

***Report on Quarterly Air Monitoring,  
Area IV, Twelfth Quarter 2021***

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



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

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

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Twelfth Quarter 2021**

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

**July 2021**

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**Prepared for:**

U.S. Department of Energy  
4100 Guardian Street, Suite 160  
Simi Valley, California 93063

**Prepared by:**

North Wind Portage, Inc.  
1425 Higham Street  
Idaho Falls, Idaho 83402

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Santa Susana Field Laboratory  
Ventura County, California

Approved by:



7/23/21

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Trina Cesnik  
ETEC Program Manager

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## EXECUTIVE SUMMARY

This report summarizes the United States Department of Energy (DOE) air monitoring activities conducted during the twelfth quarter (Q12) of the monitoring period (January 1, 2021, to March 31, 2021) at Area IV within the Santa Susana Field Laboratory (SSFL), located in Ventura County, California. The area specifically discussed within this report is the DOE portion, Area IV of SSFL, known as the Energy Technology Engineering Center (ETEC). Year one of the Baseline Air Monitoring Program consisted of Quarter 1 through Quarter 4. Year two consisted of Quarter 5 through Quarter 7. Year 3 consisted of Quarter 8 through Quarter 11. The program is continuing for a fourth year, which consists of Quarter 12 through Quarter 15.

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

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

The following air monitoring activities conducted during Q12 2021 by DOE within Area IV are summarized in this report:

- Collected meteorological data from one location (DOE-4);
- Collected PM<sub>10</sub> data from four locations (DOE-1 through DOE-4);
- Collected air samples from four locations (DOE-1 through DOE-4) for VOC laboratory analysis; and
- Collected radionuclide samples for laboratory analysis from four locations (DOE-1 through DOE-4).

Meteorological data, PM<sub>10</sub>, and radionuclide data all met the data completeness goal of 80% and VOC data met the completeness goal of 85% for Q12. The thirteenth quarter of air monitoring is to be continued beginning April 1, 2021. Data collected during remediation activities will be compared to the baseline conditions in the year 4 annual report.

The following site activities were conducted during Q12 by DOE within Area IV:

- Annual site-wide groundwater monitor well sampling
- Quarterly site-wide groundwater level monitoring
- Deactivation of contract line item number (CLIN) 8 and 9 facilities
- Demolition of CLIN 8 facilities
- CDM Smith conducted groundwater sampling activities at the Former Sodium Disposal Facility as a part of groundwater interim measures
- Surveillance and maintenance.

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## ACRONYMS AND ABBREVIATIONS

|                   |   |
|-------------------|---|
| °C                | degrees Celsius   |
| °F                | degrees Fahrenheit  |
| μCi               | microcurie(s)   |
| μg/m <sup>3</sup> | microgram(s) per cubic meter                                    |
| Boeing            | The Boeing Company  |
| CAAQS             | California Ambient Air Quality Standard                         |
| CFR               | Code of Federal Regulations                                     |
| CLIN              | contract line item number                                       |
| 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                                    |
| m                 | meter(s)  |
| m/sec             | meter(s) per second   |
| mb                | millibar(s)   |
| MDC               | minimum detectable concentration                                |
| mL                | milliliter(s)   |
| mph               | miles per hour  |
| MS                | mass spectrometry   |
| NASA              | National Aeronautics and Space Administration                   |
| NIST              | National Institute of Standards and Technology                  |
| pCi               | picocurie(s)  |
| PM <sub>10</sub>  | particulate matter less than 10 microns in aerodynamic diameter |
| Q9                | ninth quarter   |
| Q10               | tenth quarter   |
| Q11               | eleventh quarter  |
| Q12               | twelfth quarter   |
| QA                | quality assurance   |
| QC                | quality control   |
| RAWS              | Remote Automatic Weather Stations                               |
| RPD               | relative percent difference                                     |
| RSL               | regional screening level  |
| SDG               | sample delivery group   |
| SSFL              | Santa Susana Field Laboratory                                   |
| VOC               | volatile organic compound                                       |

## 1. INTRODUCTION

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

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

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

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

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

This report summarizes the Q12 quarterly results and quality assurance (QA) activities performed between January 1, 2021, and March 31, 2021.

## **1.1 Regional Climate and Wind Direction**

The climate in the SSFL area is characterized as “Mediterranean.” The mean temperature during the winter months is approximately 50 degrees Fahrenheit (°F) and the mean temperature in the summer months is approximately 70°F. Based on climate data between 2019 and 2020 from Weather Currents, average rainfall is on the order of 15.9 inches per year. The majority of the rainfall occurs between December and April with January and February being the wettest months.

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 Q12 reporting period (January 1, 2021, through March 31, 2021). Elevated air sampling levels were recorded during Q12. This slight increase can be contributed to extremely high winds with recorded gusts near 70 mph.

Quality objectives and data completeness were met for all meteorological, PM<sub>10</sub>, VOC, and radionuclide data for Q12 of the Air Monitoring Program.

Urban background data compared with air monitoring data indicate that the PM<sub>10</sub> concentrations measured at stations DOE-1, DOE-2, DOE-3, and DOE-4 during Q12 are comparable to the PM<sub>10</sub> concentrations measured at stations characterizing urban background. Other sources that emit VOC characteristics are motor vehicle emissions, fossil fuel combustion, and wildfires. The results are reflected when considering SSFL site's urban background and relatively remote location from vehicle traffic. PM<sub>10</sub> concentrations exceeded the California Ambient Air Quality Standard (CAAQS; 50 micrograms per cubic meter [ $\mu\text{g}/\text{m}^3$ ]) four times, once at each DOE location, all on the same day (01/19/2021), but the concentrations were below the National Ambient Air Quality Standard (NAAQS; 150  $\mu\text{g}/\text{m}^3$ ).

During Q12 two VOC analytes were detected above the EPA regional screening level (RSL). Ethyl acetate and benzene were detected at DOE-3. Ethyl acetate is a chemical used in glues, nail polish, and decaffeination processes. There is no source for ethyl acetate on site. Natural sources of benzene include forest fires, gasoline, crude oil, and cigarette smoke.

During Q12, 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. All radiological data reported for the air filter samples are naturally occurring.

Data collected during Q12 agrees 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. Air monitoring at Area IV of the SSFL is to be continued starting April 1, 2021, for the thirteenth quarter of the Air Monitoring Program.

Site activities during Q12 included annual site-wide groundwater monitor well sampling, quarterly site-wide groundwater level monitoring, deactivation of contract line item number (CLIN) 8 and 9 facilities, demolition of CLIN 8 facilities, surveillance and maintenance, and CDM Smith conducted groundwater sampling activities at the Former Sodium Disposal Facility as part of the groundwater interim measures. Work area air monitoring was conducted during asbestos abatement, confirming that 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 seven VOC sampling events in this reporting period with six field duplicate samples collected during this reporting period.

During Q12, radionuclide samples were collected at four perimeter sampler locations, DOE-1 through DOE-4. These samples were collected on glass fiber (Type A/E) filters that are changed twice a week. After a minimum 120-hour holding time to allow the decay of short-lived radon and thoron daughter products, the samples are simultaneously counted for gross alpha and beta activity with a low-background, thin-window, gas-flow proportional-counting system continually purged with P-10 argon/methane counting gas over a preset time interval. There were 25 sampling events for air samplers DOE-1, -3, and -4 during this reporting period, and 26 sampling events for DOE-2 (due to dust loading). Following analysis for gross alpha and gross beta radiation, sample filters were combined to form one composite sample representative of each location. The four composite samples were then analyzed for individual radionuclides at an offsite laboratory.

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## 4. DATA

Sections 4.1 through 4.4 discuss Q12 air monitoring data.

### 4.1 Meteorological Data

#### General Summary

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

Monitored meteorology parameters at the DOE-4 station included wind speed, wind direction, air temperature at 2 meters (m) and 10 m, relative humidity, precipitation, barometric pressure, and solar radiation. In addition, statistical parameters provided by the data logger included delta temperature (i.e., defined as the 10-m temperature minus the 2-m temperature), maximum wind speed (i.e., wind gust), and standard deviation of wind direction. Observations were recorded at 15-minute intervals for :00, :15, :30; and :45 minutes each hour. There were 90 days in this reporting period (Q12), which covers January 1, 2021, to March 31, 2021, with a total of 8,640 possible 15-minute observations. This is the first quarter in year 4.

#### Data Validation and Statistics

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

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

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

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

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

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

The completeness goal for meteorological data is 80% on an annual basis. Data completeness statistics for all completed reporting quarters in Year 4 of the baseline monitoring are presented in Table 2.

### **Wind Rose**

The final validated 15-minute meteorological dataset was used to develop the wind rose for Q12 as presented in Figure 3. A wind rose is a graphical representation of wind speed and direction distribution (or climatology) for the period of interest. The frequency of winds blowing from a particular direction is shown as petals on the wind rose, with the frequency of wind speeds depicted by color bands. Calm winds are identified as being less than 0.5 meters per second (m/sec).

During Q12, data capture for wind speed and direction at DOE-4 was 100%. The average and maximum wind speeds were 5.23 m/sec and 21.4 m/s, respectively. The maximum recorded wind gust was 31.2 m/sec. There are two predominant wind directions: the first clustered around north-northeast (NNE) and a second from the east-southeast (ESE).

Table 2. Data screening summary for monitored meteorological parameters.

| Meteorological Parameter                     | Screening Criteria <sup>(1)</sup><br>(for valid sensor responses) | Data Completeness Percent (%) <sup>(2)</sup> |                |                 |
|--|---|--|----------------|-----------------|
|  |   | Q12  | Year 4 to Date | Project to Date |
| Wind Speed                                   | between 0 and 25 m/sec  | 100  | 100            | 92.72           |
|  | > 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            | 92.72           |
|  | > 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            | 92.72           |
| Temperature @ 2 m                            | ≤ local record high (monthly basis)                               | 100  | 100            | 92.72           |
|  | ≥ local record low (monthly basis)                                |  |                |                 |
|  | > 0.5°C variation over 12 hours                                   |  |                |                 |
| Temperature @ 10 m                           | ≤ local record high (monthly basis)                               | 100  | 100            | 92.72           |
|  | ≥ local record low (monthly basis)                                |  |                |                 |
|  | > 0.5°C variation over 12 hours                                   |  |                |                 |
| Delta Temperature                            | ≤ 0.1°C during daytime  | 100  | 100            | 92.72           |
|  | ≥ -0.1°C during nighttime   |  |                |                 |
|  | between -3.0 and 5.0°C  |  |                |                 |
| Relative Humidity (and Dewpoint Temperature) | relative humidity between 0-100%                                  | 100  | 100            | 84.42           |
|  | 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            | 92.71           |
|  | ≤ 4 inches in 24 hours  |  |                |                 |
|  | ≥ 2 inches in 3 months  |  |                |                 |
| Barometric Pressure                          | between 871 and 982 mb (local)                                    | 100  | 100            | 92.72           |
|  | (i.e., between 940 and 1060 mb sea level)                         |  |                |                 |
|  | ≤ 6 mb variation over 3 hours                                     |  |                |                 |
| Solar Radiation                              | > 0 at night  | 95.76  | 95.76          | 92.14           |
|  | ≤ maximum possible for date and latitude                          |  |                |                 |

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

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

- a. Missing or suspect observations count against data completeness statistics.
- b. Year Two is an abbreviated data collection year spanning the period Apr 15-Dec 31, 2019 (i.e., Quarters 5, 6, and 7). This was done to synchronize future data collection years with calendar years.
- c. Last column in this table represents the cumulative Completeness % for all completed quarterly reporting periods.

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

- Q1 = 8,736
- Q2 = 8,832
- Q3 = 8,832
- Q4 = 8,640
- Year One = 35,040
- Q5 = 8,736
- Q6 = 8,832
- Q7 = 7,488
- (only 3 quarters)
- Year Two = 25,056 (abbreviated)
- Q8 = 8,736
- Q9 = 8,736
- Q10 = 8,832
- Q11 = 8,832
- Year Three = 35,136
- Q12 = 8,640
- Year Four = 8,640 (to-date)

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

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

PM<sub>10</sub> data are collected with Met One E-BAM monitors at four monitoring locations. The Met One E-BAM uses the principle of beta attenuation to provide a determination of mass concentration. Twenty-four-hour concentrations are calculated from the hourly concentrations. There were 90 days in this reporting period.

- DOE-1 had valid readings 81 out of 90 days.
- DOE-2 had valid readings 75 out of 90 days.
- DOE-3 had valid readings all 90 days.
- DOE-4 had valid readings all 90 days.

Two of the four station units had 100% data completeness for PM<sub>10</sub> for Q12, with a total data completeness of 93%, exceeding the project goal of 80% completeness for total samples collected (see Table 3). For DOE-1 from 01/09/2021 – 01/10/2021 there was a pump failure, and from 02/05/2021 – 02/11/2021 there was another pump failure with no unit available to replace it until 02/12/2021. For DOE-2 from 01/22/2021 – 02/02/2021 a pump failed due to a corroded nozzle and no unit was available to replace it, and from 03/19/2021 – 03/21/2021 a power outage caused a bad circuit board, which was replaced 03/22/2021. The complete table of daily averages is presented in Appendix A.

Table 3. PM<sub>10</sub> data completeness for January 1, 2021, to March 31, 2021.

| Location                        | Valid Readings (Days) | Possible Readings (Days) | Data Completeness (Percent) |
|---------------------------------|-----------------------|--------------------------|-----------------------------|
| DOE-1                           | 81                    | 90                       | 90                          |
| DOE-2                           | 75                    | 90                       | 83                          |
| DOE-3                           | 90                    | 90                       | 100                         |
| DOE-4                           | 90                    | 90                       | 100                         |
| Average Total Data Completeness |                       |                          | 93%                         |

The five highest PM<sub>10</sub> results identified for the reporting period are listed in Table 4 along with the CAAQS for PM<sub>10</sub>. PM<sub>10</sub> concentrations were consistent with levels typically found in urban air. Of these top five results, two were recorded at DOE-4 and one each at DOE-1, DOE-2, and DOE-3. Four of the five values were above the CAAQS, but below the NAAQS of 150 micrograms per cubic meter (µg/m<sup>3</sup>). Four of the top five PM<sub>10</sub> averages occurred on 01/19/2021 when the winds averaged 48 mph over a 15-minute period, including a maximum gust near 70 mph. High winds are known to increase air particulates.

Table 4. Top five PM<sub>10</sub> 24-hour average concentration days for Q12.

| Date       | Location | PM <sub>10</sub> Value (µg/m <sup>3</sup> ) | CAAQS (µg/m <sup>3</sup> ) |
|------------|----------|---|----------------------------|
| 01/19/2021 | DOE-2    | <b>67.16600</b>                             | 50                         |
| 01/19/2021 | DOE-4    | <b>59.50000</b>                             | 50                         |
| 01/19/2021 | DOE-1    | <b>55.54100</b>                             | 50                         |
| 01/19/2021 | DOE-3    | <b>52.04100</b>                             | 50                         |
| 03/30/2021 | DOE-4    | 41.29100                                    | 50                         |

Note: The bold numbers are above CAAQS screening level.

