bias (%)</b>
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Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d <sup>2</sup>	d	d  <sup>2</sup>
10	7/15/2020 (Y12096)	14.00	14.13	-0.920	<b>25th</b>	0.846	0.920	0.846
		16.70	16.93	-1.359		1.846	1.359	1.846
		17.50	17.62	-0.681		-1.359	0.464	0.681
10	8/25/2020 (Y12096)	14.00	14.06	-0.427	<b>75th</b>	0.182	0.427	0.182
		16.70	16.76	-0.358		0.128	0.358	0.128
		17.50	17.57	-0.398		-0.427	0.159	0.398
10	9/23/2020 (X16067)	14.00	14.28	-1.961		3.845	1.961	3.845
		16.70	16.93	-1.359		1.846	1.359	1.846
		17.50	17.81	-1.741		3.030	1.741	3.030

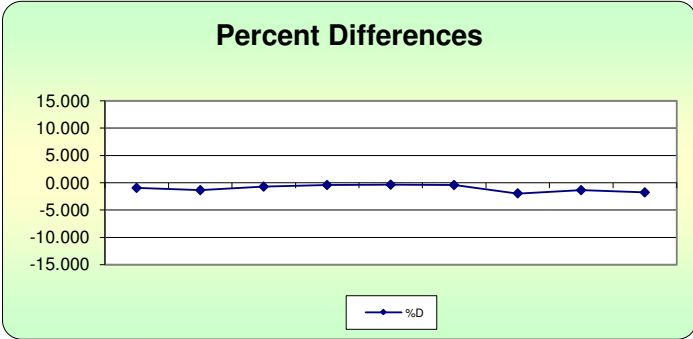
n	Σ d	"AB" (Eqn 4)
9	9.203	1.023
n-1	Σ d  <sup>2</sup>	"AS" (Eqn 5)
8	12.345	0.606

<b>Bias (%) (Eqn 3)</b>	Both Signs Positive
1.4	FALSE
<b>Signed Bias (%)</b>	Both Signs Negative
-1.4	TRUE

**Note:** E-BAM unit Y12096 was swapped out with unit X16067 in September 2020.

Return to Main Menu

Print Worksheet



Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)  
 Quality Indicator Assessment Reports  
 Data Assessment Statistical Calculator - Software to calculate precision and bias statistics (MS Excel) - 11/3/2017 (dasc\_11\_3\_17.xls)  
<https://www3.epa.gov/ttn/amtic/gareport.html>



### One-Point Flow Rate Bias Estimate

<b>Site ID: DOE-3</b>	<b>E-BAM Serial #: W23313</b>	<b>Pollutant type: PM10</b>	<b>Bias (%)</b>
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Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d <sup>2</sup>	d	d  <sup>2</sup>
10	7/15/2020	14.00	14.12	-0.850	25th	0.722	0.850	0.722
		16.70	16.80	-0.595		0.354	0.595	0.354
		17.50	17.58	-0.455		-0.595	0.207	0.455
10	8/25/2020	14.00	14.10	-0.709	75th	0.503	0.709	0.503
		16.70	16.75	-0.299		0.089	0.299	0.089
		17.50	17.53	-0.171		-0.071	0.029	0.171
10	9/23/2020	14.00	14.01	-0.071	-0.071	0.005	0.071	0.005
		16.70	16.69	0.060		0.004	0.060	0.004
		17.50	17.49	0.057		0.003	0.057	0.003

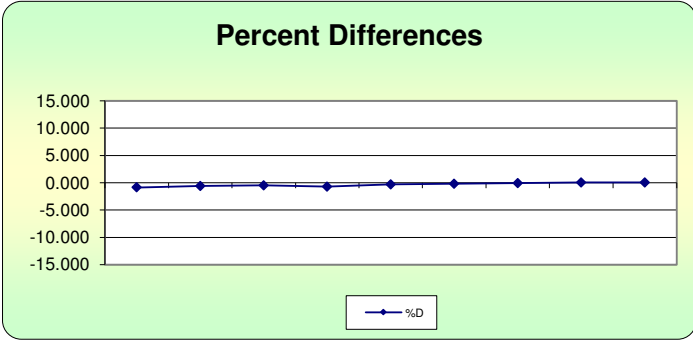
n	Σ d	"AB" (Eqn 4)
9	3.267	0.363
n-1	Σ d  <sup>2</sup>	"AS" (Eqn 5)
8	1.917	0.302

