

***Report on Air Monitoring, Area IV,
Seventh Quarter and Annual
Summary***

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



**July 2020
Revision 1**

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

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

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Santa Susana Field Laboratory Ventura County, CA

**July 2020
Revision 1**

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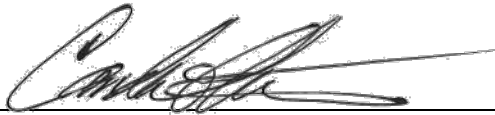
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PROFESSIONAL CERTIFICATION

Report on Air Monitoring, Area IV, Seventh Quarter and Annual Summary Santa Susana Field Laboratory Ventura County, California

July 2020
Revision 1

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 seventh quarter (Q7) of the baseline monitoring period (October 15, 2019, to December 31, 2019) at Area IV within the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. The report also provides an annual summary for the second year of the baseline monitoring period (Q5 through Q7, April 15, 2019 through December 31, 2019). 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. The program continued for a second year consisting of Quarter 5 through Quarter 8.

Note that Q7 has been abbreviated to end December 31, 2019 (instead of January 14, 2020). In addition, the Year 2 baseline monitoring period has been abbreviated to include only three quarters: Q5 through Q7. This has been done to synchronize future baseline monitoring years with the calendar years.

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

The objective of the Baseline Air Monitoring Program is to evaluate baseline (that is, pre-project) conditions. In accordance with *the Final Baseline Air Monitoring Work Plan, Santa Susana Field Laboratory, Ventura County, California* (NASA 2017), the responsible parties are monitoring for particulate matter between 2.5 and 10 microns in aerodynamic diameter (PM₁₀), volatile organic compounds (VOCs), and radionuclides at air monitoring stations DOE-1, DOE-2, DOE-3, and DOE-4 encompassing the ETEC, Area IV portion of the SSFL. Determining the baseline levels for PM₁₀, VOCs, and radionuclides helps distinguish between levels that naturally occur or were previously present at the ETEC site and if onsite remediation activities produce elevated results. Air monitoring will be continued throughout remediation activities to be able to compare results from onsite remediation activities to baseline data.

The following air monitoring activities conducted during quarters Q5 through Q7 2019 by DOE within Area IV are summarized in this report:

- Collected meteorological data from one location (DOE-4);
- Collected PM₁₀ 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, PM₁₀, VOC, and radionuclide data all met the data completeness goal for Q7. The baseline air monitoring is to be continued beginning January 1, 2020, with the eighth quarter (Year 3) of air monitoring. Future data collected during remediation may be compared to these summarized baseline conditions.

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Appendix F – Radiological Analytical Data Packages, Q5 through Q7 (included on CD)

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
μCi	microcurie(s)
μg/m ³	microgram(s) per cubic meter
Boeing	The Boeing Company
CAAQS	California Ambient Air Quality Standard
CFR	Code of Federal Regulations
DAC	Derived airborne concentration
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)
MDA	minimum detectable activity
MDC	minimum detectable concentration
NAAQS	National Ambient Air Quality Standard
NASA	National Aeronautics and Space Administration
NIST	National Institute of Standards and Technology
pCi	picocurie(s)
PM ₁₀	particulate matter less than 10 microns in aerodynamic diameter
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
Q5	fifth quarter
Q6	sixth quarter
Q7	seventh quarter
Q8	eighth quarter
QA	quality assurance
QC	quality control
RAWS	Remote Automatic Weather Stations
RPD	relative percent difference
RSL	regional screening level
SDG	sample delivery group
SSFL	Santa Susana Field Laboratory
VOC	volatile organic compound

1. INTRODUCTION

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

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

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

The objective of the Baseline Air Monitoring Program is to evaluate baseline (that is, pre-project) conditions and provide a basis for determining the magnitude of deviation from those baseline conditions resulting from onsite remediation activities (project) at SSFL. Responsible parties are monitoring for particulate matter between 2.5 and 10 microns in aerodynamic diameter (PM₁₀), and VOCs, at 14 locations at SSFL. Data were collected from 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 four locations. Meteorological data are also collected as a part of the Baseline Air Monitoring Program.

Figure 1 shows the air monitoring locations for the Baseline Air Monitoring Program. These locations were selected based on the areas to be remediated, with consideration of winds in the area, topographic features, and accessibility. The air monitoring sites were 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, PM₁₀, 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 quarterly results and quality assurance (QA) activities performed at the DOE locations between October 15, 2019, and December 31, 2019, which represents the seventh quarter (Q7) of the Baseline Air Monitoring Program. The report also provides an annual summary for the second year of the baseline monitoring period (Q5 through Q7, April 15, 2019 through December 31, 2019). The air monitoring is to be continued beginning January 1, 2020, with the eighth quarter of monitoring.

Note that Q7 has been abbreviated to end December 31, 2019 (instead of January 14, 2020). In addition, the Year 2 baseline monitoring period has been abbreviated to include only three quarters: Q5 through Q7. This has been done to synchronize future baseline monitoring years with the calendar years.

1.1 Regional Climate and Wind Direction

The climate in the area of SSFL 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 Q7 reporting period (October 15, 2019, through December 31, 2019) as well as the annual air monitoring report summary for Q5 through Q7 (April 15, 2019 through December 31, 2019).

Quality objectives and data completeness were met for all meteorological, PM₁₀, VOC, and radionuclide data for Q7 of the Baseline Air Monitoring Program.

Urban background data compared with baseline monitoring data indicate that the PM₁₀ concentrations measured at stations DOE-1, DOE-2, DOE-3 and DOE-4 during Q5 through Q7 are comparable to the PM₁₀ concentrations measured at stations characterizing urban background. Concentrations of VOCs characteristic of motor vehicle emissions, fossil fuel combustion, and wildfires are comparable around SSFL compared with the urban background, reflecting the site's relatively remote location from vehicle traffic. PM₁₀ concentrations exceeded the California Ambient Air Quality Standard (CAAQS; 50 µg/m³) at DOE-1 and DOE-2 once during Q6, but the concentrations were below the National Ambient Air Quality Standard (NAAQS; 150 µg/m³). PM₁₀ concentrations did not exceed the CAAQS during Q5 or Q7. Air monitoring at Area IV of the SSFL is to be continued beginning January 1, 2020, for Q8 of the air monitoring program.

During Q7 seven VOC analytes were detected above the EPA regional screening level (RSL) or human health risk assessment (HHRA) RSL. Ethyl acetate was detected at DOE-2 and DOE-3, naphthalene and ethylbenzene were detected at DOE-4, benzene was detected at DOE-3 and DOE-4, and acrolein was detected at DOE-1.

During Q5 through Q7, detections for gross alpha and gross beta that exceeded the minimum detectable concentration (MDC) are all naturally occurring radionuclides. Detections are expected because the results are calculated at a 95% confidence level. No man-made radionuclides that are contaminants of concern at ETEC were detected.

Data collected during Q5 through Q7 agree with data collected, analyzed, and reported by the State of California DTSC, Los Angeles County Emergency Response Organization, the DOE Emergency Response organization, or other Multi-Agency Task Forces. The remaining data were validated and there are no statistically significant changes in the air monitoring results. Air monitoring at Area IV of the SSFL is to be continued starting January 1, 2020, for the eighth quarter of the Baseline Air Monitoring Program.

Site activities during Q7 included asbestos abatement and shipping activities within the non-radiological buildings. Work area air monitoring was conducted during asbestos abatement confirming there was no airborne contamination resulting from abatement activities. Trucking activities were not conducted near the perimeter air monitoring stations.

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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 five VOC sampling events in this reporting period. One field duplicate sample was collected during each sampling event.

During Q7, radionuclide samples were collected at four perimeter sampling 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-220 and radon-222 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 21 sampling events at each of samplers DOE-1, DOE-2, DOE-3, and DOE-4. Following analysis for gross alpha and gross beta radiation, sample filters from each of the locations 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.

Q5 through Q7 of the baseline monitoring program consisted of 18 VOC sampling events with one field duplicate taken for each sampling event. There were 74 radiological sampling events for analysis of gross alpha and gross beta radiation and 12 composite samples for analysis from the four sampling stations.

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4. DATA

Sections 4.1 through 4.4 discuss Q7 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 and particulate monitoring data to describe the air quality for the people and communities living 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 meteorological 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., difference between 10-m and 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 78 days in this reporting period (Q7), which covers October 15, 2019, through December 31, 2019, with a total of 7,488 possible 15-minute observations. During Q5 through Q7, there were a total of 25,056 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. It was performed routinely throughout the reporting period following each weekly data download. Data validation quality control codes applied to the meteorological observations are defined in Table 1.

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 quality control (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 “invalid” (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. Year 1 of baseline air monitoring consisted of Q1 through Q4. Year 2 consisted of Q5 through Q7.

The project data completeness goal for meteorological data is 80% on an annual basis. Data completeness statistics for Q5 through Q7 in Year Two of the baseline monitoring are presented in Table 2. In summary, the data completeness goal was achieved for all parameters for this annual reporting period. In summary, the data completeness goal has been achieved for all parameters in Year 2.

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 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.

Wind Rose

The final validated 15-minute meteorological dataset was used to develop wind roses for Q7 (Figure 3) and for Q5 through Q7 (Figure 4). 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 Q7, data capture for wind speed and direction at DOE-4 was 100%. The average and maximum wind speeds were 5.0 m/sec and 18.3 m/sec, respectively. The predominant wind direction was from the north-northeast with a secondary peak from the east-southeast.

During Q5 through Q7, data capture for wind speed and direction at DOE-4 was 100%. The annual average and maximum 15-minute wind speeds were 3.9 m/sec and 18.3 m/s, respectively. The annual predominant wind direction was from the east-southeast. The maximum recorded wind gust for Year 2 was 27.5 m/sec and occurred in Q7.

Table 2. Data screening summary for monitored meteorological parameters.

Meteorological Parameter	Screening Criteria ⁽¹⁾ (for valid sensor responses)	Data Completeness Percent (%) ⁽²⁾				
		Q5	Q6	Q7	Year 2	Project to Date
Wind Speed	between 0 and 25 m/sec (meters/second)	100	100	100	100	87.42
	> 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	87.42
	> 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	87.42
Temperature @ 2 m	≤ local record high (monthly basis)	100	100	100	100	87.42
	≥ local record low (monthly basis)					
	> 0.5 Celsius (°C) variation over 12 hours					
Temperature @ 10 m	≤ local record high (monthly basis)	100	100	100	100	87.42
	≥ local record low (monthly basis)					
	> 0.5°C variation over 12 hours					
Delta Temperature	≤ 0.1°C during daytime	100	100	100	100	85.63
	≥ -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	73.07
	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	100	100	100	100	87.42
	≤ 4 inches in 24 hours					
	≥ 2 inches in 3 months					
Barometric Pressure	between 871 and 982 millibar (mb) (local) (i.e., between 940 and 1060 mb sea level)	100	100	100	100	87.42
	≤ 6 mb variation over 3 hours					
Solar Radiation	> 0 at night	99.93	99.98	99.96	99.96	87.39
	≤ maximum possible for date and latitude					
<p>(1) Screening criteria from EPA Meteorological Monitoring Guidance (EPA 2000), Table 8-4.</p> <p>(2) Data Completeness % = [Observations Passing] / [Possible observations]. Missing or suspect observations count against data completeness statistics. The number of possible 15-minute observations in the completed reporting periods:</p> <ul style="list-style-type: none"> • Q1 = 8,736 • Q2 = 8,832 • Q3 = 8,832 • Q4 = 8,640 • Year One = 35,040 • Q5 = 8,832 • Q6 = 8,832 • Q7 = 7,488 • Year Two = 25,056 						

4.2 PM₁₀ Data

PM₁₀ data, also defined as coarse particles between 2.5 and 10 micrometers in diameter, are measured at the ETEC site. Sources of particulate matter can be naturally occurring or caused by human activity. The air monitoring conducted at ETEC is used to determine if any suspended particles are from activities conducted onsite or if they are consistent with surrounding air quality data. Some of the naturally occurring particles can originate from high winds, forest or grass fires, burning of fossil fuels in vehicles, or stirred-up road dust.

PM₁₀ data are being 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 78 days in the Q7 reporting period.

- DOE-1 and DOE-4 monitoring stations ran for all 78 days.
- DOE-2 had 73 valid reading days (of 78); the air pump started failing on 10/31/2019 and it was replaced on 11/14/2019.
- DOE-3 had 53 valid reading days (of 78), with the shortfall due to the following reasons. The air pump failed and there were no replacements available onsite. DOE-3 was not repaired and returned to service until after the reporting period ended. There are no available data for the time range of 12/02/2019 until 12/31/2019.

Although station units needed repair during Q7, data completeness for PM₁₀ exceeded the project goal of 80% completeness (see Table 3). The complete tables of daily averages for Q7 and for Q5 through Q7 are presented in Appendix A.

Table 3. PM₁₀ data completeness for October 15, 2019 – December 31, 2019.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	78	78	100
DOE-2	73	78	94
DOE-3	53	78	68
DOE-4	78	78	100
Total Completeness			90.5

During the 261 days of the annual reporting period (Q5 through Q7) the PM₁₀ monitoring stations (DOE-1, DOE-2, DOE-3, and DOE-4) exceeded the project goal of 80% data completeness, as shown in Table 4.

Table 4. PM₁₀ data completeness for April 15, 2019 – December 31, 2019.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	258	261	99
DOE-2	256	261	98
DOE-3	214	261	82
DOE-4	238	261	91
Total Completeness			92.5

The five highest PM₁₀ results identified for the reporting period are listed in Table 5 along with the CAAQS for PM₁₀. PM₁₀ concentrations were consistent with levels typically found in urban air. Of these top five results, two were recorded at DOE-4 and one each at DOE-1, DOE-2, and DOE-3. No values exceeded the CAAQS limits. Four of the top five values were recorded on the same day, 10/30/2019, when winds exceeded 4 m/sec compared to the usual 0.5 to 1.5 m/sec. These high winds may have increased the presence of particulates in the air.

Table 5. Top five PM₁₀ 24-hour average concentration days for October 15, 2019 – December 31, 2019.

Date	Location	PM ₁₀ Value (µg/m ³)	CAAQS (µg/m ³)
10/30/2019	DOE-4	49.70800	50
10/30/2019	DOE-2	44.87500	50
10/24/2019	DOE-4	42.91600	50
10/30/2019	DOE-1	41.87500	50
10/30/2019	DOE-3	39.00000	50

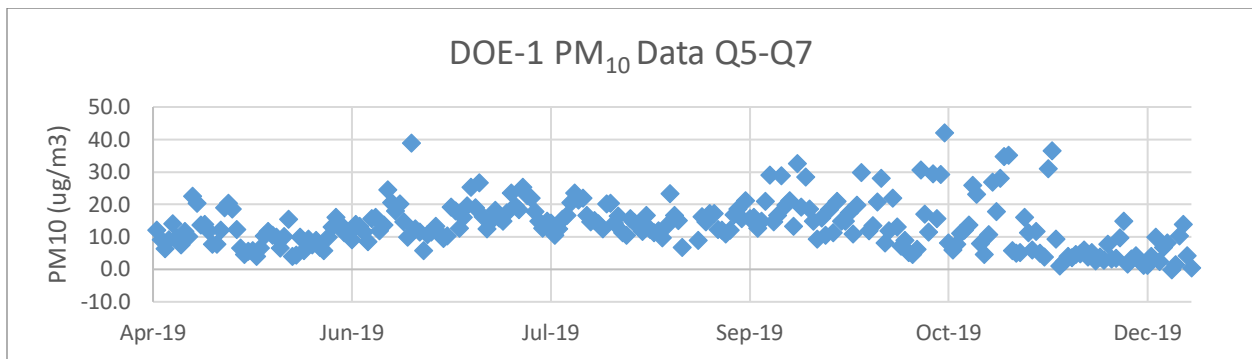
The five highest PM₁₀ results identified for the reporting year are listed in Table 6. Two of the five exceeded the CAAQS of 50 µg/m³. All five results were below the NAAQS of 150 µg/m³.

Table 6. Top five PM₁₀ 24-hour average concentration days for April 15, 2019 – December 31, 2019.

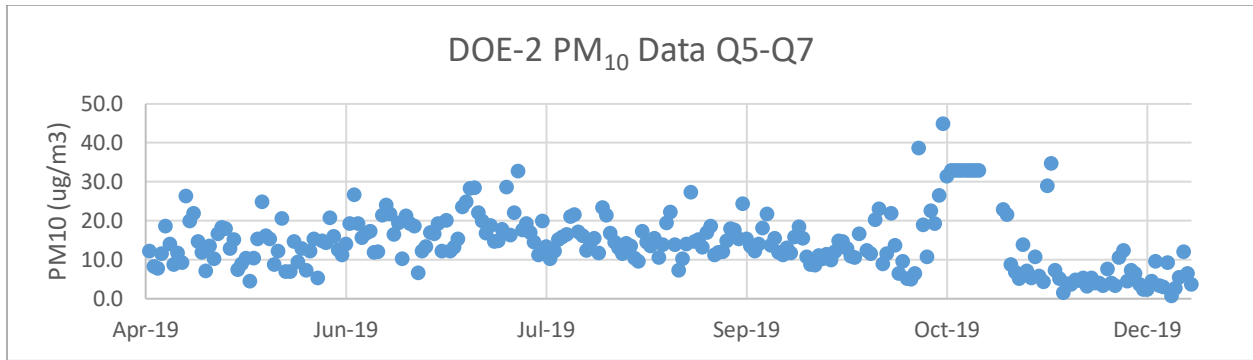
Date	Location	PM ₁₀ Value (µg/m ³)	CAAQS (µg/m ³)
10/10/2019	DOE-2	78.08300	50
10/10/2019	DOE-1	66.00000	50
10/30/2019	DOE-4	49.70800	50
10/10/2019	DOE-3	49.62500	50
9/7/2019	DOE-4	45.45800	50

Bold text and gray shaded – Value exceeds CAAQS.

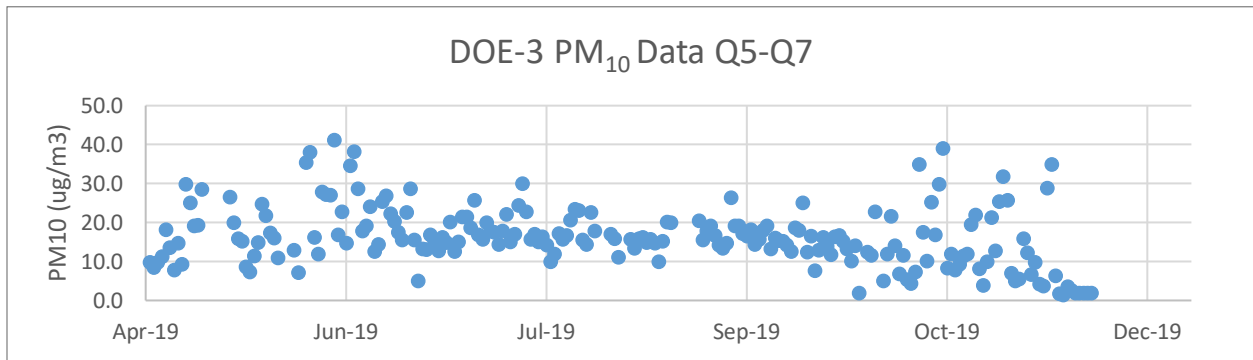
The Year 2 trend data from each monitor are shown below in Graphs 1 through 4.