### 4.3 Volatile Organic Compound Data

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

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

Table 5. Ambient air VOC data completeness.

| Location                        | Valid Readings (Days) | Possible Readings (Days) | Data Completeness (Percent) |
|---------------------------------|-----------------------|--------------------------|-----------------------------|
| DOE-1                           | 7                     | 7                        | 100                         |
| DOE-2                           | 7                     | 7                        | 100                         |
| DOE-3                           | 7                     | 7                        | 100                         |
| DOE-4                           | 7                     | 7                        | 100                         |
| Average Total Data Completeness |                       |                          | 100                         |

VOC detection results are presented in Table B-1 (Appendix B), including comparison to the April 2019 DTSC Human Health Risk Assessment (HHRA) Note 3 Screening Levels (DTSC 2019) or the May 2018 EPA Residential Air Regional Screening Levels (RSLs) (EPA 2018). Two analytes were detected above the screening levels in Q12. Both analytes were detected during the January 5, 2021, sampling event at DOE-3. Benzene was detected at 0.91  $\mu\text{g}/\text{m}^3$  and ethyl acetate was detected at 150 H;J+  $\mu\text{g}/\text{m}^3$ .

Two man-made VOC analytes, dichlorodifluoromethane (Freon-12) and ethyl acetate, have been detected routinely at all four monitoring stations, during all quarterly sampling events, and in duplicate samples. Based on laboratory QC data (method blanks, clean canister certifications), the sampling process and laboratory process are not the sources of the two analytes. The onsite source of the analytes is currently unknown.

### 4.4 Radionuclide Data

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

There were 101 airborne radioactivity filter samples collected in Q12 — 25 each for DOE-1, DOE-3, and DOE-4, and 26 for DOE-2. Each sample was collected on a glass-fiber filter (as discussed in Section 3) and was analyzed using a “low background” Protean radiation counter system onsite. These samples included background radioactive materials and the potential of Area IV–specific radioactive materials.

The alpha and beta data are presented in Table C-1 (Appendix C). The onsite analysis determined only “alpha” or “beta/gamma” and did not analyze for specific isotopes. Isotopic analysis was performed later by an offsite laboratory. Each sample produced a gross alpha and beta-gamma count. The analysis compared these values with the background radiation count rates, and using the volume of air collected

determined the net counts and the MDC for each sampling event. Some results in Table C-1 (Appendix C) are shown as negative values (because detector background is subtracted from the result).

All but four alpha sample were below the MDC, and each MDC was below the airborne effluent limits specified in California regulations. There was no possibility of significant Area IV alpha radioactive material on these filters. The single alpha sample greater than the MDC was only slightly above the MDC, and was well below the effluent limits specified in California regulations.

Approximately 26% of the beta samples were below MDC, the gross (background radioactive material included) samples exceeded the MDC in 74% of samples, indicating the presence of airborne radioactive material (including background materials). The beta-gamma samples greater than the MDC were only slightly above the MDC, and were well below the effluent limits specified in California regulations. The elevated (but still low) results correlate to the increased dust seen previously in the third quarter of previous years.

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

While artificial radionuclides (e.g., Cs-137, Sr-90, Pu-239) were present in very small amounts, none of the results were above the MDC in Q12. The presence of these radionuclides is considered a part of the normal variation of global fallout and resuspension activities.

A summary of the gross air sampling data is shown in Table 6.

Table 6. Gross alpha and beta-gamma average results for Q12.

| Location | Average alpha Result ( $\mu\text{Ci/mL}$ ) | Average alpha MDC ( $\mu\text{Ci/mL}$ ) | Average beta Result ( $\mu\text{Ci/mL}$ ) | Average beta MDC ( $\mu\text{Ci/mL}$ ) |
|----------|--|---|---|--|
| DOE-1    | 6.41E-16                                   | 6.32E-15                                | 3.58E-14                                  | 2.57E-14                               |
| DOE-2    | 2.15E-16                                   | 6.62E-15                                | 5.20E-14                                  | 2.70E-14                               |
| DOE-3    | 4.42E-16                                   | 6.37E-15                                | 4.15E-14                                  | 2.59E-14                               |
| DOE-4    | 1.05E-15                                   | 6.33E-15                                | 3.44E-14                                  | 2.58E-14                               |
| Average  | 5.83E-16                                   | 6.41E-15                                | 4.10E-14                                  | 2.61E-14                               |

## 5. QA/QC ACTIVITIES

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

### 5.1 Field QA/QC

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

The 24-hour daily averages for Q12 are presented in Appendix A along with the monthly minimum, maximum, and 95<sup>th</sup> percentile for each station location.

#### Flow Verifications

Functionality of the Met One E-BAM units is verified and recorded monthly during instrument audits; however, the instruments are also checked several times a week for operability. During the monthly audits, the Met One E-BAM temperature, pressure, and flow rate are verified against a National Institute of Standards and Technology (NIST) traceable flowmeter. E-BAM units are occasionally swapped out for maintenance, and preliminary audits of the new units are performed. The Q12 audit results for the four DOE sites showed bias percentages that ranged from -2.13 to +0.40%. None of the results exceeded the flow rate measurement quality objective of +/- 4%.

Complete audit reports and flow verification results for Q12 are presented in Appendix D of this document. The flow rate verifications were based on 40 CFR 58, Appendix A, 3.3.1 and 4.2.2 through 4.2.3, along with the *Guideline on the Meaning and the Use of Precision and Bias Data Required by 40 CFR Part 58 Appendix A* (EPA 2007). The *Data Assessment Statistical Calculator* (DASC) tool, which is an EPA Excel-based software application, was used to perform the necessary statistical calculations based on input audit data. Sections 2 and 2.5 of this EPA guidance document (EPA 2007) provide additional information and instruction for using the DASC tool.

#### 5.1.2 VOCs

A minimum of 20% of the VOC results are undergoing third-party data validation, annually. During this quarter, two of the seven sample delivery groups (SDGs), SDG P2100066 and P2101707, underwent data validation. The data validation ensures that the required analytical measurement quality objectives are met to ensure the data are of sufficient quality for their intended purpose.

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

#### 5.1.3 Field Duplicates

Six field duplicates were collected during this reporting period, out of seven sampling events. The following analytes, ethyl acetate in SDGs #P2100066, P2101108, and P2101429; toluene in SDG #P2100066; and trichlorofluoromethane (CHC 11) in SDG #P2100832, were detected in four field duplicates pairs exceeding the quality objective of +/- 15% relative percent difference (RPD). For SDG #P2100066 the analytes benzene and isopropyl alcohol were not detected at levels higher than the RL in either the sample or duplicate, and in comparison, were reported as a non-detect in the associated sample or duplicate and exceeded the quality objective of +/- 15% RPD. Fourteen sample and duplicate analyte detections were within the quality objective of +/- 15% RPD. There were no other detections associated with the samples and associated duplicates collected during this reporting period.

#### **5.1.4 Canister Pressure**

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

#### **5.1.5 Radiological**

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

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

A minimum of 20% of the annual radiological analytical results will undergo third-party data validation for Year 4.

#### **5.1.6 Meteorological**

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

#### **5.1.7 Maintenance**

Routine visual checks were performed on the meteorological station during weekly data downloading site visits. This included inspection of the meteorological tower sensors, E-BAM monitoring unit wind sensors, and solar-powered batteries to ensure proper functioning.

#### **5.1.8 Corrective Action**

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

##### **5.1.8.1 PM<sub>10</sub> Monitors**

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

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

Although there were no unresolved data quality issues impacting the data completion goal during Q12, the solar radiometer continues to record values that exceed the daily screening criteria. Also, the improperly programmed data logger continues to affect the calculation of delta temperature (i.e., temperature difference between 2 m and 10 m).

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

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

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

- Prior to November 7, 2018 (correct calculation):

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

- November 7 to December 18, 2018:

*Station DOE-4 inoperable due to wildfire damage*

- After December 18, 2018 (incorrect calculation):

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

For consistency with the initial data collection quarters when delta temperature was correctly recorded by the original data logger, the incorrect delta temperature calculations from the replacement data logger continue to be adjusted through postprocessing to conform with Equation 4-1. The adjustment is simply a multiplication factor of “-1” applied to the delta temperature values from the new data logger prior to performing the data validation.

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

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

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

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

## 5.2 Laboratory QA/QC

This report covers 34 air monitoring samples for VOCs collected and analyzed according to the EPA Toxic Compendium Method TO-15, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA 1999). These samples were reported under seven SDGs by the laboratory. All seven SDG analyses were performed by ALS in Simi Valley, CA. For each SDG, the laboratory ran continuing calibration verification, a method blank, and laboratory control samples, and verified surrogate recoveries for each sample.

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

## 5.3 Audit Results

The PM<sub>10</sub> instruments were calibrated at the manufacturer and were functioning properly upon installation. The PM<sub>10</sub> instruments were audited monthly with a secondary NIST traceable flow meter. Although audits occur only monthly, the instruments were checked several times a week to ensure that they were functioning. Table 8 lists the dates for audits conducted in January through March. No flow rate comparisons exceeded the project’s acceptance criterion of +/- 4; however, instrument Y12096 was noted that it would not run beyond 16.7. With no spare instruments to replace it, Y12096 was left in place due to “all other parameters” being within tolerance. The sample nozzles and support vanes were cleaned as needed. Complete audit reports are presented in Appendix D.

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

| Location | Met One E-BAM Serial Number | Parameter        | Date       |
|----------|-----------------------------|------------------|------------|
| DOE-1    | Y12096                      | PM <sub>10</sub> | 01/11/2021 |
| DOE-2    | X16067                      | PM <sub>10</sub> | 01/11/2021 |
| DOE-3    | W23313                      | PM <sub>10</sub> | 01/11/2021 |
| DOE-4    | W23314                      | PM <sub>10</sub> | 01/11/2021 |
| DOE-1    | Y12096                      | PM <sub>10</sub> | 02/04/2021 |
| DOE-2    | W23310                      | PM <sub>10</sub> | 02/03/2021 |
| DOE-3    | W23313                      | PM <sub>10</sub> | 02/04/2021 |
| DOE-4    | X16067                      | PM <sub>10</sub> | 02/04/2021 |
| DOE-1    | W23314                      | PM <sub>10</sub> | 03/23/2021 |
| DOE-2    | Y12096                      | PM <sub>10</sub> | 03/23/2021 |
| DOE-3    | W23313                      | PM <sub>10</sub> | 03/23/2021 |
| DOE-4    | X16067                      | PM <sub>10</sub> | 03/23/2021 |

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## 6. REFERENCES

- 10 Code of Federal Regulations (CFR) 20, Appendix B, “Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage,” Table 2.
- 40 CFR 58, Appendix C – Ambient Air Quality Monitoring Methodology.
- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). 2018. *Approval of the Final Air Monitoring Station Locations for the Santa Susana Field Laboratory, Ventura County, California*. January.
- California Environmental Protection Agency, DTSC. 2019. Human and Ecological Risk Office Human Health Risk Assessment Note Number 3, DTSC-modified Screening Levels. April. <https://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-April-2019.pdf>.
- National Aeronautics and Space Administration (NASA). 2017. *Santa Susana Field Laboratory Baseline Air Monitoring Report Work Plan Report*. Prepared for California Department of Toxic Substances Control. Prepared on behalf of National Aeronautics and Space Administration, George C. Marshall Space Flight Center, The Boeing Company, and Department of Energy, Energy Technology and Engineering Center. September. Available online at: [https://www.dtsc-ssfl.com/files/lib\\_air\\_monitor/work\\_plan/67496\\_SSFL\\_AirMonitoringWorkPlan\\_Final.pdf](https://www.dtsc-ssfl.com/files/lib_air_monitor/work_plan/67496_SSFL_AirMonitoringWorkPlan_Final.pdf)
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- U.S. Environmental Protection Agency (EPA). 2018. Regional Screening Levels – Generic Tables. <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>. May.
- Solar Energy Research Institute (SERI). 1981. *A Simplified Clear Sky Model for Direct and Diffuse Insolation on Horizontal Surfaces*. SERI/TR-642-761. February 1981.

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Figure 1 – SSFL Air Monitoring Locations