<b>Bias (%) (Eqn 3)</b>	Both Signs Positive
0.55	FALSE
<b>Signed Bias (%)</b>	Both Signs Negative
-0.55	TRUE

**Note:** No issues encountered with this E-BAM unit during this quarter.

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Print Worksheet



**Reference:** U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)  
 Quality Indicator Assessment Reports  
 Data Assessment Statistical 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>



### One-Point Flow Rate Bias Estimate

<b>Site ID: DOE-4</b>	<b>E-BAM Serial #: W23314</b>	<b>Pollutant type: PM10</b>	<b>Bias (%)</b>
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Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d <sup>2</sup>	d	d  <sup>2</sup>
10	7/15/2020	14.00	14.16	-1.130	<b>25th</b>	1.277	1.130	1.277
		16.70	16.81	-0.654		0.428	0.654	0.428
		17.50	17.70	-1.130	-1.649	1.277	1.130	1.277
10	8/25/2020	14.00	14.15	-1.060	<b>75th</b>	1.124	1.060	1.124
		16.70	17.02	-1.880		3.535	1.880	3.535
		17.50	17.81	-1.741	-1.060	3.030	1.741	3.030
10	9/23/2020	14.00	14.20	-1.408		1.984	1.408	1.984
		16.70	16.98	-1.649		2.719	1.649	2.719
		17.50	17.61	-0.625		0.390	0.625	0.390

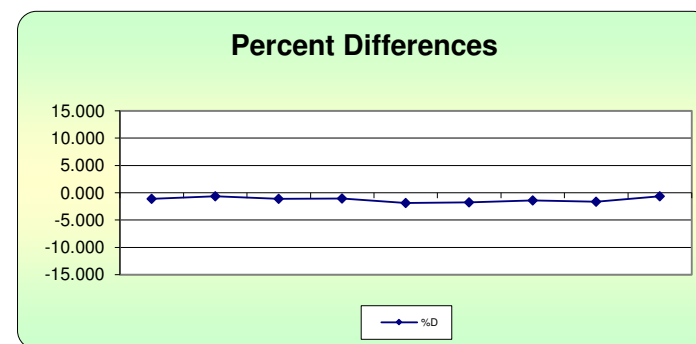
<b>n</b>	<b>Σ d </b>	<b>"AB" (Eqn 4)</b>
9	11.277	1.253
<b>n-1</b>	<b>Σ d <sup>2</sup></b>	<b>"AS" (Eqn 5)</b>
8	15.763	0.452

<b>Bias (%) (Eqn 3)</b>	Both Signs Positive
1.53	FALSE
<b>Signed Bias (%)</b>	Both Signs Negative
-1.53	TRUE

**Note:** No issues encountered with this E-BAM unit during this quarter.

Return to Main Menu

Print Worksheet



**Reference:** U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)  
 Quality Indicator Assessment Reports  
 Data Assessment Statistical 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>



Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-1 Serial # W23310  
 Audit Date: 7/15/2020 Audited By: TS Williford

Flow Audit			
Flow Audit Device Model:	<u>BGI Delta Cal DC-1A</u>	Serial No: <u>158047</u>	Calibration Date: <u>2/5/2020</u>
Leak Check Value:	as found: <u>0.5</u>	as left: <u>0.5</u>	