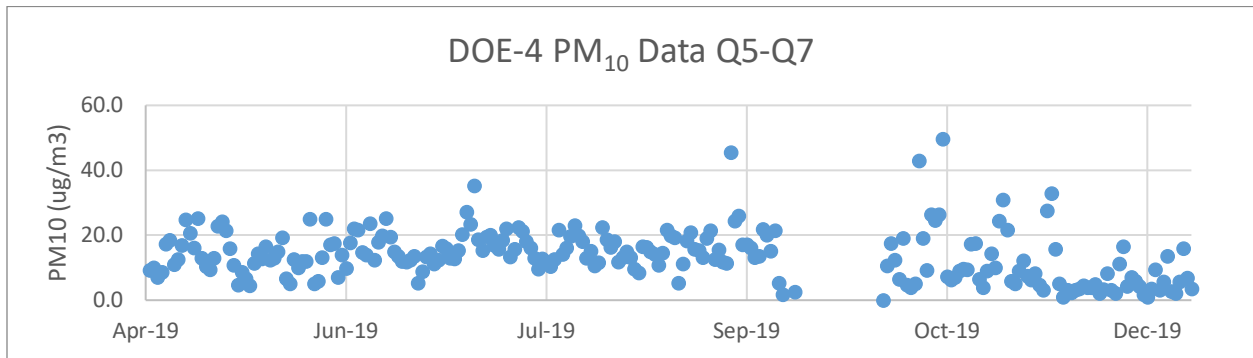
Graph 1. Year 2 trend data, Q5–Q7, for PM₁₀ at monitor DOE-1.



Graph 2. Year 2 trend data, Q5–Q7, for PM₁₀ at monitor DOE-2.



Graph 3. Year 2 trend data, Q5–Q7, for PM₁₀ at monitor DOE-3.



Graph 4. Year 2 trend data, Q5–Q7, for PM₁₀ at monitor DOE-4.

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 human-made. The VOC data collected can help distinguish between human-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.

There were five VOC sampling events in the Q7 reporting period. Each of the four DOE locations was sampled during each sampling event. Data completeness goals for VOCs exceeded the project goal of 85% (see Table 7).

Table 7. Ambient air VOC data completeness for Q7.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	5	5	100
DOE-2	5	5	100
DOE-3	5	5	100
DOE-4	5	5	100
Average Total Data Completeness			100

There were 18 annual VOC sampling events. Each of the four locations was sampled during each sampling event. Data completeness goals for VOCs exceeded the project goal of 85% (Table 8).

Table 8. Ambient air VOC data completeness for Q5–Q7.

Location	Valid Readings (Days)	Possible Readings (Days)	Data Completeness (Percent)
DOE-1	18	18	100
DOE-2	17	18	94
DOE-3	18	18	100
DOE-4	18	18	100
Average Total Data Completeness			98.5

VOC detection results for Q7 are presented in Table B-1 (Appendix B), including comparison to the April 2019 DTSC HHRA Note 3 Screening Levels (DTSC 2019) or the May 2018 EPA Residential Air RSLs (EPA 2018). Acrolein, ethyl benzene, and naphthalene each exceeded their respective EPA RSLs during one sample event. Complete VOC analytical results for Q7 are presented in Table B-2 (Appendix B). Annual VOC analytical results for Q5 through Q7 are presented in Table B-3 (Appendix B).

Acrolein was first detected above method detection limits in Q7 at DOE-1. According to Pub Chem, acrolein can enter the air when trees, tobacco, other plants, gasoline, and oil are burned. It is also used as a pesticide to control algae, weeds, bacteria, and mollusks.

Ethylbenzene was detected above EPA RSLs three times in Q1–Q6. It was also detected at DOE-4 in Q7. Ethylbenzene is found in natural products such as coal tar and petroleum, and manufactured products such as inks, pesticides, and paints.

Naphthalene was first detected above EPA RSL in Q7 at DOE-4. Naphthalene is found in petroleum and coal fuels and is produced during the burning of tobacco or wood.

Ethyl acetate exceeded the EPA RSL once at DOE-2 and once at DOE-3 in Q7. Although ethyl acetate has been detected above method reporting limits throughout Q1–Q7, this is the first time EPA RSLs have been exceeded. Ethyl acetate is found in alcoholic beverages, cereal crops, radishes, and fruit juices, and can be used as a solvent in modified hop extract and decaffeinated tea or coffee.

Benzene exceeded the DTSC HHRA once each at DOE-3 and DOE-4 during Q7. Benzene was not detected above method detection limits in Q1–Q6. Benzene is typically found in crude oils and as a by-product of oil-refining processes. Some industries use benzene to make other chemicals to make plastics,

resins, nylon, and synthetic fibers. It is one of the top 20 chemicals for production volume in the U.S. Natural sources include volcanoes, forest fires, crude oil, gasoline, and tobacco smoke.

4.4 Radionuclide Data

ETEC continuously monitors air at multiple locations for radioactive particles. This activity is performed for two reasons: (1) to determine the background airborne radioactivity concentration so that any possible releases from future work activities can be detected, and (2) to detect any possible release from existing activities. During Q7, the background airborne radioactive contamination continued at low and stable concentrations, and there was no detected release of material.

There were 88 airborne radioactivity samples collected in Q7 — 22 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.

Gross alpha and gross beta data are used to evaluate whether site remediation work is potentially causing airborne radionuclide emissions. The gross alpha and beta analyses are performed at the site using a Protean alpha/beta radiation counter and a Ludlum 2929 gross alpha/beta counter.

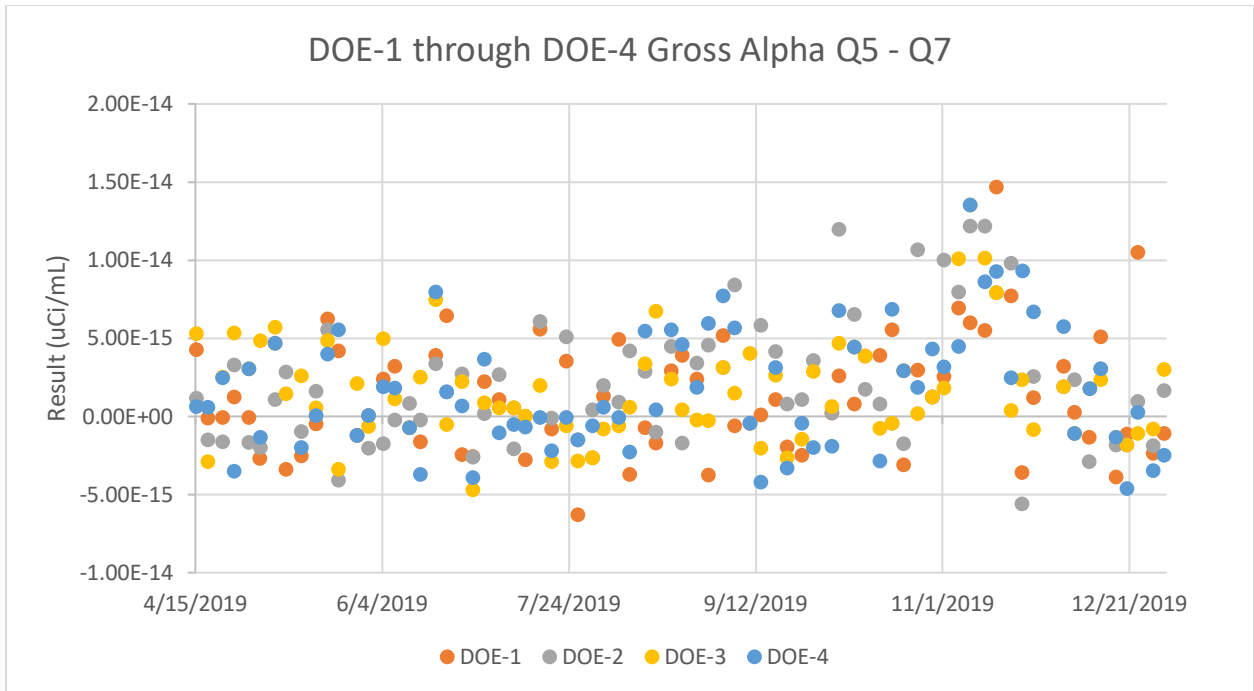
The individual filters are analyzed within approximately one week following collection. The delay in analysis is required for the naturally occurring short-lived radon daughters to decay and not affect the analysis results. The benefit of analyzing the filters at the site is this allows an early warning of potential site remediation-caused elevated radionuclide emissions.

The air sample analysis results are tabulated and reviewed for trends. By nature, all results are above zero, some are above background, and some are above MDC, a value statistically above background. The MDC is tracked and reviewed with every analysis to determine if the instrument performance is stable. A variation may provoke a repair or a calibration.

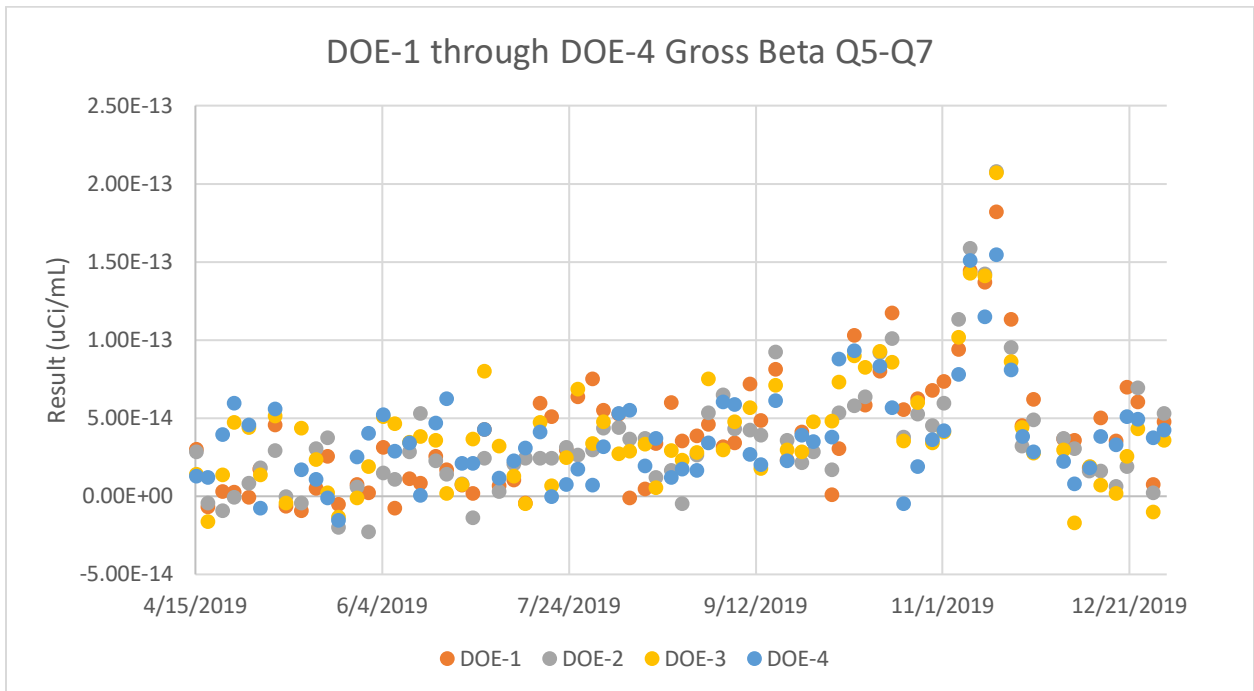
While about a quarter of the gross alpha results and about half of the gross beta-gamma results are above the MDC, none of these results are significant. This is due to the fact that the “background” value is computed with a clean filter, not a filter exposed to background airborne concentrations.

For conservatism, the air sample gross counting results are reviewed considering all alpha activity is from the most restrictive expected radionuclide (Pu-239), and all beta activity is the most restrictive expected radionuclide (Sr/Y-90). In all cases the results are less than 1% of the airborne limit for the most conservative radionuclide.

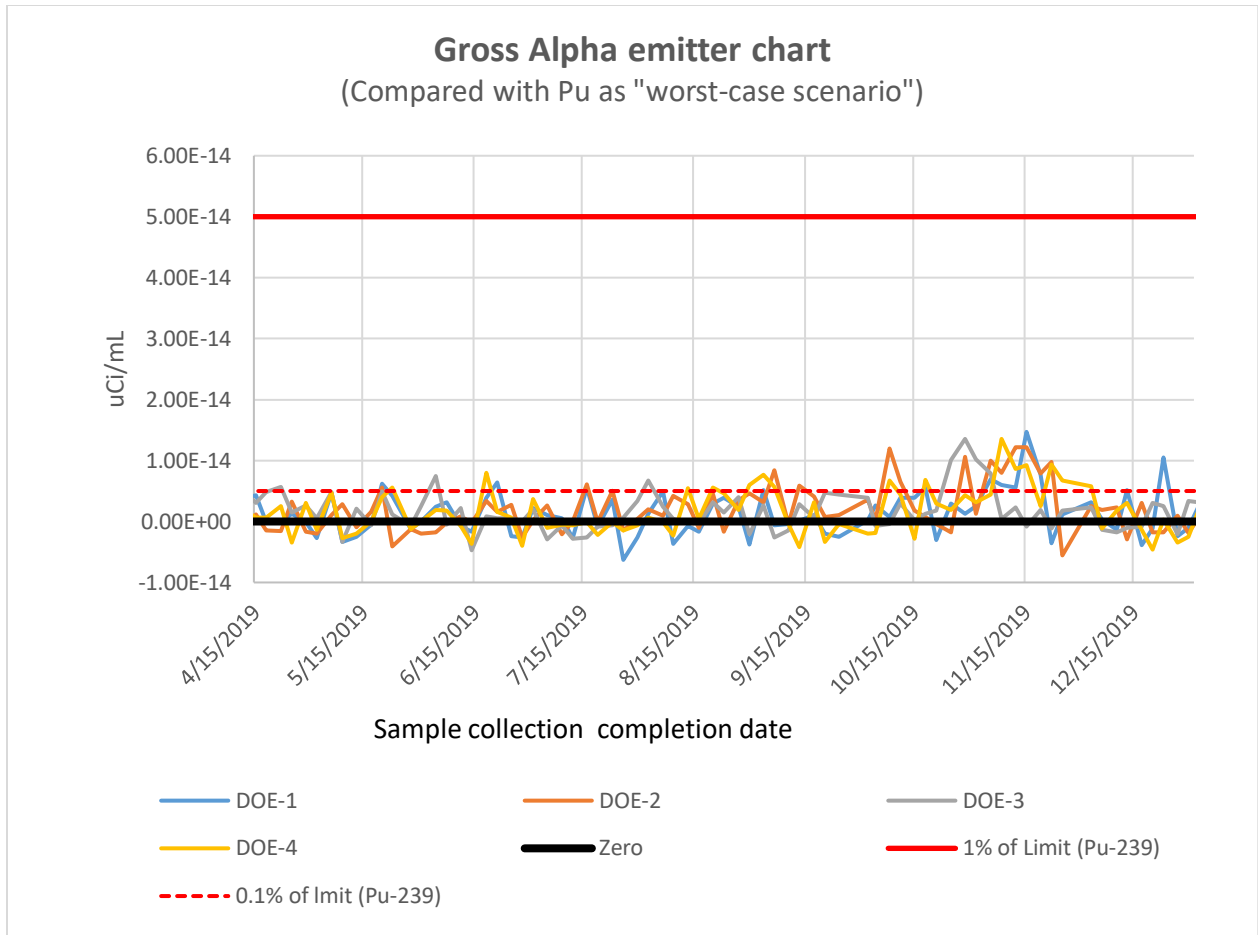
After the end of a quarter, the samples are composited and sent to a laboratory for detailed isotopic analysis. All analyses to date show a broad range of radioactive material consistent with background material and global fallout. These results vary seasonally, and do not show any contribution from ETEC activities. There is a small spike in November 2019 that is attributed to environmental factors external to SSFL. This small spike was not only seen at the ETEC site but was seen across the Boeing site. Gross alpha and gross beta results along with the radionuclide analytical results for Q7 and Year 2 (Q5–Q7) can be found in Appendix C. The gross alpha and gross beta results for Year 2 are presented in Graph 5 and Graph 6, respectively. To give a full picture of the significance in background variation, Graph 7 presents the gross alpha results compared to the Pu-239 limit. Graph 7 shows how the air samples are less than 1% of the limit, hover around 0.1%, and are sometimes less than zero.



Graph 5. Gross alpha results for Year 2 (Q5–Q7).



Graph 6. Gross beta results for Year 2 (Q5–Q7).



Graph 7. Year 2 gross alpha worst-case emitter chart.

When radionuclides are collated and compared, it is clear that the primary contributors are background radioactive materials. The two most common indicators of artificial radionuclides are Cs-137 and Co-60, which have short half-lives. These radionuclides are completely absent. For this analysis, the radioisotopic analyses from Year 2 were summed, then compared to the airborne radioactivity limits (derived airborne concentration [DAC]) (Table 9).

Table 9. Comparison of air sample results with DAC.

Radionuclide	Average no Zero	% contribution to total alpha activity	DAC alpha	%DAC	% contribution to total alpha DAC	DAC beta	% of DAC	% contribution to beta-gamma total
Cesium-137	0.00E+00					8.00E-08	0.00E+00	0.0%
Strontium-90	2.46E-14					1.00E-08	2.46E-06	0.2%
Cobalt-60	0.00E+00					3.00E-08	0.00E+00	0.0%
Potassium-40	1.03E-11					1.00E-07	1.03E-04	9.4%
Beryllium-7	1.98E-11					2.00E-08	9.92E-04	90.4%
Plutonium-238	3.38E-15	0.08%	5.00E-11	6.76E-05	0.1%			
Polonium-210	1.91E-12	47.35%	2.00E-10	9.57E-03	10.2%			
Plutonium-241	5.82E-13	14.40%	2.00E-10	2.91E-03	3.1%			
Thorium-230	1.24E-13	3.06%	3.00E-12	4.12E-02	43.9%			
Thorium-228	8.16E-14	2.02%	2.00E-11	4.08E-03	4.4%			
Actinium-228	3.06E-13	7.57%	6.00E-09	5.10E-05	0.1%			
Americium-241	7.70E-15	0.19%	5.00E-12	1.54E-03	1.6%			
Plutonium-239	7.12E-15	0.18%	5.00E-12	1.42E-03	1.5%			
Ra-228 – total	5.92E-14	1.46%	1.00E-10	5.92E-04	0.6%			
Radium-226, -228 combined	7.09E-13	17.53%	2.00E-10	3.54E-03	3.8%			
Thorium-232	8.44E-14	2.09%	3.00E-12	2.81E-02	30.0%			
Uranium-238	8.40E-14	2.08%	3.00E-10	2.80E-04	0.3%			
Uranium-233/234	7.50E-14	1.86%	2.00E-10	3.75E-04	0.4%			
Uranium-235/236	5.56E-15	0.14%	3.00E-10	1.85E-05	0.0%			
Sum:	4.04E-12	100%	7.59E-09	9.38E-02	100%	2.40E-07	1.10E-03	100%

Artificial Radionuclides
Natural Radionuclides

Over 75% the alpha-emitting radionuclides are background radioactive materials indicating airborne dust. Less than 5% of the alpha contribution is from artificial radionuclides (plutonium). As discussed above, it is likely that most of the airborne radioactivity is from the environment, either cosmogenic or global fallout. There is no indication of a local release, as there is no clear mixture associated with fission reactions, given the absence of Cs-137 and Sr-90.

The air sample results are compared using conservative assumptions. Since the results hover near or below the detection limit of the instruments, there are no plans to investigate minor variations in background.

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5. QA/QC ACTIVITIES

The following QA/QC activities were conducted for the PM₁₀, VOC, radionuclide, and meteorological data collection and analysis.

5.1 Field QA/QC

5.1.1 PM₁₀

The 24-hour daily averages for Q7 are presented in Appendix A along with the monthly average minimum, maximum, and 95th percentile for each station location.

Flow Verifications

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

Complete audit reports and flow verification results are presented in Appendix D. 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 Excel-based software application, was used to perform the necessary statistical calculations based on input audit data. Sections 2 and 2.5 of the EPA guidance document (EPA 2007) provide additional information and instruction for the use of the DASC tool.

5.1.2 VOCs

A minimum of 20% of the VOC results are undergoing third-party data validation. During Q7, one of the five sample delivery groups (SDGs), SDG P1906482, 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.

Data completeness goals for VOCs exceeded the project goal of 85%.