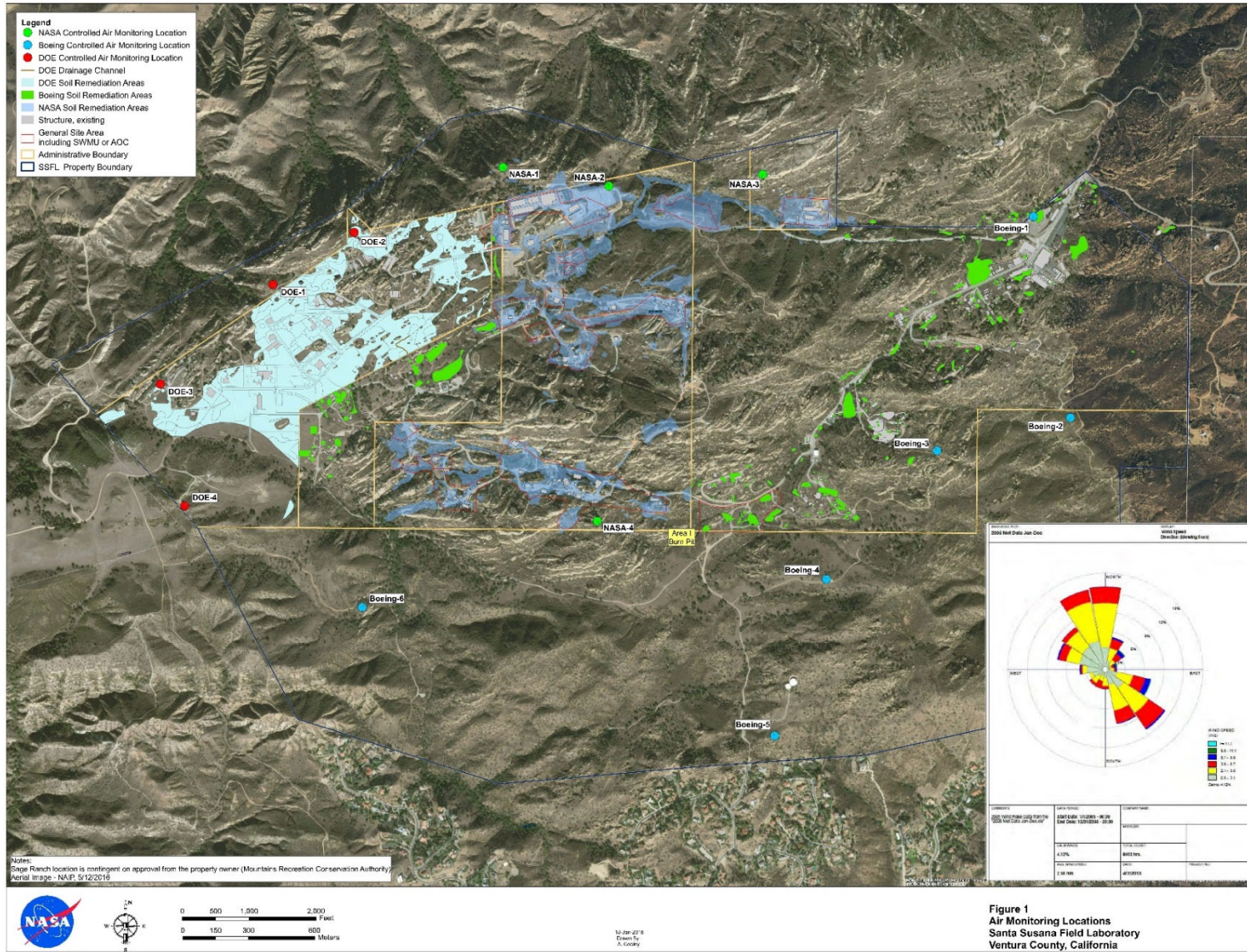
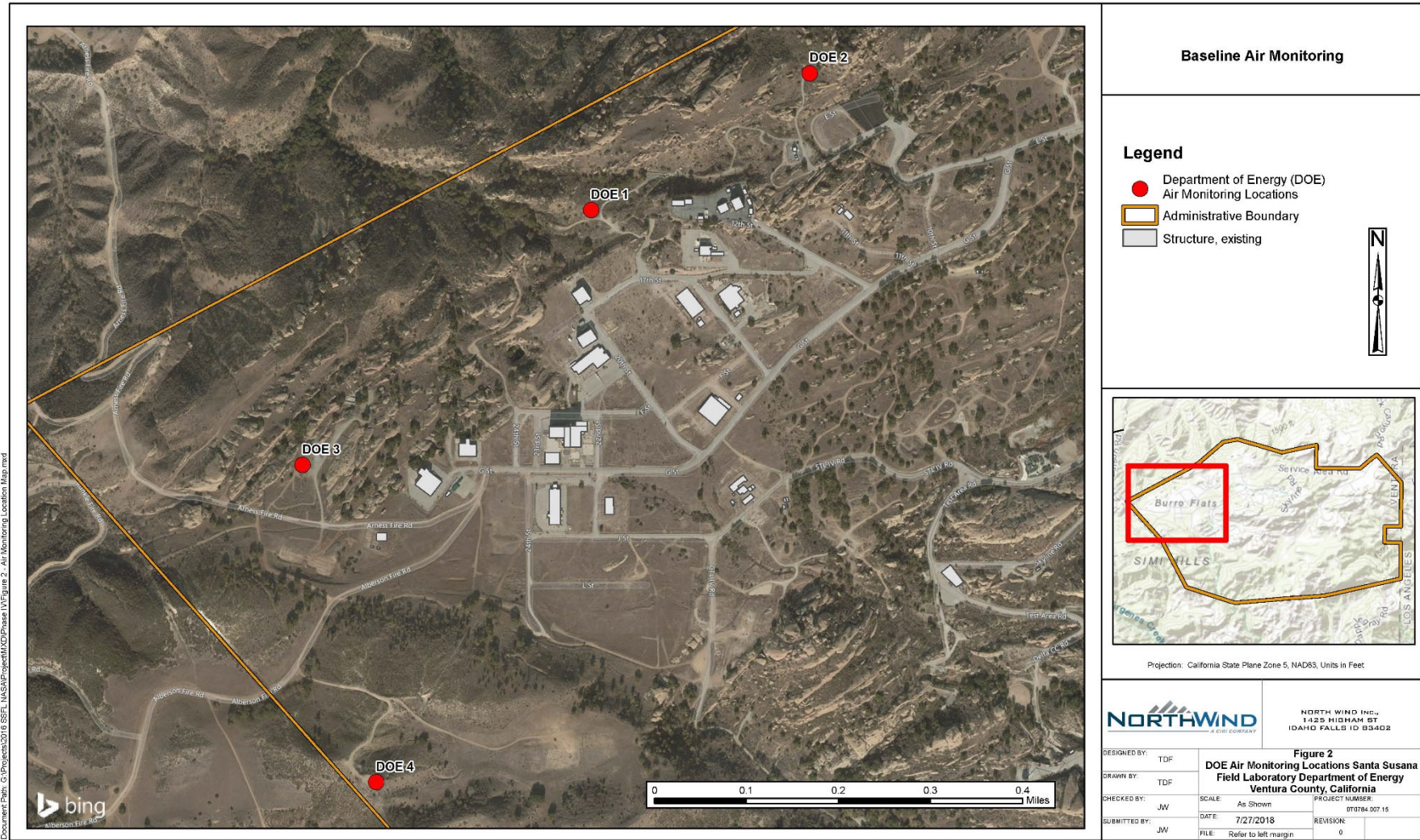
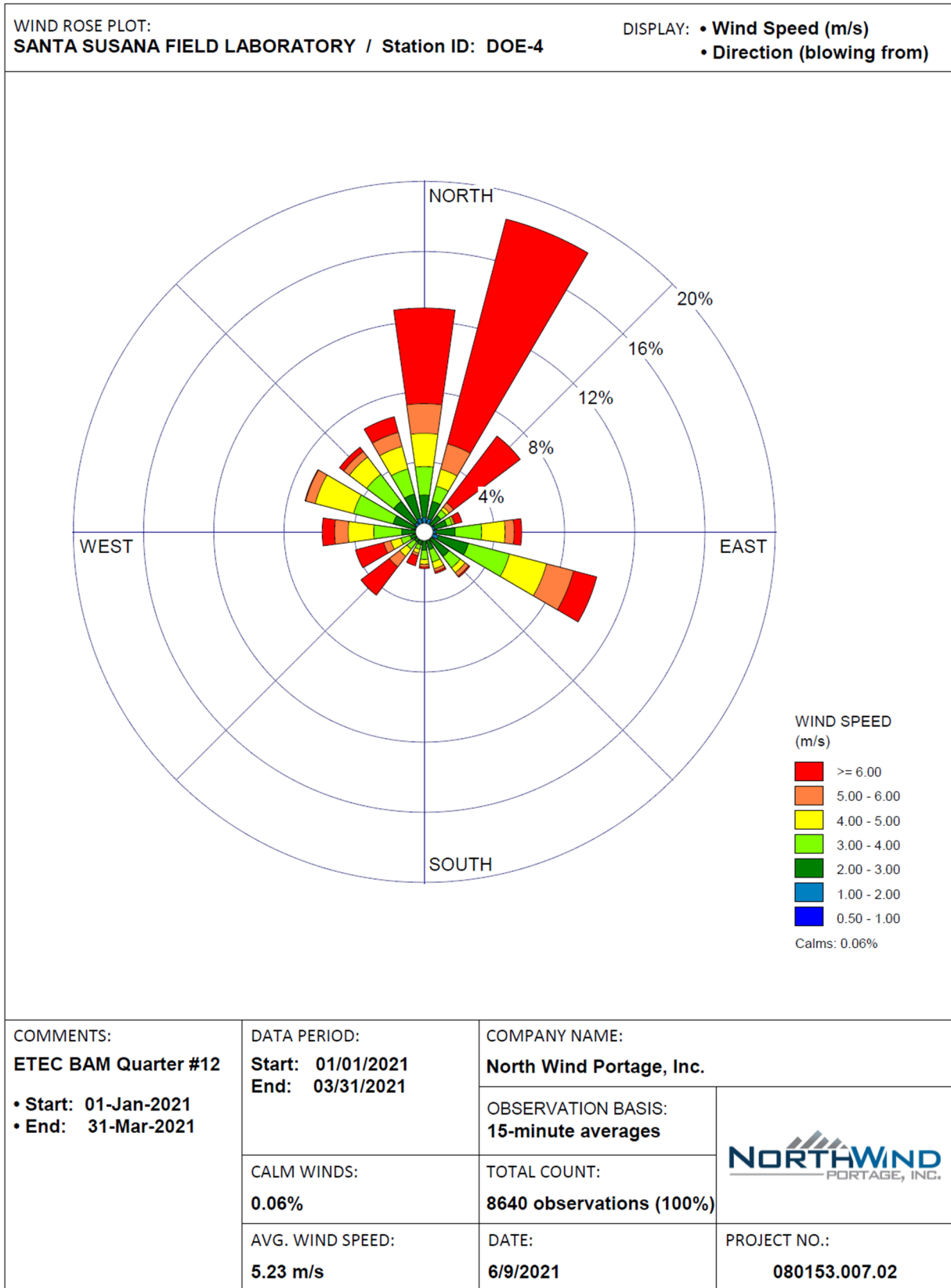


Figure 2 – DOE Air Monitoring Locations



### Figure 3 – DOE Quarterly Wind Rose



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**APPENDIX A**

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

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

| Site ID     | DOE-1   | DOE-2   | DOE-3   | DOE-4   |
|-------------|---|---|---|---|
| Sample Date | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) |
| 01/01/21    | 2.2   | 2.3   | 0.2   | 1.8   |
| 01/02/21    | 7.708   | 9.666   | 7.791   | 6.958   |
| 01/03/21    | 14.833  | 16.291  | 16.791  | 13.458  |
| 01/04/21    | 9.708   | 12.583  | 10.583  | 10.416  |
| 01/05/21    | 3.083   | 2.5   | 3.125   | 1.291   |
| 01/06/21    | 3.291   | 4   | 3.166   | 3.166   |
| 01/07/21    | 1.75  | 2.833   | 1.5   | 1.708   |
| 01/08/21    | 0.166   | 5.208   | 4.333   | 4.041   |
| 01/09/21    | ---   | 14.166  | 12.75   | 13.083  |
| 01/10/21    | ---   | 3.791   | 2.416   | 2.708   |
| 01/11/21    | 2.12  | 3.125   | 3.291   | 2.625   |
| 01/12/21    | 4.416   | 4.125   | 3.541   | 5.541   |
| 01/13/21    | 5.625   | 4.166   | 3.833   | 3.416   |
| 01/14/21    | 4.75  | 4.375   | 2.958   | 5.208   |
| 01/15/21    | 3.416   | 4.916   | 3.333   | 5.416   |
| 01/16/21    | 3.375   | 4.041   | 2.916   | 3.375   |
| 01/17/21    | 2.208   | 3.125   | 1.333   | 2.375   |
| 01/18/21    | 4.958   | 6.25  | 4.5   | 5.083   |
| 01/19/21    | 55.541  | 67.166  | 52.041  | 59.5  |
| 01/20/21    | 10.5  | 10.833  | 8.958   | 10.875  |
| 01/21/21    | 9.625   | 6.846   | 9.958   | 9.458   |
| 01/22/21    | 13.916  | ---   | 10.166  | 13.739  |
| 01/23/21    | 5.25  | ---   | 4.666   | 4.208   |
| 01/24/21    | 6.041   | ---   | 4.666   | 5.291   |
| 01/25/21    | 6.458   | ---   | 3.25  | 5.75  |
| 01/26/21    | 4.875   | ---   | 3.458   | 4.583   |
| 01/27/21    | 9.5   | ---   | 6.75  | 7.291   |
| 01/28/21    | 9.583   | ---   | 10.25   | 8.208   |
| 01/29/21    | 9.958   | ---   | 3.541   | 3.833   |
| 01/30/21    | 8.833   | ---   | 4.75  | 5.416   |
| 01/31/21    | 3.166   | ---   | 1.583   | 2.041   |
| 02/01/21    | 7.25  | ---   | 3.333   | 6.208   |
| 02/02/21    | 4.666   | ---   | 4.541   | 4.583   |
| 02/03/21    | 7.791   | 7   | 7.208   | 7.041   |
| 02/04/21    | 13.769  | 5.208   | 5.833   | 6.375   |
| 02/05/21    | ---   | 3.708   | 4.875   | 3.916   |

| Site ID     | DOE-1   | DOE-2   | DOE-3   | DOE-4   |
|-------------|---|---|---|---|
| Sample Date | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) |
| 02/06/21    | ---   | 8.541   | 7.666   | 10.541  |
| 02/07/21    | ---   | 12.75   | 11  | 13.083  |
| 02/08/21    | ---   | 24.208  | 22.083  | 25.583  |
| 02/09/21    | ---   | 24.458  | 22.833  | 20.791  |
| 02/10/21    | ---   | 23  | 22.541  | 22.5  |
| 02/11/21    | ---   | 15.291  | 14.041  | 14.291  |
| 02/12/21    | 10.866  | 7   | 7.25  | 7.291   |
| 02/13/21    | 10.541  | 8.583   | 7.875   | 11.416  |
| 02/14/21    | 5.041   | 3.958   | 4   | 5.625   |
| 02/15/21    | 6.541   | 6.043   | 8.666   | 11.375  |
| 02/16/21    | 8.958   | 8.166   | 6.458   | 10.041  |
| 02/17/21    | 5.916   | 5.25  | 4.75  | 8.041   |
| 02/18/21    | 3.791   | 4.708   | 4.083   | 6.375   |
| 02/19/21    | 5.458   | 5.333   | 5.625   | 6.916   |
| 02/20/21    | 16.166  | 7.416   | 6.458   | 8.375   |
| 02/21/21    | 2.625   | 3.208   | 3.541   | 5.708   |
| 02/22/21    | 1.583   | 1.666   | 2.458   | 3.333   |
| 02/23/21    | 2.125   | 2.791   | 2.083   | 4.166   |
| 02/24/21    | 8.5   | 9   | 10.25   | 13.833  |
| 02/25/21    | 25.708  | 28.916  | 27.666  | 37.666  |
| 02/26/21    | 8.291   | 8.583   | 8.375   | 11.041  |
| 02/27/21    | 8.166   | 8.291   | 8.166   | 11.833  |
| 02/28/21    | 8.041   | 8.791   | 9.916   | 13  |
| 03/01/21    | 4   | 4.708   | 4.375   | 6.416   |
| 03/02/21    | 6.541   | 6.333   | 7.958   | 8.541   |
| 03/03/21    | 9.916   | 12.125  | 10.708  | 15.875  |
| 03/04/21    | 8.041   | 7   | 6.375   | 8.708   |
| 03/05/21    | 10.083  | 8.833   | 8.791   | 13.375  |
| 03/06/21    | 11.083  | 12.541  | 9.875   | 14.708  |
| 03/07/21    | 19.666  | 16.875  | 15.375  | 16.166  |
| 03/08/21    | 11.708  | 12.791  | 10.208  | 15.041  |
| 03/09/21    | 12.125  | 17.083  | 12.625  | 11.458  |
| 03/10/21    | 3.958   | 2.708   | 1.416   | 10.625  |
| 03/11/21    | 2.416   | 0.541   | 0.958   | 5.958   |
| 03/12/21    | 3.791   | 2.416   | 3.625   | 6.583   |
| 03/13/21    | 11  | 11.75   | 10.833  | 16.5  |
| 03/14/21    | 12.583  | 21.125  | 16.25   | 17.291  |

| Site ID     | DOE-1   | DOE-2   | DOE-3   | DOE-4   |
|-------------|---|---|---|---|
| Sample Date | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) | PM <sub>10</sub> (µg/m <sup>3</sup> )<br>(CAAQS<br>50 µg/m <sup>3</sup> ) |
| 03/15/21    | 5.791   | 5.208   | 5   | 12.625  |
| 03/16/21    | 5.5   | 9.083   | 4.958   | 14.25   |
| 03/17/21    | 12.833  | 10.916  | 8.833   | 15.5  |
| 03/18/21    | 13.875  | 4.041   | 9.833   | 14.75   |
| 03/19/21    | 9.291   | ---   | 8.333   | 15.916  |
| 03/20/21    | 6.625   | ---   | 4.083   | 11.791  |
| 03/21/21    | 5.291   | ---   | 4   | 6.416   |
| 03/22/21    | 10.166  | 9.291   | 8.083   | 15.208  |
| 03/23/21    | 23.583  | 10.75   | 16.375  | 14.333  |
| 03/24/21    | 12  | 9.333   | 12.708  | 12.541  |
| 03/25/21    | 14.541  | 12.666  | 11.25   | 22.666  |
| 03/26/21    | 11.875  | 10.666  | 9.666   | 9.583   |
| 03/27/21    | 7.791   | 6.666   | 6.708   | 7.5   |
| 03/28/21    | 6.583   | 5.833   | 5.375   | 6.958   |
| 03/29/21    | 10.708  | 10.166  | 9.875   | 23.375  |
| 03/30/21    | 29.208  | 28.458  | 31.208  | 41.291  |
| 03/31/21    | 11.958  | 20.041  | 13.625  | 16.25   |