	E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found: <u>26.5</u> °C	<u>26.8</u> °C	as left:	<u>26.5</u> °C	<u>26.8</u> °C
Barometric Pressure:	as found: <u>711.4</u> mmHg	<u>712.0</u> mmHg	as left:	<u>711.4</u> mmHg	<u>712.0</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	<u>16.71</u> lpm	as left:	<u>16.7</u> lpm	<u>16.71</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	<u>14.06</u> lpm	as left:	<u>14.0</u> lpm	<u>14.06</u> lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	<u>17.49</u> lpm	as left:	<u>17.5</u> lpm	<u>17.49</u> lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm <sup>2</sup> ): <u>0.915</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm <sup>2</sup> ): <u>0.913</u>			
Difference (mg/cm <sup>2</sup> ): <u>0.002</u>			
% Difference <u>Pass or Fail</u> : <u>0.22%</u>	<u>15.0</u>	<u>418.1</u>	<u>Good/Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1228</u>	<u>1228</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>1</u>	<u>1</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C°</u>
Realtime Avg	60 mins	<u>60</u>	Delta T Setpoint	15 C	<u>15C°</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>on</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0V</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log						
Error	Date	Time	Error	Date	Time	
<u>1 No New Messages</u>	<u>7/15/20</u>	<u>1235</u>	<u>4</u>			
<u>2</u>			<u>5</u>			
<u>3</u>			<u>6</u>			

Audit Notes:  
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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # Y12096  
 Audit Date: 7/15/2020 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: <u>0.3</u>	as left:	<u>0.3</u>

	E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found: <u>27.8</u> °C	<u>27.6</u> °C	as left:	<u>27.8</u> °C	<u>27.6</u> °C
Barometric Pressure:	as found: <u>708.1</u> mmHg	<u>709.0</u> mmHg	as left:	<u>708.1</u> mmHg	<u>708.709</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	<u>16.93</u> lpm	as left:	<u>16.7</u> lpm	<u>16.93</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	<u>14.13</u> lpm	as left:	<u>14.0</u> lpm	<u>14.13</u> lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	<u>17.62</u> lpm	as left:	<u>17.5</u> lpm	<u>17.62</u> lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm2): <u>0.848</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2): <u>0.870</u>			
Difference (mg/cm2): <u>0.022</u>			
% Difference / <del>Pass</del> or Fail: <u>2.6%</u>	<u>14.1</u>	<u>398.0</u>	<u>Good</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1311</u>	<u>1311</u>	Analog Mode	Hourly	<u>hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>2</u>	<u>2</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5V</u>
Tape Advance	24 hrs	<u>24hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0V</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>on</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0V</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log						
Error	Date	Time	Error	Date	Time	
<u>1 No New Messages</u>	<u>7/15/20</u>	<u>1325</u>	<u>4</u>			
<u>2</u>			<u>5</u>			
<u>3</u>			<u>6</u>			

Audit Notes:  
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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOB-3 Serial # W23313  
 Audit Date: 7/15/2020 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: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	<u>29.3</u> °C	<u>29.4</u> °C	as left:	<u>29.3</u> °C	<u>29.4</u> °C
Barometric Pressure:	as found:	<u>709.8</u> mmHg	<u>710.5</u> mmHg	as left:	<u>709.8</u> mmHg	<u>710.5</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>16.80</u> lpm	as left:	<u>16.7</u> lpm	<u>16.80</u> lpm
14.0 lpm Flow Rate	as found:	<u>14.0</u> lpm	<u>14.12</u> lpm	as left:	<u>14.0</u> lpm	<u>14.12</u> lpm
17.5 lpm Flow Rate	as found:	<u>17.5</u> lpm	<u>17.58</u> lpm	as left:	<u>17.5</u> lpm	<u>17.58</u> lpm

Mechanical Audits (Y = Yes N = No)

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

Manual Span Membrane Test

Pump Test

Expected Span Mass (mg/cm2):	<u>0.885</u>	Flow Rate	14.0 - 15.0 (lpm)	Vacuum Value (Hg)	416.2	Quality Category	Good / Marginal / Poor
Measured Span Mass (mg/cm2):	<u>0.888</u>						
Difference (mg/cm2):	<u>0.003</u>						
% Difference / Pass or Fail:	<u>0.34%</u>						<u>Good/Marg</u>