5.1.3 Field Duplicates

Five field duplicates were collected during this reporting period, one per sampling event. In SDG #1907474, ethyl acetate was detected in five field duplicate pairs at a level exceeding the quality objective of +/- 15% relative percent difference (RPD). In SDG #1907180, the analytes ethylbenzene, m,p-xylenes, o-xylene, 4-ethyltoluene, 1,2,4-trimethylbenzene, and total xylenes were detected at levels higher than the reporting limit in either the sample or duplicate, and in comparison, were reported as a non-detect in the associated sample or duplicate and exceeded the quality objective of +/- 15% RPD. Seven analytes were detected near the reporting limit in either the sample or duplicate, and in comparison, were reported as a non-detect in the associated sample or duplicate. Thirteen sample and duplicate analyte detections were within the quality objective of +/- 15% RPD. There were no other detections associated with the samples and associated duplicates collected during this reporting period.

5.1.4 Canister Pressure

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

5.1.5 Radiological

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

Samples analyzed at the offsite laboratory are QC-checked at the laboratory. These QC checks include blanks, laboratory replicates, matrix spikes, and matrix spike duplicates. Barium, which behaves chemically similar to radium, is used as a carrier to determine the yield of the chemical extraction. The acceptable yield per laboratory procedure is from 40 to 110%. The barium yield was greater than 110% for all radium analyses. When the yield is higher than that allowed, then the analytical results for radium-226 and radium-228 are biased low. All results were less than the laboratory MDC during Q7. In all cases, the radium-226 and radium-228 results when evaluated against the MDC were more than 1,000 times less than the airborne effluent limits listed in 10 CFR 20, Appendix B, Table 2. Thus, there is no reason to suspect that there was an airborne release of radium-226 or radium-228 that was of any significance.

A minimum of 20% of the annual radiological analytical results are undergoing third-party data validation. The SDG from Q5 (from Year 2 of baseline air monitoring) as well as Q3 (from Year 1 of baseline air monitoring) underwent the annual data validation, exceeding the minimum of 20%. The data validation ensures the analytical measurement quality objectives that are required to ensure the data are of sufficient quality for their intended purpose.

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

Equipment maintenance performed during this reporting period included the following:

- Cleaned Met One E-BAM nozzle/vane, as needed.
- Cleaned PM₁₀ inlets and down tubes, as needed.
- Sent Met One E-BAM unit W23310 to manufacturer for repair.
- Sent Met One E-BAM unit W23314 to manufacturer for repair.
- Sent Met One E-BAM unit Y12096 to manufacturer for repair.
- Sent Met One E-BAM unit W233213 to manufacturer for repair.

5.1.8 Corrective Action

Issues and corrective actions regarding the PM₁₀ monitors and the meteorological station are noted in Sections 5.1.8.1 and Section 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 PM₁₀ Monitors

Refer to Section 4.2 for a detailed description of PM₁₀ air monitoring equipment issues that occurred during Q7.

5.1.8.2 Meteorological Station

Although there were no unresolved data quality issues for Q7, an improperly programmed data logger continues to affect the calculation of delta temperature (i.e., temperature difference between 2 m and 10 m).

Delta Temperature Calculation – As stated in the Corrective Action section of the Q3 air monitoring report (North Wind, Inc. 2019), the new data logger installed on December 18, 2018, was programmed to calculate delta temperature inversely to how it had been calculated in the original data logger (i.e., prior to November 7, 2018). Consequently, the new delta temperature observations are 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:

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

- November 7 to December 18, 2018:

Missing (wildfire damage to station DOE-4)

- After December 18, 2018:

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

For consistency with the initial data collection quarters, the delta temperature calculations from the new data logger are 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 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 10 lists the maintenance schedules for the Met One sensors installed at the DOE-4 meteorological station.

Table 10. 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 and 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 are specified in the respective Met One sensor user manuals.

5.2 Laboratory QA/QC

This report covers 25 air monitoring samples during Q7 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 five SDGs by the laboratory. The 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 certified clean canisters are discussed by ALS in the case narrative of each SDG.

5.3 Audit Results

The PM₁₀ instruments were calibrated at the manufacturer and were functioning properly upon installation. The PM₁₀ 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 11 lists the dates for audits conducted during Q7. No flow rate comparisons exceeded the project’s acceptance criterion of +/- 4. Complete audit reports are presented in Appendix D.

Table 11. PM₁₀ audit completeness.

Location	Met One E-BAM Serial Number	Parameter	Date
DOE-1	X16067	PM ₁₀	11/14/2019
DOE-2	Y12096	PM ₁₀	11/14/2019
*DOE-3	W23313	PM ₁₀	11/14/2019
DOE-4	W23310	PM ₁₀	11/14/2019
DOE-1	X16067	PM ₁₀	12/12/2019
DOE-2	Y12096	PM ₁₀	12/12/2019
**DOE-3	W23313	PM ₁₀	12/12/2019
DOE-4	Y23310	PM ₁₀	12/12/2019

*Audit conducted after E-BAM repair.

** Audit conducted during repair.

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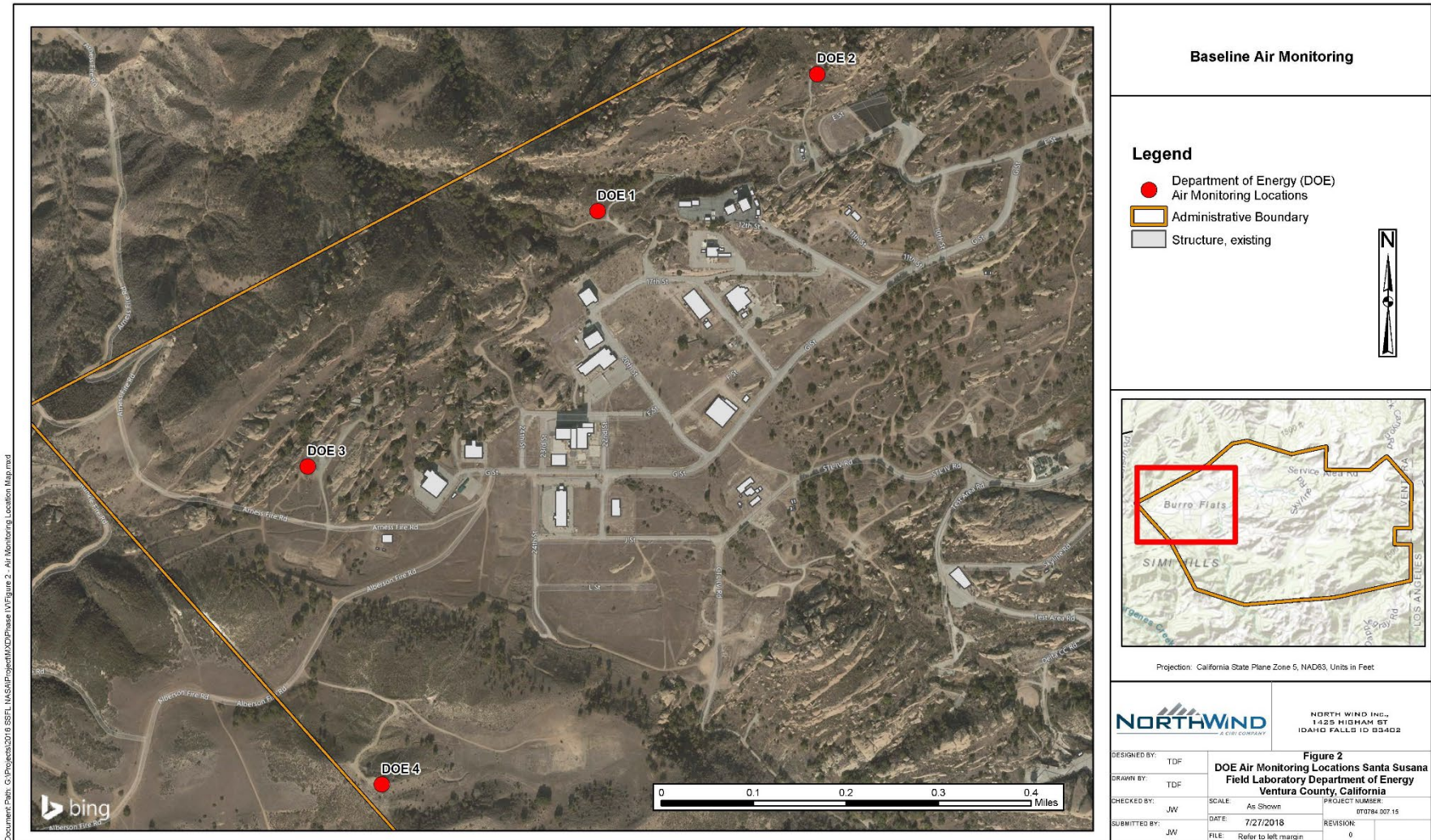
6. REFERENCES

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

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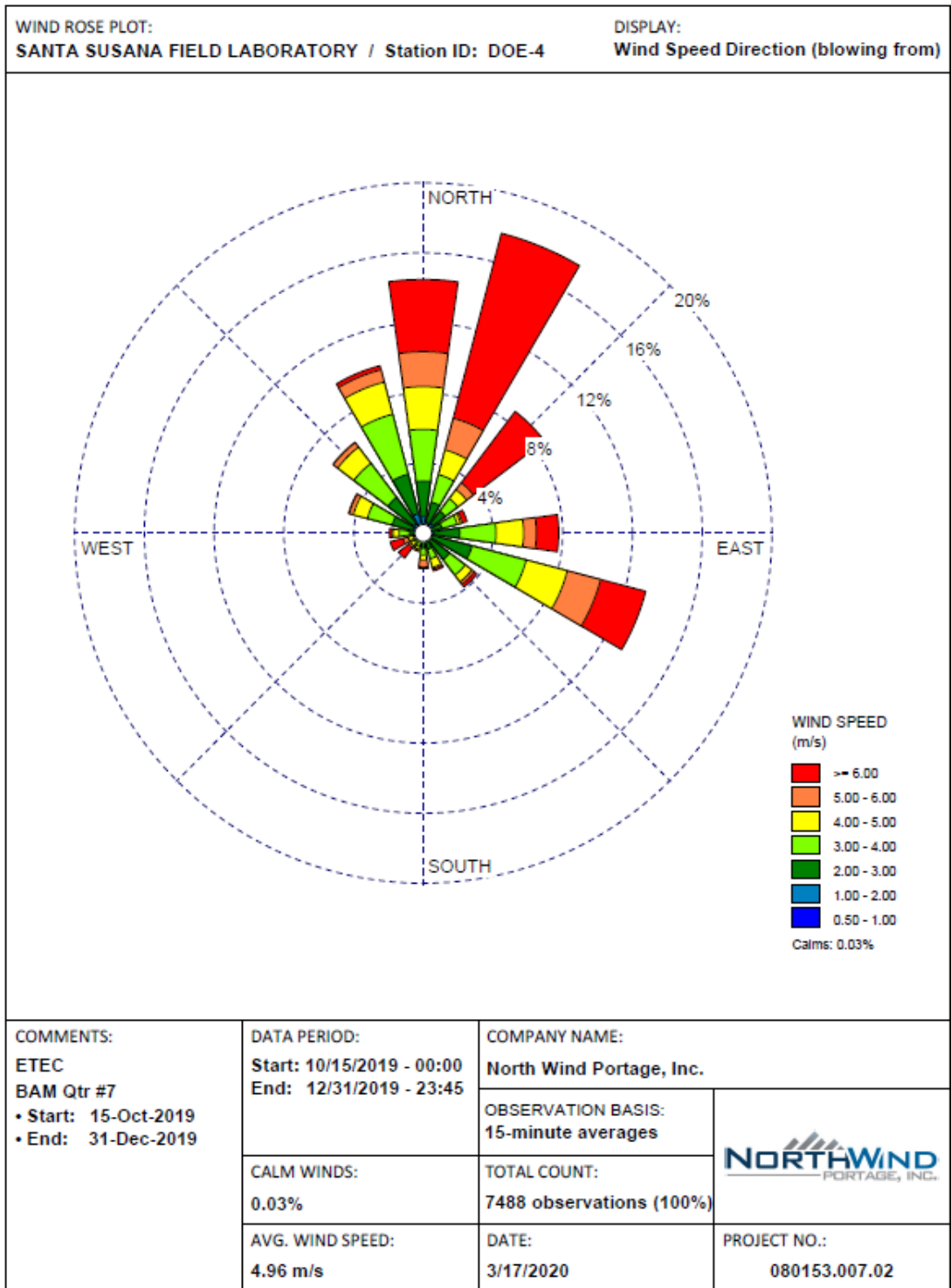
Figure 1
SSFL Air Monitoring Locations

Figure 2
DOE Air Monitoring Locations



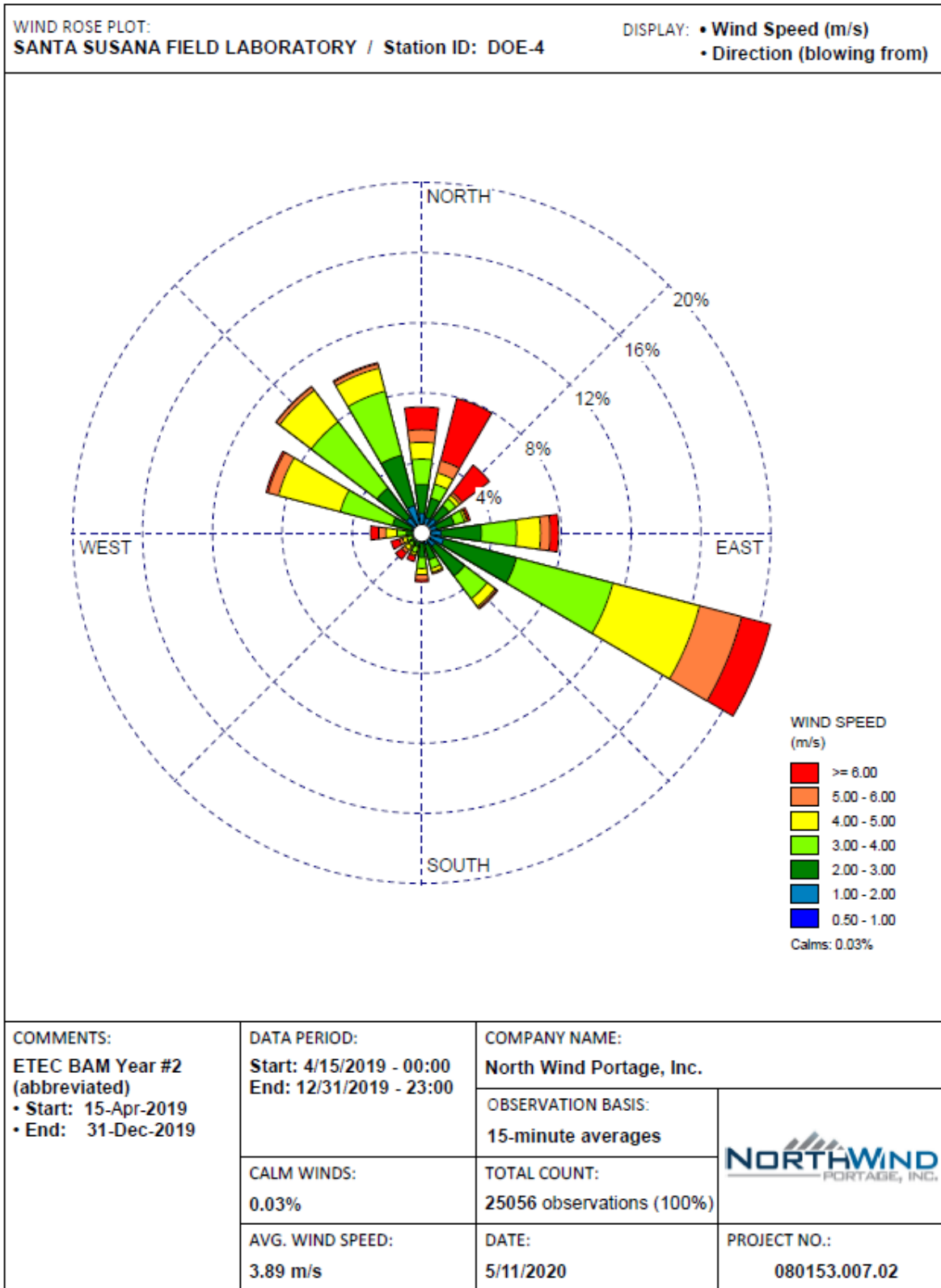
Document Path: G:\Projects\2018 SSFL M&M\Project\M&M\Phase 1\Figure 2 - Air Monitoring Location Map.mxd

Figure 3 – DOE Quarterly Wind Rose



WRPLOT View - Lakes Environmental Software

Figure 4 – DOE Annual Wind Rose



APPENDIX A
PM₁₀ Daily Averages and Monthly Statistics

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PM₁₀ Daily Averages, Q7

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
10/15/19	8.00000	9.00000	5.00000	0.00000
10/16/19	11.87500	11.54100	12.04100	10.58300
10/17/19	21.83300	21.87500	21.70800	17.50000
10/18/19	12.87500	13.70800	14.12500	12.33300
10/19/19	7.00000	6.41600	6.83300	6.45800
10/20/19	8.91600	9.58300	11.66600	19.04100
10/21/19	5.00000	5.16600	5.37500	4.66600
10/22/19	4.58300	5.04100	4.50000	3.87500
10/23/19	6.04100	6.50000	7.37500	5.12500
10/24/19	30.54100	38.66600	35.00000	42.91600
10/25/19	16.95800	19.04100	17.50000	19.00000
10/26/19	11.37500	10.79100	10.20800	9.20800
10/27/19	29.41600	22.62500	25.29100	26.41600
10/28/19	15.45800	19.33300	16.87500	24.58300
10/29/19	29.12500	26.45800	29.83300	26.37500
10/30/19	41.87500	44.87500	39.00000	49.70800
10/31/19	8.12500	31.50000	8.37500	7.29100
11/01/19	5.87500	33.00000	11.91600	6.25000
11/02/19	7.70800	33.00000	7.79100	7.04100
11/03/19	10.95800	33.00000	9.29100	9.08300
11/04/19	12.04100	33.00000	11.41600	9.66600
11/05/19	13.58300	33.00000	11.95800	9.50000
11/06/19	25.83300	33.00000	19.54100	17.33300
11/07/19	22.95800	33.00000	21.91600	17.50000
11/08/19	7.87500	33.00000	8.16600	6.50000
11/09/19	4.58300		3.95800	3.87500
11/10/19	10.66600		10.04100	9.04100
11/11/19	26.83300		21.29100	14.29100
11/12/19	17.70800		12.87500	9.95800
11/13/19	27.87500		25.37500	24.33300
11/14/19	34.66600	22.87500	31.91600	30.87500
11/15/19	35.12500	21.62500	25.79100	21.66600
11/16/19	5.66600	8.79100	7.04100	5.83300
11/17/19	4.91600	6.83300	5.12500	5.04100
11/18/19	5.08300	5.16600	5.54100	9.12500
11/19/19	15.91600	13.91600	15.87500	12.29100
11/20/19	11.16600	7.12500	12.33300	7.45800

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
11/21/19	5.87500	5.37500	6.75000	6.20800
11/22/19	11.50000	10.83300	9.87500	8.29100
11/23/19	4.95800	5.79100	4.20800	4.75000
11/24/19	3.70800	4.37500	3.70800	3.20800
11/25/19	30.91600	28.91600	28.83300	27.54100
11/26/19	36.33300	34.75000	34.95800	32.95800
11/27/19	9.16600	7.33300	6.33300	15.83300
11/28/19	0.95800	5.12500	1.75000	5.04100
11/29/19	2.37500	1.58300	1.54100	0.91600
11/30/19	3.95800	3.91600	3.58300	3.20800
12/01/19	3.41600	3.66600	2.62500	2.37500
12/02/19	4.54100	4.87500	1.95800	3.08300
12/03/19	4.66600	4.66600	2.00000	3.45800
12/04/19	5.79100	5.33300	2.00000	4.58300
12/05/19	3.62500	3.20800	2.00000	3.87500
12/06/19	5.12500	5.33300	2.00000	3.95800
12/07/19	2.50000	4.00000		5.00000
12/08/19	3.66600	4.04100		2.08300
12/09/19	2.70800	3.37500		3.29100
12/10/19	7.58300	7.66600		8.20800
12/11/19	3.16600	4.04100		3.08300
12/12/19	3.29100	3.29100		2.16600
12/13/19	9.58300	10.54100		11.29100
12/14/19	14.70800	12.33300		16.58300
12/15/19	1.50000	4.45800		4.25000
12/16/19	3.12500	7.33300		7.12500
12/17/19	4.16600	6.54100		5.87500
12/18/19	2.54100	3.66600		4.29100
12/19/19	1.08300	2.33300		1.70800
12/20/19	1.16600	2.37500		0.95800
12/21/19	3.83300	4.54100		3.45800
12/22/19	9.79100	9.54100		9.37500
12/23/19	2.25000	3.29100		3.08300
12/24/19	6.66600	3.04100		5.75000
12/25/19	8.08300	9.25000		13.50000
12/26/19	-0.33300	0.79100		2.75000
12/27/19	1.37500	2.70800		2.08300
12/28/19	10.25000	5.45800		5.70800

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
12/29/19	13.75000	12.00000		15.91600
12/30/19	4.04100	6.41600		6.83300
12/31/19	0.37500	3.62500		3.54100

Note: Gray-shaded boxes indicate a filter sensor pressure failure.