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

| Location ID | January 2021     |         |           | February 2021    |         |           | March 2021       |         |           |
|-------------|------------------|---------|-----------|------------------|---------|-----------|------------------|---------|-----------|
|             | PM <sub>10</sub> |         |           | PM <sub>10</sub> |         |           | PM <sub>10</sub> |         |           |
|             | High             | Low     | 95th PCTL | High             | Low     | 95th PCTL | High             | Low     | 95th PCTL |
| DOE-1       | 55.54100         | 0.00000 | 14.37450  | 25.70800         | 0.00000 | 15.80645  | 29.20800         | 2.41600 | 22.01620  |
| DOE-2       | 67.16600         | 2.30000 | 16.29100  | 28.91600         | 1.66600 | 24.37050  | 28.45800         | 0.00000 | 20.69140  |
| DOE-3       | 52.04100         | 0.20000 | 14.77050  | 27.66600         | 2.08300 | 22.70160  | 31.20800         | 0.95800 | 16.32500  |
| DOE-4       | 59.50000         | 1.29100 | 13.59850  | 37.66600         | 3.33300 | 24.19565  | 41.29100         | 5.95800 | 23.09140  |

PCTL = percentile

**APPENDIX B**

**Analytical Results for Ambient Air VOCs**

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

| Location ID | Sample Date | Analyte                 | Result (µg/m <sup>3</sup> ) | Screening Level Value (µg/m <sup>3</sup> ) | SL Source        |
|-------------|-------------|-------------------------|-----------------------------|--|------------------|
| DOE-1       | 01/05/2021  | Dichlorodifluoromethane | 1.8                         | 100  | US EPA RSL       |
| DOE-1       | 01/05/2021  | Ethyl acetate           | 23 (H;J+)                   | 73   | US EPA RSL       |
| DOE-1       | 01/05/2021  | Toluene                 | 1.1                         | 310  | DTSC HHRA NOTE 3 |
| DOE-2       | 01/05/2021  | Dichlorodifluoromethane | 1.9                         | 100  | US EPA RSL       |
| DOE-2       | 01/05/2021  | Ethyl acetate           | 14 (H;J+)                   | 73   | US EPA RSL       |
| DOE-2       | 01/05/2021  | Trichlorofluoromethane  | 0.96                        | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 01/05/2021  | Benzene                 | <b>0.91</b>                 | 0.097                                      | DTSC HHRA NOTE 3 |
| DOE-3       | 01/05/2021  | Dichlorodifluoromethane | 1.9                         | 100  | US EPA RSL       |
| DOE-3       | 01/05/2021  | Ethyl acetate           | <b>150 (H;J+)</b>           | 73   | US EPA RSL       |
| DOE-3       | 01/05/2021  | Toluene                 | 4.1 (;J)                    | 310  | DTSC HHRA NOTE 3 |
| DOE-3       | 01/05/2021  | Trichlorofluoromethane  | 0.93                        | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 01/05/2021  | Dichlorodifluoromethane | 1.9                         | 100  | US EPA RSL       |
| DOE-4       | 01/05/2021  | Ethyl acetate           | 70 (H;J+)                   | 73   | US EPA RSL       |
| DOE-4       | 01/05/2021  | Toluene                 | 2.4                         | 310  | DTSC HHRA NOTE 3 |
| DOE-4       | 01/05/2021  | Trichlorofluoromethane  | 0.96                        | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 01/20/2021  | Dichlorodifluoromethane | 2.3                         | 100  | US EPA RSL       |
| DOE-1       | 01/20/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 01/20/2021  | Dichlorodifluoromethane | 2.5                         | 100  | US EPA RSL       |
| DOE-2       | 01/20/2021  | Ethyl acetate           | 2.0 (L;)                    | 73   | US EPA RSL       |
| DOE-2       | 01/20/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 01/20/2021  | Dichlorodifluoromethane | 2.5                         | 100  | US EPA RSL       |
| DOE-3       | 01/20/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 01/20/2021  | Dichlorodifluoromethane | 2.4                         | 100  | US EPA RSL       |
| DOE-4       | 01/20/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 02/04/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-1       | 02/04/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 02/04/2021  | Dichlorodifluoromethane | 2.3                         | 100  | US EPA RSL       |
| DOE-2       | 02/04/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 02/04/2021  | Dichlorodifluoromethane | 2.3                         | 100  | US EPA RSL       |
| DOE-3       | 02/04/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 02/04/2021  | Dichlorodifluoromethane | 2.3                         | 100  | US EPA RSL       |
| DOE-4       | 02/04/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 02/19/2021  | Dichlorodifluoromethane | 2.3                         | 100  | US EPA RSL       |
| DOE-1       | 02/19/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 02/19/2021  | Dichlorodifluoromethane | 2.4                         | 100  | US EPA RSL       |
| DOE-2       | 02/19/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 02/19/2021  | Dichlorodifluoromethane | 2.4                         | 100  | US EPA RSL       |
| DOE-3       | 02/19/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 02/19/2021  | Dichlorodifluoromethane | 2.4                         | 100  | US EPA RSL       |
| DOE-4       | 02/19/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 03/05/2021  | Dichlorodifluoromethane | 2.1                         | 100  | US EPA RSL       |
| DOE-1       | 03/05/2021  | Ethyl acetate           | 3.8                         | 73   | US EPA RSL       |
| DOE-1       | 03/05/2021  | Trichlorofluoromethane  | 1.0                         | 1300                                       | DTSC HHRA NOTE 3 |

| Location ID | Sample Date | Analyte                 | Result (µg/m <sup>3</sup> ) | Screening Level Value (µg/m <sup>3</sup> ) | SL Source        |
|-------------|-------------|-------------------------|-----------------------------|--|------------------|
| DOE-2       | 03/05/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-2       | 03/05/2021  | Ethyl acetate           | 3.3                         | 73   | US EPA RSL       |
| DOE-2       | 03/05/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 03/05/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-3       | 03/05/2021  | Ethyl acetate           | 2.6                         | 73   | US EPA RSL       |
| DOE-3       | 03/05/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 03/05/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-4       | 03/05/2021  | Ethyl acetate           | 5.4                         | 73   | US EPA RSL       |
| DOE-4       | 03/05/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 03/18/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-1       | 03/18/2021  | Ethyl acetate           | 14                          | 73   | US EPA RSL       |
| DOE-1       | 03/18/2021  | Toluene                 | 0.87                        | 310  | DTSC HHRA NOTE 3 |
| DOE-1       | 03/18/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 03/18/2021  | Dichlorodifluoromethane | 2.1                         | 100  | US EPA RSL       |
| DOE-2       | 03/18/2021  | Ethyl acetate           | 4.1                         | 73   | US EPA RSL       |
| DOE-2       | 03/18/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 03/18/2021  | Dichlorodifluoromethane | 2.1                         | 100  | US EPA RSL       |
| DOE-3       | 03/18/2021  | Ethyl acetate           | 3.2                         | 73   | US EPA RSL       |
| DOE-3       | 03/18/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-4       | 03/18/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-4       | 03/18/2021  | Ethyl acetate           | 17                          | 73   | US EPA RSL       |
| DOE-4       | 03/18/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 03/31/2021  | 2-butanone              | 2.4                         | 5200                                       | US EPA RSL       |
| DOE-1       | 03/31/2021  | Acrolein                | 2.5                         | 0.021                                      | US EPA RSL       |
| DOE-1       | 03/31/2021  | Dichlorodifluoromethane | 2.4                         | 100  | US EPA RSL       |
| DOE-1       | 03/31/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-1       | 03/31/2021  | Ethyl acetate           | 31                          | 73   | US EPA RSL       |
| DOE-1       | 03/31/2021  | Ethyl acetate           | 6                           | 73   | US EPA RSL       |
| DOE-1       | 03/31/2021  | Toluene                 | 0.84                        | 310  | DTSC HHRA NOTE 3 |
| DOE-1       | 03/31/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-1       | 03/31/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 03/31/2021  | Dichlorodifluoromethane | 2.2                         | 100  | US EPA RSL       |
| DOE-2       | 03/31/2021  | Dichlorodifluoromethane | 2.5                         | 100  | US EPA RSL       |
| DOE-2       | 03/31/2021  | Ethyl acetate           | 3.9                         | 73   | US EPA RSL       |
| DOE-2       | 03/31/2021  | Ethyl acetate           | 42                          | 73   | US EPA RSL       |
| DOE-2       | 03/31/2021  | Toluene                 | 1.0                         | 310  | DTSC HHRA NOTE 3 |
| DOE-2       | 03/31/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-2       | 03/31/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 03/31/2021  | Dichlorodifluoromethane | 2.1                         | 100  | US EPA RSL       |
| DOE-3       | 03/31/2021  | Dichlorodifluoromethane | 2.5                         | 100  | US EPA RSL       |
| DOE-3       | 03/31/2021  | Ethyl acetate           | 11                          | 73   | US EPA RSL       |
| DOE-3       | 03/31/2021  | Ethyl acetate           | 28                          | 73   | US EPA RSL       |
| DOE-3       | 03/31/2021  | Trichlorofluoromethane  | 1.2                         | 1300                                       | DTSC HHRA NOTE 3 |
| DOE-3       | 03/31/2021  | Trichlorofluoromethane  | 1.1                         | 1300                                       | DTSC HHRA NOTE 3 |

| <b>Location ID</b> | <b>Sample Date</b> | <b>Analyte</b>          | <b>Result (µg/m<sup>3</sup>)</b> | <b>Screening Level Value (µg/m<sup>3</sup>)</b> | <b>SL Source</b> |
|--------------------|--------------------|-------------------------|----------------------------------|---|------------------|
| DOE-4              | 03/31/2021         | Dichlorodifluoromethane | 2.1                              | 100   | US EPA RSL       |
| DOE-4              | 03/31/2021         | Dichlorodifluoromethane | 2.5                              | 100   | US EPA RSL       |
| DOE-4              | 03/31/2021         | Ethyl acetate           | 1.9                              | 73  | US EPA RSL       |
| DOE-4              | 03/31/2021         | Ethyl acetate           | 36                               | 73  | US EPA RSL       |
| DOE-4              | 03/31/2021         | Toluene                 | 0.90                             | 310   | DTSC HHRA NOTE 3 |
| DOE-4              | 03/31/2021         | Trichlorofluoromethane  | 1.3                              | 1300  | DTSC HHRA NOTE 3 |
| DOE-4              | 03/31/2021         | Trichlorofluoromethane  | 1.2                              | 1300  | DTSC HHRA NOTE 3 |

Note: The bold numbers are above the screening levels.

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# **APPENDIX C**

## **Radionuclide Results**

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

| Sample collection date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|------------------------|-----------------------|----------------------|----------------------|---------------------|
| Sample location DOE-1  |                       |                      |                      |                     |
| 12/30/2020             | 2.12E-15              | 3.90E-15             | 5.43E-14             | 1.67E-14            |
| 1/4/2021               | 6.84E-15              | 6.72E-15             | 5.82E-14             | 2.89E-14            |
| 1/7/2021               | 1.11E-15              | 4.89E-15             | 2.46E-14             | 2.10E-14            |
| 1/11/2021              | 2.54E-15              | 6.61E-15             | 5.69E-14             | 2.84E-14            |
| 1/14/2021              | 1.08E-15              | 4.79E-15             | 5.14E-14             | 2.06E-14            |
| 1/18/2021              | 5.13E-15              | 6.80E-15             | 5.27E-14             | 2.92E-14            |
| 1/21/2021              | 3.16E-15              | 4.88E-15             | 3.16E-14             | 2.09E-14            |
| 1/25/2021              | -1.44E-15             | 1.00E-14             | -1.45E-14            | 4.29E-14            |
| 1/27/2021              | 7.92E-16              | 4.25E-15             | 3.39E-14             | 1.66E-14            |
| 2/1/2021               | 3.06E-16              | 7.24E-15             | 4.68E-14             | 2.82E-14            |
| 2/4/2021               | -1.05E-15             | 5.32E-15             | 5.10E-14             | 2.07E-14            |
| 2/8/2021               | 1.00E-15              | 7.24E-15             | 7.67E-14             | 2.82E-14            |
| 2/11/2021              | -2.44E-17             | 4.24E-15             | 3.13E-14             | 1.65E-14            |
| 2/16/2021              | -1.79E-15             | 7.27E-15             | 2.68E-14             | 2.83E-14            |
| 2/19/2021              | -2.08E-15             | 7.07E-15             | 1.30E-14             | 2.75E-14            |
| 2/22/2021              | -1.40E-15             | 7.09E-15             | 2.20E-14             | 2.76E-14            |
| 2/25/2021              | 2.07E-15              | 5.83E-15             | 5.09E-14             | 2.35E-14            |
| 3/1/2021               | 1.66E-15              | 7.76E-15             | 3.92E-14             | 3.13E-14            |
| 3/4/2021               | 9.70E-16              | 5.80E-15             | 3.79E-14             | 2.34E-14            |
| 3/8/2021               | -1.22E-15             | 5.83E-15             | -2.09E-15            | 2.35E-14            |
| 3/12/2021              | -2.32E-15             | 5.86E-15             | 2.64E-14             | 2.37E-14            |
| 3/16/2021              | -8.36E-16             | 7.29E-15             | 4.29E-14             | 2.94E-14            |
| 3/19/2021              | -1.58E-16             | 7.65E-15             | 2.84E-14             | 3.09E-14            |
| 3/22/2021              | 2.06E-16              | 7.81E-15             | 2.82E-14             | 3.15E-14            |
| 3/25/2021              | -6.61E-16             | 5.76E-15             | 2.77E-14             | 2.33E-14            |
| Sample location DOE-2  |                       |                      |                      |                     |
| 12/30/2020             | 2.32E-15              | 3.90E-15             | 4.02E-14             | 1.67E-14            |
| 1/4/2021               | 4.01E-15              | 6.73E-15             | 5.89E-14             | 2.89E-14            |
| 1/7/2021               | 5.89E-16              | 4.89E-15             | 5.80E-14             | 2.10E-14            |
| 1/11/2021              | 2.20E-15              | 6.62E-15             | 8.05E-14             | 2.84E-14            |
| 1/14/2021              | 2.60E-15              | 4.79E-15             | 5.21E-14             | 2.06E-14            |