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1416</u>	<u>1416</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>3</u>	<u>3</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>2.5v</u>
Tape Advance	24 hrs	<u>24 hrs</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>On</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
<u>1 No New Messages</u>	<u>7/15/20</u>	<u>1423</u>	4		
<u>2</u>			5		
<u>3</u>			6		

Audit Notes:

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# NORTHWIND

## Baseline Air Monitoring Program - DOE

### E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23314  
 Audit Date: 7/15/2020 Audited By: T.S. WALLFORD

#### Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/5/2020  
 Leak Check Value: as found: 0.3 as left: 0.3

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	28.1 °C	27.9 °C	as left:	28.1 °C	27.9 °C
Barometric Pressure:	as found:	704.0 mmHg	702.5 mmHg	as left:	704.0 mmHg	702.5 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.81 lpm	as left:	16.7 lpm	16.81 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.16 lpm	as left:	14.0 lpm	14.16 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.70 lpm	as left:	17.5 lpm	17.70 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/cm <sup>2</sup> ) : <u>0.919</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm <sup>2</sup> ) : <u>0.923</u>			
Difference (mg/cm <sup>2</sup> ) <u>0.004</u> <del>0.004</del>	14.3	417.5	Marginal
% Difference <u>0.43%</u> <del>0.43%</del> Pass or Fail: <u>Pass</u>			

#### Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1501	1501	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	24 hrs	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60 mins	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	7/15/20	1514			
2					
3					

Audit Notes:

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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-1 Serial # W23310
Audit Date: 8/25/2020 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

Table with 4 columns: Parameter, as found, Ref. Std., as left. Rows include Ambient Temperature, Barometric Pressure, and three flow rates (16.7, 14.0, 17.5 lpm).

Mechanical Audits (Y = Yes N = No)

Table with 4 columns: Item, as found, as left. Items include Sample nozzle clean, Tape support vane clean, Tape spool covers tight, PM10 particle trap clean, PM10 drip jar empty, and PM10 bug screen clear.

Manual Span Membrane Test

Pump Test

Table with 4 columns: Manual Span Membrane Test (Expected, Measured, Difference, % Difference) and Pump Test (Flow Rate, Vacuum Value, Quality Category).

Setup and Calibration Values

Table with 9 columns: Parameter, Expected, Found, Parameter, Expected, Found, Parameter, Expected, Found. Rows include Clock, Location, Tape Advance, Realtime Avg, Machine Type, Analog FS, Analog Mode, Baud Rate, RH Setpoint, Delta T Setpoint, RH Control, Flow Setpoint, Flow Type, Restart Voltage, Std Cond Temp, DAC, RH Connect, Pump Protect.

Last 6 Errors in E-BAM Error Log

Table with 7 columns: Error, Date, Time, Error, Date, Time. Row 1: No New Messages, 8/25/20, 08:10.

Audit Notes:

The sample dots are very dark to black. I assume it is from all the smoke we're getting from nearby fires.
Cleaned sample nozzle and support vane.



Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2

Serial # Y12096

Audit Date: 8/25/2020

Audited By: T.S. Wilford

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:	<u>24.7</u> °C	<u>23.5</u> °C	as left:	<u>24.7</u> °C	<u>23.5</u> °C
Barometric Pressure:	as found:	<u>706.8</u> mmHg	<u>707.5</u> mmHg	as left:	<u>706.8</u> mmHg	<u>707.5</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>16.76</u> lpm	as left:	<u>16.7</u> lpm	<u>16.76</u> lpm
14.0 lpm Flow Rate	as found:	<u>14.0</u> lpm	<u>14.06</u> lpm	as left:	<u>14.0</u> lpm	<u>14.06</u> lpm
17.5 lpm Flow Rate	as found:	<u>17.5</u> lpm	<u>17.57</u> lpm	as left:	<u>17.5</u> lpm	<u>17.57</u> lpm