PM₁₀ Daily Averages, Q5 through Q7

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
04/15/19	12.00000	12.25000	9.83300	9.33300
04/16/19	9.08300	8.25000	8.54100	10.08300
04/17/19	6.25000	7.83300	9.91600	7.16600
04/18/19	8.95800	11.62500	11.32000	8.62500
04/19/19	13.87500	18.62500	18.20800	17.29100
04/20/19	9.54100	14.04100	13.58300	18.41600
04/21/19	7.41600	8.70800	7.83300	11.08300
04/22/19	11.66600	11.66600	14.75000	12.66600
04/23/19	10.00000	9.25000	9.41600	16.95800
04/24/19	22.37500	26.41600	29.91600	24.79100
04/25/19	20.29100	20.00000	25.16600	20.70800
04/26/19	13.58300	22.00000	19.16600	16.16600
04/27/19	13.66600	14.70800	19.33300	25.16600
04/28/19	11.75000	11.95800	28.58300	12.91600
04/29/19	7.58300	7.20800		10.37500
04/30/19	7.54100	13.50000		9.45800
05/01/19	12.04100	10.29100		12.91600
05/02/19	18.91600	16.66600		22.91600
05/03/19	20.29100	18.37500		24.20800
05/04/19	18.50000	18.04100		21.54100
05/05/19	12.12500	12.95800	26.54100	16.00000
05/06/19	6.41600	15.25000	20.00000	10.83300

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
05/07/19	4.41600	7.50000	15.95800	4.66600
05/08/19	5.54100	9.00000	15.25000	8.62500
05/09/19	5.62500	10.37500	8.66600	6.75000
05/10/19	3.95800	4.54100	7.37500	4.58300
05/11/19	6.37500	10.41600	11.54100	11.41600
05/12/19	10.16600	15.33300	14.95800	14.29100
05/13/19	11.54100	24.87500	24.70800	12.75000
05/14/19	10.45800	16.20800	21.87500	16.54100
05/15/19	9.79100	15.41600	17.33300	12.45800
05/16/19	6.41600	8.83300	16.08300	13.04100
05/17/19	9.95800	12.25000	11.00000	14.91600
05/18/19	15.37500	20.66600		19.29100
05/19/19	3.83300	7.00000		6.66600
05/20/19	4.37500	6.95800		5.12500
05/21/19	9.70800	14.66600	13.00000	12.50000
05/22/19	5.75000	9.50000	7.20800	10.00000
05/23/19	9.25000	12.91600		12.08300
05/24/19	7.45800	7.33300	35.54100	12.00000
05/25/19	8.75000	12.29100	38.08300	24.95800
05/26/19	6.75000	15.41600	16.29100	5.12500
05/27/19	5.75000	5.29100	12.00000	5.91600
05/28/19	9.79100	14.87500	27.95800	13.20800
05/29/19	12.87500	14.41600	27.33300	24.95800
05/30/19	15.95800	20.70800	27.04100	17.08300
05/31/19	13.95800	16.08300	41.25000	17.58300
06/01/19	11.20800	12.50000	16.91600	7.00000
06/02/19	10.75000	11.20800	22.79100	13.87500
06/03/19	9.08300	14.04100	14.79100	9.75000
06/04/19	13.66600	19.25000	34.62500	17.70800
06/05/19	13.25000	26.70800	38.29100	22.00000
06/06/19	11.29100	19.29100	28.79100	21.62500
06/07/19	8.37500	15.75000	17.87500	14.79100

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
06/08/19	15.45800	16.79100	19.25000	13.91600
06/09/19	15.83300	17.33300	24.16600	23.54100
06/10/19	11.79100	11.87500	12.66600	12.33300
06/11/19	13.62500	12.12500	14.37500	17.87500
06/12/19	24.33300	21.41600	25.50000	19.79100
06/13/19	20.54100	24.12500	27.00000	25.29100
06/14/19	17.91600	21.75000	22.37500	19.54100
06/15/19	20.12500	16.45800	20.41600	15.04100
06/16/19	14.50000	19.41600	17.58300	13.62500
06/17/19	9.75000	10.25000	15.58300	12.08300
06/18/19	38.79100	21.25000	22.58300	11.79100
06/19/19	12.29100	19.37500	28.70800	12.45800
06/20/19	11.45800	18.66600	15.62500	13.58300
06/21/19	5.70800	6.58300	5.00000	5.25000
06/22/19	10.54100	12.20800	13.29100	8.91600
06/23/19	11.33300	13.37500	13.08300	13.37500
06/24/19	13.20800	17.00000	16.95800	14.37500
06/25/19	11.04100	16.70800	15.75000	11.20800
06/26/19	9.41600	19.29100	12.79100	12.37500
06/27/19	10.25000	12.16600	16.20800	16.66600
06/28/19	19.16600	20.04100	14.87500	15.87500
06/29/19	17.91600	12.16600	20.16600	13.04100
06/30/19	12.50000	13.29100	12.66600	12.87500
07/01/19	15.91600	15.41600	15.08300	15.37500
07/02/19	19.50000	23.50000	21.54100	20.33300
07/03/19	25.25000	24.83300	21.58300	27.20800
07/04/19	18.91600	28.33300	18.70800	23.41600
07/05/19	26.50000	28.45800	25.83300	35.20800
07/06/19	16.08300	22.04100	16.83300	18.66600
07/07/19	12.37500	19.95800	15.75000	15.29100
07/08/19	15.00000	16.87500	20.04100	19.58300
07/09/19	18.08300	18.79100	17.91600	20.04100

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
07/10/19	15.62500	14.75000	17.58300	17.00000
07/11/19	14.66600	14.79100	14.41600	15.79100
07/12/19	17.37500	17.75000	17.91600	18.54100
07/13/19	23.37500	28.62500	22.16600	22.12500
07/14/19	19.50000	16.33300	15.08300	13.33300
07/15/19	18.29100	22.08300	17.00000	15.66600
07/16/19	25.12500	32.75000	24.45800	22.50000
07/17/19	22.58300	17.70800	30.04100	21.25000
07/18/19	21.79100	19.25000	22.83300	18.08300
07/19/19	17.66600	16.91600	15.79100	16.12500
07/20/19	14.70800	14.45800	17.12500	12.91600
07/21/19	12.54100	11.20800	15.16600	9.58300
07/22/19	14.70800	19.91600	16.33300	12.79100
07/23/19	14.12500	13.33300	14.33300	11.83300
07/24/19	10.33300	10.20800	9.95800	10.45800
07/25/19	12.45800	12.16600	11.91600	12.54100
07/26/19	15.33300	15.16600	17.16600	21.58300
07/27/19	16.41600	15.79100	15.79100	14.16600
07/28/19	20.37500	16.45800	16.70800	16.20800
07/29/19	23.33300	21.04100	20.75000	19.75000
07/30/19	21.25000	21.66600	23.45800	23.12500
07/31/19	21.91600	17.20800	23.08300	19.87500
08/01/19	16.58300	16.20800	15.54100	18.12500
08/02/19	14.54100	12.45800	14.50000	13.04100
08/03/19	14.91600	14.45800	22.66600	15.12500
08/04/19	13.95800	15.50000	17.91600	10.66600
08/05/19	12.41600	11.75000		11.58300
08/06/19	19.95800	23.41600		22.54100
08/07/19	20.16600	21.45800		18.70800
08/08/19	14.08300	16.87500	17.04100	16.25000
08/09/19	16.37500	14.54100	15.91600	18.04100
08/10/19	11.25000	13.00000	11.16600	11.79100

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
08/11/19	10.41600	11.58300		13.25000
08/12/19	15.45800	14.25000		14.95800
08/13/19	14.37500	13.58300	15.75000	13.12500
08/14/19	13.12500	10.41600	13.37500	9.58300
08/15/19	11.54100	9.62500	15.95800	8.41600
08/16/19	16.41600	17.29100	16.20800	16.50000
08/17/19	12.16600	14.54100	14.91600	16.37500
08/18/19	11.16600	13.54100	15.70800	15.00000
08/19/19	11.70800	15.45800	14.75000	14.20800
08/20/19	9.62500	10.54100	10.08300	10.83300
08/21/19	13.08300	13.91600	15.29100	14.50000
08/22/19	23.20800	19.41600	20.25000	21.75000
08/23/19	16.50000	22.29100	20.00000	19.83300
08/24/19	14.83300	13.91600		19.33300
08/25/19	6.70800	7.33300		5.29100
08/26/19		10.29100		11.20800
08/27/19		13.95800		18.33300
08/28/19		27.29100		20.87500
08/29/19	8.91600	14.62500		15.79100
08/30/19	16.16600	15.20800	20.50000	15.33300
08/31/19	14.54100	13.25000	15.54100	13.16600
09/01/19	17.16600	16.95800	17.91600	19.16600
09/02/19	17.12500	18.70800	19.12500	21.37500
09/03/19	12.16600	11.29100	16.66600	12.66600
09/04/19	11.95800	11.83300	14.25000	15.50000
09/05/19	10.70800	12.08300	13.37500	11.83300
09/06/19	12.00000	14.87500	14.75000	11.45800
09/07/19	16.75000	17.91600	26.37500	45.45800
09/08/19	18.45800	17.66600	19.16600	24.33300
09/09/19	15.54100	15.41600	19.12500	25.95800
09/10/19	20.95800	24.45800	17.16600	17.04100
09/11/19	15.54100	15.33300	16.58300	17.04100

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
09/12/19	15.95800	13.54100	18.25000	16.04100
09/13/19	12.50000	12.20800	14.50000	13.25000
09/14/19	14.70800	13.95800	15.75000	13.62500
09/15/19	20.75000	18.08300	18.08300	21.87500
09/16/19	29.00000	21.79100	19.25000	20.08300
09/17/19	14.62500	13.70800	13.25000	15.12500
09/18/19	16.41600	15.54100	16.04100	21.37500
09/19/19	28.70800	11.95800	15.50000	5.29100
09/20/19	19.70800	11.29100	15.20800	1.70800
09/21/19	21.00000	13.12500	14.20800	
09/22/19	13.25000	11.79100	12.70800	
09/23/19	32.41600	15.79100	18.75000	2.53800
09/24/19	19.12500	18.54100	18.04100	
09/25/19	28.41600	15.54100	25.04100	
09/26/19	18.45800	10.70800	12.50000	
09/27/19	14.75000	8.79100	16.65500	
09/28/19	9.12500	8.54100	7.75000	
09/29/19	15.62500	11.04100	12.95800	
09/30/19	10.33300	10.29100	16.16600	
10/01/19	18.25000	11.45800	13.95800	
10/02/19	11.25000	9.95800	11.75000	
10/03/19	20.87500	12.12500	16.37500	
10/04/19	14.66600	14.91600	16.75000	
10/05/19	14.75000	14.66600	15.29100	
10/06/19	17.33300	12.83300	13.25000	
10/07/19	10.79100	10.91600	10.16600	
10/08/19	19.58300	10.54100	14.04100	
10/09/19	29.79100	16.70800	2.00000	
10/10/19	66.00000	78.08300	49.62500	
10/11/19	11.87500	12.33300	12.50000	
10/12/19	13.41600	11.58300	11.58300	
10/13/19	20.66600	20.33300	22.83300	

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
10/14/19	28.00000	23.00000		
10/15/19	8.00000	9.00000	5.00000	0.00000
10/16/19	11.87500	11.54100	12.04100	10.58300
10/17/19	21.83300	21.87500	21.70800	17.50000
10/18/19	12.87500	13.70800	14.12500	12.33300
10/19/19	7.00000	6.41600	6.83300	6.45800
10/20/19	8.91600	9.58300	11.66600	19.04100
10/21/19	5.00000	5.16600	5.37500	4.66600
10/22/19	4.58300	5.04100	4.50000	3.87500
10/23/19	6.04100	6.50000	7.37500	5.12500
10/24/19	30.54100	38.66600	35.00000	42.91600
10/25/19	16.95800	19.04100	17.50000	19.00000
10/26/19	11.37500	10.79100	10.20800	9.20800
10/27/19	29.41600	22.62500	25.29100	26.41600
10/28/19	15.45800	19.33300	16.87500	24.58300
10/29/19	29.12500	26.45800	29.83300	26.37500
10/30/19	41.87500	44.87500	39.00000	49.70800
10/31/19	8.12500	31.50000	8.37500	7.29100
11/01/19	5.87500	33.00000	11.91600	6.25000
11/02/19	7.70800	33.00000	7.79100	7.04100
11/03/19	10.95800	33.00000	9.29100	9.08300
11/04/19	12.04100	33.00000	11.41600	9.66600
11/05/19	13.58300	33.00000	11.95800	9.50000
11/06/19	25.83300	33.00000	19.54100	17.33300
11/07/19	22.95800	33.00000	21.91600	17.50000
11/08/19	7.87500	33.00000	8.16600	6.50000
11/09/19	4.58300		3.95800	3.87500
11/10/19	10.66600		10.04100	9.04100
11/11/19	26.83300		21.29100	14.29100
11/12/19	17.70800		12.87500	9.95800
11/13/19	27.87500		25.37500	24.33300
11/14/19	34.66600	22.87500	31.91600	30.87500

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
11/15/19	35.12500	21.62500	25.79100	21.66600
11/16/19	5.66600	8.79100	7.04100	5.83300
11/17/19	4.91600	6.83300	5.12500	5.04100
11/18/19	5.08300	5.16600	5.54100	9.12500
11/19/19	15.91600	13.91600	15.87500	12.29100
11/20/19	11.16600	7.12500	12.33300	7.45800
11/21/19	5.87500	5.37500	6.75000	6.20800
11/22/19	11.50000	10.83300	9.87500	8.29100
11/23/19	4.95800	5.79100	4.20800	4.75000
11/24/19	3.70800	4.37500	3.70800	3.20800
11/25/19	30.91600	28.91600	28.83300	27.54100
11/26/19	36.33300	34.75000	34.95800	32.95800
11/27/19	9.16600	7.33300	6.33300	15.83300
11/28/19	0.95800	5.12500	1.75000	5.04100
11/29/19	2.37500	1.58300	1.54100	0.91600
11/30/19	3.95800	3.91600	3.58300	3.20800
12/01/19	3.41600	3.66600	2.62500	2.37500
12/02/19	4.54100	4.87500	1.95800	3.08300
12/03/19	4.66600	4.66600	2.00000	3.45800
12/04/19	5.79100	5.33300	2.00000	4.58300
12/05/19	3.62500	3.20800	2.00000	3.87500
12/06/19	5.12500	5.33300	2.00000	3.95800
12/07/19	2.50000	4.00000		5.00000
12/08/19	3.66600	4.04100		2.08300
12/09/19	2.70800	3.37500		3.29100
12/10/19	7.58300	7.66600		8.20800
12/11/19	3.16600	4.04100		3.08300
12/12/19	3.29100	3.29100		2.16600
12/13/19	9.58300	10.54100		11.29100
12/14/19	14.70800	12.33300		16.58300
12/15/19	1.50000	4.45800		4.25000
12/16/19	3.12500	7.33300		7.12500

Site ID	DOE-1	DOE-2	DOE-3	DOE-4
Sample Date	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)	PM ₁₀ (µg/m ³) (CAAQS 50 µg/m ³)
12/17/19	4.16600	6.54100		5.87500
12/18/19	2.54100	3.66600		4.29100
12/19/19	1.08300	2.33300		1.70800
12/20/19	1.16600	2.37500		0.95800
12/21/19	3.83300	4.54100		3.45800
12/22/19	9.79100	9.54100		9.37500
12/23/19	2.25000	3.29100		3.08300
12/24/19	6.66600	3.04100		5.75000
12/25/19	8.08300	9.25000		13.50000
12/26/19	-0.33300	0.79100		2.75000
12/27/19	1.37500	2.70800		2.08300
12/28/19	10.25000	5.45800		5.70800
12/29/19	13.75000	12.00000		15.91600
12/30/19	4.04100	6.41600		6.83300
12/31/19	0.37500	3.62500		3.54100

Note: Gray-shaded boxes indicate a filter sensor pressure failure.

PM₁₀ Monthly Statistics, Q7

Location ID	October 2019			November 2019			December 2019		
	PM ₁₀			PM ₁₀			PM ₁₀		
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL
DOE-1	41.87500	4.58300	32.80780	36.33300	0.95800	34.89550	14.70800	-0.33300	12.17500
DOE-2	44.87500	5.04100	39.90780	34.75000	1.58300	33.00000	12.33300	0.79100	11.70820
DOE-3	39.00000	4.50000	35.80000	34.95800	1.54100	30.37450	2.00000	1.95800	2.00000
DOE-4	49.70800	0.00000	44.27440	32.95800	0.91600	29.20800	16.58300	0.95800	14.82880

PCTL = percentile

PM₁₀ Monthly Statistics, Q5 through Q7

Location ID	Quarter 5											
	April 2019			May 2019			June 2019			July 2019		
	PM ₁₀			PM ₁₀			PM ₁₀			PM ₁₀		
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL
DOE-1	22.37500	6.25000	20.81200	20.29100	3.83300	18.70800	38.79100	5.70800	22.62660	26.50000	12.37500	25.68750
DOE-2	26.41600	7.20800	23.10400	24.87500	4.54100	20.68700	26.70800	6.58300	23.05625	28.62500	14.75000	28.51645
DOE-3	29.91600	7.83300	29.04955	41.25000	7.20800	37.82880	38.29100	5.00000	31.99970	25.83300	14.41600	23.44945
DOE-4	25.16600	7.16600	24.88475	24.95800	4.58300	24.58300	25.29100	5.25000	22.84755	35.20800	13.33300	30.00800
Location ID	Quarter 6											
	July 2019			August 2019			September 2019			October 2019		
	PM ₁₀			PM ₁₀			PM ₁₀			PM ₁₀		
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL
DOE-1	25.12500	10.33300	23.69140	23.20800	6.70800	20.09320	32.41600	9.12500	28.86860	66.00000	10.79100	42.46415
DOE-2	32.75000	10.20800	24.21640	27.29100	7.33300	22.85350	24.45800	8.54100	20.40365	78.08300	9.95800	42.27905
DOE-3	30.04100	9.95800	25.57460	22.66600	10.08300	20.60830	26.37500	7.75000	22.43505	49.62500	2.00000	33.54980
DOE-4	23.12500	9.58300	22.62500	22.54100	5.29100	21.31250	45.45800	1.70800	25.95800	0.00000	0.00000	N/A
Location ID	Quarter 7											
	October 2019			November 2019			December 2019					
	PM ₁₀			PM ₁₀			PM ₁₀					
	High	Low	95th PCTL	High	Low	95th PCTL	High	Low	95th PCTL			
DOE-1	41.87500	4.58300	32.80780	36.33300	0.95800	34.89550	14.70800	-	12.17500			
DOE-2	44.87500	5.04100	39.90780	34.75000	1.58300	33.00000	12.33300	0.79100	11.70820			
DOE-3	39.00000	4.50000	35.80000	34.95800	1.54100	30.37450	2.00000	1.95800	2.00000			
DOE-4	49.70800	0.00000	44.27440	32.95800	0.91600	29.20800	16.58300	0.95800	14.82880			

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APPENDIX B
Analytical Results for Ambient Air VOCs

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

Location ID	Sample Date	Analyte	Result (µg/m ³)	Screening Level Value (µg/m ³)	Method Reporting Limit (µg/m ³)	Screening Level Source
DOE-1	10/24/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.83	US EPA RSL
DOE-1	10/24/2019	Ethyl Acetate	3.1	73	1.7	US EPA RSL
DOE-1	10/24/2019	Trichlorofluoromethane	1.1	1300	0.83	DTSC HHRA note 3
DOE-2	10/24/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.78	US EPA RSL
DOE-2	10/24/2019	Trichlorofluoromethane	1.1	1300	0.78	US EPA RSL
DOE-3	10/24/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.80	US EPA RSL
DOE-3	10/24/2019	Trichlorofluoromethane	1.1	1300	0.80	DTSC HHRA note 3
DOE-4	10/24/2019	Benzene	2.9	0.097	0.82	US EPA RSL
DOE-4	10/24/2019	Freon 12 (Dichlorodifluoromethane)	2.1	100	0.82	US EPA RSL
DOE-4	10/24/2019	Tetrahydrofuran	5	2100	0.85	US EPA RSL
DOE-4	10/24/2019	Trichlorofluoromethane	1.1	1300	0.82	DTSC HHRA note 3
DOE-1	11/8/2019	2-Butanone	2.8	5200	1.5	US EPA RSL
DOE-1	11/8/2019	Acrolein	1.6	0.021	1.3	US EPA RSL
DOE-1	11/8/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.71	US EPA RSL
DOE-1	11/8/2019	Ethyl Acetate	9.8	73	1.5	US EPA RSL
DOE-1	11/8/2019	Toluene	0.75	310	0.72	DTSC HHRA note 3
DOE-1	11/8/2019	Trichlorofluoromethane	1.2	1300	0.71	DTSC HHRA note 3
DOE-2	11/8/2019	2-Butanone	12	5200	9.4	US EPA RSL
DOE-2	11/8/2019	Ethyl Acetate	330	73	9.4	US EPA RSL
DOE-3	11/8/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.82	US EPA RSL
DOE-3	11/8/2019	Ethyl Acetate	16	73	1.7	US EPA RSL
DOE-3	11/8/2019	Trichlorofluoromethane	1.2	1300	0.82	DTSC HHRA note 3
DOE-4	11/8/2019	Freon 12 (Dichlorodifluoromethane)	2.2	100	0.71	US EPA RSL
DOE-4	11/8/2019	Ethyl Acetate	12	73	1.5	US EPA RSL
DOE-4	11/8/2019	Naphthalene	19	0.083	0.70	US EPA RSL
DOE-4	11/8/2019	Toluene	0.89	310	0.72	DTSC HHRA note 3
DOE-4	11/8/2019	Trichlorofluoromethane	1.2	1300	0.71	DTSC HHRA note 3

Location ID	Sample Date	Analyte	Result (µg/m ³)	Screening Level Value (µg/m ³)	Method Reporting Limit (µg/m ³)	Screening Level Source
DOE-1	11/22/2019	Freon 12 (Dichlorodifluoromethane)	2.7	100	0.78	US EPA RSL
DOE-1	11/22/2019	Ethyl Acetate	1.8	73	1.6	US EPA RSL
DOE-1	11/22/2019	Trichlorofluoromethane	1.4	1300	0.78	DTSC HHRA note 3
DOE-2	11/22/2019	Freon 12 (Dichlorodifluoromethane)	2.7	100	0.78	US EPA RSL
DOE-2	11/22/2019	Ethyl Acetate	2.1	73	1.6	US EPA RSL
DOE-2	11/22/2019	Trichlorofluoromethane	1.4	1300	0.78	DTSC HHRA note 3
DOE-3	11/22/2019	Freon 12 (Dichlorodifluoromethane)	2.7	100	0.75	US EPA RSL
DOE-3	11/22/2019	Ethyl Acetate	3.2	73	1.6	US EPA RSL
DOE-3	11/22/2019	Trichlorofluoromethane	1.4	1300	0.75	DTSC HHRA note 3
DOE-4	11/22/2019	1,2,4 - Trimethylbenzene	9.2	63	0.76	US EPA RSL
DOE-4	11/22/2019	1,2 - Dimethyl-benzene	13	100	0.76	US EPA RSL
DOE-4	11/22/2019	1,3,5 - Trimethylbenzene	0.95	63	0.75	US EPA RSL
DOE-4	11/22/2019	4 - Ethyltoluene	2.8	3.1	0.76	US EPA RSL
DOE-4	11/22/2019	Freon 12 (Dichlorodifluoromethane)	2.7	100	0.75	US EPA RSL
DOE-4	11/22/2019	Ethyl Acetate	3.2	73	1.6	US EPA RSL
DOE-4	11/22/2019	Ethylbenzene	11	1.1	0.76	US EPA RSL
DOE-4	11/22/2019	Isopropanol	4.7	210	3.0	US EPA RSL
DOE-4	11/22/2019	M-xylene & P-xylene	45	100	1.6	US EPA RSL
DOE-4	11/22/2019	N-propylbenzene	1.4	1000	0.76	US EPA RSL
DOE-4	11/22/2019	Tetrahydrofuran	0.8	2100	0.78	US EPA RSL
DOE-4	11/22/2019	Toluene	1.3	310	0.76	DTSC HHRA note 3
DOE-4	11/22/2019	Trichlorofluoromethane	1.4	1300	0.75	DTSC HHRA note 3
DOE-4	11/22/2019	Xylenes, total	58	100	1.6	US EPA RSL
DOE-1	12/6/2019	Freon 12 (Dichlorodifluoromethane)	2.4	100	0.94	US EPA RSL
DOE-1	12/6/2019	Ethyl Acetate	4.7	73	1.9	US EPA RSL
DOE-1	12/6/2019	Trichlorofluoromethane	1.2	1300	0.94	DTSC HHRA note 3
DOE-4	12/6/2019	Carbon disulfide	8.6	730	2.0	US EPA RSL
DOE-4	12/6/2019	Freon 12 (Dichlorodifluoromethane)	2.5	100	0.95	US EPA RSL
DOE-4	12/6/2019	Ethyl Acetate	5.8	73	2.0	US EPA RSL

Location ID	Sample Date	Analyte	Result (µg/m ³)	Screening Level Value (µg/m ³)	Method Reporting Limit (µg/m ³)	Screening Level Source
DOE-4	12/6/2019	Trichlorofluoromethane	1.2	1300	0.95	DTSC HHRA note 3
DOE-3	12/6/2019	Freon 12 (Dichlorodifluoromethane)	2.5	100	0.94	US EPA RSL
DOE-3	12/6/2019	Ethyl Acetate	81	73	2.0	US EPA RSL
DOE-3	12/6/2019	Trichlorofluoromethane	1.2	1300	0.94	DTSC HHRA note 3
DOE-2	12/6/2019	Freon 12 (Dichlorodifluoromethane)	2.5	100	1.1	US EPA RSL
DOE-2	12/6/2019	Ethyl Acetate	32	73	2.2	US EPA RSL
DOE-2	12/6/2019	Trichlorofluoromethane	1.2	1300	1.1	DTSC HHRA note 3
DOE-1	12/20/2019	Freon 12 (Dichlorodifluoromethane)	2.3	100	0.72	US EPA RSL
DOE-1	12/20/2019	Ethyl Acetate	3.4	73	1.5	US EPA RSL
DOE-1	12/20/2019	Trichlorofluoromethane	1.1	1300	0.72	DTSC HHRA note 3
DOE-2	12/20/2019	Freon 12 (Dichlorodifluoromethane)	2.3	100	0.73	US EPA RSL
DOE-2	12/20/2019	Ethyl Acetate	3.4	73	1.5	US EPA RSL
DOE-2	12/20/2019	Trichlorofluoromethane	1.1	1300	0.73	DTSC HHRA note 3
DOE-3	12/20/2019	Benzene	1.2	0.097	0.73	DTSC HHRA note 3
DOE-3	12/20/2019	Freon 12 (Dichlorodifluoromethane)	2.3	100	0.73	US EPA RSL
DOE-3	12/20/2019	Trichlorofluoromethane	1.1	1300	0.73	DTSC HHRA note 3
DOE-4	12/20/2019	Freon 12 (Dichlorodifluoromethane)	2.4	100	0.79	US EPA RSL
DOE-4	12/20/2019	Trichlorofluoromethane	1.2	1300	0.79	DTSC HHRA note 3

Note: Bold text and gray-shaded boxes indicate detection above reporting limit, and also exceeds the EPA or DTSC Screening Level.

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APPENDIX C
Radiological Results

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Table C-1. Gross alpha and gross beta air sample results for air samplers, Q7.

Air Station ID	Sample Collection Date	Gross Alpha ($\mu\text{Ci}/\text{mL}$)	Gross Alpha Minimum Detectable Activity (MDA) ($\mu\text{Ci}/\text{mL}$)	Gross Beta ($\mu\text{Ci}/\text{mL}$)	Gross Beta MDC ($\mu\text{Ci}/\text{mL}$)
Sample Location – DOE-1					
DOE-1	10/15/19	3.91E-15	7.90E-15	7.98E-14	2.99E-14
DOE-1	10/18/19	-5.55E-15	1.04E-14	1.17E-13	3.89E-14
DOE-1	10/21/19	-3.09E-15	1.04E-14	5.55E-14	3.91E-14
DOE-1	10/25/19	2.95E-15	8.62E-15	6.26E-14	3.23E-14
DOE-1	10/29/19	1.22E-15	8.12E-15	6.79E-14	3.04E-14
DOE-1	11/1/19	2.54E-15	1.02E-14	7.35E-14	3.93E-14
DOE-1	11/5/19	6.94E-15	7.60E-15	9.39E-14	2.92E-14
DOE-1	11/8/19	6.01E-15	1.03E-14	1.44E-13	3.98E-14
DOE-1	11/12/19	5.52E-15	7.73E-15	1.37E-13	2.97E-14
DOE-1	11/15/19	1.47E-14	1.01E-14	1.82E-15	3.90E-14
DOE-1	11/19/19	7.71E-15	7.87E-15	1.13E-13	3.03E-14
DOE-1	11/22/19	-3.58E-15	1.02E-14	4.53E-14	3.94E-14
DOE-1	11/25/19	1.19E-15	1.03E-14	6.22E-14	3.96E-14
DOE-1	12/3/19	3.19E-15	3.79E-15	3.65E-14	1.47E-14
DOE-1	12/6/19	2.74E-16	1.01E-14	3.58E-14	3.89E-14
DOE-1	12/10/19	-1.35E-15	7.63E-15	1.83E-14	2.95E-14
DOE-1	12/13/19	5.10E-15	1.02E-14	5.00E-14	3.93E-14
DOE-1	12/17/19	-3.87E-15	7.50E-15	3.54E-14	2.90E-14
DOE-1	12/20/19	-1.12E-15	1.03E-14	6.98E-14	3.99E-14
DOE-1	12/23/19	1.05E-14	1.00E-14	6.04E-14	3.88E-14
DOE-1	12/27/19	-2.37E-15	7.59E-15	7.34E-15	2.93E-14
DOE-1	12/30/19	-1.10E-15	1.01E-14	4.77E-14	3.90E-14
Sample Location – DOE-2					
DOE-2	10/15/19	7.82E-16	7.90E-15	9.18E-14	2.99E-14
DOE-2	10/18/19	-4.25E-16	1.04E-14	1.01E-13	3.89E-14
DOE-2	10/21/19	-1.76E-15	1.04E-14	3.79E-14	3.91E-14
DOE-2	10/25/19	1.07E-14	8.62E-15	5.25E-14	3.23E-14
DOE-2	10/29/19	1.22E-15	8.12E-15	4.52E-14	3.04E-14
DOE-2	11/1/19	1.00E-14	1.02E-14	5.97E-14	3.93E-14
DOE-2	11/5/19	7.95E-15	7.60E-15	1.13E-13	2.92E-14
DOE-2	11/8/19	1.22E-14	1.03E-14	1.59E-13	3.97E-14
DOE-2	11/12/19	1.22E-14	7.73E-15	1.42E-13	2.97E-14
DOE-2	11/15/19	7.92E-15	1.01E-14	2.08E-13	3.90E-14
DOE-2	11/19/19	9.80E-15	7.87E-15	9.51E-14	3.03E-14
DOE-2	11/22/19	-5.16E-15	1.02E-14	3.22E-14	3.93E-14
DOE-2	11/25/19	2.56E-15	1.03E-14	4.90E-14	3.96E-14

Air Station ID	Sample Collection Date	Gross Alpha ($\mu\text{Ci}/\text{mL}$)	Gross Alpha Minimum Detectable Activity (MDA) ($\mu\text{Ci}/\text{mL}$)	Gross Beta ($\mu\text{Ci}/\text{mL}$)	Gross Beta MDC ($\mu\text{Ci}/\text{mL}$)
DOE-2	12/3/19	1.90E-15	3.79E-15	3.69E-14	1.46E-14
DOE-2	12/6/19	2.34E-15	1.01E-14	3.05E-14	3.91E-14
DOE-2	12/10/19	-2.90E-15	7.63E-15	1.62E-14	2.95E-14
DOE-2	12/13/19	3.03E-15	1.02E-14	1.61E-14	3.92E-14
DOE-2	12/17/19	-1.83E-15	7.50E-15	6.24E-15	2.90E-014
DOE-2	12/20/19	-1.82E-15	1.03E-14	1.91E-14	3.99E-14
DOE-2	12/23/19	9.54E-15	1.00E-14	6.93E-14	3.88E-14
DOE-2	12/27/19	-1.85E-15	7.59E-15	2.17E-15	2.93E-14
DOE-2	12/30/19	1.65E-15	1.01E-14	5.32E-14	3.90E-14
Sample Location – DOE-3					
DOE-3	10/15/19	-7.82E-16	7.91E-15	9.29E-14	3.00E-14
DOE-3	10/18/19	-4.25E-16	1.04E-14	8.56E-14	3.90E-14
DOE-3	10/21/19	2.91E-15	1.04E-14	3.52E-14	3.91E-14
DOE-3	10/25/19	1.98E-16	8.63E-15	5.98E-14	3.23E-14
DOE-3	10/29/19	1.22E-15	8.12E-15	3.42E-14	3.04E-14
DOE-3	11/1/19	1.83E-14	1.01E-14	4.12E-14	3.87E-14
DOE-3	11/5/19	1.01E-14	7.69E-15	1.02E-13	2.96E-14
DOE-3	11/8/19	1.35E-14	1.03E-14	1.43E-13	3.97E-14
DOE-3	11/12/19	1.01E-14	7.73E-15	1.41E-13	2.97E-14
DOE-3	11/15/19	7.92E-15	1.01E-14	2.07E-13	3.90E-14
DOE-3	11/19/19	3.87E-16	7.87E-15	8.61E-14	3.03E-14
DOE-3	11/22/19	2.37E-15	9.52E-15	4.40E-14	3.66E-14
DOE-3	11/25/19	-8.63E-16	1.03E-14	2.79E-14	3.96E-14
DOE-3	12/3/19	1.90E-15	3.78E-15	2.97E-14	1.49E-14
DOE-3	12/6/19	-1.10E-15	1.01E-14	-1.71E-14	3.92E-14
DOE-3	12/10/19	1.76E-15	7.63E-15	1.88E-14	2.95E-14
DOE-3	12/13/19	2.34E-15	1.02E-14	7.06E-15	3.92E-14
DOE-3	12/17/19	-1.32E-15	7.51E-15	1.64E-15	2.90E-14
DOE-3	12/20/19	-1.82E-15	1.03E-14	2.55E-14	3.99E-14
DOE-3	12/23/19	-1.09E-15	1.00E-14	4.32E-14	3.88E-14
DOE-3	12/27/19	-8.24E-16	7.59E-15	-1.02E-14	2.93E-14
DOE-3	12/30/19	3.02E-15	1.01E-14	3.60E-14	3.91E-14
Sample Location – DOE-4					
DOE-4	10/15/19	-2.87E-15	7.91E-15	8.35E-14	3.00E-14
DOE-4	10/18/19	6.87E-15	1.04E-14	5.65E-14	3.89E-14
DOE-4	10/21/19	2.91E-15	1.04E-14	-4.78E-15	3.91E-14
DOE-4	10/25/19	1.87E-15	8.72E-15	1.91E-14	3.26E-14
DOE-4	10/29/19	4.33E-15	8.12E-15	3.63E-14	3.04E-14

Air Station ID	Sample Collection Date	Gross Alpha ($\mu\text{Ci}/\text{mL}$)	Gross Alpha Minimum Detectable Activity (MDA) ($\mu\text{Ci}/\text{mL}$)	Gross Beta ($\mu\text{Ci}/\text{mL}$)	Gross Beta MDC ($\mu\text{Ci}/\text{mL}$)
DOE-4	11/1/19	3.17E-15	1.01E-14	4.18E-14	3.87E-14
DOE-4	11/5/19	4.46E-15	7.69E-15	7.79E-14	2.96E-14
DOE-4	11/8/19	1.35E-14	1.03E-14	1.51E-13	3.97E-14
DOE-4	11/12/19	8.60E-15	7.53E-15	1.15E-13	2.97E-14
DOE-4	10/15/19	9.27E-15	1.01E-14	1.55E-13	3.09E-14
DOE-4	11/19/19	2.48E-15	7.87E-15	8.09E-14	3.03E-14
DOE-4	11/22/19	9.33E-15	1.02E-14	3.83E-14	3.93E-14
DOE-4	11/25/19	6.67E-15	1.03E-14	2.83E-14	3.96E-14
DOE-4	12/3/19	5.74E-15	3.78E-15	2.22E-14	1.46E-14
DOE-4	12/6/19	-1.10E-15	1.01E-14	7.74E-15	3.92E-14
DOE-4	12/10/19	1.76E-15	7.63E-15	1.83E-14	2.95E-14
DOE-4	12/13/19	3.03E-15	1.02E-14	3.82E-14	3.92E-14
DOE-4	12/17/19	-1.33E-15	7.51E-15	3.29E-14	2.90E-14
DOE-4	12/20/19	-4.63E-15	1.03E-14	5.08E-14	3.99E-14
DOE-4	12/23/19	2.72E-16	1.00E-14	4.93E-14	3.87E-14
DOE-4	12/27/19	-3.45E-15	9.09E-15	3.73E-14	3.51E-14
DOE-4	12/30/19	-2.47E-15	1.01E-14	4.22E-14	3.91E-14

Note: Results less than the MDC are noted in the table as negative numbers.

Table C-2. Gross alpha and gross beta air sample results for air samplers, Q5–Q7.