| Sample collection date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|------------------------|-----------------------|----------------------|----------------------|---------------------|
| 1/18/2021              | 4.41E-15              | 6.80E-15             | 8.96E-14             | 2.92E-14            |
| 1/21/2021              | -9.57E-16             | 4.87E-15             | 4.79E-14             | 2.09E-14            |
| 1/25/2021              | 1.48E-16              | 9.98E-15             | 7.69E-14             | 4.29E-14            |
| 1/27/2021              | 1.64E-16              | 1.11E-14             | 8.29E-14             | 4.75E-14            |
| 1/29/2021              | -2.07E-15             | 7.04E-15             | -9.99E-15            | 2.74E-14            |
| 2/1/2021               | 2.74E-15              | 7.25E-15             | 3.91E-14             | 2.83E-14            |
| 2/4/2021               | 1.50E-15              | 5.32E-15             | 4.58E-14             | 2.07E-14            |
| 2/8/2021               | -3.89E-16             | 7.24E-15             | 9.01E-14             | 2.82E-14            |
| 2/11/2021              | 1.60E-15              | 4.24E-15             | 4.35E-14             | 1.65E-14            |
| 2/16/2021              | -2.83E-15             | 7.27E-15             | 3.07E-14             | 2.83E-14            |
| 2/19/2021              | -4.11E-15             | 7.07E-15             | 5.81E-14             | 2.76E-14            |
| 2/22/2021              | -7.21E-16             | 7.09E-15             | 6.68E-14             | 2.76E-14            |
| 2/25/2021              | -1.22E-15             | 5.83E-15             | 3.49E-14             | 2.35E-14            |
| 3/1/2021               | 2.04E-16              | 7.77E-15             | 3.07E-14             | 3.14E-14            |
| 3/4/2021               | -3.92E-16             | 5.80E-15             | 7.10E-14             | 2.34E-14            |
| 3/8/2021               | -3.94E-16             | 5.83E-15             | 3.90E-14             | 2.35E-14            |
| 3/12/2021              | -1.22E-15             | 5.86E-15             | 4.91E-14             | 2.37E-14            |
| 3/16/2021              | -1.61E-15             | 7.70E-15             | 6.37E-14             | 3.11E-14            |
| 3/19/2021              | 9.20E-16              | 7.65E-15             | 5.72E-14             | 3.09E-14            |
| 3/22/2021              | 9.38E-16              | 7.80E-15             | 2.43E-14             | 3.15E-14            |
| 3/25/2021              | -2.83E-15             | 5.76E-15             | 3.00E-14             | 2.33E-14            |
| Sample location DOE-3  |                       |                      |                      |                     |
| 12/30/2020             | 4.79E-15              | 3.89E-15             | 5.81E-14             | 1.67E-14            |
| 1/4/2021               | 2.59E-15              | 6.74E-15             | 6.23E-14             | 2.89E-14            |
| 1/7/2021               | 2.14E-15              | 4.89E-15             | 4.96E-14             | 2.10E-14            |
| 1/11/2021              | 4.47E-16              | 6.61E-15             | 7.76E-14             | 2.84E-14            |
| 1/14/2021              | 1.84E-15              | 4.79E-15             | 5.72E-14             | 2.05E-14            |
| 1/18/2021              | 4.60E-16              | 6.80E-15             | 6.14E-14             | 2.92E-14            |
| 1/21/2021              | 2.90E-15              | 4.87E-15             | 1.83E-14             | 2.09E-14            |
| 1/25/2021              | -4.61E-15             | 1.00E-14             | -2.23E-15            | 4.29E-14            |
| 1/27/2021              | 1.81E-15              | 4.25E-15             | 2.00E-14             | 1.66E-14            |
| 2/1/2021               | -4.18E-17             | 7.25E-15             | 4.58E-14             | 2.83E-14            |
| 2/4/2021               | 1.50E-15              | 5.32E-15             | 5.01E-14             | 2.07E-14            |

| Sample collection date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|------------------------|-----------------------|----------------------|----------------------|---------------------|
| 2/8/2021               | 1.00E-15              | 7.24E-15             | 1.16E-13             | 2.82E-14            |
| 2/11/2021              | -2.28E-16             | 4.24E-15             | 4.34E-14             | 1.65E-14            |
| 2/16/2021              | 3.07E-16              | 7.28E-15             | 1.94E-14             | 2.84E-14            |
| 2/19/2021              | -1.40E-15             | 7.07E-15             | 1.44E-14             | 2.76E-14            |
| 2/22/2021              | 9.79E-16              | 7.09E-15             | 1.93E-14             | 2.76E-14            |
| 2/25/2021              | 1.52E-15              | 5.83E-15             | 3.29E-14             | 2.35E-14            |
| 3/1/2021               | 1.64E-15              | 7.64E-15             | 6.82E-14             | 3.08E-14            |
| 3/4/2021               | 2.91E-15              | 5.87E-15             | 5.53E-14             | 2.37E-14            |
| 3/8/2021               | -1.40E-15             | 6.72E-15             | -2.75E-15            | 2.71E-14            |
| 3/12/2021              | -3.97E-16             | 5.87E-15             | 4.65E-14             | 2.37E-14            |
| 3/16/2021              | -5.21E-16             | 7.71E-15             | 2.86E-14             | 3.11E-14            |
| 3/19/2021              | -3.39E-15             | 7.64E-15             | 1.70E-14             | 3.08E-14            |
| 3/22/2021              | -1.26E-15             | 7.80E-15             | 5.56E-14             | 3.15E-14            |
| 3/25/2021              | -2.56E-15             | 5.76E-15             | 2.48E-14             | 2.33E-14            |
| Sample location DOE-4  |                       |                      |                      |                     |
| 12/30/2020             | 3.96E-15              | 3.89E-15             | 4.53E-14             | 1.67E-14            |
| 1/4/2021               | 2.59E-15              | 6.74E-15             | 5.48E-14             | 2.89E-14            |
| 1/7/2021               | 1.62E-15              | 4.89E-15             | 3.35E-14             | 2.10E-14            |
| 1/11/2021              | 3.94E-15              | 6.61E-15             | 4.98E-14             | 2.84E-14            |
| 1/14/2021              | 1.84E-15              | 4.79E-15             | 4.02E-14             | 2.05E-14            |
| 1/18/2021              | 4.77E-15              | 6.80E-15             | 5.70E-14             | 2.92E-14            |
| 1/21/2021              | 2.39E-15              | 4.87E-15             | 3.49E-14             | 2.09E-14            |
| 1/25/2021              | 3.32E-15              | 1.00E-14             | -9.68E-15            | 4.30E-14            |
| 1/27/2021              | 9.96E-16              | 4.25E-15             | 1.20E-14             | 1.66E-14            |
| 2/1/2021               | 1.00E-15              | 7.26E-15             | 5.71E-14             | 2.83E-14            |
| 2/4/2021               | 5.84E-15              | 5.32E-15             | 5.76E-14             | 2.07E-14            |
| 2/8/2021               | 3.43E-15              | 7.24E-15             | 6.44E-14             | 2.82E-14            |
| 2/11/2021              | 7.89E-16              | 4.24E-15             | 2.28E-14             | 1.65E-14            |
| 2/16/2021              | -1.44E-15             | 7.27E-15             | 2.05E-14             | 2.83E-14            |
| 2/19/2021              | -1.74E-15             | 7.07E-15             | 2.68E-14             | 2.76E-14            |
| 2/22/2021              | -3.10E-15             | 7.09E-15             | 5.10E-14             | 2.76E-14            |
| 2/25/2021              | 2.35E-15              | 5.83E-15             | 3.20E-14             | 2.35E-14            |
| 3/1/2021               | -3.03E-15             | 7.65E-15             | 2.12E-14             | 3.09E-14            |

| Sample collection date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|------------------------|-----------------------|----------------------|----------------------|---------------------|
| 3/4/2021               | 4.01E-15              | 5.87E-15             | 4.45E-14             | 2.37E-14            |
| 3/8/2021               | -9.38E-16             | 5.80E-15             | 5.69E-15             | 2.34E-14            |
| 3/12/2021              | -1.78E-15             | 5.88E-15             | 2.56E-14             | 2.38E-14            |
| 3/16/2021              | -3.06E-15             | 7.71E-15             | 2.67E-14             | 3.11E-14            |
| 3/19/2021              | 5.60E-16              | 7.64E-15             | 2.19E-14             | 3.08E-14            |
| 3/22/2021              | -1.99E-15             | 7.79E-15             | 4.13E-14             | 3.15E-14            |
| 3/25/2021              | -1.19E-16             | 5.76E-15             | 2.42E-14             | 2.33E-14            |

**Note:** Some values are negative after background subtraction

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

| Radionuclide  | Result<br>(pCi/sample) | MDC<br>(pCi/sample) | Data<br>Qualifier | Airborne Concentration<br>(µCi/mL) |
|---|------------------------|---------------------|-------------------|------------------------------------|
| <b>Location DOE-1 – Air volume/sample = 9.64E+08 mL</b> |                        |                     |                   |                                    |
| Cesium-137  | 0.968                  | 6.40                | U                 | 1.004E-15                          |
| Strontium-90  | 0.498                  | 2.26                | U                 | 5.166E-16                          |
| Cobalt-60   | 0.453                  | 6.33                | U                 | 4.699E-16                          |
| Potassium-40  | 53.8                   | 59.7                | U                 | 5.581E-14                          |
| Beryllium-7   | 117                    | 72.8                |                   | 1.214E-13                          |
| Plutonium-238   | 0.121                  | 0.713               | U                 | 1.255E-16                          |
| Polonium-210  | 8.34                   | 0.783               |                   | 8.651E-15                          |
| Plutonium-241   | 7.51                   | 33.8                | U                 | 7.790E-15                          |
| Thorium-230   | 0.995                  | 0.926               |                   | 1.032E-15                          |
| Thorium-228   | 0.709                  | 1.14                | U                 | 7.355E-16                          |
| Actinium-228  | -11.7                  | 25.2                | U                 | -1.214E-14                         |
| Americium-241   | 0.000                  | 1.19                | U                 | 0.000E+0                           |
| Plutonium-239   | -0.0110                | 0.870               | U                 | -1.141E-17                         |
| Ra-228 - total  | 5.11                   | 4.38                |                   | 5.301E-15                          |
| Radium-226, -228 combined                               | 2.00                   | 0.710               |                   | 2.075E-15                          |
| Thorium-232   | 0.661                  | 0.555               |                   | 6.857E-16                          |
| Uranium-238   | 0.868                  | 0.308               |                   | 9.004E-16                          |
| Uranium-233/234   | 0.917                  | 0.404               |                   | 9.512E-16                          |
| Uranium-235/236   | -0.0614                | 0.323               | U                 | -6.369E-17                         |
| <b>Location DOE-2 – Air volume/sample = 9.59E+08 mL</b> |                        |                     |                   |                                    |
| Cesium-137  | -4.01                  | 8.48                | U                 | -4.181E-15                         |
| Strontium-90  | 3.37                   | 3.33                |                   | 3.514E-15                          |
| Cobalt-60   | 0.855                  | 7.54                | U                 | 8.916E-16                          |
| Potassium-40  | -29.2                  | 140                 | U                 | -3.045E-14                         |
| Beryllium-7   | 202                    | 88.0                |                   | 2.106E-13                          |
| Plutonium-238   | -0.0159                | 0.556               | U                 | -1.658E-17                         |
| Polonium-210  | 9.84                   | 0.707               |                   | 1.026E-14                          |
| Plutonium-241   | 11.3                   | 27.7                | U                 | 1.178E-14                          |
| Thorium-230   | 1.19                   | 1.06                |                   | 1.241E-15                          |
| Thorium-228   | 0.265                  | 1.13                | U                 | 2.763E-16                          |
| Actinium-228  | -8.55                  | 47.1                | U                 | -8.916E-15                         |
| Americium-241   | 0.396                  | 1.22                | U                 | 4.129E-16                          |
| Plutonium-239   | 0.0222                 | 0.484               | U                 | 2.315E-17                          |
| Ra-228 - total  | 7.85                   | 3.96                |                   | 8.186E-15                          |
| Radium-226, -228 combined                               | 2.28                   | 0.547               |                   | 2.377E-15                          |
| Thorium-232   | 0.597                  | 0.639               | U                 | 6.225E-16                          |
| Uranium-238   | 0.794                  | 0.262               |                   | 8.279E-16                          |

| Radionuclide  | Result (pCi/sample) | MDC (pCi/sample) | Data Qualifier | Airborne Concentration (µCi/mL) |
|---|---------------------|------------------|----------------|---------------------------------|
| Uranium-233/234   | 0.423               | 0.310            |                | 4.411E-16                       |
| Uranium-235/236   | 0.0345              | 0.103            | U              | 3.597E-17                       |
| <b>Location DOE-3 – Air volume/sample = 9.56E+08 mL</b> |                     |                  |                |                                 |
| Cesium-137  | -3.58               | 5.74             | U              | -3.745E-15                      |
| Strontium-90  | 0.248               | 2.99             | U              | 2.594E-16                       |
| Cobalt-60   | 2.03                | 9.65             | U              | 2.123E-15                       |
| Potassium-40  | 61.8                | 82.5             | U              | 6.464E-14                       |
| Beryllium-7   | 177                 | 70.4             |                | 1.851E-13                       |
| Plutonium-238   | -0.0461             | 0.531            | U              | -4.822E-17                      |
| Polonium-210  | 9.71                | 0.702            |                | 1.016E-14                       |
| Plutonium-241   | 20.1                | 36.4             | U              | 2.103E-14                       |
| Thorium-230   | 1.40                | 1.29             |                | 1.464E-15                       |
| Thorium-228   | 0.457               | 1.18             | U              | 4.780E-16                       |
| Actinium-228  | -4.10               | 34.3             | U              | -4.289E-15                      |
| Americium-241   | -0.415              | 1.85             | U              | -4.341E-16                      |
| Plutonium-239   | -0.0882             | 0.774            | U              | -9.226E-17                      |
| Ra-228 - total  | 5.38                | 4.16             |                | 5.628E-15                       |
| Radium-226, -228 combined                               | 1.71                | 1.37             |                | 1.789E-15                       |
| Thorium-232   | 0.422               | 1.05             | U              | 4.414E-16                       |
| Uranium-238   | 0.656               | 0.441            |                | 6.862E-16                       |
| Uranium-233/234   | 0.924               | 0.552            |                | 9.665E-16                       |
| Uranium-235/236   | 0.0224              | 0.265            | U              | 2.343E-17                       |
| <b>Location DOE-4 – Air volume/sample = 9.62E+08 mL</b> |                     |                  |                |                                 |
| Cesium-137  | 1.29                | 6.72             | U              | 1.341E-15                       |
| Strontium-90  | 1.50                | 2.88             | U              | 1.559E-15                       |
| Cobalt-60   | -1.25               | 5.84             | U              | -1.299E-15                      |
| Potassium-40  | 33.1                | 72.5             | U              | 3.441E-14                       |
| Beryllium-7   | 162                 | 71.9             |                | 1.684E-13                       |
| Plutonium-238   | 0.210               | 0.562            | U              | 2.183E-16                       |
| Polonium-210  | 9.63                | 0.565            |                | 1.001E-14                       |
| Plutonium-241   | 15.0                | 31.8             | U              | 1.559E-14                       |
| Thorium-230   | 0.835               | 0.734            |                | 8.680E-16                       |
| Thorium-228   | 0.416               | 0.650            | U              | 4.324E-16                       |
| Actinium-228  | 7.52                | 30.3             | U              | 7.817E-15                       |
| Americium-241   | -0.106              | 1.53             | U              | -1.102E-16                      |
| Plutonium-239   | -0.264              | 0.846            | U              | -2.744E-16                      |
| Ra-228 - total  | 2.65                | 3.93             | U              | 2.755E-15                       |
| Radium-226, -228 combined                               | 1.85                | 1.53             |                | 1.923E-15                       |
| Thorium-232   | 0.492               | 0.457            |                | 5.114E-16                       |

| <b>Radionuclide</b> | <b>Result<br/>(pCi/sample)</b> | <b>MDC<br/>(pCi/sample)</b> | <b>Data<br/>Qualifier</b> | <b>Airborne Concentration<br/>(<math>\mu</math>Ci/mL)</b> |
|---------------------|--------------------------------|-----------------------------|---------------------------|---|
| Uranium-238         | 0.401                          | 0.374                       |                           | 4.168E-16   |
| Uranium-233/234     | 0.286                          | 0.527                       | U                         | 2.973E-16   |
| Uranium-235/236     | -0.0387                        | 0.270                       | U                         | -4.023E-17  |