Mechanical Audits ( Y = Yes N = No )

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

Manual Span Membrane Test

Pump Test

Expected Span Mass (mg/cm2):	<u>0.848</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm2):	<u>0.815</u>	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm2):	<u>3.1%</u> <u>0.027</u>	(lpm)	(Hg)	
% Difference / Pass or Fail:	<u>3.1%</u>	<u>14.3</u>	<u>401.9</u>	<u>Good/Marginal</u>

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>0808</u>	<u>0808</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>2</u>	<u>2</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>on</u>	RH Connect	No	<u>No</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
<u>1 No new messages</u>	<u>8/25/20</u>	<u>0915</u>	4		
<u>2</u>			5		
<u>3</u>			6		

Audit Notes:

\* The sample dots are very dark. I assume it is from the smoke we're getting from all the nearby fires.

Cleaned sample nozzle and support vane.

# NORTHWIND INC.

## Baseline Air Monitoring Program - DOE

### E-BAM Monthly Audit and Maintenance

Station # DOE-3 Serial # W23313  
 Audit Date: 8/25/2020 Audited By: T.S. Williford

Flow Audit					
Flow Audit Device Model:	<u>BGI Delta Cal DC-1A</u>	Serial No:	<u>158047</u>	Calibration Date:	<u>2/5/2020</u>
Leak Check Value:	as found: <u>0.4</u>			as left: <u>0.4</u>	
	E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found: <u>28.7</u> °C	<u>27.3</u> °C	as left:	<u>28.7</u> °C	<u>27.3</u> °C
Barometric Pressure:	as found: <u>708.9</u> mmHg	<u>709.0</u> mmHg	as left:	<u>708.9</u> mmHg	<u>709.0</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	<u>16.75</u> lpm	as left:	<u>16.7</u> lpm	<u>16.75</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	<u>14.10</u> lpm	as left:	<u>14.0</u> lpm	<u>14.10</u> lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	<u>17.53</u> lpm	as left:	<u>17.5</u> lpm	<u>17.53</u> lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm <sup>2</sup> ): <u>0.885</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm <sup>2</sup> ): <u>0.890</u>			
Difference (mg/cm <sup>2</sup> ): <u>0.005</u>			
% Difference <u>Pass</u> or Fail: <u>0.56%</u>	<u>14.4</u>	<u>406</u>	<u>Good</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>0944</u>	<u>0944</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>3</u>	<u>3</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25°C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15°C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>On</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log						
Error	Date	Time	Error	Date	Time	
<u>1 No New Messages</u>	<u>8/25/20</u>	<u>1050</u>	<u>4</u>			
<u>2</u>			<u>5</u>			
<u>3</u>			<u>6</u>			

Audit Notes:  
The sample dots are very dark to black. I assume it is from all the smoke from nearby fires.  
Cleaned sample nozzle and support vane.



Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4

Serial # W23314

Audit Date: 8/25/2020

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: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	<u>32.2</u> °C	<u>31.9</u> °C	as left:	<u>32.2</u> °C	<u>31.9</u> °C
Barometric Pressure:	as found:	<u>703.5</u> mmHg	<u>702.5</u> mmHg	as left:	<u>703.5</u> mmHg	<u>702.5</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>17.02</u> lpm	as left:	<u>16.7</u> lpm	<u>17.02</u> lpm
14.0 lpm Flow Rate	as found:	<u>14.0</u> lpm	<u>14.15</u> lpm	as left:	<u>14.0</u> lpm	<u>14.15</u> lpm
17.5 lpm Flow Rate	as found:	<u>17.5</u> lpm	<u>17.81</u> lpm	as left:	<u>17.5</u> lpm	<u>17.81</u> lpm

Mechanical Audits (Y = Yes N = No)

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

Manual Span Membrane Test

Pump Test

Expected Span Mass (mg/cm <sup>2</sup> ):	<u>0.919</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm <sup>2</sup> ):	<u>0.912</u>	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm <sup>2</sup> ):	<u>0.007</u>	(lpm)	(Hg)	
% Difference (Pass or Fail):	<u>0.76%</u>	<u>14.8</u>	<u>409.8</u>	<u>Good</u>

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1009</u>	<u>1009</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>4</u>	<u>4</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>on</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
<u>1 No New Messages</u>	<u>8/25/20</u>	<u>11:21</u>			
<u>2</u>					
<u>3</u>					

Audit Notes:

\* The sample dots are very dark to black. I assume it is from the smoke we are getting from all the nearby fires.

Cleaned sample nozzle and support vane.



**Baseline Air Monitoring Program - DOE  
E-BAM Monthly Audit and Maintenance**

Station # DOE-1 Serial # W23310  
 Audit Date: 9/23/2020 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: <u>0.5</u>		as left: <u>0.5</u>		
Ambient Temperature:	as found:	E-BAM	Ref. Std.	as left:	E-BAM
Barometric Pressure:	as found:	714.1 mmHg	714.5 mmHg	as left:	714 mmHg
16.7 lpm Flow Rate	as found:	16.7 lpm	16.68 lpm	as left:	16.7 lpm
14.0 lpm Flow Rate	as found:	14.0 lpm	14.03 lpm	as left:	14.0 lpm
17.5 lpm Flow Rate	as found:	17.5 lpm	17.43 lpm	as left:	17.5 lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm <sup>2</sup> ): <u>0.915</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm <sup>2</sup> ): <u>0.922</u>	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm <sup>2</sup> ): <u>0.007</u>	(lpm)	(Hg)	
% Difference / <u>Pass</u> or Fail: <u>0.76%</u>	<u>14.9</u>	<u>392.0</u>	<u>Good</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1025	1025	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	24hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25C
Realtime Avg	60 mins	60min	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	9/23/20	1033	4		
2	1033	TSW	5		
3			6		

Audit Notes:

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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # X16067  
 Audit Date: 9/23/2020 Audited By: TSW

Flow Audit			
Flow Audit Device Model:	<u>BGI Delta Cal DC-1A</u>	Serial No: <u>158047</u>	Calibration Date: <u>2/5/2020</u>
Leak Check Value:	as found: <u>0.4</u>	as left: <u>0.4</u>	

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	<u>28.3</u> °C	<u>27.6</u> °C	as left:	<u>28.3</u> °C	<u>27.6</u> °C
Barometric Pressure:	as found:	<u>714.0</u> mmHg	<u>714.5</u> mmHg	as left:	<u>714.0</u> mmHg	<u>714.5</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>16.93</u> lpm	as left:	<u>16.7</u> lpm	<u>16.7</u> lpm
14.0 lpm Flow Rate	as found:	<u>14.0</u> lpm	<u>14.28</u> lpm	as left:	<u>14.0</u> lpm	<u>14.0</u> lpm
17.5 lpm Flow Rate	as found:	<u>17.5</u> lpm	<u>17.81</u> lpm	as left:	<u>17.5</u> lpm	<u>17.5</u> lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm2): <u>0.914</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm2): <u>0.918</u>			
Difference (mg/cm2): <u>0.004</u>			
% Difference / Pass or Fail: <u>0.44%</u>	<u>14.3</u>	<u>401.3</u>	<u>Good / Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1130</u>	<u>1130</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Act</u>
Location	<u>2</u>	<u>2</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24 hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25 C</u>
Realtime Avg	60 mins	<u>60min</u>	Delta T Setpoint	15 C	<u>15 C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>On</u>	RH Connect	No	<u>No</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log						
Error	Date	Time	Error	Date	Time	
<u>1 No New Messages</u>	<u>9/23/20</u>	<u>1135</u>	<u>4</u>			
<u>2</u>			<u>5</u>			
<u>3</u>			<u>6</u>			

Audit Notes:

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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3