Quarter	End Sample Date/Time	Result Alpha ($\mu\text{Ci}/\text{mL}$)	MDC – Alpha ($\mu\text{Ci}/\text{mL}$)	Result Beta ($\mu\text{Ci}/\text{mL}$)	MDC – Beta ($\mu\text{Ci}/\text{mL}$)
Sample Location – DOE-1					
Q5	4/15/2019	4.26E-15	7.41E-15	3.01E-14	3.06E-14
Q5	4/18/2019	-1.11E-16	9.71E-15	-7.01E-15	4.13E-14
Q5	4/22/2019	-8.19E-17	7.18E-15	3.07E-15	3.05E-14
Q5	4/25/2019	1.25E-15	9.54E-15	2.71E-15	4.06E-14
Q5	4/29/2019	-8.33E-17	7.30E-15	-5.46E-16	3.11E-14
Q5	5/2/2019	-2.69E-15	9.55E-15	1.73E-14	4.07E-14
Q5	5/6/2019	4.69E-15	7.18E-15	4.55E-14	3.06E-14
Q5	5/9/2019	-3.37E-15	1.20E-14	-6.21E-15	5.09E-14
Q5	5/13/2019	-2.53E-15	7.14E-15	-9.44E-15	3.04E-14
Q5	5/17/2019	-4.75E-16	7.18E-15	5.18E-15	3.06E-14
Q5	5/20/2019	6.24E-15	9.56E-15	2.57E-14	4.07E-14
Q5	5/23/2019	4.18E-15	9.56E-15	-5.02E-15	4.12E-14
Q5	5/28/2019	-1.21E-15	5.74E-15	7.56E-15	2.47E-14
Q5	5/31/2019	5.54E-17	9.62E-15	2.04E-15	4.14E-14
Q5	6/4/2019	2.39E-15	7.54E-15	3.13E-14	2.93E-14
Q5	6/7/2019	3.19E-15	1.01E-14	-7.52E-15	3.90E-14

Quarter	End Sample Date/Time	Result Alpha (µCi/mL)	MDC – Alpha (µCi/mL)	Result Beta (µCi/mL)	MDC – Beta (µCi/mL)
Q5	6/11/2019	-7.05E-16	7.58E-15	1.13E-14	2.94E-14
Q5	6/14/2019	-1.63E-15	1.01E-14	8.23E-15	3.92E-14
Q5	6/18/2019	3.89E-15	7.45E-15	2.55E-14	2.97E-14
Q5	6/21/2019	6.46E-15	1.06E-14	1.71E-14	4.03E-14
Q5	6/25/2019	-2.46E-15	7.93E-15	6.98E-15	3.00E-14
Q5	6/28/2019	-2.57E-15	1.05E-14	1.67E-15	3.98E-14
Q5	7/1/2019	2.24E-15	1.05E-14	4.29E-14	3.97E-14
Q5	7/5/2019	1.08E-15	7.87E-15	6.84E-15	3.12E-14
Q5	7/9/2019	5.40E-16	7.74E-15	1.04E-14	3.07E-14
Q5	7/12/2019	-2.77E-15	1.04E-14	-4.20E-15	4.12E-14
Q6	7/16/2019	5.58E-15	7.95E-15	5.97E-14	3.02E-14
Q6	7/19/2019	-8.04E-16	1.07E-14	5.10E-14	4.07E-14
Q6	7/23/2019	3.54E-15	7.99E-15	2.96E-14	3.03E-14
Q6	7/26/2019	-6.29E-15	1.06E-14	6.37E-14	4.03E-14
Q6	7/30/2019	-2.66E-15	7.98E-15	7.50E-14	3.03E-14
Q6	8/2/2019	1.29E-15	1.08E-14	5.49E-14	4.10E-14
Q6	8/6/2019	4.95E-15	7.77E-15	5.27E-14	2.95E-14
Q6	8/9/2019	-3.70E-15	1.11E-14	-9.72E-16	4.21E-14
Q6	8/13/2019	-7.32E-16	7.55E-15	4.68E-15	2.99E-14
Q6	8/16/2019	-1.70E-15	1.03E-14	3.37E-14	4.07E-14
Q6	8/20/2019	2.91E-15	7.63E-15	5.98E-14	3.02E-14
Q6	8/23/2019	3.89E-15	1.02E-14	3.55E-14	4.04E-14
Q6	8/27/2019	2.39E-15	7.63E-15	3.85E-14	3.02E-14
Q6	8/30/2019	-3.77E-15	1.02E-14	4.58E-14	4.03E-14
Q6	9/3/2019	5.18E-15	7.82E-15	3.18E-14	2.99E-14
Q6	9/6/2019	-5.96E-16	1.06E-14	3.41E-14	4.06E-14
Q6	9/10/2019	-4.24E-16	7.56E-15	7.17E-14	2.89E-14
Q6	9/13/2019	1.01E-16	1.10E-14	4.85E-14	4.21E-14
Q6	9/17/2019	1.09E-15	7.81E-15	8.13E-14	2.99E-14
Q6	9/20/2019	-1.95E-15	1.04E-14	2.32E-14	3.99E-14
Q6	9/24/2019	-2.48E-15	7.82E-15	4.11E-14	2.99E-14
Q6	10/2/2019	2.10E-16	6.37E-15	9.56E-16	2.41E-14
Q6	10/4/2019	2.61E-15	1.58E-14	3.05E-14	5.99E-14
Q6	10/8/2019	7.84E-16	7.92E-15	1.03E-13	3.00E-14
Q6	10/11/2019	3.85E-15	1.06E-14	5.82E-14	4.02E-14
Q7	10/15/2019	3.91E-15	7.90E-15	7.98E-14	2.99E-14
Q7	10/18/2019	5.55E-15	1.04E-14	1.17E-13	3.89E-14
Q7	10/21/2019	-3.09E-15	1.04E-14	5.55E-14	3.91E-14
Q7	10/25/2019	2.95E-15	8.62E-15	6.26E-14	3.23E-14
Q7	10/29/2019	1.22E-15	8.12E-15	6.79E-14	3.04E-14
Q7	11/1/2019	2.54E-15	1.02E-14	7.35E-14	3.93E-14

Quarter	End Sample Date/Time	Result Alpha (µCi/mL)	MDC – Alpha (µCi/mL)	Result Beta (µCi/mL)	MDC – Beta (µCi/mL)
Q7	11/5/2019	6.94E-15	7.60E-15	9.39E-14	2.92E-14
Q7	11/8/2019	6.01E-15	1.03E-14	1.44E-13	3.98E-14
Q7	11/12/2019	5.52E-15	7.73E-15	1.37E-13	2.97E-14
Q7	11/15/2019	1.47E-14	1.01E-14	1.82E-13	3.90E-14
Q7	11/19/2019	7.71E-15	7.87E-15	1.13E-13	3.03E-14
Q7	11/22/2019	-3.58E-15	1.02E-14	4.53E-14	3.94E-14
Q7	11/25/2019	1.19E-15	1.03E-14	6.22E-14	3.96E-14
Q7	12/3/2019	3.19E-15	3.79E-15	3.65E-14	1.47E-14
Q7	12/6/2019	2.74E-16	1.01E-14	3.58E-14	3.89E-14
Q7	12/10/2019	-1.35E-15	7.63E-15	1.83E-14	2.95E-14
Q7	12/13/2019	5.10E-15	1.02E-14	5.00E-14	3.93E-14
Q7	12/17/2019	-3.87E-15	7.50E-15	3.54E-14	2.90E-14
Q7	12/20/2019	-1.12E-15	1.03E-14	6.98E-14	3.99E-14
Q7	12/23/2019	1.05E-14	1.00E-14	6.04E-14	3.88E-14
Q7	12/27/2019	-2.37E-15	7.59E-15	7.34E-15	2.93E-14
Q7	12/30/2019	-1.10E-15	1.01E-14	4.77E-14	3.90E-14
Sample Location – DOE-2					
Q5	4/15/2019	1.16E-15	7.43E-15	2.83E-14	3.09E-14
Q5	4/18/2019	-1.50E-15	9.71E-15	-4.22E-15	4.13E-14
Q5	4/22/2019	-1.62E-15	7.18E-15	-9.30E-15	3.05E-14
Q5	4/25/2019	3.29E-15	9.54E-15	-7.12E-16	4.05E-14
Q5	4/29/2019	-1.65E-15	7.31E-15	8.38E-15	3.11E-14
Q5	5/2/2019	-2.01E-15	9.55E-15	1.80E-14	4.07E-14
Q5	5/6/2019	1.07E-15	7.18E-15	2.93E-14	3.06E-14
Q5	5/9/2019	2.82E-15	9.62E-15	-8.42E-17	4.10E-14
Q5	5/13/2019	-9.86E-16	7.14E-15	-4.23E-15	3.04E-14
Q5	5/17/2019	1.59E-15	7.19E-15	3.04E-14	3.06E-14
Q5	5/20/2019	5.56E-15	9.56E-15	3.76E-14	4.07E-14
Q5	5/23/2019	-4.07E-15	9.55E-15	-1.98E-14	4.11E-14
Q5	5/28/2019	-1.20E-15	5.74E-15	5.87E-15	2.47E-14
Q5	5/31/2019	-2.02E-15	9.63E-15	-2.28E-14	4.14E-14
Q5	6/4/2019	-1.73E-15	7.54E-15	1.49E-14	2.93E-14
Q5	6/7/2019	-2.48E-16	1.01E-14	1.09E-14	3.91E-14
Q5	6/11/2019	8.51E-16	7.58E-15	2.84E-14	2.94E-14
Q5	6/14/2019	-2.49E-16	1.01E-14	5.28E-14	3.92E-14
Q5	6/18/2019	3.38E-15	7.45E-15	2.29E-14	2.97E-14
Q5	6/21/2019	1.58E-15	1.06E-14	1.43E-14	4.03E-14
Q5	6/25/2019	2.73E-15	7.93E-15	8.02E-15	3.00E-14
Q5	6/28/2019	-2.60E-15	1.06E-14	-1.36E-14	4.02E-14
Q5	7/1/2019	1.78E-16	1.05E-14	2.43E-14	3.96E-14
Q5	7/5/2019	2.66E-15	7.87E-15	3.15E-15	3.12E-14

Quarter	End Sample Date/Time	Result Alpha (μCi/mL)	MDC – Alpha (μCi/mL)	Result Beta (μCi/mL)	MDC – Beta (μCi/mL)
Q5	7/9/2019	-2.06E-15	7.75E-15	2.08E-14	3.07E-14
Q5	7/12/2019	2.79E-17	1.04E-14	2.44E-14	4.12E-14
Q6	7/16/2019	6.09E-15	7.95E-15	2.43E-14	3.02E-14
Q6	7/19/2019	-1.11E-16	1.07E-14	2.43E-14	4.07E-14
Q6	7/23/2019	5.09E-15	7.99E-15	3.12E-14	3.03E-14
Q6	7/26/2019	-1.48E-15	1.06E-14	2.62E-14	4.03E-14
Q6	7/30/2019	4.32E-16	7.96E-15	2.95E-14	3.02E-14
Q6	8/2/2019	1.99E-15	1.08E-14	4.36E-14	4.10E-14
Q6	8/6/2019	9.26E-16	7.78E-15	4.41E-14	2.95E-14
Q6	8/9/2019	4.19E-15	1.11E-14	3.68E-14	4.21E-14
Q6	8/13/2019	2.88E-15	7.55E-15	3.71E-14	2.99E-14
Q6	8/16/2019	-9.96E-16	1.03E-14	1.20E-14	4.07E-14
Q6	8/20/2019	4.47E-15	7.64E-15	1.67E-14	3.02E-14
Q6	8/23/2019	-1.69E-15	1.02E-14	-4.80E-15	4.04E-14
Q6	8/27/2019	3.43E-15	7.63E-15	2.66E-14	3.02E-14
Q6	8/30/2019	4.57E-15	1.02E-14	5.35E-14	4.03E-14
Q6	9/3/2019	3.13E-15	7.81E-15	6.48E-14	2.99E-14
Q6	9/6/2019	8.43E-15	1.06E-14	4.33E-14	4.07E-14
Q6	9/10/2019	-4.24E-16	7.56E-15	4.22E-14	2.89E-14
Q6	9/13/2019	5.84E-15	1.10E-14	3.90E-14	4.21E-14
Q6	9/17/2019	4.15E-15	7.81E-15	9.21E-14	2.99E-14
Q6	9/20/2019	7.77E-16	1.04E-14	3.57E-14	4.00E-14
Q6	9/24/2019	1.09E-15	7.81E-15	2.15E-14	2.99E-14
Q6	9/27/2019	3.56E-15	1.06E-14	2.86E-14	4.07E-14
Q6	10/2/2019	2.10E-16	6.37E-15	1.69E-14	2.41E-14
Q6	10/4/2019	1.20E-14	1.58E-14	5.34E-14	5.99E-14
Q6	10/8/2019	6.54E-15	7.92E-15	5.81E-14	3.00E-14
Q6	10/11/2019	1.75E-15	1.06E-14	6.38E-14	4.02E-14
Q7	10/15/2019	7.82E-16	7.90E-15	9.18E-14	2.99E-14
Q7	10/18/2019	-4.25E-16	1.04E-14	1.01E-13	3.89E-14
Q7	10/21/2019	-1.76E-15	1.04E-14	3.79E-14	3.91E-14
Q7	10/25/2019	1.07E-14	8.62E-15	5.25E-14	3.23E-14
Q7	10/29/2019	1.22E-15	8.12E-15	4.52E-14	3.04E-14
Q7	11/1/2019	1.00E-14	1.02E-14	5.97E-14	3.93E-14
Q7	11/5/2019	7.95E-15	7.60E-15	1.13E-13	2.92E-14
Q7	11/8/2019	1.22E-14	1.03E-14	1.59E-13	3.97E-14
Q7	11/12/2019	1.22E-14	7.73E-15	1.42E-13	2.97E-14
Q7	11/15/2019	7.92E-15	1.01E-14	2.08E-13	3.90E-14
Q7	11/19/2019	9.80E-15	7.87E-15	9.51E-14	3.03E-14
Q7	11/22/2019	-5.61E-15	1.02E-14	3.22E-14	3.93E-14
Q7	11/25/2019	2.56E-15	1.03E-14	4.90E-14	3.96E-14

Quarter	End Sample Date/Time	Result Alpha (µCi/mL)	MDC – Alpha (µCi/mL)	Result Beta (µCi/mL)	MDC – Beta (µCi/mL)
Q7	12/3/2019	1.90E-15	3.79E-15	3.69E-14	1.46E-14
Q7	12/6/2019	2.34E-15	1.01E-14	3.05E-14	3.91E-14
Q7	12/10/2019	-2.90E-15	7.63E-15	1.62E-14	2.95E-14
Q7	12/13/2019	3.03E-15	1.02E-14	1.61E-14	3.92E-14
Q7	12/17/2019	-1.83E-15	7.50E-15	6.24E-15	2.90E-14
Q7	12/20/2019	-1.82E-15	1.03E-14	1.91E-14	3.99E-14
Q7	12/23/2019	9.54E-16	1.00E-14	6.93E-14	3.88E-14
Q7	12/27/2019	-1.85E-15	7.59E-15	2.17E-15	2.93E-14
Q7	12/30/2019	1.65E-15	1.01E-14	5.32E-14	3.90E-14
Sample Location – DOE-3					
Q5	4/15/2019	5.31E-15	7.43E-15	1.40E-14	3.09E-14
Q5	4/18/2019	-2.88E-15	9.72E-15	-1.61E-14	4.13E-14
Q5	4/22/2019	2.50E-15	7.24E-15	1.35E-14	3.08E-14
Q5	4/25/2019	5.33E-15	9.53E-15	4.72E-14	4.05E-14
Q5	4/29/2019	3.05E-15	7.31E-15	4.41E-14	3.11E-14
Q5	5/2/2019	4.86E-15	9.55E-15	1.39E-14	4.07E-14
Q5	5/6/2019	5.72E-15	7.18E-15	5.13E-14	3.06E-14
Q5	5/9/2019	1.44E-15	9.60E-15	-4.29E-15	4.09E-14
Q5	5/13/2019	2.61E-15	7.14E-15	4.37E-14	3.04E-14
Q5	5/17/2019	5.60E-16	7.20E-15	2.36E-14	3.07E-14
Q5	5/20/2019	4.87E-15	9.56E-15	2.01E-15	4.07E-14
Q5	5/23/2019	-3.39E-15	9.57E-15	-1.34E-14	4.08E-14
Q5	5/28/2019	2.10E-15	5.74E-15	-8.97E-16	2.47E-14
Q5	5/31/2019	-6.37E-16	9.63E-15	1.91E-14	4.14E-14
Q5	6/4/2019	4.97E-15	7.54E-15	5.07E-14	2.93E-14
Q5	6/7/2019	1.13E-15	1.01E-14	4.65E-14	3.90E-14
Q5	6/11/2019	-7.06E-16	7.59E-15	3.46E-14	2.95E-14
Q5	6/14/2019	2.51E-15	1.01E-14	3.84E-14	3.92E-14
Q5	6/18/2019	7.46E-15	7.45E-15	3.59E-14	2.97E-14
Q5	6/21/2019	-5.16E-16	1.06E-14	1.69E-15	4.03E-14
Q5	6/25/2019	2.21E-15	7.93E-15	7.50E-15	3.00E-14
Q5	6/28/2019	-4.68E-15	1.06E-14	3.65E-14	4.01E-14
Q5	7/1/2019	8.65E-16	1.05E-14	8.00E-14	3.97E-14
Q5	7/5/2019	5.49E-16	7.87E-15	3.21E-14	3.11E-14
Q5	7/9/2019	5.41E-16	7.76E-15	1.30E-14	3.07E-14
Q5	7/12/2019	2.80E-17	1.04E-14	-4.90E-15	4.12E-14
Q6	7/16/2019	1.98E-15	7.95E-15	4.72E-14	3.02E-14
Q6	7/19/2019	-2.88E-15	1.07E-14	6.77E-15	4.07E-14
Q6	7/23/2019	-6.00E-16	7.99E-15	2.49E-14	3.03E-14
Q6	7/26/2019	-2.86E-15	1.06E-14	6.86E-14	4.03E-14
Q6	7/30/2019	-2.65E-15	7.95E-15	3.36E-14	3.02E-14

Quarter	End Sample Date/Time	Result Alpha (µCi/mL)	MDC – Alpha (µCi/mL)	Result Beta (µCi/mL)	MDC – Beta (µCi/mL)
Q6	8/2/2019	-8.11E-16	1.08E-14	4.78E-14	4.10E-14
Q6	8/6/2019	-5.84E-16	7.78E-15	2.73E-14	2.95E-14
Q6	8/9/2019	6.03E-16	1.11E-14	2.88E-14	4.21E-14
Q6	8/13/2019	3.39E-15	7.55E-15	3.35E-14	2.99E-14
Q6	8/16/2019	6.71E-15	1.03E-14	5.66E-15	4.06E-14
Q6	8/20/2019	2.39E-15	7.65E-15	2.92E-14	3.03E-14
Q6	8/23/2019	4.04E-16	1.02E-14	2.30E-14	4.04E-14
Q6	8/27/2019	-2.19E-16	7.63E-15	2.81E-14	3.02E-14
Q6	8/30/2019	-2.92E-16	1.02E-14	7.50E-14	4.03E-14
Q6	9/3/2019	3.13E-15	7.81E-15	2.98E-14	2.99E-14
Q6	9/6/2019	1.49E-15	1.06E-14	4.75E-14	4.07E-14
Q6	9/10/2019	4.02E-15	7.56E-15	5.67E-14	2.89E-14
Q6	9/13/2019	-2.05E-15	1.10E-14	1.79E-14	4.21E-14
Q6	9/17/2019	2.62E-15	7.80E-15	7.09E-14	2.99E-14
Q6	9/20/2019	-2.63E-15	1.05E-14	2.95E-14	4.00E-14
Q6	9/24/2019	-1.46E-15	7.81E-15	2.82E-14	2.99E-14
Q6	9/27/2019	2.87E-15	1.06E-14	4.75E-14	4.07E-14
Q6	10/2/2019	6.30E-16	6.37E-15	4.79E-14	2.41E-14
Q6	10/4/2019	4.69E-15	1.58E-14	7.31E-14	5.98E-14
Q6	10/8/2019	4.45E-15	7.93E-15	9.00E-14	3.01E-14
Q6	10/11/2019	3.85E-15	1.06E-14	8.27E-14	4.02E-14
Q7	10/15/2019	-7.82E-16	7.91E-15	9.29E-14	3.00E-14
Q7	10/18/2019	-4.25E-16	1.04E-14	8.56E-14	3.90E-14
Q7	10/21/2019	2.91E-15	1.04E-14	3.52E-14	3.91E-14
Q7	10/25/2019	1.98E-16	8.63E-15	5.98E-14	3.23E-14
Q7	10/29/2019	1.22E-15	8.12E-15	3.42E-14	3.04E-14
Q7	11/1/2019	1.83E-15	1.01E-14	4.12E-14	3.87E-14
Q7	11/5/2019	1.01E-14	7.69E-15	1.02E-13	2.96E-14
Q7	11/8/2019	1.35E-14	1.03E-14	1.43E-13	3.97E-14
Q7	11/12/2019	1.01E-14	7.73E-15	1.41E-13	2.97E-14
Q7	11/15/2019	7.92E-15	1.01E-14	2.07E-13	3.90E-14
Q7	11/19/2019	3.87E-16	7.87E-15	8.61E-14	3.03E-14
Q7	11/22/2019	2.37E-15	9.52E-15	4.40E-14	3.66E-14
Q7	11/25/2019	-8.63E-16	1.03E-14	2.76E-14	3.96E-14
Q7	12/3/2019	1.90E-15	3.78E-15	2.97E-14	1.46E-14
Q7	12/6/2019	-1.10E-15	1.01E-14	-1.71E-14	3.92E-14
Q7	12/10/2019	1.76E-15	7.63E-15	1.88E-14	2.95E-14
Q7	12/13/2019	2.34E-15	1.02E-14	7.06E-15	3.92E-14
Q7	12/17/2019	-1.32E-15	7.51E-15	1.64E-15	2.90E-14
Q7	12/20/2019	-1.82E-15	1.03E-14	2.55E-14	3.99E-14
Q7	12/23/2019	-1.09E-15	1.00E-14	4.32E-14	3.88E-14

Quarter	End Sample Date/Time	Result Alpha (µCi/mL)	MDC – Alpha (µCi/mL)	Result Beta (µCi/mL)	MDC – Beta (µCi/mL)
Q7	12/27/2019	-8.24E-16	7.59E-15	-1.02E-14	2.93E-14
Q7	12/30/2019	3.02E-15	1.01E-14	3.60E-14	3.91E-14
Sample Location – DOE-4					
Q5	4/15/2019	6.42E-16	7.42E-15	1.30E-14	3.08E-14
Q5	4/18/2019	5.82E-16	9.73E-15	1.19E-14	4.14E-14
Q5	4/22/2019	2.47E-15	7.17E-15	3.96E-14	3.05E-14
Q5	4/25/2019	-3.51E-15	9.54E-15	5.96E-14	4.06E-14
Q5	4/29/2019	3.05E-15	7.32E-15	4.57E-14	3.11E-14
Q5	5/2/2019	-1.32E-15	9.55E-15	-7.75E-15	4.07E-14
Q5	5/6/2019	4.69E-15	7.18E-15	5.60E-14	3.06E-14
Q5	5/9/2009	-2.70E-15	9.59E-15	1.25E-14	4.08E-14
Q5	5/13/2019	-2.01E-15	7.13E-15	1.71E-14	3.04E-14
Q5	5/17/2019	4.77E-17	8.28E-15	1.08E-14	3.53E-14
Q5	5/20/2019	3.98E-15	1.09E-14	-8.89E-16	4.64E-14
Q5	5/23/2019	5.56E-15	9.57E-15	-1.56E-14	4.12E-14
Q5	5/28/2019	-1.20E-15	5.74E-15	2.53E-14	2.47E-14
Q5	5/31/2019	5.54E-17	9.63E-15	4.04E-14	4.14E-14
Q5	6/4/2019	1.89E-15	7.57E-15	5.20E-14	2.94E-14
Q5	6/7/2019	1.82E-15	1.01E-14	2.87E-14	3.91E-14
Q5	6/11/2019	-7.06E-16	7.59E-15	3.41E-14	2.95E-14
Q5	6/14/2019	-3.70E-15	1.01E-14	6.86E-16	3.92E-14
Q5	6/18/2019	7.97E-15	7.45E-15	4.68E-14	2.97E-14
Q5	6/21/2019	1.58E-15	1.06E-14	6.25E-14	4.03E-14
Q5	6/25/2019	6.54E-16	7.93E-15	2.10E-14	3.00E-14
Q5	6/28/2019	-3.94E-15	1.05E-14	2.09E-14	3.97E-14
Q5	7/1/2019	3.65E-15	1.06E-14	4.27E-14	4.01E-14
Q5	7/5/2019	-1.03E-15	7.87E-15	1.16E-14	3.11E-14
Q5	7/9/2019	-5.00E-16	7.76E-15	2.29E-14	3.07E-14
Q5	7/12/2019	-6.71E-16	1.04E-14	3.07E-14	4.13E-14
Q6	7/16/2019	-8.23E-17	7.95E-15	4.09E-14	3.02E-14
Q6	7/19/2019	-2.19E-15	1.07E-14	-2.38E-16	4.07E-14
Q6	7/23/2019	-8.27E-17	7.99E-15	7.67E-15	3.03E-14
Q6	7/26/2019	-1.49E-15	1.06E-14	1.71E-14	4.03E-14
Q6	7/30/2019	-5.96E-16	7.94E-15	7.10E-15	3.01E-14
Q6	8/2/2019	5.87E-16	1.08E-14	3.16E-14	4.10E-14
Q6	8/6/2019	-8.06E-17	7.79E-15	5.28E-14	2.96E-14
Q6	8/9/2019	-2.27E-15	1.11E-14	5.49E-14	4.21E-14
Q6	8/13/2019	5.46E-15	7.55E-15	1.96E-14	2.99E-14
Q6	8/16/2019	4.06E-16	1.03E-14	3.71E-14	4.06E-14
Q6	8/20/2019	5.53E-15	7.66E-15	1.20E-14	3.03E-14
Q6	8/23/2019	4.59E-15	1.02E-14	1.75E-14	4.04E-14

Quarter	End Sample Date/Time	Result Alpha (μCi/mL)	MDC – Alpha (μCi/mL)	Result Beta (μCi/mL)	MDC – Beta (μCi/mL)
Q6	8/27/2019	1.87E-15	7.63E-15	1.67E-14	3.02E-14
Q6	8/30/2019	5.97E-15	1.02E-14	3.41E-14	4.03E-14
Q6	9/3/2019	7.72E-15	7.81E-15	6.02E-14	2.99E-14
Q6	9/6/2019	5.65E-15	1.06E-14	5.87E-14	4.07E-14
Q6	9/10/2019	-4.24E-16	7.56E-15	2.68E-14	2.89E-14
Q6	9/13/2019	-4.21E-15	1.10E-14	2.01E-14	4.21E-14
Q6	9/17/2019	3.13E-15	7.80E-15	6.11E-14	2.98E-14
Q6	9/20/2019	-3.32E-15	1.05E-14	2.26E-14	4.00E-14
Q6	9/24/2019	-4.38E-16	7.81E-15	3.90E-14	2.99E-14
Q6	9/27/2019	-1.98E-15	1.06E-14	3.49E-14	4.07E-14
Q6	10/2/2019	-1.89E-15	6.37E-15	3.79E-14	2.41E-14
Q6	10/4/2019	6.78E-15	1.58E-14	8.77E-14	5.99E-14
Q6	10/8/2019	4.45E-15	7.93E-15	9.31E-14	3.00E-14
Q7	10/15/2019	-2.87E-15	7.91E-15	8.35E-14	3.00E-14
Q7	10/18/2019	6.87E-15	1.04E-14	5.65E-14	3.89E-14
Q7	10/21/2019	2.91E-15	1.04E-14	-4.78E-15	3.91E-14
Q7	10/25/2019	1.87E-15	8.72E-15	1.92E-14	3.26E-14
Q7	10/29/2019	4.33E-15	8.12E-15	3.63E-14	3.04E-14
Q7	11/1/2019	3.17E-15	1.01E-14	4.18E-14	3.87E-14
Q7	11/5/2019	4.46E-15	7.69E-15	7.79E-14	2.96E-14
Q7	11/8/2019	1.35E-14	1.03E-14	1.51E-13	3.97E-14
Q7	11/12/2019	8.60E-15	7.73E-15	1.15E-13	2.97E-14
Q7	11/15/2019	9.27E-15	1.01E-14	1.55E-13	3.90E-14
Q7	11/19/2019	2.48E-15	7.87E-15	8.09E-14	3.03E-14
Q7	11/22/2019	9.33E-15	1.02E-14	3.83E-14	3.93E-14
Q7	11/25/2019	6.67E-15	1.03E-14	2.83E-14	3.96E-14
Q7	12/3/2019	5.74E-15	3.78E-15	2.22E-14	1.46E-14
Q7	12/6/2019	-1.10E-15	1.01E-14	7.74E-15	3.92E-14
Q7	12/10/2019	1.76E-15	7.63E-15	1.83E-14	2.95E-14
Q7	12/13/2019	3.03E-15	1.02E-14	3.82E-14	3.92E-14
Q7	12/17/2019	-1.33E-15	7.51E-15	3.29E-14	2.90E-14
Q7	12/20/2019	-4.63E-15	1.03E-14	5.08E-14	3.99E-14
Q7	12/23/2019	2.72E-16	1.00E-14	4.93E-14	3.87E-14
Q7	12/27/2019	-3.45E-15	9.09E-15	3.73E-14	3.51E-14
Q7	12/30/2019	-2.47E-15	1.01E-14	4.22E-14	3.91E-14

Note: Results less than the MDC are noted in the table as negative numbers.

Table C-3. Individual radionuclide analysis for composite filter samples, Q7.

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Location DOE-1 – Air volume/sample =				
Cesium-137	-3.25	7.63	U	-1.001E-13
Strontium-90	-0.264	2.92	U	-8.130E-15
Cobalt-60	-0.72	9.46	U	-2.217E-14
Potassium-40	35.1	81.7	U	1.081E-12
Beryllium-7	90.6	102	U	2.790E-12
Plutonium-238	0.0389	0.117	U	1.198E-15
Polonium-210	10.5	1.42		3.234E-13
Plutonium-241	3.46	19.5	U	1.066E-13
Thorium-230	1.16	0.61		3.572E-14
Thorium-228	1.04	0.294		3.203E-14
Actinium-228	7.44	37.9	U	2.291E-13
Americium-241	0.093	0.204	U	2.864E-15
Plutonium-239	0.0981	0.216	U	3.021E-15
Ra-228 – total	0.297	1.67	U	9.147E-15
Radium-226, -228 combined	5.98	4.77		1.842E-13
Thorium-232	0.804	0.444		2.476E-14
Uranium-238	0.526	0.143		1.620E-14
Uranium-233/234	0.483	0.169		1.487E-14
Uranium-235/236	0.0695	0.121	U	2.140E-15
Location DOE-2 – Air volume/sample =				
Cesium-137	-0.716	6.48	U	-2.205E-14
Strontium-90	-1.34	2.94	U	-4.127E-14
Cobalt-60	-1.89	7.21	U	-5.821E-14
Potassium-40	130	51.6		4.004E-12
Beryllium-7	201	74.3		6.190E-12
Plutonium-238	0.0211	0.224	U	6.498E-16
Polonium-210	16.3	1.31		5.020E-13
Plutonium-241	5.07	21.6	U	1.561E-13
Thorium-230	1.14	0.818		3.511E-14
Thorium-228	0.149	0.771	U	4.589E-15
Actinium-228	6.94	33.8	U	2.137E-13
Americium-241	0.0667	0.182	U	2.054E-15
Plutonium-239	0	0.121	U	0.000E+0
Ra-228 – total	0.0272	1.66	U	8.377E-16
Radium-226, -228 combined	5.32	3.37		1.638E-13
Thorium-232	0.269	0.586	U	8.284E-15

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Uranium-238	0.78	0.126		2.402E-14
Uranium-233/234	0.673	0.182		2.073E-14
Uranium-235/236	0.0493	0.18	U	1.518E-15
Location DOE-3 – Air volume/sample =				
Cesium-137	3.75	6.44	U	1.155E-13
Strontium-90	2.55	2.94	U	7.856E-14
Cobalt-60	0.304	7.98	U	9.366E-15
Potassium-40	137	62.2		4.221E-12
Beryllium-7	176	77.8		5.422E-12
Plutonium-238	0.0197	0.209	U	6.069E-16
Polonium-210	13.5	1.19		4.159E-13
Plutonium-241	-2.54	19.5	U	-7.825E-14
Thorium-230	0.754	0.89	U	2.323E-14
Thorium-228	0.537	0.862	U	1.654E-14
Actinium-228	0.926	32.4	U	2.853E-14
Americium-241	0.0747	0.272	U	2.301E-15
Plutonium-239	0.0952	0.209	U	2.933E-15
Ra-228 - total	0.07	1.3	U	2.157E-15
Radium-226, -228 combined	5.41	3.45		1.667E-13
Thorium-232	1.04	0.638		3.204E-14
Uranium-238	0.786	0.206		2.422E-14
Uranium-233/234	0.565	0.223		1.741E-14
Uranium-235/236	0.0276	0.174	U	8.503E-16
Location DOE-4 – Air volume/sample =				
Cesium-137	-1.41	5.95	U	-4.345E-14
Strontium-90	-0.235	2.3	U	-7.241E-15
Cobalt-60	1.14	6.78	U	3.513E-14
Potassium-40	12.3	69.1	U	3.790E-13
Beryllium-7	141	75.5		4.345E-123
Plutonium-238	0.0335	0.211	U	1.032E-15
Polonium-210	18.3	1.2		5.639E-13
Plutonium-241	10.8	20.2	U	3.328E-13
Thorium-230	0.634	0.827	U	1.954E-14
Thorium-228	0.717	0.935	U	2.209E-14
Actinium-228	-5.45	26.7	U	-1.679E-13
Americium-241	0.00372	0.613	U	1.146E-16
Plutonium-239	0.0334	0.211	U	1.029E-15
Ra-228 – total	1.26	1.92	U	3.883E-14

Radionuclide	Result (pCi/sample)	MDC (pCi/sample)	Data Qualifier	Airborne Concentration (µCi/mL)
Radium-226, -228 combined	5.42	5.28		1.670E-13
Thorium-232	0.431	0.555	U	1.328E-14
Uranium-238	0.409	0.137		1.260E-14
Uranium-233/234	0.487	0.183		1.501E-146
Uranium-235/236	0.021	0.132	U	6.471E-16

Table C-4. Individual radionuclide analysis for composite filter samples, Q5 through Q7.

Radionuclide	Q5 Result (µCi/mL)	Data Qualifier ¹	Q6 Result (µCi/mL)	Data Qualifier	Q7 Result (µCi/mL)	Data Qualifier
Sample Location – DOE-1						
Cesium-137	-4.40E-15	U U	-1.93E-15	U	-1.001E-13	U
Strontium-90	1.41E-15	U U	-1.03E-15	U	-8.130E-15	U
Cobalt-60	-4.01E-15	U U	-1.72E-15	U	-2.217E-14	U
Potassium-40	1.05E-14	U U	3.71E-14	U	1.081E-12	U
Beryllium-7	1.42E-13	U U	2.55E-13		2.790E-12	U
Plutonium-238	4.88E-17	U U	-6.30E-17	U	1.198E-15	U
Polonium-210	1.45E-14		1.53E-14		3.234E-13	
Plutonium-241	1.19E-14	U U	3.81E-15	U	1.066E-13	U
Thorium-230	9.32E-16		2.83E-15		3.572E-14	
Thorium-228	5.33E-16	U U	1.78E-15		3.203E-14	
Actinium-228			7.55E-15	U	2.291E-13	U
Americium-241	-2.25E-17	U U	-7.83E-17	U	2.864E-15	U
Plutonium-239	2.92E-17	U U	-4.62E-17	U	3.021E-15	U
Ra-228 – total	2.52E-15	U U	1.75E-15	U	9.147E-15	U
Radium-226, -228 combined	2.55E-15		3.70E-15		1.842E-13	
Thorium-232	5.13E-16	U U	1.59E-15		2.476E-14	
Uranium-238	8.64E-16		9.81E-16		1.620E-14	
Uranium-233/234	7.51E-16		1.16E-15		1.487E-14	
Uranium-235/236	8.90E-17		2.66E-17	U	2.140E-15	U
Sample Location – DOE-2						
Cesium-137	-7.19E-16	U U	-4.85E-16	U	-2.205E-14	U
Strontium-90	1.89E-15	U U	4.57E-16	U	-4.127E-14	U
Cobalt-60	1.81E-15	U U	-1.26E-16	U	-5.821E-14	U
Potassium-40	1.53E-13		4.56E-14	U	4.004E-12	
Beryllium-7	4.61E-15	U U	2.26E-13		6.190E-12	
Plutonium-238	-3.73E-17	U U	-3.77E-17	U	6.498E-16	U
Polonium-210	1.51E-14		1.37E-14		5.020E-13	
Plutonium-241	1.08E-14	U U	3.75E-15	U	1.561E-13	U

Radionuclide	Q5 Result ($\mu\text{Ci/mL}$)	Data Qualifier ¹	Q6 Result ($\mu\text{Ci/mL}$)	Data Qualifier	Q7 Result ($\mu\text{Ci/mL}$)	Data Qualifier
Thorium-230	1.02E-15		1.49E-15		3.511E-14	
Thorium-228	3.96E-16	U U	9.10E-16		4.589E-15	U
Actinium-228			7.23E-15	U	2.137E-13	U
Americium-241	-1.89E-17	U U	8.72E-17	U	2.054E-15	U
Plutonium-239	-4.46E-17	U U	7.06E-17	U	0.000E+0	U
Ra-228 – total	1.31E-15	U U	2.66E-15		8.377E-16	U
Radium-226, -228 combined	3.00E-15		3.18E-15		1.638E-13	
Thorium-232	6.80E-16		1.04E-15		8.284E-15	U
Uranium-238	6.53E-16		6.34E-16		2.402E-14	
Uranium-233/234	7.23E-16		8.90E-16		2.073E-14	
Uranium-235/236	5.24E-17		1.06E-16	U	1.518E-15	U
Sample Location – DOE-3						
Cesium-137	-2.89E-15	U U	1.30E-15	U	1.155E-13	U
Strontium-90	6.04E-16	U U	4.95E-16	U	7.856E-14	U
Cobalt-60	4.82E-15	U U	2.77E-15	U	9.366E-15	U
Potassium-40	1.08E-13	U U	1.01E-13		4.221E-12	
Beryllium-7	2.42E-14	U U	2.01E-13		5.422E-12	
Plutonium-238	-2.33E-17	U U	-4.36E-17	U	6.069E-16	U
Polonium-210	1.52E-14		1.15E-14		4.159E-13	
Plutonium-241	1.70E-14	U U	8.97E-16	U	-7.825E-14	U
Thorium-230	7.72E-16	J	1.29E-15		2.323E-14	U
Thorium-228	9.21E-16	J	3.84E-16	U	1.654E-14	U
Actinium-228			-1.64E-14	U	2.853E-14	U
Americium-241	2.56E-17	U U	3.38E-17	U	2.301E-15	U
Plutonium-239	1.94E-18	U U	5.66E-17	U	2.933E-15	U
Ra-228 – total	2.30E-15	U U	5.71E-16	U	2.157E-15	U
Radium-226, -228 combined	3.80E-15		3.29E-15		1.667E-13	
Thorium-232	7.40E-16	J	6.92E-16	U	3.204E-14	
Uranium-238	8.80E-16		1.31E-15		2.422E-14	
Uranium-233/234	8.14E-16		1.08E-15		1.741E-14	
Uranium-235/236	2.15E-17	U U	2.55E-17	U	8.503E-16	U
Sample Location – DOE-4						
Cesium-137	5.03E-15	U U	-5.79E-16	U	-4.345E-14	U
Strontium-90	-1.79E-15	U U	5.97E-16	U	-7.241E-15	U
Cobalt-60	7.35E-15	U U	3.64E-15	U	3.513E-14	U
Potassium-40	7.44E-14	U U	5.10E-14	U	3.790E-13	U
Beryllium-7	7.04E-14	U U	1.64E-13		4.345E-12	
Plutonium-238	7.77E-17	U U	-2.97E-17	U	1.032E-15	U
Polonium-210	1.53E-14		8.48E-15		5.639E-13	

Radionuclide	Q5 Result ($\mu\text{Ci/mL}$)	Data Qualifier¹	Q6 Result ($\mu\text{Ci/mL}$)	Data Qualifier	Q7 Result ($\mu\text{Ci/mL}$)	Data Qualifier
Plutonium-241	1.34E-14	<i>U U</i>	3.29E-15	U	3.328E-13	U
Thorium-230	7.37E-16	<i>U UJ</i>	8.52E-16		1.954E-14	U
Thorium-228	2.31E-16	<i>U UJ</i>	1.23E-15		2.209E-14	U
Actinium-228			4.26E-15	U	-1.679E-13	U
Americium-241	1.10E-16	<i>U U</i>	2.26E-16	U	1.146E-16	U
Plutonium-239	3.10E-17	<i>U U</i>	3.50E-17	U	1.029E-15	U
Ra-228 – total	0.00E+00	<i>U U</i>	-2.89E-15	U	3.883E-14	U
Radium-226, -228 combined	2.38E-15		5.24E-15		1.670E-13	
Thorium-232	3.62E-16	<i>U UJ</i>	4.37E-16	U	1.328E-14	U
Uranium-238	8.22E-16		8.47E-16		1.260E-14	
Uranium-233/234	8.42E-16		7.66E-16		1.501E-14	
Uranium-235/236	3.86E-17	<i>U U</i>	4.64E-17	U	6.471E-16	U

¹ Qualifier column contains laboratory flags (normal font) and validation qualifiers (italics).

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APPENDIX D

PM₁₀ Monthly Audit Reports and Flow Verification Results

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

Station # DOE-1 Serial # X16067
 Audit Date: 11/14/19 Audited By: TBW

Flow Audit			
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047
Calibration Date:	1/21/2019		
Leak Check Value:	as found: <u>0.4</u>	as left: <u>0.4</u>	

	as found:	E-BAM	Ref. Std.	as left:	E-BAM	Ref. Std.
Ambient Temperature:		<u>20.6</u> °C	<u>20.6</u> °C		<u>20.6</u> °C	<u>20.6</u> °C
Barometric Pressure:		<u>712.5</u> mmHg	<u>715.0</u> mmHg		<u>712.5</u> mmHg	<u>715.0</u> mmHg
16.7 lpm Flow Rate		<u>14.7</u> lpm	<u>16.8</u> lpm		<u>16.7</u> lpm	<u>16.8</u> lpm
14.0 lpm Flow Rate		<u>14.0</u> lpm	<u>14.1</u> lpm		<u>14.00</u> lpm	<u>14.1</u> lpm
17.5 lpm Flow Rate		<u>17.5</u> lpm	<u>17.7</u> lpm		<u>17.5</u> lpm	<u>17.7</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>0.906</u>	Flow Rate	Vacuum Value	Quality Category
Measured Span Mass (mg/cm2):	<u>0.906</u>	14.0 - 15.0 (lpm)	(Hg)	Good / Marginal / Poor
Difference (mg/cm2):	<u>0.000</u>			
% Difference / Pass or Fail:	<u>0% PASS</u>	<u>15.0</u>	<u>424.6</u>	<u>Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>0931</u>	<u>0931</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>12.5</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>11/14/19</u>	<u>4</u>				
<u>2</u>		<u>5</u>				
<u>3</u>		<u>6</u>				

Audit Notes:



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

Station # DOE-2 Serial # Y12096
 Audit Date: 11/14/2019 Audited By: T. Stewart W. McFord

Flow Audit			
Flow Audit Device Model:	<u>BGI Delta Cal DC-1A</u>	Serial No:	<u>158047</u>
		Calibration Date:	<u>1/21/2019</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>21.0</u> °C	<u>20.6</u> °C	as left:	<u>21.0</u> °C	<u>20.6</u> °C
Barometric Pressure:	as found: <u>711.9</u> mmHg	<u>711.5</u> mmHg	as left:	<u>711.9</u> mmHg	<u>711.5</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	<u>16.81</u> lpm	as left:	<u>16.7</u> lpm	<u>16.81</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	<u>14.02</u> lpm	as left:	<u>14.0</u> lpm	<u>14.02</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/cm2): <u>0.848</u>	Flow Rate	Vacuum Value	Quality Category
Measured Span Mass (mg/cm2): <u>0.865</u>	14.0 - 15.0	(Hg)	Good / Marginal / Poor
Difference (mg/cm2): <u>0.017</u>	(lpm)		
% Difference / Pass or Fail: <u>1.98% Pass</u>	<u>14.3</u>	<u>403.0</u>	<u>Good</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>10:42</u>	<u>10:42</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>12.5 v</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>60 min</u>	Delta T Setpoint	15 C	<u>15 C</u>	DAC	8.0 v	<u>8.0 v</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>1.0 v</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>						4
<u>2</u>						5
<u>3</u>						6

Audit Notes:
Initial Audit for Start up



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

Station # DOE-3

Serial # W23313

Audit Date: 11/14/19

Audited By: TRW

Flow Audit					
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047	Calibration Date:	1/21/2019
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
	<u>20.5</u>	°C	<u>18.1</u>	°C	<u>20.5</u>
Barometric Pressure:	as found:	E-BAM	Ref. Std.	as left:	E-BAM
	<u>713.9</u>	mmHg	<u>711.0</u>	mmHg	<u>713.9</u>
16.7 lpm Flow Rate	as found:	E-BAM	Ref. Std.	as left:	E-BAM
	<u>16.7</u>	lpm	<u>16.78</u>	lpm	<u>16.7</u>
14.0 lpm Flow Rate	as found:	E-BAM	Ref. Std.	as left:	E-BAM
	<u>14.0</u>	lpm	<u>14.07</u>	lpm	<u>14.0</u>
17.5 lpm Flow Rate	as found:	E-BAM	Ref. Std.	as left:	E-BAM
	<u>17.5</u>	lpm	<u>17.6</u>	lpm	<u>17.5</u>

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 ²):	<u>0.895</u>	Flow Rate	Vacuum Value
Measured Span Mass (mg/cm ²):	<u>0.877</u>	14.0 - 15.0 (lpm)	Quality Category
Difference (mg/cm ²):	<u>0.018</u>		Good / Marginal / Poor
% Difference / Pass or Fail:	<u>0.91% PASS</u>	<u>14.3</u>	<u>394.2</u>
			<u>Good</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>1148</u>	<u>1148</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>24 hr</u>	RH Setpoint	45%	<u>45%</u>	Std Cond Temp	25 C	<u>25 C</u>
Realtime Avg	60 mins	<u>60 mins</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 F-BAM Error Log					
Error	Date	Time	Error	Date	Time
<u>1 No New Messages</u>	<u>11/1/19</u>	<u>4</u>			
<u>2</u>		<u>5</u>			
<u>3</u>		<u>6</u>			

Audit Notes:



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

Station # DOE-4 Serial # W23310
 Audit Date: 11/14/2019 Audited By: TJW

Flow Audit						
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047	Calibration Date:	1/21/2019	
Leak Check Value:	as found: <u>0.4</u>		as left: <u>0.4</u>			
Ambient Temperature:	as found: <u>15.8</u> °C	Ref. Std.:	<u>16.0</u> °C	as left: <u>15.8</u> °C	Ref. Std.:	<u>16.0</u> °C
Barometric Pressure:	as found: <u>703.9</u> mmHg		<u>703.4</u> mmHg	as left: <u>703.9</u> mmHg		<u>703.4</u> mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm		<u>16.6</u> lpm	as left: <u>16.7</u> lpm		<u>16.6</u> lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm		<u>14.3</u> lpm	as left: <u>14.0</u> lpm		<u>14.3</u> lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm		<u>17.34</u> lpm	as left: <u>17.5</u> lpm		<u>17.34</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>0.915</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm2):	<u>0.912</u>	14.0 - 15.0	Value	
Difference (mg/cm2):	<u>0.003</u>	(lpm)	(Hg)	Good / Marginal / Poor
% Difference / Pass or Fail:	<u>0.33% PASS</u>	<u>14.6</u>	<u>403.8</u>	

Setup and Calibration Values									
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found	
Clock	<u>1305</u>	<u>1305</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>24 hr</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	
<u>1 No New Messages</u>	<u>11/14/19</u>	<u>4</u>				
<u>2</u>		<u>5</u>				
<u>3</u>		<u>6</u>				

Audit Notes:

NORTHWIND

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

Station # DOE-1 Serial # X 16067
 Audit Date: 12/12/2019 Audited By: TBW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019
 Leak Check Value: as found: 0.4 as left: 0.4

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:	<u>22.9</u> °C	<u>21.5</u> °C	as left:	<u>22.9</u> °C	<u>21.5</u> °C
Barometric Pressure:	as found:	<u>720.0</u> mmHg	<u>718.0</u> mmHg	as left:	<u>720.0</u> mmHg	<u>718.0</u> mmHg
16.7 lpm Flow Rate	as found:	<u>16.7</u> lpm	<u>16.86</u> lpm	as left:	<u>16.7</u> lpm	<u>16.86</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>17.75</u> lpm	as left:	<u>17.5</u> lpm	<u>17.75</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>0.904</u>	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm2): <u>0.903</u>	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm2): <u>0.003</u>	(lpm)	(Hg)	
% Difference <u>Pass</u> or Fail: <u>0.33%</u>	<u>14.1</u>	<u>398.8</u>	<u>Good</u>

Setup and Calibration Values

Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>11:17</u>	<u>11:17</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 hr</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>1.0 v</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>2</u>					
<u>3</u>					

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-2 Serial # Y12096
 Audit Date: 12/12/19 Audited By: TOW

Flow Audit					
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047	Calibration Date:	1/21/2019
Leak Check Value:	as found: <u>0.5</u>	as left:	<u>0.5</u>		
Ambient Temperature:	as found: <u>13.4</u> °C	Ref. Std. °C	<u>14.0</u>	as left: <u>13.4</u> °C	Ref. Std. °C
Barometric Pressure:	as found: <u>714.5</u> mmHg	Ref. Std. mmHg	<u>714.0</u>	as left: <u>714.5</u> mmHg	Ref. Std. mmHg
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	Ref. Std. lpm	<u>16.79</u>	as left: <u>16.7</u> lpm	Ref. Std. lpm
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	Ref. Std. lpm	<u>14.04</u>	as left: <u>14.0</u> lpm	Ref. Std. lpm
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	Ref. Std. lpm	<u>17.7</u>	as left: <u>17.5</u> lpm	Ref. Std. 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	Quality Category
Measured Span Mass (mg/cm2):	<u>0.876</u>	14.0 - 15.0 (lpm)	Good / Marginal / Poor
Difference (mg/cm2):	<u>0.028</u>	Vacuum Value (Hg)	
% Difference / Pass or Fail:	<u>3.2%</u>	<u>14.5</u> / <u>415.5</u>	<u>Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	<u>0700</u>	<u>0700</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>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	
<u>1 No New Messages</u>	<u>12/12/19</u>	<u>0710</u>				
<u>2</u>						
<u>3</u>						

Audit Notes:

NORTHWIND

Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3 Serial # NA (W23313)
 Audit Date: 12/12/2019 Audited By: TBW

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 1/21/2019
 Leak Check Value: as found: _____ as left: _____

		E-BAM	Ref. Std.		E-BAM	Ref. Std.
Ambient Temperature:	as found:		°C	as left:		°C
Barometric Pressure:	as found:		mmHg	as left:		mmHg
16.7 lpm Flow Rate	as found:		lpm	as left:		lpm
14.0 lpm Flow Rate	as found:		lpm	as left:		lpm
17.5 lpm Flow Rate	as found:		lpm	as left:		lpm

Mechanical Audits (Y = Yes N = No)

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

Manual Span Membrane Test	Pump Test		
Expected Span Mass (mg/cm ²):	Flow Rate	Vacuum	Quality Category
Measured Span Mass (mg/cm ²):	14.0 - 15.0	Value	Good / Marginal / Poor
Difference (mg/cm ²):	(lpm)	(Hg)	
% Difference / Pass or Fail:			

Setup and Calibration Values

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

Last 6 Errors in E-BAM Error Log

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

Audit Notes:

Unit is G met one being repaired. Arrived on 12/10/2019 at Met one

NORTHWIND

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

Station # DOE-4 Serial # W23310
 Audit Date: 12/12/19 Audited By: TSW

Flow Audit					
Flow Audit Device Model:	BGI Delta Cal DC-1A	Serial No:	158047	Calibration Date:	1/21/2019
Leak Check Value:	as found: <u>0.7</u>		as left: <u>0.7</u>		
Ambient Temperature:	as found: <u>21.3</u> °C	Ref. Std.	<u>21.1</u> °C	as left: <u>21.3</u> °C	Ref. Std.
Barometric Pressure:	as found: <u>708.5</u> mmHg	Ref. Std.	<u>708.0</u> mmHg	as left: <u>708.5</u> mmHg	Ref. Std.
16.7 lpm Flow Rate	as found: <u>16.7</u> lpm	Ref. Std.	<u>16.7</u> lpm	as left: <u>16.7</u> lpm	Ref. Std.
14.0 lpm Flow Rate	as found: <u>14.0</u> lpm	Ref. Std.	<u>14.01</u> lpm	as left: <u>14.0</u> lpm	Ref. Std.
17.5 lpm Flow Rate	as found: <u>17.5</u> lpm	Ref. Std.	<u>17.47</u> lpm	as left: <u>17.5</u> lpm	Ref. Std.
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 ²): <u>0.915</u>	Flow Rate 14.0 - 15.0 (lpm)	Vacuum Value (Hg)	Quality Category Good / Marginal / Poor
Measured Span Mass (mg/cm ²): <u>0.912</u>			
Difference (mg/cm ²): <u>0.003</u>			
% Difference / Pass or Fail: <u>0.33%</u>	<u>15.0</u>	<u>424.9</u>	<u>Marginal</u>

Setup and Calibration Values								
Parameter	Expected	Found	Parameter	Expected	Found	Parameter	Expected	Found
Clock	1220	1200	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	24hr	RH Setpoint	45%	45%	Std Cond Temp	25 C	25°C
Realtime Avg	60 mins	60min	Delta T Setpoint	15 C	15°C	DAC	8.0 v	8.0v
Machine Type	PM-10	PM-10	RH Control	On	on	RH Connect	No	NO
Analog FS	1.0 v	1.0v	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	12/12/19	1225	4		
2			5		
3			6		

Audit Notes:
No TSW



One-Point Flow Rate Bias Estimate

Site ID: DOE-1	E-BAM Serial #: X16067	Pollutant type: PM10	Bias (%)
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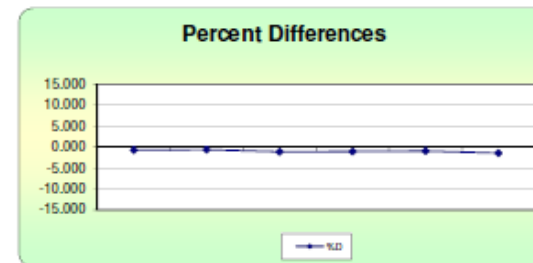
Quarter	Date	Meas Val (Y)	Audh Val (X)	d (Eqn. 1)	Percentile	d ²	d	d ³
7	11/14/2019	14.00	14.10	-0.709	25th -1.112	0.503	0.709	0.503
		16.70	16.80	-0.595		0.354	0.595	0.354
		17.50	17.70	-1.130		1.277	1.130	1.277
7	12/12/2019	14.00	14.15	-1.060	75th -0.769	1.124	1.060	1.124
		16.70	16.86	-0.949		0.901	0.949	0.901
		17.50	17.75	-1.408		1.984	1.408	1.984

n	$\sum d$	"AB" (Eqn 4)
6	5.952	0.975
n-1	$\sum d^2$	"AS" (Eqn 5)
5	6.142	0.295

Bias (%) (Eqn 3)	Both Signs Positive
1.22	FALSE
Signed Bias (%)	Both Signs Negative
-1.22	TRUE

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/qiareport.html>



One-Point Flow Rate Bias Estimate

Site ID: DOE-2	E-BAM Serial #: Y12096	Pollutant type: PM10	Bias (%)
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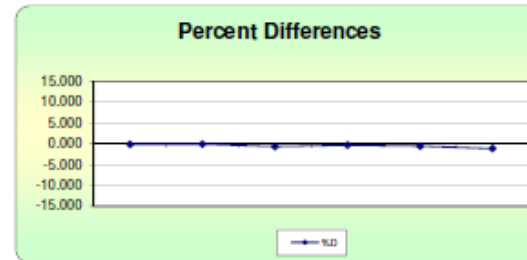
Quarter	Date	Meas Val (Y)	Audh Val (X)	d (Eqn. 1)	Percentile	d ²	d	d ²
7	11/14/2019	14.00	14.02	-0.143	25th -0.602	0.020	0.143	0.020
		16.70	16.71	-0.060		0.004	0.060	0.004
		17.50	17.61	-0.625		0.390	0.625	0.390
7	12/12/2019	14.00	14.04	-0.285	75th -0.178	0.081	0.285	0.081
		16.70	16.79	-0.536		0.287	0.536	0.287
		17.50	17.70	-1.130		1.277	1.130	1.277

n	$\sum d $	"AB" (Eqn 4)
6	2.778	0.463
n-1	$\sum d ^2$	"AS" (Eqn 5)
5	2.059	0.393

Bias (%) (Eqn 3)	Both Signs Positive
0.79	FALSE
Signed Bias (%)	Both Signs Negative
-0.79	TRUE

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

Site ID: DOE-3	E-BAM Serial #: W23313	Pollutant type: PM10	Bias (%)
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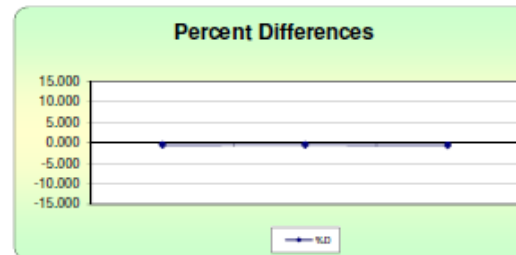
Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d ²	d	d ²
7	11/14/2019	14.00	14.07	-0.498	25th -0.633	0.248	0.498	0.248
		16.70	16.78	-0.477		0.227	0.477	0.227
		17.50	17.60	-0.568		0.323	0.568	0.323
7	12/12/2019	Unit has been sent to Met-One for repair.			75th -0.487			

n	Σ d	"AB" (Eqn 4)
3	1.542	0.514
n-1	Σd ²	"AS" (Eqn 5)
2	0.798	0.048

Bias (%) (Eqn 3)	Both Signs Positive
0.59	FALSE
Signed Bias (%)	Both Signs Negative
-0.59	TRUE

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/tto/amtic/qareport.html>



One-Point Flow Rate Bias Estimate

Site ID: DOE-4	E-BAM Serial #: W23310	Pollutant type: PM10	Bias (%)
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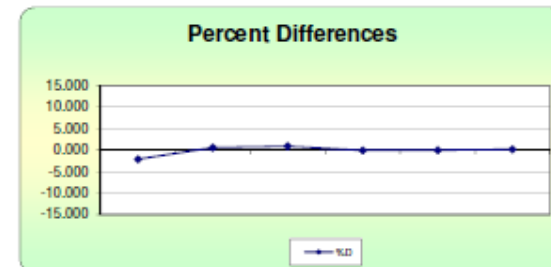
Quarter	Date	Meas Val (Y)	Audit Val (X)	d (Eqn. 1)	Percentile	d ²	d	d ²
7	11/14/2019	14.00	14.30	-2.098	25th	4.401	2.098	4.401
		16.70	16.60	0.602		0.363	0.602	0.363
		17.50	17.34	0.923		-0.054	0.851	0.923
7	12/12/2019	14.00	14.01	-0.071	75th	0.005	0.071	0.005
		16.70	16.70	0.000		0.000	0.000	0.000
		17.50	17.47	0.172		0.495	0.029	0.172

n	$\sum d $	"AB" (Eqn 4)
6	3.966	0.644
n-1	$\sum d ^2$	"AS" (Eqn 5)
5	5.650	0.795

Bias (%) (Eqn 3)	Both Signs Positive
1.3	FALSE
Signed Bias (%)	Both Signs Negative
+/-1.3	FALSE

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>

APPENDIX E
VOC Analytical Data Packages, Q5 through Q7

Appendix E is available on CD. The appendix is too large to include as an attachment.

APPENDIX F

Radiological Analytical Data Packages, Q5 through Q7

Appendix F is available on CD. The appendix is too large to include as an attachment.