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## **APPENDIX D**

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

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### One-Point Flow Rate Bias Estimate

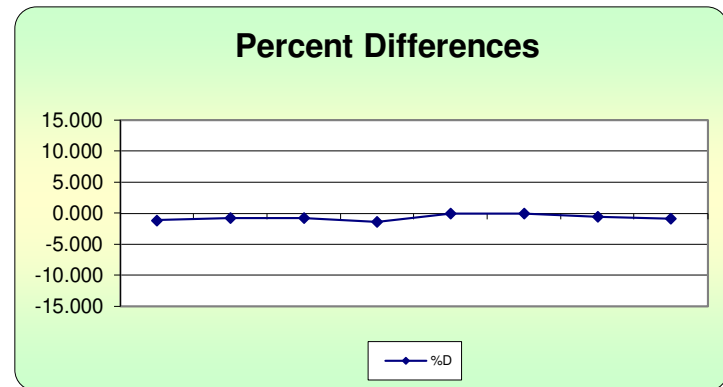
|                         |  |  |  |                             |  |  |  |                 |  |  |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|--|--|
| <b>ETEC Site: DOE-1</b> |  |  |  | <b>Pollutant type: PM10</b> |  |  |  | <b>Bias (%)</b> |  |  |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|--|--|

| Quarter | E-BAM  | Date      | Meas Val (Y) | Audit Val (X) | d (Eqn. 1) | Percentile  | d <sup>2</sup> | d     | d  <sup>2</sup> |
|---------|--------|-----------|--------------|---------------|------------|-------------|----------------|-------|-----------------|
| 12      | Y12096 | 1/11/2021 | 14.00        | 14.16         | -1.130     | <u>25th</u> | 1.277          | 1.130 | 1.277           |
|         |        |           | 16.70        | 16.83         | -0.772     |             | 0.597          | 0.772 | 0.597           |
|         |        |           | 17.50        | 17.64         | -0.794     |             | -0.947         | 0.630 | 0.794           |
| 12      | Y12096 | 2/4/2021  | 14.00        | 14.20         | -1.408     | <u>75th</u> | 1.984          | 1.408 | 1.984           |
|         |        |           | 16.20        | 16.20         | 0.000      |             | -0.721         | 0.000 | 0.000           |
| 12      | W23314 | 3/23/2021 | 14.00        | 14.08         | -0.568     |             | 0.323          | 0.568 | 0.323           |
|         |        |           | 16.79        | 16.94         | -0.885     |             | 0.784          | 0.885 | 0.784           |
|         |        |           | 17.55        | 17.70         | -0.847     |             | 0.718          | 0.847 | 0.718           |

|            |              |                     |
|------------|--------------|---------------------|
| <b>n</b>   | $\sum  d $   | <b>"AB" (Eqn 4)</b> |
| 8          | 6.406        | 0.801               |
| <b>n-1</b> | $\sum  d ^2$ | <b>"AS" (Eqn 5)</b> |
| 7          | 6.312        | 0.411               |

|                         |                     |
|-------------------------|---------------------|
| <b>Bias (%) (Eqn 3)</b> | Both Signs Positive |
| 1.08                    | FALSE               |
| <b>Signed Bias (%)</b>  | Both Signs Negative |
| -1.08                   | TRUE                |

**Note:** 2/4/2021, unit would not run at 16.7 or higher. Moved to another site after repair.





### One-Point Flow Rate Bias Estimate

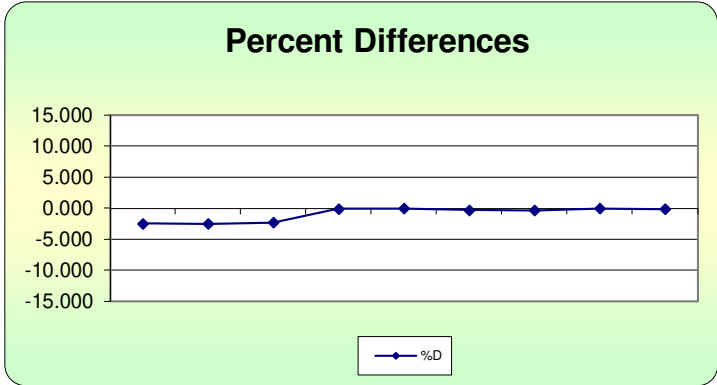
|                         |  |  |  |                             |  |  |  |                 |  |  |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|--|--|
| <b>ETEC Site: DOE-2</b> |  |  |  | <b>Pollutant type: PM10</b> |  |  |  | <b>Bias (%)</b> |  |  |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|--|--|

| Quarter | E-BAM  | Date      | Meas Val (Y) | Audit Val (X) | d (Eqn. 1) | Percentile  | d <sup>2</sup> | d     | d  <sup>2</sup> |
|---------|--------|-----------|--------------|---------------|------------|-------------|----------------|-------|-----------------|
| 12      | X16067 | 1/11/2021 | 14.00        | 14.36         | -2.507     | <b>25th</b> | 6.285          | 2.507 | 6.285           |
|         |        |           | 16.70        | 17.13         | -2.510     |             | 6.301          | 2.510 | 6.301           |
|         |        |           | 17.50        | 17.92         | -2.344     | -2.344      | 5.493          | 2.344 | 5.493           |
| 12      | X23310 | 2/3/2021  | 14.00        | 14.02         | -0.143     | <b>75th</b> | 0.020          | 0.143 | 0.020           |
|         |        |           | 16.70        | 16.71         | -0.060     |             | 0.004          | 0.060 | 0.004           |
|         |        |           | 17.50        | 17.56         | -0.342     | -0.143      | 0.117          | 0.342 | 0.117           |
| 12      | Y12096 | 3/23/2021 | 14.00        | 14.05         | -0.356     |             | 0.127          | 0.356 | 0.127           |
|         |        |           | 16.70        | 16.71         | -0.060     |             | 0.004          | 0.060 | 0.004           |
|         |        |           | 17.50        | 17.53         | -0.171     | 0.029       | 0.171          | 0.029 |                 |

|            |              |                     |
|------------|--------------|---------------------|
| <b>n</b>   | $\sum  d $   | <b>"AB" (Eqn 4)</b> |
| 9          | 8.492        | 0.944               |
| <b>n-1</b> | $\sum  d ^2$ | <b>"AS" (Eqn 5)</b> |
| 8          | 18.379       | 1.138               |

|                         |                     |
|-------------------------|---------------------|
| <b>Bias (%) (Eqn 3)</b> | Both Signs Positive |
| 1.65                    | FALSE               |
| <b>Signed Bias (%)</b>  | Both Signs Negative |
| -1.65                   | TRUE                |

**Note:** Monitor swap outs occurred during the Quarter to balance monitor maintenance and coverage of D&D areas.





### One-Point Flow Rate Bias Estimate

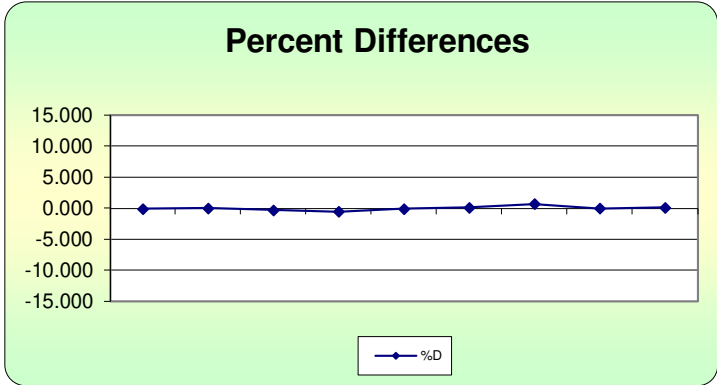
|                         |  |  |  |                             |  |  |  |                 |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|
| <b>ETEC Site: DOE-3</b> |  |  |  | <b>Pollutant type: PM10</b> |  |  |  | <b>Bias (%)</b> |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|

| Quarter | E-BAM  | Date      | Meas Val (Y) | Audit Val (X) | d (Eqn. 1) | Percentile  | d <sup>2</sup> | d     | d  <sup>2</sup> |
|---------|--------|-----------|--------------|---------------|------------|-------------|----------------|-------|-----------------|
| 12      | W23313 | 1/11/2021 | 14.00        | 14.02         | -0.143     |             | 0.020          | 0.143 | 0.020           |
|         |        |           | 16.70        | 16.70         | 0.000      | <b>25th</b> | 0.000          | 0.000 | 0.000           |
|         |        |           | 17.50        | 17.56         | -0.342     | -0.143      | 0.117          | 0.342 | 0.117           |
| 12      | W23313 | 2/4/2021  | 14.00        | 14.08         | -0.568     |             | 0.323          | 0.568 | 0.323           |
|         |        |           | 16.70        | 16.72         | -0.120     | <b>75th</b> | 0.014          | 0.120 | 0.014           |
|         |        |           | 17.50        | 17.48         | 0.114      | 0.114       | 0.013          | 0.114 | 0.013           |
| 12      | W23313 | 3/23/2021 | 14.00        | 13.90         | 0.719      |             | 0.518          | 0.719 | 0.518           |
|         |        |           | 16.70        | 16.71         | -0.060     |             | 0.004          | 0.060 | 0.004           |
|         |        |           | 17.50        | 17.48         | 0.114      |             | 0.013          | 0.114 | 0.013           |

|            |              |                     |
|------------|--------------|---------------------|
| <b>n</b>   | $\sum  d $   | <b>"AB" (Eqn 4)</b> |
| 9          | 2.180        | 0.242               |
| <b>n-1</b> | $\sum  d ^2$ | <b>"AS" (Eqn 5)</b> |
| 8          | 1.022        | 0.248               |

|                         |                     |
|-------------------------|---------------------|
| <b>Bias (%) (Eqn 3)</b> | Both Signs Positive |
| 0.40                    | FALSE               |
| <b>Signed Bias (%)</b>  | Both Signs Negative |
| +/-0.4                  | FALSE               |

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





### One-Point Flow Rate Bias Estimate

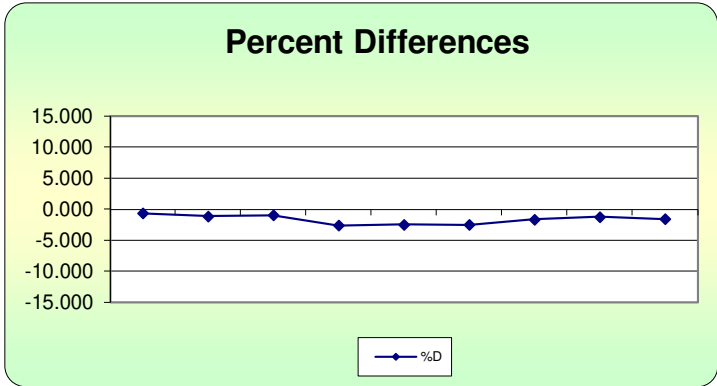
|                         |  |  |  |                             |  |  |  |                 |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|
| <b>ETEC Site: DOE-4</b> |  |  |  | <b>Pollutant type: PM10</b> |  |  |  | <b>Bias (%)</b> |  |
|-------------------------|--|--|--|-----------------------------|--|--|--|-----------------|--|

| Quarter | E-BAM  | Date      | Meas Val (Y) | Audit Val (X) | d (Eqn. 1) | Percentile  | d <sup>2</sup> | d     | d  <sup>2</sup> |
|---------|--------|-----------|--------------|---------------|------------|-------------|----------------|-------|-----------------|
| 12      | W23314 | 1/11/2021 | 14.00        | 14.10         | -0.709     |             | 0.503          | 0.709 | 0.503           |
|         |        |           | 16.70        | 16.89         | -1.125     | <b>25th</b> | 1.265          | 1.125 | 1.265           |
|         |        |           | 17.50        | 17.68         | -1.018     | -2.510      | 1.037          | 1.018 | 1.037           |
| 12      | X16067 | 2/4/2021  | 14.00        | 14.38         | -2.643     |             | 6.983          | 2.643 | 6.983           |
|         |        |           | 16.70        | 17.13         | -2.510     | <b>75th</b> | 6.301          | 2.510 | 6.301           |
|         |        |           | 17.50        | 17.96         | -2.561     | -1.125      | 6.560          | 2.561 | 6.560           |
| 12      | X16067 | 3/23/2021 | 14.00        | 14.24         | -1.685     |             | 2.841          | 1.685 | 2.841           |
|         |        |           | 16.70        | 16.91         | -1.242     |             | 1.542          | 1.242 | 1.542           |
|         |        |           | 17.50        | 17.79         | -1.630     |             | 2.657          | 1.630 | 2.657           |

|            |              |                     |
|------------|--------------|---------------------|
| <b>n</b>   | $\sum  d $   | <b>"AB" (Eqn 4)</b> |
| 9          | 15.124       | 1.680               |
| <b>n-1</b> | $\sum  d ^2$ | <b>"AS" (Eqn 5)</b> |
| 8          | 29.689       | 0.731               |

|                         |                     |
|-------------------------|---------------------|
| <b>Bias (%) (Eqn 3)</b> | Both Signs Positive |
| 2.13                    | FALSE               |
| <b>Signed Bias (%)</b>  | Both Signs Negative |
| -2.13                   | TRUE                |

**Note:** 2/4/2021, unit would not run at 16.7 or higher. Moved to another site after repair.



# NORTHWIND

## Baseline Air Monitoring Program - DOE

### E-BAM Monthly Audit and Maintenance

Station # DOB-1

Serial # Y12096

Audit Date: 1/11/2021

Audited By: TS Williford

#### Flow Audit

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

|                      | E-BAM                       | Ref. Std.         |          | E-BAM             | Ref. Std.         |
|----------------------|-----------------------------|-------------------|----------|-------------------|-------------------|
| Ambient Temperature: | as found: <u>20.7</u> °C    | <u>19.5</u> °C    | as left: | <u>20.7</u> °C    | <u>19.5</u> °C    |
| Barometric Pressure: | as found: <u>719.5</u> mmHg | <u>716.5</u> mmHg | as left: | <u>719.5</u> mmHg | <u>716.5</u> mmHg |
| 16.7 lpm Flow Rate   | as found: <u>16.7</u> lpm   | <u>16.83</u> lpm  | as left: | <u>16.7</u> lpm   | <u>16.83</u> lpm  |
| 14.0 lpm Flow Rate   | as found: <u>14.0</u> lpm   | <u>14.16</u> lpm  | as left: | <u>14.0</u> lpm   | <u>14.16</u> lpm  |
| 17.5 lpm Flow Rate   | as found: <u>17.5</u> lpm   | <u>17.64</u> lpm  | as left: | <u>17.5</u> lpm   | <u>17.64</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