Serial # W23313

Audit Date: 9/23/2020

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:	<u>23.1</u> °C	<u>23.9</u> °C	as left:	<u>23.1</u> °C	<u>23.9</u> °C
Barometric Pressure:	as found:	<u>710.5</u> mmHg	<u>710.5</u> mmHg	as left:	<u>710.5</u> mmHg	<u>710.5</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>16.69</u> lpm	as left:	<u>16.7</u> lpm	<u>16.7</u> lpm
14.0 lpm Flow Rate	as found:	<u>14.0</u> lpm	<u>14.01</u> lpm	as left:	<u>14.0</u> lpm	<u>14.0</u> lpm
17.5 lpm Flow Rate	as found:	<u>17.5</u> lpm	<u>17.49</u> lpm	as left:	<u>17.5</u> lpm	<u>17.5</u> lpm

Mechanical Audits (Y = Yes N = No)

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

Manual Span Membrane Test

Pump Test

Expected Span Mass (mg/cm <sup>2</sup> ):	<u>0.885</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm <sup>2</sup> ):	<u>0.882</u>	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm <sup>2</sup> ):	<u>0.003</u>	(lpm)	(Hg)	
% Difference / Pass or Fail:	<u>0.34%</u>	<u>15.0</u>	<u>418.4</u>	<u>Good / Marginal</u>

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1231</u>	<u>1231</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>Actual</u>
Location	<u>3</u>	<u>3</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5v</u>
Tape Advance	24 hrs	<u>24 hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60 mins</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0v</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>on</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0v</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>off</u>

Last 6 Errors in E-BAM Error Log

Error	Date	Time	Error	Date	Time
<u>1 No New Messages</u>	<u>9/23/20</u>	<u>1236</u>	4		
2			5		
3			6		

Audit Notes:

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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4 Serial # W23314  
 Audit Date: 9/23/20 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: <u>0.3</u>		as left: <u>0.3</u>		
	E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found: <u>24.0</u> °C	<u>23.3</u> °C	as left:	<u>24.0</u> °C	<u>23.3</u> °C
Barometric Pressure:	as found: <u>705.5</u> mmHg	<u>703.5</u> mmHg	as left:	<u>705.5</u> mmHg	<u>703.5</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	<u>16.98</u> lpm	as left:	<u>16.7</u> lpm	<u>16.98</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	<u>14.20</u> lpm	as left:	<u>14.0</u> lpm	<u>14.20</u> lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	<u>17.61</u> lpm	as left:	<u>17.5</u> lpm	<u>17.61</u> lpm

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm <sup>2</sup> ): <u>0.919</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm <sup>2</sup> ): <u>0.923</u>			
Difference (mg/cm <sup>2</sup> ): <u>0.004</u>			
% Difference / Pass or Fail: <u>0.43%</u>	<u>14.5</u>	<u>421.9</u>	<u>Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1340</u>	<u>1340</u>	Analog Mode	Hourly	<u>Hourly</u>	Flow Type	Actual	<u>ACT</u>
Location	<u>4</u>	<u>4</u>	Baud Rate	9600	<u>9600</u>	Restart Voltage	12.5 v	<u>12.5V</u>
Tape Advance	24 hrs	<u>24hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25C</u>
Realtime Avg	60 mins	<u>60 min</u>	Delta T Setpoint	15 C	<u>15C</u>	DAC	8.0 v	<u>8.0V</u>
Machine Type	PM-10	<u>PM-10</u>	RH Control	On	<u>ON</u>	RH Connect	No	<u>NO</u>
Analog FS	1.0 v	<u>1.0V</u>	Flow Setpoint	16.7	<u>16.7</u>	Pump Protect	Off	<u>OFF</u>

Last 6 Errors in E-BAM Error Log					
Error	Date	Time	Error	Date	Time
1 <del>NEW</del> <u>No New Messages</u>	<u>9/23/2020</u>	<u>1346</u>	4		
2			5		
3			6		

Audit Notes:  
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