Expected Span Mass (mg/cm<sup>2</sup>): 0.891  
 Measured Span Mass (mg/cm<sup>2</sup>): 0.865  
 Difference (mg/cm<sup>2</sup>): 0.026  
 % Difference / Pass or Fail: 2.96%

#### Pump Test

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| <u>14.7</u>       | <u>430.4</u> | <u>Marginal</u>        |

#### Setup and Calibration Values

| Parameter    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1240</u> | <u>1240</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>24hrs</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>1/11/21</u> | <u>1250</u> | 4     |      |      |
| <u>2</u>                 |                |             | 5     |      |      |
| <u>3</u>                 |                |             | 6     |      |      |

Audit Notes:

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# NORTHWIND

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

Station # DOE-2 Serial # X16067  
 Audit Date: 1/11/21 Audited By: TS Willford

### Flow Audit

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

|                      | E-BAM                       | Ref. Std.         |          | E-BAM             | Ref. Std.         |
|----------------------|-----------------------------|-------------------|----------|-------------------|-------------------|
| Ambient Temperature: | as found: <u>22.0</u> °C    | <u>21.8</u> °C    | as left: | <u>22.0</u> °C    | <u>21.8</u> °C    |
| Barometric Pressure: | as found: <u>715.2</u> mmHg | <u>713.0</u> mmHg | as left: | <u>715.2</u> mmHg | <u>713.0</u> mmHg |
| 16.7 lpm Flow Rate   | as found: <u>16.7</u> lpm   | <u>17.13</u> lpm  | as left: | <u>16.7</u> lpm   | <u>17.13</u> lpm  |
| 14.0 lpm Flow Rate   | as found: <u>14.0</u> lpm   | <u>14.36</u> lpm  | as left: | <u>14.0</u> lpm   | <u>14.36</u> lpm  |
| 17.5 lpm Flow Rate   | as found: <u>17.5</u> lpm   | <u>17.92</u> lpm  | as left: | <u>17.5</u> lpm   | <u>17.92</u> lpm  |

### Mechanical Audits (Y = Yes N = No)

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

### Manual Span Membrane Test

### Pump Test

|   |              |                                   |                         |  |
|---|--------------|-----------------------------------|-------------------------|--|
| Expected Span Mass (mg/cm <sup>2</sup> ): | <u>0.914</u> | Flow Rate<br>14.0 - 15.0<br>(lpm) | Vacuum<br>Value<br>(Hg) | Quality Category<br>Good / Marginal / Poor |
| Measured Span Mass (mg/cm <sup>2</sup> ): | <u>0.908</u> |                                   |                         |  |
| Difference (mg/cm <sup>2</sup> ):         | <u>0.006</u> |                                   |                         |  |
| % Difference / Pass or Fail:              | <u>0.66%</u> | <u>14.3</u>                       | <u>415.0</u>            | <u>Marginal</u>                            |

### Setup and Calibration Values

| Parameter    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1412</u> | <u>1412</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 hrs</u> | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25C</u>   |
| Realtime Avg | 60 mins     | <u>60mins</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>1/11/21</u> | <u>1421</u> |       |      |      |
| <u>2</u>                 |                |             |       |      |      |
| <u>3</u>                 |                |             |       |      |      |

Audit Notes:  
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 \_\_\_\_\_  
 \_\_\_\_\_

# NORTHWIND

## Baseline Air Monitoring Program - DOE

### E-BAM Monthly Audit and Maintenance

 Station # DOE-3

 Serial # W23313

 Audit Date: 1/11/21

 Audited By: JS Willisford

#### Flow Audit

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

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

|                      | E-BAM                     | Ref. Std.        |          | E-BAM           | Ref. Std.        |
|----------------------|---------------------------|------------------|----------|-----------------|------------------|
| Ambient Temperature: | as found: <u>20.1</u> °C  | <u>19.6</u> °C   | as left: | <u>20.1</u> °C  | <u>19.6</u> °C   |
| Barometric Pressure: | as found: <u>715</u> mmHg | <u>715</u> mmHg  | as left: | <u>715</u> mmHg | <u>715</u> mmHg  |
| 16.7 lpm Flow Rate   | as found: <u>16.7</u> lpm | <u>16.7</u> lpm  | as left: | <u>16.7</u> lpm | <u>16.7</u> lpm  |
| 14.0 lpm Flow Rate   | as found: <u>14.0</u> lpm | <u>14.02</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>17.56</u> lpm | as left: | <u>17.5</u> lpm | <u>17.56</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

 Expected Span Mass (mg/cm<sup>2</sup>): 0.885

 Measured Span Mass (mg/cm<sup>2</sup>): 0.887

 Difference (mg/cm<sup>2</sup>): 0.002

 % Difference / Pass or Fail: 0.22%

#### Pump Test

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| <u>14.0</u>       | <u>403.2</u> | <u>Good/Marginal</u>   |

#### Setup and Calibration Values

| Parameter    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1501</u> | <u>1501</u>   | Analog Mode      | Hourly   | <u>Hourly</u> | Flow Type       | Actual   | <u>Act</u>   |
| Location     | <u>3</u>    | <u>3</u>      | Baud Rate        | 9600     | <u>9600</u>   | Restart Voltage | 12.5 v   | <u>12.5v</u> |
| Tape Advance | 24 hrs      | <u>24hr</u>   | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25c</u>   |
| Realtime Avg | 60 mins     | <u>60mins</u> | Delta T Setpoint | 15 C     | <u>15C</u>    | DAC             | 8.0 v    | <u>80v</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>1/11/21</u> | <u>1512</u> |       |      |      |
| <u>2</u>                 |                |             |       |      |      |
| <u>3</u>                 |                |             |       |      |      |

Audit Notes:

# NORTHWIND

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

 Station # DOE4

 Serial # W23314

 Audit Date: 1/11/21

 Audited By: TSW/AFerd

### Flow Audit

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

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

|                      |           | E-BAM       |      | Ref. Std.    |      | E-BAM    |             | Ref. Std. |              |      |
|----------------------|-----------|-------------|------|--------------|------|----------|-------------|-----------|--------------|------|
| Ambient Temperature: | as found: | <u>18.9</u> | °C   | <u>17.8</u>  | °C   | as left: | <u>18.9</u> | °C        | <u>17.8</u>  | °C   |
| Barometric Pressure: | as found: | <u>709</u>  | mmHg | <u>707</u>   | mmHg | as left: | <u>709</u>  | mmHg      | <u>707</u>   | mmHg |
| 16.7 lpm Flow Rate   | as found: | <u>16.7</u> | lpm  | <u>16.89</u> | lpm  | as left: | <u>16.7</u> | lpm       | <u>16.89</u> | lpm  |
| 14.0 lpm Flow Rate   | as found: | <u>14.0</u> | lpm  | <u>14.10</u> | lpm  | as left: | <u>14.0</u> | lpm       | <u>14.10</u> | lpm  |
| 17.5 lpm Flow Rate   | as found: | <u>17.5</u> | lpm  | <u>17.68</u> | lpm  | as left: | <u>17.5</u> | lpm       | <u>17.68</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

 Expected Span Mass (mg/cm<sup>2</sup>): 0.919

 Measured Span Mass (mg/cm<sup>2</sup>): 0.922

 Difference (mg/cm<sup>2</sup>): 0.003

 % Difference / Pass or Fail: 0.32%

### Pump Test

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| <u>14.0</u>       | <u>420.3</u> | <u>marginal</u>        |

### Setup and Calibration Values

| Parameter    | Expected    | Found          | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|----------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1546</u> | <u>1546</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 hrs</u>  | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25C</u>   |
| Realtime Avg | 60 mins     | <u>60 mins</u> | Delta T Setpoint | 15 C     | <u>15C</u>    | DAC             | 8.0 v    | <u>8.0V</u>  |
| Machine Type | PM-10       | <u>PM-10</u>   | RH Control       | On       | <u>On</u>     | RH Connect      | No       | <u>No</u>    |
| Analog FS    | 1.0 v       | <u>1.0V</u>    | Flow Setpoint    | 16.7     | <u>16.7</u>   | Pump Protect    | Off      | <u>off</u>   |

### Last 6 Errors in E-BAM Error Log

| Error                    | Date           | Time        | Error | Date | Time |
|--------------------------|----------------|-------------|-------|------|------|
| <u>1 No New Messages</u> | <u>1/11/21</u> | <u>1555</u> |       |      |      |
| <u>2</u>                 |                |             |       |      |      |
| <u>3</u>                 |                |             |       |      |      |

Audit Notes:



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

Station # DOE-1 Serial # Y12096  
 Audit Date: 2/4/2021 Audited By: T.S. Williford

| Flow Audit               |                            |                   |                   |                   |                   |
|--------------------------|----------------------------|-------------------|-------------------|-------------------|-------------------|
| Flow Audit Device Model: | <u>BGI Delta Cal DC-1A</u> | Serial No:        | <u>158047</u>     | Calibration Date: | <u>2/5/2020</u>   |
| Leak Check Value:        | as found: _____            |                   | as left: _____    |                   |                   |
| Ambient Temperature:     | as found:                  | <u>19.4</u> °C    | Ref. Std.         | <u>19.3</u> °C    | as left:          |
| Barometric Pressure:     | as found:                  | <u>717.4</u> mmHg | <u>715.0</u> mmHg | as left:          | <u>717.4</u> mmHg |
| 16.7 lpm Flow Rate       | as found:                  | <u>16.2</u> lpm   | <u>16.2</u> lpm   | as left:          | <u>16.2</u> lpm   |
| 14.0 lpm Flow Rate       | as found:                  | <u>14.0</u> lpm   | <u>14.2</u> lpm   | as left:          | <u>14.0</u> lpm   |
| 17.5 lpm Flow Rate       | as found:                  | <u>16.2</u> lpm   | <u>16.2</u> lpm   | as left:          | <u>16.2</u> lpm   |

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

| Manual Span Membrane Test                              | Pump Test                         |                         |  |
|--|-----------------------------------|-------------------------|--|
| Expected Span Mass (mg/cm <sup>2</sup> ): <u>0.891</u> | Flow Rate<br>14.0 - 15.0<br>(lpm) | Vacuum<br>Value<br>(Hg) | Quality Category<br>Good / Marginal / Poor |
| Measured Span Mass (mg/cm <sup>2</sup> ): <u>0.886</u> |                                   |                         |  |
| Difference (mg/cm <sup>2</sup> ): <u>0.005</u>         |                                   |                         |  |
| % Difference <u>Pass</u> or Fail: <u>0.56%</u>         | <u>15.0</u>                       | <u>438.3</u>            | <u>Marginal</u>                            |

| Setup and Calibration Values |             |               |                  |          |               |                 |          |              |
|------------------------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Parameter                    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
| Clock                        | <u>1005</u> | <u>1005</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>24hr</u>   | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25C</u>   |
| Realtime Avg                 | 60 mins     | <u>60mins</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>No new messages</u>           | <u>2/4/21</u> | <u>1011</u> |       |      |      |
|                                  |               |             |       |      |      |
|                                  |               |             |       |      |      |
|                                  |               |             |       |      |      |
|                                  |               |             |       |      |      |

Audit Notes:  
 \* Unit will not run at 16.7. I have no extra to replace it with. Since all other parameter are good I will leave running.

# NORTHWIND

## Baseline Air Monitoring Program - DOE

### E-BAM Monthly Audit and Maintenance

Station # DOE-2

Serial # W23310

Audit Date: 2/3/21

Audited By: T. S. Williford

#### Flow Audit

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

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

|                      | E-BAM                       | Ref. Std.         |          | E-BAM             | Ref. Std.         |
|----------------------|-----------------------------|-------------------|----------|-------------------|-------------------|
| Ambient Temperature: | as found: <u>20.1</u> °C    | <u>19.5</u> °C    | as left: | <u>20.1</u> °C    | <u>19.5</u> °C    |
| Barometric Pressure: | as found: <u>710.8</u> mmHg | <u>710.0</u> mmHg | as left: | <u>710.8</u> mmHg | <u>710.0</u> mmHg |
| 16.7 lpm Flow Rate   | as found: <u>16.7</u> lpm   | <u>16.71</u> lpm  | as left: | <u>16.7</u> lpm   | <u>16.71</u> lpm  |
| 14.0 lpm Flow Rate   | as found: <u>14.0</u> lpm   | <u>14.02</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>17.56</u> lpm  | as left: | <u>17.5</u> lpm   | <u>17.56</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

Expected Span Mass (mg/cm2): 0.915

Measured Span Mass (mg/cm2): 0.924

Difference (mg/cm2): 0.009

% Difference Pass or Fail: 0.98%

#### Pump Test

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| <u>14.9</u>       | <u>422.3</u> | <u>Marginal</u>        |

#### Setup and Calibration Values

| Parameter    | Expected | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|----------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        |          |               | Analog Mode      | Hourly   | <u>Hourly</u> | Flow Type       | Actual   | <u>Act</u>   |
| Location     | <u>2</u> | <u>2</u>      | Baud Rate        | 9600     | <u>9600</u>   | Restart Voltage | 12.5 v   | <u>12.5v</u> |
| Tape Advance | 24 hrs   | <u>24hr</u>   | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25C</u>   |
| Realtime Avg | 60 mins  | <u>60mins</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>2/3/21</u> | <u>11:15</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 # WZ3313

 Audit Date: 2/4/2021

 Audited By: TSWilliford

#### Flow Audit

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

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

|                      |           | E-BAM      | Ref. Std. |          | E-BAM      | Ref. Std. |
|----------------------|-----------|------------|-----------|----------|------------|-----------|
| Ambient Temperature: | as found: | 22.7 °C    | 21.5 °C   | as left: | 22.7 °C    | 21.5 °C   |
| Barometric Pressure: | as found: | 712.7 mmHg | 713 mmHg  | as left: | 712.7 mmHg | 713 mmHg  |
| 16.7 lpm Flow Rate   | as found: | 16.7 lpm   | 16.72 lpm | as left: | 16.7 lpm   | 16.72 lpm |
| 14.0 lpm Flow Rate   | as found: | 14.0 lpm   | 14.08 lpm | as left: | 14.0 lpm   | 14.08 lpm |
| 17.5 lpm Flow Rate   | as found: | 17.5 lpm   | 17.48 lpm | as left: | 17.5 lpm   | 17.48 lpm |

#### Mechanical Audits ( Y = Yes N = No )

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

#### Manual Span Membrane Test

 Expected Span Mass (mg/cm2): 0.885

 Measured Span Mass (mg/cm2): 0.892

 Difference (mg/cm2): 0.007

 % Difference / Pass or Fail: 0.79%

#### Pump Test

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| 14.4              | 410.5        | Marginal               |

#### Setup and Calibration Values

| Parameter    | Expected | Found | Parameter        | Expected | Found  | Parameter       | Expected | Found |
|--------------|----------|-------|------------------|----------|--------|-----------------|----------|-------|
| Clock        | 1031     | 1031  | Analog Mode      | Hourly   | Hourly | Flow Type       | Actual   | Act   |
| Location     | 3        | 3     | Baud Rate        | 9600     | 9600   | Restart Voltage | 12.5 v   | 12.5V |
| Tape Advance | 24 hrs   | 24hr  | RH Setpoint      | 45%      | 45%    | Std Cond Temp   | 25 C     | 25C   |
| Realtime Avg | 60 mins  | 60min | Delta T Setpoint | 15 C     | 15C    | DAC             | 8.0 v    | 8.0v  |
| Machine Type | PM-10    | PM-10 | RH Control       | On       | on     | RH Connect      | No       | NO    |
| Analog FS    | 1.0 v    | 1.0V  | Flow Setpoint    | 16.7     | 16.7   | Pump Protect    | Off      | off   |

#### Last 6 Errors in E-BAM Error Log

| Error             | Date   | Time | Error | Date | Time |
|-------------------|--------|------|-------|------|------|
| 1 No New messages | 2/4/21 | 1846 | 4     |      |      |
| 2                 |        |      | 5     |      |      |
| 3                 |        |      | 6     |      |      |

Audit Notes:



Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4

Serial # X16067

Audit Date: 2/4/2021

Audited By: T.S. Williford

| Flow Audit               |                      |                   |                     |                   |                   |
|--------------------------|----------------------|-------------------|---------------------|-------------------|-------------------|
| Flow Audit Device Model: | BGI Delta Cal DC-1A  | Serial No:        | 158047              | Calibration Date: | 2/25/2021         |
| 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>22.0</u> °C    | <u>21.0</u> °C      |                   | <u>22.0</u> °C    |
| Barometric Pressure:     | as found:            | <u>706.5</u> mmHg | <u>704.5</u> mmHg   | as left:          | <u>706.5</u> mmHg |
| 16.7 lpm Flow Rate       | as found:            | <u>16.7</u> lpm   | <u>17.13</u> lpm    | as left:          | <u>16.7</u> lpm   |
| 14.0 lpm Flow Rate       | as found:            | <u>14.0</u> lpm   | <u>14.38</u> lpm    | as left:          | <u>14.0</u> lpm   |
| 17.5 lpm Flow Rate       | as found:            | <u>17.5</u> lpm   | <u>17.96</u> lpm    | as left:          | <u>17.5</u> lpm   |

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

| Manual Span Membrane Test    |              | Pump Test         |              |                        |
|------------------------------|--------------|-------------------|--------------|------------------------|
| Expected Span Mass (mg/cm2): | <u>0.914</u> | Flow Rate         | Vacuum Value | Quality Category       |
| Measured Span Mass (mg/cm2): | <u>0.926</u> | 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| Difference (mg/cm2):         | <u>0.012</u> |                   |              |                        |
| % Difference / Pass or Fail: | <u>1.30%</u> | <u>14.0</u>       | <u>412.6</u> | <u>Marginal</u>        |

| Setup and Calibration Values |             |               |                  |          |               |                 |          |              |
|------------------------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Parameter                    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
| Clock                        | <u>1228</u> | <u>1228</u>   | Analog Mode      | Hourly   | <u>Hourly</u> | Flow Type       | Actual   | <u>Act</u>   |
| Location                     | <u>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>24hrs</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>15°C</u>   | DAC             | 8.0 v    | <u>8.0v</u>  |
| Machine Type                 | PM-10       | <u>PM-10</u>  | RH Control       | On       | <u>On</u>     | RH Connect      | No       | <u>NO</u>    |
| Analog FS                    | 1.0 v       | <u>1.0v</u>   | Flow Setpoint    | 16.7     | <u>16.7</u>   | Pump Protect    | Off      | <u>off</u>   |

| Last 6 Errors in E-BAM Error Log |               |             |       |      |      |  |
|----------------------------------|---------------|-------------|-------|------|------|--|
| Error                            | Date          | Time        | Error | Date | Time |  |
| <u>No new messages</u>           | <u>2/4/21</u> | <u>1246</u> | 4     |      |      |  |
|                                  |               |             | 5     |      |      |  |
|                                  |               |             | 6     |      |      |  |

Audit Notes:

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

Station # DOE-1

Serial # W2 3314

Audit Date: 3/23/21

Audited By: T.S.W. Hillford

**Flow Audit**

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/25/2021

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

|                      |           | E-BAM             | Ref. Std.         |          | E-BAM             | Ref. Std.         |
|----------------------|-----------|-------------------|-------------------|----------|-------------------|-------------------|
| Ambient Temperature: | as found: | <u>17.6</u> °C    | <u>16.9</u> °C    | as left: | <u>17.6</u> °C    | <u>16.9</u> °C    |
| Barometric Pressure: | as found: | <u>708.9</u> mmHg | <u>708.5</u> mmHg | as left: | <u>708.9</u> mmHg | <u>708.5</u> mmHg |
| 16.7 lpm Flow Rate   | as found: | <u>16.7</u> lpm   | <u>16.79</u> lpm  | as left: | <u>16.7</u> lpm   | <u>16.79</u> lpm  |
| 14.0 lpm Flow Rate   | as found: | <u>14.0</u> lpm   | <u>14.08</u> lpm  | as left: | <u>14.0</u> lpm   | <u>14.08</u> lpm  |
| 17.5 lpm Flow Rate   | as found: | <u>17.5</u> lpm   | <u>17.55</u> lpm  | as left: | <u>17.5</u> lpm   | <u>17.55</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**

Expected Span Mass (mg/cm2): 0.919

Measured Span Mass (mg/cm2): 0.921

Difference (mg/cm2): 0.002

% Difference Pass or Fail: 0.22%

**Pump Test**

| Flow Rate         | Vacuum Value | Quality Category       |
|-------------------|--------------|------------------------|
| 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| <u>14.2</u>       | <u>363.3</u> | <u>Good</u>            |

**Setup and Calibration Values**

| Parameter    | Expected    | Found        | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|--------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1353</u> | <u>1353</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>24hrs</u> | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25C</u>   |
| Realtime Avg | 60 mins     | <u>10min</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>No new messages</u> | <u>3/23/21</u> | <u>4</u> |       |      |      |
|                        |                | <u>5</u> |       |      |      |
|                        |                | <u>6</u> |       |      |      |

Audit Notes:

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

Station # DOE-2 Serial # Y12096  
 Audit Date: 3/23/21 Audited By: T.S.W. Wilford

| Flow Audit               |                      |            |                     |                   |            |
|--------------------------|----------------------|------------|---------------------|-------------------|------------|
| Flow Audit Device Model: | BGI Delta Cal DC-1A  | Serial No: | 158047              | Calibration Date: | 2/25/2021  |
| Leak Check Value:        | as found: <u>0.4</u> |            | as left: <u>0.4</u> |                   |            |
| Ambient Temperature:     | as found:            | E-BAM      | Ref. Std.           | as left:          | E-BAM      |
| Barometric Pressure:     | as found:            | 12.9 °C    | 12.3 °C             | as left:          | 12.9 °C    |
| 16.7 lpm Flow Rate       | as found:            | 706.5 mmHg | 707.0 mmHg          | as left:          | 706.5 mmHg |
| 14.0 lpm Flow Rate       | as found:            | 16.7 lpm   | 16.71 lpm           | as left:          | 16.7 lpm   |
| 17.5 lpm Flow Rate       | as found:            | 14.0 lpm   | 14.05 lpm           | as left:          | 14.0 lpm   |
|                          | as found:            | 17.5 lpm   | 17.53 lpm           | as left:          | 17.5 lpm   |

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

| Manual Span Membrane Test                 | Pump Test   |        |                        |
|---|-------------|--------|------------------------|
| Expected Span Mass (mg/cm2): <u>0.891</u> | Flow Rate   | Vacuum | Quality Category       |
| Measured Span Mass (mg/cm2): <u>0.908</u> | 14.0 - 15.0 | Value  | Good / Marginal / Poor |
| Difference (mg/cm2): <u>0.017</u>         | (lpm)       | (Hg)   |                        |
| % Difference / Pass or Fail: <u>1.9%</u>  | 15.0        | 308.0  | <u>Good</u>            |

| Setup and Calibration Values |          |       |                  |          |        |                 |          |       |
|------------------------------|----------|-------|------------------|----------|--------|-----------------|----------|-------|
| Parameter                    | Expected | Found | Parameter        | Expected | Found  | Parameter       | Expected | Found |
| Clock                        | 0921     | 0921  | Analog Mode      | Hourly   | Hourly | Flow Type       | Actual   | Act   |
| Location                     | 2        | 2     | Baud Rate        | 9600     | 9600   | Restart Voltage | 12.5 v   | 12.5v |
| Tape Advance                 | 24 hrs   | 24hrs | RH Setpoint      | 45%      | 45%    | Std Cond Temp   | 25 C     | 25C   |
| Realtime Avg                 | 60 mins  | 60min | Delta T Setpoint | 15 C     | 15C    | DAC             | 8.0 v    | 8.0v  |
| Machine Type                 | PM-10    | PM-10 | RH Control       | On       | On     | RH Connect      | No       | No    |
| Analog FS                    | 1.0 v    | 1.0v  | Flow Setpoint    | 16.7     | 16.7   | Pump Protect    | Off      | off   |

| Last 6 Errors in E-BAM Error Log |                |             |       |      |      |
|----------------------------------|----------------|-------------|-------|------|------|
| Error                            | Date           | Time        | Error | Date | Time |
| <u>No new messages</u>           | <u>3/23/21</u> | <u>1025</u> |       |      |      |
|                                  |                |             |       |      |      |
|                                  |                |             |       |      |      |
|                                  |                |             |       |      |      |
|                                  |                |             |       |      |      |

Audit Notes:  
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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-3

Serial # W23313

Audit Date: 3/23/21

Audited By: T.S.W. - W Ford

| Flow Audit               |                            |                   |                     |                   |                   |
|--------------------------|----------------------------|-------------------|---------------------|-------------------|-------------------|
| Flow Audit Device Model: | <u>BGI Delta Cal DC-1A</u> | Serial No:        | <u>158047</u>       | Calibration Date: | <u>2/25/2021</u>  |
| Leak Check Value:        | as found: <u>0.5</u>       |                   | as left: <u>0.5</u> |                   |                   |
| Ambient Temperature:     | as found:                  | <u>15.5</u> °C    | Ref. Std.           | <u>14.9</u> °C    | as left:          |
| Barometric Pressure:     | as found:                  | <u>708.2</u> mmHg | <u>708.5</u> mmHg   | as left:          | <u>708.2</u> mmHg |
| 16.7 lpm Flow Rate       | as found:                  | <u>16.7</u> lpm   | <u>16.71</u> lpm    | as left:          | <u>16.7</u> lpm   |
| 14.0 lpm Flow Rate       | as found:                  | <u>14.0</u> lpm   | <u>13.90</u> lpm    | as left:          | <u>14.0</u> lpm   |
| 17.5 lpm Flow Rate       | as found:                  | <u>17.5</u> lpm   | <u>17.48</u> lpm    | as left:          | <u>17.5</u> lpm   |

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

| Manual Span Membrane Test    |              | Pump Test         |              |                        |
|------------------------------|--------------|-------------------|--------------|------------------------|
| Expected Span Mass (mg/cm2): | <u>0.885</u> | Flow Rate         | Vacuum Value | Quality Category       |
| Measured Span Mass (mg/cm2): | <u>0.889</u> | 14.0 - 15.0 (lpm) | (Hg)         | Good / Marginal / Poor |
| Difference (mg/cm2):         | <u>0.004</u> |                   |              |                        |
| % Difference / Pass or Fail: | <u>0.45%</u> | <u>14.9</u>       | <u>332.9</u> | <u>Good</u>            |

| Setup and Calibration Values |             |               |                  |          |               |                 |          |              |
|------------------------------|-------------|---------------|------------------|----------|---------------|-----------------|----------|--------------|
| Parameter                    | Expected    | Found         | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
| Clock                        | <u>1054</u> | <u>1054</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 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>No new messages</u>           | <u>3/23/21</u> | <u>1203</u> | 4     |      |      |  |
|                                  |                |             | 5     |      |      |  |
|                                  |                |             | 6     |      |      |  |

Audit Notes:

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Baseline Air Monitoring Program - DOE

E-BAM Monthly Audit and Maintenance

Station # DOE-4

Serial # X16067

Audit Date: 3/23/21

Audited By: T.S.W. Wilford

Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 2/25/2021

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

|                      |           | E-BAM             | Ref. Std.         |          | E-BAM             | Ref. Std.         |
|----------------------|-----------|-------------------|-------------------|----------|-------------------|-------------------|
| Ambient Temperature: | as found: | <u>18.3</u> °C    | <u>17.5</u> °C    | as left: | <u>18.3</u> °C    | <u>17.5</u> °C    |
| Barometric Pressure: | as found: | <u>702.3</u> mmHg | <u>700.0</u> mmHg | as left: | <u>702.3</u> mmHg | <u>700.0</u> mmHg |
| 16.7 lpm Flow Rate   | as found: | <u>16.7</u> lpm   | <u>16.91</u> lpm  | as left: | <u>16.7</u> lpm   | <u>16.91</u> lpm  |
| 14.0 lpm Flow Rate   | as found: | <u>14.0</u> lpm   | <u>14.24</u> lpm  | as left: | <u>14.0</u> lpm   | <u>14.24</u> lpm  |
| 17.5 lpm Flow Rate   | as found: | <u>17.5</u> lpm   | <u>17.79</u> lpm  | as left: | <u>17.5</u> lpm   | <u>17.79</u> lpm  |

Mechanical Audits (Y = Yes N = No)

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

Manual Span Membrane Test

Pump Test

|   |                                   |                         |  |
|---|-----------------------------------|-------------------------|--|
| Expected Span Mass (mg/cm2): <u>0.914</u> | Flow Rate<br>14.0 - 15.0<br>(lpm) | Vacuum<br>Value<br>(Hg) | Quality Category<br>Good / Marginal / Poor |
| Measured Span Mass (mg/cm2): <u>0.934</u> |                                   |                         |  |
| Difference (mg/cm2): <u>0.02</u>          |                                   |                         |  |
| % Difference / Pass or Fail: <u>2.16%</u> | <u>14.2</u>                       | <u>418.4</u>            | <u>Marginal</u>                            |

Setup and Calibration Values

| Parameter    | Expected    | Found        | Parameter        | Expected | Found         | Parameter       | Expected | Found        |
|--------------|-------------|--------------|------------------|----------|---------------|-----------------|----------|--------------|
| Clock        | <u>1156</u> | <u>1156</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</u>    | RH Setpoint      | 45%      | <u>45%</u>    | Std Cond Temp   | 25 C     | <u>25°C</u>  |
| Realtime Avg | 60 mins     | <u>60</u>    | Delta T Setpoint | 15 C     | <u>15C</u>    | DAC             | 8.0 v    | <u>8.0v</u>  |
| Machine Type | PM-10       | <u>PM-10</u> | RH Control       | On       | <u>on</u>     | RH Connect      | No       | <u>NO</u>    |
| Analog FS    | 1.0 v       | <u>1.0v</u>  | Flow Setpoint    | 16.7     | <u>16.7</u>   | Pump Protect    | Off      | <u>off</u>   |

Last 6 Errors in E-BAM Error Log

| Error                  | Date           | Time         | Error | Date | Time |
|------------------------|----------------|--------------|-------|------|------|
| <u>No New Messages</u> | <u>3/23/21</u> | <u>1:300</u> | 4     |      |      |
|                        |                |              | 5     |      |      |
|                        |                |              | 6     |      |      |

Audit Notes: