# *Report on Quarterly Air Monitoring, Area IV, Third Quarter 2022*

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

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

***Prepared by:***
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# REPORT ON QUARTERLY AIR MONITORING, AREA IV, THIRD QUARTER 2022, SANTA SUSANA FIELD LABORATORY, VENTURA COUNTY, CA

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# EXECUTIVE SUMMARY

This report summarizes the United States Department of Energy (DOE) air monitoring activities conducted during the third quarter of 2022, which is the eighteenth quarter (Q18) of the monitoring period (July 1, 2022, to September 30, 2022) 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. Year 4 consisted of Quarter 12 through Quarter 15. The program is continuing for a fifth year, which consists of Quarter 16 through Quarter 19.

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 ($PM_{10}$), volatile organic compounds (VOCs), and radionuclides at air monitoring stations DOE-1, DOE-2, DOE-3, and DOE-4 encompassing the ETEC, Area IV portion of SSFL. Having developed the baseline levels for $PM_{10}$, VOCs, and radionuclides helps distinguish between levels that naturally occur or were previously present at the ETEC site and if onsite remediation activities produce elevated results. Air monitoring will be continued throughout remediation activities to be able to compare results from onsite remediation activities to baseline data in the Annual Air Monitoring Reports.

The following air monitoring activities conducted during 2022, Q3, by DOE within Area IV are summarized in this report:

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

Meteorological data, $PM_{10}$, and radionuclide data all met the data completeness goal of 80%, and VOC data met the completeness goal of 85% for Q18. The nineteenth quarter of the Air Monitoring Program will begin October 1, 2022.

The following site activities were conducted during Q18 by DOE within Area IV:

- Quarterly site-wide groundwater level monitoring
- 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$^3$ | microgram(s) per cubic meter |
| Boeing | The Boeing Company |
| CAAQS | California Ambient Air Quality Standards |
| CFR | Code of Federal Regulations |
| DASC | Data Assessment Statistical Calculator |
| DOE | U.S. Department of Energy |
| DTSC | State of California Department of Toxic Substances Control |
| EPA | U.S. Environmental Protection Agency |
| ETEC | Energy Technology Engineering Center |
| GC | gas chromatography |
| Hg | mercury |
| HHRA | Human Health Risk Assessment |
| 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 |
| MDL | method detection limit |
| NAAQS | National Ambient Air Quality Standards |
| NASA | National Aeronautics and Space Administration |
| NIST | National Institute of Standards and Technology |
| pCi | picocurie(s) |
| $PM_{10}$ | particulate matter less than 10 microns in aerodynamic diameter |
| Q18 | eighteenth quarter |
| QA | quality assurance |
| QC | quality control |
| RAWS | Remote Automatic Weather Stations |
| RPD | relative percent difference |
| 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 ($PM_{10}$), and volatile organic compounds (VOCs), at 14 locations at SSFL. Data was 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 is 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, $PM_{10}$, and radionuclides are monitored at the four DOE monitoring locations, and meteorological conditions are monitored at the DOE-4 location. The DOE monitoring locations DOE-1 through DOE-4 are shown in Figure 2.

This report summarizes the results and quality assurance (QA) activities performed during the third quarter of 2022, which was from July 1, 2022, through September 30, 2022. This represents the eighteenth quarter (Q18) of the monitoring period.

## 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 for 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.

Through the third quarter in 2022, the Simi Valley received approximately 0.1 inches of rainfall.

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 Q18 reporting period (July 1, 2022, through September 30, 2022).

Quality objectives and data completeness were met for all meteorological, $PM_{10}$, VOC, and radionuclide data for Q18 of the Air Monitoring Program.

Urban background data compared with air monitoring data indicate that the $PM_{10}$ concentrations measured at stations DOE-1, DOE-2, DOE-3, and DOE-4 during Q18 are comparable to the $PM_{10}$ 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. $PM_{10}$ concentrations did not exceed the California Ambient Air Quality Standard (CAAQS; 50 micrograms per cubic meter [$\mu g/m^3$]) during Q18. During Q18 DOE-2 experienced a pump failure starting August 9, 2022, and was out of commission until August 11, 2022, and DOE-1 experienced a sensor failure starting September 17, 2022, and was out of commission until September 20, 2022 (as noted in Appendix A).

During Q18, no VOC analytes were detected above the EPA regional screening level (RSL).

Data collected during Q18 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 October 1, 2022, for the nineteenth quarter of the Air Monitoring Program.

Site activities during Q18 included quarterly site-wide groundwater level monitoring, surveillance and maintenance, and groundwater sampling activities conducted by CDM Smith at the Former Sodium Disposal Facility as part of the groundwater interim measures.

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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) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA 1999). Twenty-four-hour time-integrated samples are collected into Summa canisters via a flow controller and sent to an offsite laboratory for analysis. VOCs are collected every other week. There were six VOC sampling events with five field duplicate samples collected during this reporting period.

During Q18, 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 108 airborne radioactivity filter samples collected in Q18 — 27 each for DOE-1, DOE-2, DOE-3, and DOE-4. 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 Q18 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 to 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., 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 corresponding to minutes :00, :15, :30, and :45 each hour. There were 92 days in this reporting period (Q18) from 01 July 2022 through 30 September 2022 with a total of 8,832 possible 15-minute observations. This is the third quarter of Year 5 of the baseline monitoring.

**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 5 of the Air Monitoring Program are presented in Table 2.

**Wind Rose**

The final validated 15-minute meteorological dataset was used to develop the wind rose for Q18 as presented in Figure 3. A wind rose is a graphical representation of wind speed and direction distribution (or wind climatology) for the period of interest. The frequency of winds blowing from specific directions are 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 Q18, data capture for wind speed and direction at DOE-4 was 97.62%. The average and maximum wind speeds were 3.53 m/sec and 10.8 m/s, respectively. The maximum recorded wind gust was 15.9 m/sec. The predominant wind direction was from the east-southeast (ESE).

Table 2. Data screening summary for monitored meteorological parameters.

| Meteorological Parameter | Screening Criteria [1] (for valid sensor responses) | Data Completeness Percent (%) [2] Q18 | Data Completeness Percent (%) [2] Year 5 to Date | Data Completeness Percent (%) [2] Project to Date |
|---|---|---|---|---|
| Wind Speed | between 0 and 25 m/sec<br>> 0.1 m/sec variation over 3 hours<br>> 0.5 m/sec variation over 12 hours | 97.62 | 99.19 | 94.41 |
| Wind Direction | between 0 and 360 degrees<br>> 1 degree variation over 3 hours<br>> 10 degree variation over 12 hours | 100 | 99.996 | 95.29 |
| Standard Deviation of Wind Direction | Inherits the completeness stats of Wind Direction | 100 | 99.996 | 95.29 |
| Temperature @ 2 m | ≤ local record high (monthly basis)<br>≥ local record low (monthly basis)<br>> 0.5 degrees Celsius (°C) variation over 12 hours | 100 | 99.996 | 95.29 |
| Temperature @ 10 m | ≤ local record high (monthly basis)<br>≥ local record low (monthly basis)<br>> 0.5°C variation over 12 hours | 100 | 99.996 | 95.29 |
| Delta Temperature | ≤ 0.1°C during daytime<br>≥ -0.1°C during nighttime<br>between -3.0 and 5.0°C | 100 | 99.996 | 95.29 |
| Relative Humidity (and Dewpoint Temperature) | relative humidity between 0-100%<br>dew point T ≤ ambient T<br>dew point T ≤ 5.0°C variation over 1 hour<br>dew point T > 0.5°C variation over 12 hours | 100 | 99.996 | 89.77 |
| Precipitation | ≤ 1 inch in 1 hour<br>≤ 4 inches in 24 hours<br>≥ 2 inches in 3 months | 100 | 99.996 | 95.29 |
| Barometric Pressure | between 871 and 982 millibar (mb) (local)<br>(i.e., between 940 and 1060 mb sea level)<br>≤ 6 mb variation over 3 hours | 100 | 99.996 | 95.29 |
| Solar Radiation | > 0 at night<br>≤ maximum possible for date and latitude | 99.99 | 99.96 | 95.27 |

(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:

- Q01 = 8,736
- Q02 = 8,832
- Q03 = 8,832
- Q04 = 8,640 (only 3 quarters)
- Year One = 35,040
- Q05 = 8,736
- Q06 = 8,832
- Q07 = 7,488
- Year Two = 25,056 (abbreviated)
- Q08 = 8,736
- Q09 = 8,736
- Q10 = 8,832
- Q11 = 8,832
- Year Three = 35,136
- Q12 = 8,640
- Q13 = 8,736
- Q14 = 8,832
- Q15 = 8,832
- Year Four = 35,040
- Q16 = 8,640
- Q17 = 8,736
- Q18 = 8,832
- Year Five = 26,208 (to-date)
- Project = 156,480 (to-date)

## 4.2 $PM_{10}$ Data

$PM_{10}$ 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.

$PM_{10}$ data are collected with Met One E-BAM monitors at four monitoring locations. The Met One E-BAM uses the principle of beta attenuation to provide a determination of mass concentration. Twenty-four-hour concentrations are calculated from the hourly concentrations. There were 92 days in this reporting period.

- DOE-1 had valid readings 89 out of 92 days.
- DOE-2 had valid readings 89 out of 92 days.
- DOE-3 had valid readings all 92 days.
- DOE-4 had valid readings all 92 days.

DOE-3 and DOE-4 had 100% data completeness for $PM_{10}$ in Q18. DOE-1 and DOE-2 had a completeness of 97%, for a total data completeness of 98.5%, exceeding the project goal of 80% completeness for total samples collected (see Table 3). The complete table of daily averages is presented in Appendix A. The unit at DOE-2 (Y12096) stopped working on August 9, 2022, due to a failed air pump and had to be repaired. The unit at DOE-2 (Y12096) was replaced with backup unit (W23313), and DOE-2 was back up and running on August 11, 2022. DOE-2 had three days during which no data was collected. The unit at DOE-1 (X16067) stopped working on September 17, 2022, due to a sensor failure. The sample nozzle and vane on the unit at DOE-1 (X16067) were cleaned, and DOE-1 was back up and running on September 20, 2022. DOE-1 had three days during which no data was collected.

Table 3. $PM_{10}$ data completeness for July 1, 2022, to September 30, 2022.

| Location | Valid Readings (Days) | Possible Readings (Days) | Data Completeness (Percent) |
|---|---|---|---|
| DOE-1 | 89 | 92 | 97% |
| DOE-2 | 89 | 92 | 97% |
| DOE-3 | 92 | 92 | 100% |
| DOE-4 | 92 | 92 | 100% |
| | | Average Total Data Completeness | 98.5% |

The five highest $PM_{10}$ results identified for the reporting period are listed in Table 4 along with the CAAQS for $PM_{10}$. $PM_{10}$ concentrations were consistent with levels typically found in urban air. Of these top five results, three were recorded at DOE-1, one at DOE-3, and one at DOE-4. None of the top five values in Q18 were above the CAAQS of 50 µg/$m^3$ or NAAQS of 150 µg/$m^3$.

Table 4. Top five $PM_{10}$ 24-hour average concentration days for Q18.

| Date | Location | $PM_{10}$ Value (µg/m³) | CAAQS (µg/m³) |
|---|---|---|---|
| 9/30/2022 | DOE-1 | 47.291 | 50 |
| 9/21/2022 | DOE-1 | 44.333 | 50 |
| 9/9/2022 | DOE-3 | 40.333 | 50 |
| 9/17/2022 | DOE-4 | 38.625 | 50 |
| 9/29/2022 | DOE-1 | 35.166 | 50 |

Note: No values were 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 each day during the six VOC sampling events this period. Data completeness goals for VOCs exceeded the project goal of 85% (see Table 5).

Table 5. Ambient air VOC data completeness.

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

VOC detection results are presented in Table B-1 (Appendix B), including comparison to the April 2019 DTSC Human Health Risk Assessment (HHRA) Note 3 Screening Levels (DTSC 2019) or the 40 CFR 136 Appendix D for MDLs. During Q18, no VOC analytes were detected above the EPA regional screening level (RSL).

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. These analytes were also detected as estimated values at NASA stations, but were not detected at Boeing stations. 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.

Neither the establishment of sources for specific contaminants nor the performance of source apportionment was required for identifying remedial air quality impacts, nor was either within the scope or data quality objectives of the Air Monitoring Program.

## 4.4 Radionuclide Data

ETEC continuously monitors air at multiple locations for radioactive particles. This is performed for two reasons: (1) to determine the background airborne radioactivity concentration so that any possible releases from work activities can be detected, and (2) to detect any possible release from existing activities.

There were 108 airborne radioactivity filter samples collected in Q18 — 27 each for DOE-1, DOE-2, DOE-3, and DOE-4. Each sample was collected on a glass-fiber filter (as discussed in Section 3) and was analyzed using a "low background" Protean radiation counter system onsite. These samples included background radioactive materials and the potential of Area IV–specific radioactive materials.

The alpha and beta data are presented in Table C-1 (Appendix C). The onsite analysis determined only "alpha" or "beta/gamma" and did not analyze for specific isotopes. Isotopic analysis was performed later by an offsite laboratory. Each sample produced a gross alpha and beta-gamma count. The analysis compared these values with the background radiation count rates, and using the volume of air collected determined the net counts and the minimum detectable concentration (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 six alpha samples were below the MDC, and these samples were only slightly greater than the MDC. 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.

Approximately 32% of the beta samples were below MDC, and the gross (background radioactive material included) samples exceeded the MDC in 68% 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 may be due to more airborne dust.

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., cesium-137, strontium-90, plutonium-239) were present in very small amounts, none of the results were above the MDC in Q18. 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 below.

Table 6. Gross alpha and beta-gamma average results for Q18.

| Location | Average alpha result (µCi/mL) | Average alpha MDC (µCi/mL) | Average beta result (µCi/mL) | Average beta MDC (µCi/mL) |
|---|---|---|---|---|
| DOE-1 | 8.38E-16 | 5.75E-15 | 3.62E-14 | 2.56E-14 |
| DOE-2 | 1.46E-15 | 5.75E-15 | 4.53E-14 | 2.56E-14 |
| DOE-3 | 1.22E-15 | 5.75E-15 | 3.80E-14 | 2.56E-14 |
| DOE-4 | 2.10E-15 | 5.75E-15 | 3.63E-14 | 2.56E-14 |
| Average | 1.40E-15 | 5.75E-15 | 3.90E-14 | 2.56E-14 |

# 5. QA/QC ACTIVITIES

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

## 5.1 Field QA/QC

### 5.1.1 $PM_{10}$

The 24-hour daily averages for Q18 are presented in Appendix A along with the monthly minimum, maximum, and 95$^{th}$ 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 Q18 audit results for the four DOE sites showed bias percentages that ranged from -1.08 to -0.21%. None of the results exceeded the flow rate measurement quality objective of +/- 4%.

Complete audit reports and flow verification results for Q18 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 the flowrate data collected during the monthly audits. 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

All data underwent at least two levels of QC review at the laboratory prior to transmission to North Wind. A minimum of 20% of the transmitted VOC results undergo a Level IV third-party data validation, annually. During this quarter, two of the six SDGs, P2202944 and P2204118, underwent the Level IV 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 the six sample days for a sample completeness of 100%. Data completeness goals for VOCs exceeded the project goal of 85%.

### 5.1.3 Field Duplicates

Five field duplicates were collected during this reporting period. Six sampling events were conducted for the Q18 effort; however, the inclusion of five field duplicates meets the frequency required per the QAPP. Ethyl acetate in SDGs P2202944, P2203145, P2203366, P2203912, and P2204118 and toluene for SDG P2202944 were detected in five field duplicates pair that exceeded the quality objective of +/- 15% relative percent difference (RPD). Ten 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.

Since Q13, 100% of the radiological analytical results have undergone Level IV, third-party 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.

### 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 $PM_{10}$ monitors and the meteorological station are noted in Sections 5.1.8.1 and 5.1.8.2, respectively. Issues and corrective actions regarding the E-BAM monitors are noted in Section 4.2. No issues or corrective actions were noted regarding the remaining monitoring equipment or sampling events during this reporting period.

#### *5.1.8.1 $PM_{10}$ Monitors*

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

### *5.1.8.2 Meteorological Station*

Although the data percent completion goal during Q18 was met: (1) the solar radiometer continued to record values that exceed the daily screening criteria and was affected by shadows cast by the tower, (2) the wind speed sensor was closely monitored for signs of bearing failure, and (3) the improperly programmed data logger continues to affect calculation of delta temperature (i.e., temperature difference between 2 m and 10 m). These three items are discussed below, including issues and corrective actions/resolutions. The recommend sensor maintenance schedule is provided as item (4) below.

**(1) Solar Radiometer:**

- Data Quality Issues:
  - The solar radiometer continued to display an upward bias drift in the raw data observations.
- Corrective Actions:
  - Bias Removal – In the quarterly report for Quarter 14, details of the bias and correction were first presented. Quarterly adjustment factors have been developed and applied to the project datasets starting with the first quarter of 2020 based on a statistical trend analysis. A "bias removal" adjustment factor was also developed and applied to the Q18 solar radiometer data. All validated project meteorological datasets to-date now include "unbiased" solar radiometer observations.
  - Resolutions – The unbiased observations are in line with the baseline year observations and theoretical values. The sensor drift bias will continue to be evaluated and correction factors applied during upcoming quarters. The following table presents the quarterly adjustment factors that have been applied to the solar radiometer raw data. In addition, replacement of the solar radiometer is being considered.

**Solar Radiometer Adjustment Factor - Quarterly**
**(adustment factor to eliminate drift bias)**

| MONTH | 2020 | 2021 | 2022 |
|---|---|---|---|
| 1 | 0.946 | 0.894 | 0.859 |
| 2 | | | |
| 3 | | | |
| 4 | 0.924 | 0.889 | 0.861 |
| 5 | | | |
| 6 | | | |
| 7 | 0.888 | 0.860 | 0.836 |
| 8 | | | |
| 9 | | | |
| 10 | 0.893 | 0.849 | - |
| 11 | | | |
| 12 | | | |

**(2) Wind Speed Sensor**

- Data Quality Issue:
    - Near the end of Quarter 15 the wind speed sensor failed and then began working again after an 11-day period. To avoid having the same failure, since Q16 the data has been closely monitored to verify that this is no longer a problem. Near the end of Q18, the wind speed sensor failed and then began working again after a 2-day period, similar to the sensor failure that occurred at the end of Q15.
- Corrective Action:
    - Resolution – The wind speed sensor is scheduled for replacement. This is expected to occur within the first month of Q19.

**(3) Delta Temperature Calculation**

- Data Quality Issue:
    - For meteorological monitoring, delta temperature should be defined as T at the higher level minus T at the lower level. However, the datalogger was improperly programmed to calculate the inverse of delta temperature when the station was replaced after the Woolsey Wildfire during Q3. Consequently, delta temperature observations are being calculated with an opposite sign compared to the values from the original data logger.
- Corrective Action:
    - Datalogger Equation – Instead of reprogramming the datalogger to correctly calculate delta temperature, an adjustment multiplication factor of "-1" has been applied to the delta temperature values from the new data logger prior to performing the data validation.

      Resolution – With application of the "-1" multiplication factor, delta temperature values in the validated project dataset accurately present delta temperature as:

      *Delta Temperature = [Temperature @ 10 m] minus [Temperature @ 2 m]*

**(4) Recommended Maintenance Schedule:**

Although not a corrective action, the manufacturer's recommended maintenance frequency for meteorological sensors is presented below for information purposes. 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 provided in the sensor user manuals and based on the in-service time of the sensor. Table 7 lists the recommended 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 are as specified in the respective Met One sensor user manuals.

## 5.2 Laboratory QA/QC

This report covers 29 air monitoring samples for VOCs collected and analyzed according to the EPA Toxic Compendium Method TO-15, *Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)* (EPA 1999). These samples were reported under six SDGs by the laboratory. All six SDG analyses were performed by ALS in Simi Valley, CA. For each SDG, the laboratory ran continuing calibration verification, a method blank, and laboratory control samples, and verified surrogate recoveries for each sample.

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

## 5.3 Audit Results

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

Table 8. $PM_{10}$ audit completeness.

| Location | Met One E-BAM Serial Number | Parameter | Date |
|---|---|---|---|
| DOE-1 | X16067 | $PM_{10}$ | 07/21/2022 |
| DOE-2 | Y12096 | $PM_{10}$ | 07/21/2022 |
| DOE-3 | W23314 | $PM_{10}$ | 07/21/2022 |
| DOE-4 | W23310 | $PM_{10}$ | 07/21/2022 |
| DOE-2 | W23313 | $PM_{10}$ | 08/11/2022 |
| DOE-1 | X16067 | $PM_{10}$ | 08/30/2022 |
| DOE-2 | W23313 | $PM_{10}$ | 08/30/2022 |
| DOE-3 | W23314 | $PM_{10}$ | 08/30/2022 |
| DOE-4 | W23310 | $PM_{10}$ | 08/30/2022 |
| DOE-1 | X16067 | $PM_{10}$ | 09/22/2022 |
| DOE-2 | W23313 | $PM_{10}$ | 09/22/2022 |
| DOE-3 | W23314 | $PM_{10}$ | 09/22/2022 |
| DOE-4 | W23310 | $PM_{10}$ | 09/22/2022 |

# 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.

40 CFR 136, Appendix B – Definition and Procedure for the Determination of the Method Detection Limit.

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. 2022. Human and Ecological Risk Office Human Health Risk Assessment Note Number 3, DTSC-modified Screening Levels. April. Available online at: Human Health Risk Assessment Note 3 -June 2020 revised May 2022 (ca.gov) and HHRA-Note-3-Tables-June2020-Revised-May2022A.xlsx (live.com).

National Aeronautics and Space Administration (NASA). 2017. *Baseline Air Monitoring Work Plan, Santa Susana Field Laboratory, Ventura County, California.* 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: SSFL Baseline Air Monitoring Work Plan

U.S. Environmental Protection Agency (EPA). 1999. *Air Method, Toxic Organics-15 (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 625/R-96/010b. January. Available online at: Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 2nd Edition - Compendium Method TO-15 (epa.gov)https://www.epa.gov/homeland-security-research/epa-air-method-toxic-organics-15-15-determination-volatile-organic

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

U.S. Environmental Protection Agency (EPA). 2007. *Guideline on the Meaning and the Use of Precision and Bias Data Required by 40 CFR Part 58 Appendix A, Version 1.1*. EPA-454/B-07-001. October.

U.S. Environmental Protection Agency (EPA). 2017. *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Monitoring Program*. EPA-454/B-17-001. January.

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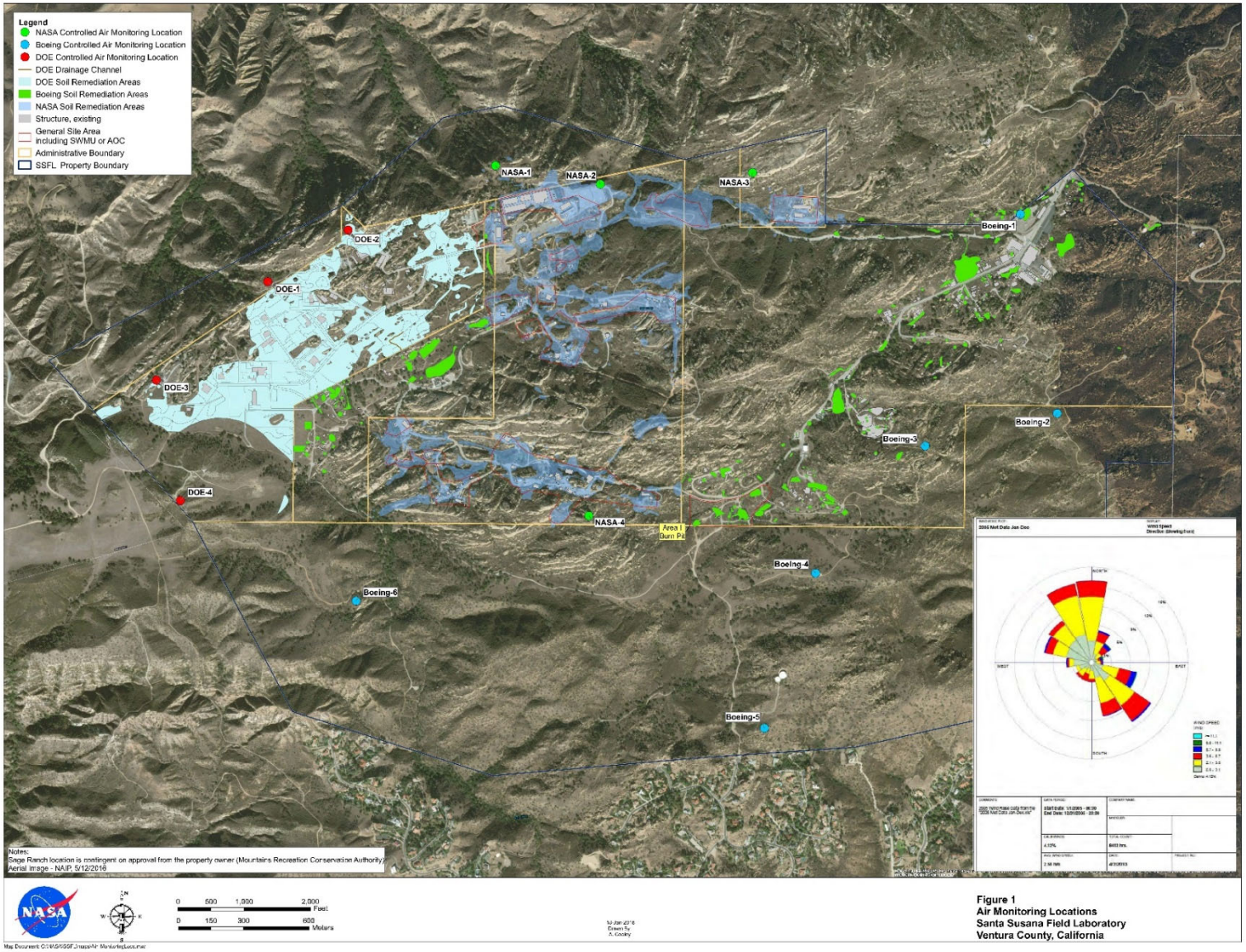
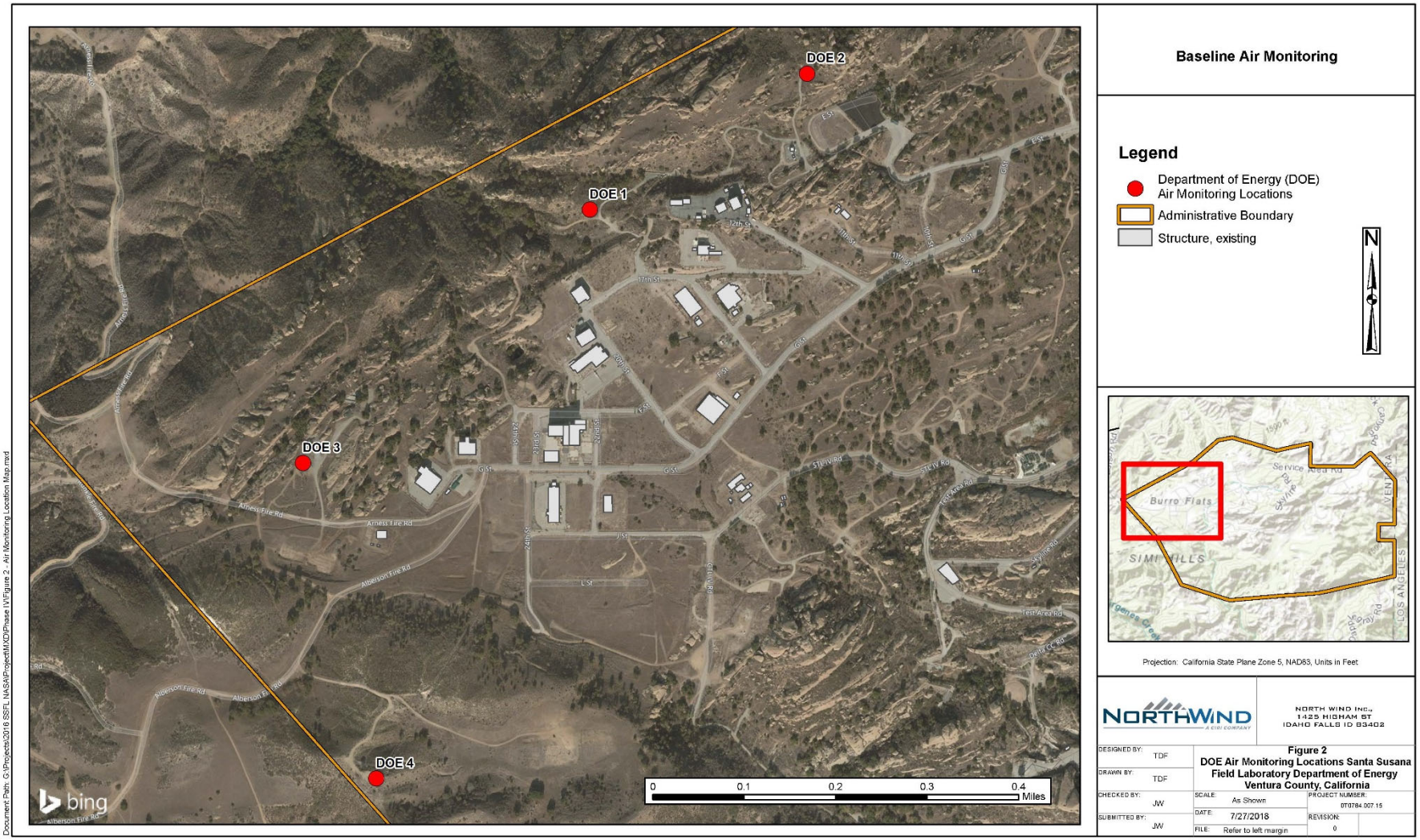
# Figure 1 –SSFL Air Monitoring Locations



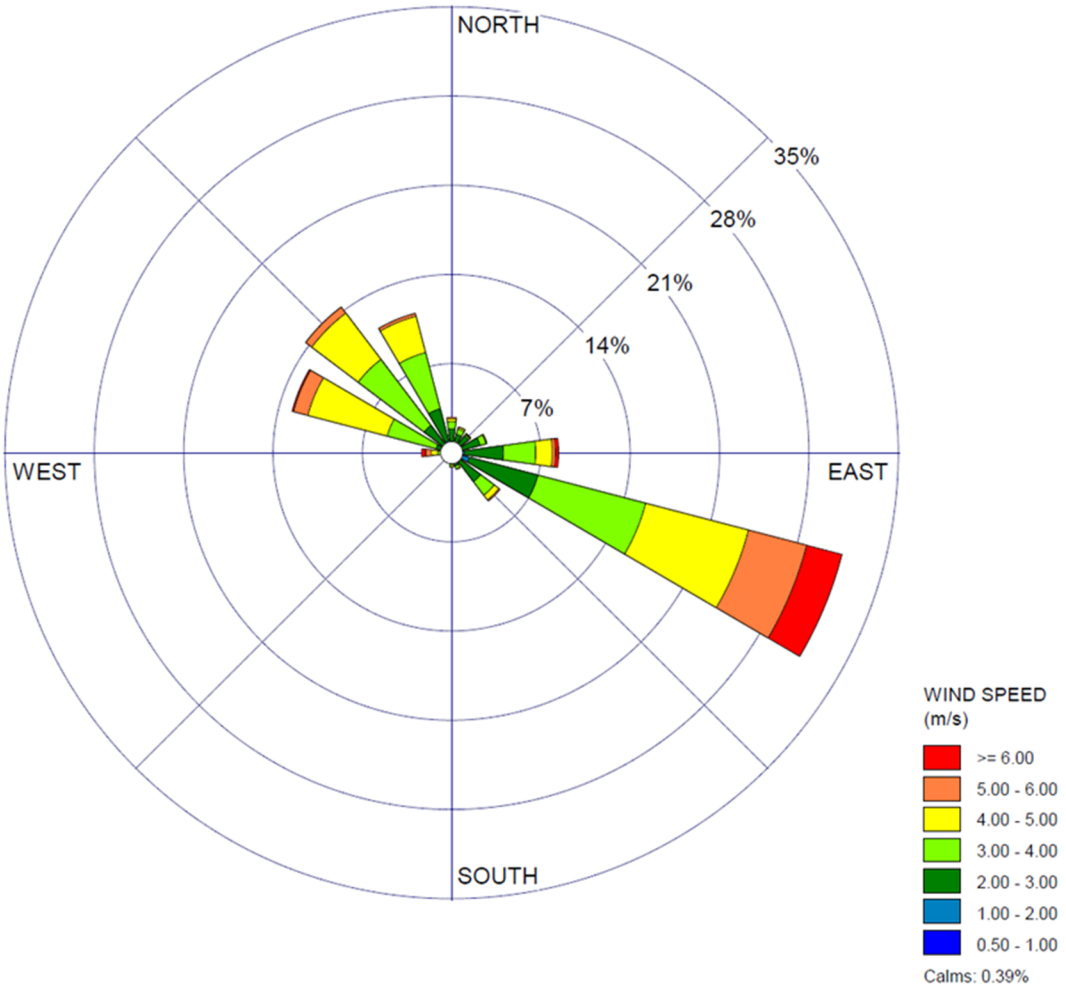
# Figure 2 –DOE Air Monitoring Locations



# Figure 3 – DOE Quarterly Wind Rose

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

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




| | | | |
|---|---|---|---|
| COMMENTS:<br>**ETEC BAM Quarter #18**<br>• **Start: 01-Jul-2022**<br>• **End: 30-Sep-2022** | DATA PERIOD:<br>**Start Date: 07/01/2022**<br>**End Date: 09/30/2022** | COMPANY NAME:<br>**North Wind Portage, Inc.** | |
| | | OBSERVATION BASIS:<br>**15-minute averages** | NORTHWIND PORTAGE, INC. |
| | CALM WINDS:<br>**0.39%** | TOTAL COUNT:<br>**8622 observations (100%)** | |
| | AVG. WIND SPEED:<br>**3.53 m/s** | DATE:<br>**11/15/2022** | PROJECT NO.:<br>**080153.018.15** |

WRPLOT View - Lakes Environmental Software

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# APPENDIX A

# $PM_{10}$ Daily Averages and Monthly Statistics

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# $PM_{10}$ Daily Averages

| Site ID | DOE-1 | DOE-2 | DOE-3 | DOE-4 |
|---|---|---|---|---|
| Sample Date | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) |
| 07/01/22 | 23.708 | 23.041 | 18.041 | 17.625 |
| 07/02/22 | 15.666 | 15.708 | 19.625 | 14.916 |
| 07/03/22 | 19.208 | 16.041 | 18.041 | 17.958 |
| 07/04/22 | 17.541 | 16.958 | 15.916 | 20.208 |
| 07/05/22 | 27.166 | 21.125 | 27.416 | 29.5 |
| 07/06/22 | 14.125 | 13 | 11.833 | 11.041 |
| 07/07/22 | 13.625 | 10.625 | 11.416 | 11 |
| 07/08/22 | 14.291 | 12.375 | 15.375 | 13.083 |
| 07/09/22 | 8.708 | 7.583 | 8.625 | 9.416 |
| 07/10/22 | 12.458 | 11.833 | 12.166 | 12.75 |
| 07/11/22 | 15.708 | 17.166 | 14.791 | 14.375 |
| 07/12/22 | 14.291 | 26.5 | 15.166 | 18.208 |
| 07/13/22 | 16.333 | 17 | 10.333 | 12.125 |
| 07/14/22 | 13.833 | 13.708 | 12.458 | 12.958 |
| 07/15/22 | 18.416 | 26.5 | 16.083 | 17.75 |
| 07/16/22 | 20.541 | 25.333 | 18.916 | 17.833 |
| 07/17/22 | 23.333 | 15.416 | 16.541 | 17.041 |
| 07/18/22 | 13.916 | 12.25 | 14.5 | 14.791 |
| 07/19/22 | 7.5 | 8.041 | 8.833 | 8.541 |
| 07/20/22 | 10.916 | 9.5 | 12.375 | 12.25 |
| 07/21/22 | 16.625 | 14.416 | 14.75 | 13.75 |
| 07/22/22 | 19.916 | 18.708 | 20 | 18.75 |
| 07/23/22 | 20.791 | 24.958 | 23.166 | 21.833 |
| 07/24/22 | 21.625 | 26.291 | 21.083 | 25.583 |
| 07/25/22 | 24.208 | 17.208 | 17.458 | 18.166 |
| 07/26/22 | 12.25 | 18.416 | 15.083 | 17.375 |
| 07/27/22 | 17.583 | 23.375 | 14.708 | 12.958 |
| 07/28/22 | 16.208 | 19.875 | 19.75 | 16.25 |
| 07/29/22 | 15.166 | 18.333 | 15.583 | 16.833 |
| 07/30/22 | 12.125 | 21.958 | 15.5 | 11.791 |
| 07/31/22 | 14.958 | 9.541 | 9.833 | 12.166 |
| 08/01/22 | 14.583 | 10.625 | 12.75 | 11.333 |
| 08/02/22 | 13.041 | 13.25 | 14.875 | 11.541 |
| 08/03/22 | 20.083 | 19.25 | 15.583 | 13.708 |
| 08/04/22 | 15.625 | 16.166 | 21.583 | 17.5 |
| 08/05/22 | 13.958 | 12.541 | 18.125 | 13.875 |

| Site ID | DOE-1 | DOE-2 | DOE-3 | DOE-4 |
|---|---|---|---|---|
| Sample Date | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) |
| 08/06/22 | 9.208 | 8.25 | 10.416 | 9.958 |
| 08/07/22 | 10.583 | 9.958 | 11.291 | 11.333 |
| 08/08/22 | 16.291 | 13.541 | 15.125 | 15 |
| 08/09/22 | 15.875 | -- | 15.875 | 15.041 |
| 08/10/22 | 11.416 | -- | 12.875 | 10.166 |
| 08/11/22 | 10.208 | -- | 8.708 | 9.458 |
| 08/12/22 | 13.416 | 15.083 | 13.541 | 12.666 |
| 08/13/22 | 15.291 | 19.75 | 16.208 | 15.333 |
| 08/14/22 | 12.958 | 13.541 | 12.041 | 11.583 |
| 08/15/22 | 15.916 | 28.75 | 16.541 | 15.541 |
| 08/16/22 | 16.875 | 15.541 | 16.583 | 15.083 |
| 08/17/22 | 14 | 12.958 | 17.125 | 13.625 |
| 08/18/22 | 13.083 | 11.791 | 12.041 | 11.375 |
| 08/19/22 | 18.125 | 15 | 16.083 | 15.833 |
| 08/20/22 | 20.25 | 15.416 | 22.458 | 19.416 |
| 08/21/22 | 15.458 | 15.625 | 24.875 | 29.875 |
| 08/22/22 | 14.125 | 13.5 | 15 | 20.75 |
| 08/23/22 | 23.958 | 16.458 | 21.583 | 26.166 |
| 08/24/22 | 19.916 | 17.916 | 22.625 | 20.708 |
| 08/25/22 | 16.916 | 13.375 | 15.375 | 18.916 |
| 08/26/22 | 17.25 | 12.541 | 15.791 | 17.166 |
| 08/27/22 | 13.041 | 11.5 | 14.875 | 17.958 |
| 08/28/22 | 11.416 | 14.291 | 22.833 | 27.166 |
| 08/29/22 | 13.75 | 13 | 17.875 | 17.083 |
| 08/30/22 | 12.291 | 10.083 | 13 | 12.458 |
| 08/31/22 | 9.833 | 9.5 | 10.166 | 13.708 |
| 09/01/22 | 30.333 | 22.208 | 23.875 | 21.333 |
| 09/02/22 | 24.041 | 21.333 | 28.5 | 22 |
| 09/03/22 | 16.875 | 17 | 16.916 | 17.25 |
| 09/04/22 | 12.916 | 13.041 | 13.666 | 13.583 |
| 09/05/22 | 17.125 | 15.75 | 16.708 | 16.25 |
| 09/06/22 | 21.916 | 17.791 | 19.875 | 18 |
| 09/07/22 | 15.416 | 14.5 | 18 | 15.416 |
| 09/08/22 | 17.541 | 14.375 | 21.916 | 15.333 |
| 09/09/22 | 27.083 | 23.083 | 40.333 | 25.875 |
| 09/10/22 | 6.625 | 8.833 | 31.5 | 30.916 |

| Site ID | DOE-1 | DOE-2 | DOE-3 | DOE-4 |
|---|---|---|---|---|
| Sample Date | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) | $PM_{10}$ (µg/m$^3$) (CAAQS 50 µg/m$^3$) |
| 09/11/22 | 11.208 | 8.333 | 22.958 | 18.083 |
| 09/12/22 | 9.166 | 6.666 | 20.208 | 24.083 |
| 09/13/22 | 15.958 | 14.916 | 24.083 | 22.791 |
| 09/14/22 | 18.541 | 17.416 | 24.375 | 28.375 |
| 09/15/22 | 14.416 | 13.208 | 20.416 | 25.333 |
| 09/16/22 | 17.083 | 18.416 | 20.458 | 24.666 |
| 09/17/22 | -- | 17.708 | 34.625 | 38.625 |
| 09/18/22 | -- | 13.125 | 16.291 | 25.583 |
| 09/19/22 | -- | 8.416 | 12 | 13.083 |
| 09/20/22 | 30.583 * | 4.166 | 9.833 | 12.125 |
| 09/21/22 | 44.333 | 6.333 | 12.333 | 16.875 |
| 09/22/22 | 24.708 | 9.75 | 12.25 | 16.583 |
| 09/23/22 | 14.708 | 10.958 | 12.833 | 13.166 |
| 09/24/22 | 8.208 | 10.375 | 6.916 | 8.083 |
| 09/25/22 | 6 | 5.416 | 5.291 | 5 |
| 09/26/22 | 7.25 | 5.5 | 6.875 | 7.75 |
| 09/27/22 | 13.333 | 10.708 | 10.833 | 11.083 |
| 09/28/22 | 20.166 | 15.291 | 15.916 | 15.916 |
| 09/29/22 | 35.166 | 16 | 16.625 | 18.666 |
| 09/30/22 | 47.291 | 19.583 | 23.833 | 21.583 |

Note: * indicates the average is only for a partial day of readings due to sensor failure

# $PM_{10}$ Monthly Statistics

| Location ID | July 2022 | | | August 2022 | | | September 2022 | | |
|---|---|---|---|---|---|---|---|---|---|
| | $PM_{10}$ | | | $PM_{10}$ | | | $PM_{10}$ | | |
| | High | Low | 95th PCTL | High | Low | 95th PCTL | High | Low | 95th PCTL |
| DOE-1 | 27.16600 | 7.50000 | 23.95800 | 23.95800 | 9.20800 | 20.16650 | 47.29100 | 6.00000 | 41.58290 |
| DOE-2 | 26.50000 | 7.58300 | 26.39550 | 28.75000 | 8.25000 | 19.57500 | 23.08300 | 4.16600 | 21.81425 |
| DOE-3 | 27.41600 | 8.62500 | 26.39550 | 24.87500 | 8.70800 | 22.72900 | 40.33300 | 5.29100 | 28.65000 |
| DOE-4 | 29.50000 | 8.54100 | 23.70800 | 29.87500 | 9.45800 | 26.66600 | 38.62500 | 5.00000 | 29.77255 |

PCTL = percentile

# APPENDIX B

# Analytical Results for Ambient Air VOCs

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

| Location ID | Sample Date | Analyte | Method Detection Limit | Result | Screening Level Value | SL Source |
|---|---|---|---|---|---|---|
| DOE-1 | 07/06/2022 | Dichlorodifluoromethane | 0.13 | 1.9 | 100 | US EPA RSL |
| DOE-1 | 07/06/2022 | Ethyl acetate | 0.41 | 26 | 73 | US EPA RSL |
| DOE-1 | 07/06/2022 | Toluene | 0.096 | 1.1 | 310 | DTSC HHRA NOTE 3 |
| DOE-1 | 07/06/2022 | Trichlorofluoromethane | 0.12 | 1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 07/06/2022 | Dichlorodifluoromethane | 0.12 | 1.9 | 100 | US EPA RSL |
| DOE-2 | 07/06/2022 | Ethyl acetate | 0.4 | 26 | 73 | US EPA RSL |
| DOE-2 | 07/06/2022 | Toluene | 0.092 | 1 | 310 | DTSC HHRA NOTE 3 |
| DOE-2 | 07/06/2022 | Trichlorofluoromethane | 0.12 | 1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-3 | 07/06/2022 | Dichlorodifluoromethane | 0.15 | 1.9 | 100 | US EPA RSL |
| DOE-3 | 07/06/2022 | Ethyl acetate | 0.47 | 44 (;J) | 73 | US EPA RSL |
| DOE-3 | 07/06/2022 | Toluene | 0.11 | 1.5 (;J) | 310 | DTSC HHRA NOTE 3 |
| DOE-3 | 07/06/2022 | Trichlorofluoromethane | 0.14 | 1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 07/06/2022 | Dichlorodifluoromethane | 0.13 | 1.9 | 100 | US EPA RSL |
| DOE-4 | 07/06/2022 | Ethyl acetate | 0.42 | 19 | 73 | US EPA RSL |
| DOE-4 | 07/06/2022 | Isopropanol | 0.33 | 1.5 | 210 | US EPA RSL |
| DOE-4 | 07/06/2022 | Toluene | 0.098 | 0.94 | 310 | DTSC HHRA NOTE 3 |
| DOE-4 | 07/06/2022 | Trichlorofluoromethane | 0.12 | 1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-1 | 07/19/2022 | Dichlorodifluoromethane | 0.14 | 1.9 | 100 | US EPA RSL |
| DOE-1 | 07/19/2022 | Ethyl acetate | 0.45 | 25 | 73 | US EPA RSL |
| DOE-1 | 07/19/2022 | Trichlorofluoromethane | 0.13 | 0.95 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 07/19/2022 | Dichlorodifluoromethane | 0.13 | 1.9 | 100 | US EPA RSL |
| DOE-2 | 07/19/2022 | Ethyl acetate | 0.43 | 15 | 73 | US EPA RSL |
| DOE-2 | 07/19/2022 | Trichlorofluoromethane | 0.12 | 0.95 | 1300 | DTSC HHRA NOTE 3 |
| DOE-3 | 07/19/2022 | Dichlorodifluoromethane | 0.13 | 2.0 | 100 | US EPA RSL |
| DOE-3 | 07/19/2022 | Trichlorofluoromethane | 0.12 | 0.98 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 07/19/2022 | Dichlorodifluoromethane | 0.13 | 2.0 | 100 | US EPA RSL |
| DOE-4 | 07/19/2022 | Ethyl acetate | 0.43 | 13 | 73 | US EPA RSL |
| DOE-4 | 07/19/2022 | Trichlorofluoromethane | 0.12 | 0.99 | 1300 | DTSC HHRA NOTE 3 |
| DOE-1 | 08/02/2022 | Dichlorodifluoromethane | 0.13 | 1.7 | 100 | US EPA RSL |
| DOE-1 | 08/02/2022 | Ethyl acetate | 0.41 | 35 | 73 | US EPA RSL |
| DOE-1 | 08/02/2022 | Toluene | 0.094 | 1.7 | 310 | DTSC HHRA NOTE 3 |
| DOE-1 | 08/02/2022 | Trichlorofluoromethane | 0.12 | 0.82 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 08/02/2022 | Dichlorodifluoromethane | 0.11 | 1.7 | 100 | US EPA RSL |
| DOE-2 | 08/02/2022 | Ethyl acetate | 0.36 | 33 | 73 | US EPA RSL |
| DOE-2 | 08/02/2022 | Toluene | 0.084 | 1.3 | 310 | DTSC HHRA NOTE 3 |
| DOE-2 | 08/02/2022 | Trichlorofluoromethane | 0.10 | 0.86 | 1300 | DTSC HHRA NOTE 3 |
| DOE-3 | 08/02/2022 | Dichlorodifluoromethane | 0.13 | 1.7 | 100 | US EPA RSL |
| DOE-3 | 08/02/2022 | Ethyl acetate | 0.43 | 22 | 73 | US EPA RSL |
| DOE-3 | 08/02/2022 | Toluene | 0.099 | 1.2 | 310 | DTSC HHRA NOTE 3 |
| DOE-3 | 08/02/2022 | Trichlorofluoromethane | 0.12 | 0.83 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 08/02/2022 | Dichlorodifluoromethane | 0.14 | 1.7 | 100 | US EPA RSL |
| DOE-4 | 08/02/2022 | Ethyl acetate | 0.44 | 12 | 73 | US EPA RSL |

| Location ID | Sample Date | Analyte | Method Detection Limit | Result | Screening Level Value | SL Source |
|---|---|---|---|---|---|---|
| DOE-4 | 08/02/2022 | Trichlorofluoromethane | 0.13 | 0.84 | 1300 | DTSC HHRA NOTE 3 |
| DOE-1 | 09/01/2022 | 2-butanone | 0.16 | 2.4 | 5200 | US EPA RSL |
| DOE-1 | 09/01/2022 | Dichlorodifluoromethane | 0.13 | 2.2 | 100 | US EPA RSL |
| DOE-1 | 09/01/2022 | Ethyl acetate | 0.42 | 11 | 73 | US EPA RSL |
| DOE-1 | 09/01/2022 | Trichlorofluoromethane | 0.12 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 09/01/2022 | Dichlorodifluoromethane | 0.13 | 2.1 | 100 | US EPA RSL |
| DOE-2 | 09/01/2022 | Ethyl acetate | 0.43 | 23 | 73 | US EPA RSL |
| DOE-2 | 09/01/2022 | Trichlorofluoromethane | 0.13 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-3 | 09/01/2022 | Ethyl acetate | 0.49 | 18 | 73 | US EPA RSL |
| DOE-3 | 09/01/2022 | Trichlorofluoromethane | 0.14 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 09/01/2022 | Dichlorodifluoromethane | 0.14 | 2.2 | 100 | US EPA RSL |
| DOE-4 | 09/01/2022 | Ethyl acetate | 0.45 | 11 | 73 | US EPA RSL |
| DOE-4 | 09/01/2022 | Trichlorofluoromethane | 0.13 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-1 | 09/16/2022 | Dichlorodifluoromethane | 0.12 | 2.4 | 100 | US EPA RSL |
| DOE-1 | 09/16/2022 | Ethyl acetate | 0.39 | 4.7 | 73 | US EPA RSL |
| DOE-1 | 09/16/2022 | Trichlorofluoromethane | 0.11 | 1.2 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 09/16/2022 | Dichlorodifluoromethane | 0.21 | 2.3 | 100 | US EPA RSL |
| DOE-2 | 09/16/2022 | Ethyl acetate | 0.68 | 19 | 73 | US EPA RSL |
| DOE-3 | 09/16/2022 | Dichlorodifluoromethane | 0.12 | 2.3 | 100 | US EPA RSL |
| DOE-3 | 09/16/2022 | Ethyl acetate | 0.4 | 9 (;J) | 73 | US EPA RSL |
| DOE-3 | 09/16/2022 | Trichlorofluoromethane | 0.12 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 09/16/2022 | Dichlorodifluoromethane | 0.13 | 2.4 | 100 | US EPA RSL |
| DOE-4 | 09/16/2022 | Ethyl acetate | 0.43 | 10 | 73 | US EPA RSL |
| DOE-4 | 09/16/2022 | Trichlorofluoromethane | 0.12 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-1 | 09/30/2022 | Dichlorodifluoromethane | 0.13 | 2.3 | 100 | US EPA RSL |
| DOE-1 | 09/30/2022 | Ethyl acetate | 0.40 | 27 | 73 | US EPA RSL |
| DOE-1 | 09/30/2022 | Toluene | 0.094 | 1.4 | 310 | DTSC HHRA NOTE 3 |
| DOE-1 | 09/30/2022 | Trichlorofluoromethane | 0.12 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-2 | 09/30/2022 | Dichlorodifluoromethane | 0.12 | 2.4 | 100 | US EPA RSL |
| DOE-2 | 09/30/2022 | Ethyl acetate | 0.38 | 22 | 73 | US EPA RSL |
| DOE-2 | 09/30/2022 | Toluene | 0.088 | 0.99 | 310 | DTSC HHRA NOTE 3 |
| DOE-2 | 09/30/2022 | Trichlorofluoromethane | 0.11 | 1.2 | 1300 | DTSC HHRA NOTE 3 |
| DOE-3 | 09/30/2022 | Dichlorodifluoromethane | 0.12 | 2.3 | 100 | US EPA RSL |
| DOE-3 | 09/30/2022 | Ethyl acetate | 0.40 | 31 | 73 | US EPA RSL |
| DOE-3 | 09/30/2022 | Toluene | 0.093 | 1.3 | 310 | DTSC HHRA NOTE 3 |
| DOE-3 | 09/30/2022 | Trichlorofluoromethane | 0.12 | 1.1 | 1300 | DTSC HHRA NOTE 3 |
| DOE-4 | 09/30/2022 | Dichlorodifluoromethane | 0.12 | 2.3 | 100 | US EPA RSL |
| DOE-4 | 09/30/2022 | Ethyl acetate | 0.39 | 11 | 73 | US EPA RSL |
| DOE-4 | 09/30/2022 | Toluene | 0.091 | 0.94 | 310 | DTSC HHRA NOTE 3 |
| DOE-4 | 09/30/2022 | Trichlorofluoromethane | 0.11 | 1.1 | 1300 | DTSC HHRA NOTE 3 |

J = estimated value

# 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** | | | | |
| 7/1/2022 | 1.85E-15 | 4.63E-15 | 3.38E-14 | 2.14E-14 |
| 7/5/2022 | 2.17E-15 | 4.80E-15 | 1.40E-14 | 2.22E-14 |
| 7/8/2022 | 5.10E-16 | 6.32E-15 | -9.35E-15 | 2.92E-14 |
| 7/11/2022 | 2.59E-15 | 6.48E-15 | 1.45E-14 | 3.00E-14 |
| 7/15/2022 | -6.28E-16 | 4.77E-15 | 1.98E-14 | 2.21E-14 |
| 7/18/2022 | -1.60E-16 | 6.26E-15 | 3.09E-14 | 2.90E-14 |
| 7/22/2022 | -3.75E-16 | 4.78E-15 | 1.04E-14 | 2.21E-14 |
| 7/25/2022 | 1.51E-15 | 6.28E-15 | 5.50E-14 | 2.91E-14 |
| 7/29/2022 | -3.83E-16 | 4.88E-15 | 4.14E-14 | 2.26E-14 |
| 8/1/2022 | -1.17E-15 | 6.86E-15 | 2.91E-14 | 2.89E-14 |
| 8/5/2022 | 2.13E-15 | 5.18E-15 | 4.11E-14 | 2.19E-14 |
| 8/8/2022 | -3.77E-15 | 6.76E-15 | 2.34E-14 | 2.85E-14 |
| 8/12/2022 | 1.64E-15 | 5.23E-15 | 3.36E-14 | 2.21E-14 |
| 8/15/2022 | 3.39E-15 | 7.37E-15 | 4.12E-14 | 3.11E-14 |
| 8/19/2022 | 1.38E-15 | 5.22E-15 | 6.32E-14 | 2.20E-14 |
| 8/22/2022 | -2.22E-15 | 7.03E-15 | 2.44E-14 | 2.96E-14 |
| 8/26/2022 | -8.79E-16 | 5.15E-15 | 5.79E-14 | 2.17E-14 |
| 8/29/2022 | -1.51E-15 | 6.90E-15 | 2.79E-14 | 2.91E-14 |
| 9/2/2022 | 5.49E-15 | 4.82E-15 | 5.17E-14 | 2.18E-14 |
| 9/6/2022 | 5.48E-15 | 4.81E-15 | 7.33E-14 | 2.18E-14 |
| 9/9/2022 | 1.71E-15 | 6.54E-15 | 8.33E-14 | 2.96E-14 |
| 9/12/2022 | 2.38E-15 | 6.51E-15 | 7.94E-15 | 2.95E-14 |
| 9/16/2022 | 1.27E-15 | 4.83E-15 | 3.40E-14 | 2.19E-14 |
| 9/19/2022 | 2.60E-17 | 6.29E-15 | 3.17E-14 | 2.85E-14 |
| 9/23/2022 | -9.30E-16 | 4.60E-15 | 7.13E-15 | 2.08E-14 |
| 9/26/2022 | 1.11E-15 | 6.97E-15 | 7.18E-14 | 3.16E-14 |
| 9/30/2022 | 2.02E-17 | 4.89E-15 | 6.36E-14 | 2.21E-14 |

| Sample Collection Date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|---|---|---|---|---|
| **Sample location DOE-2** | | | | |
| 7/1/2022 | 2.34E-15 | 4.63E-15 | 3.46E-14 | 2.14E-14 |
| 7/5/2022 | 2.43E-15 | 4.80E-15 | 1.10E-14 | 2.22E-14 |
| 7/8/2022 | -1.17E-15 | 6.32E-15 | 1.70E-14 | 2.92E-14 |
| 7/11/2022 | -5.09E-16 | 6.48E-15 | 5.13E-14 | 3.00E-14 |
| 7/15/2022 | 6.38E-16 | 4.77E-15 | 4.69E-14 | 2.21E-14 |
| 7/18/2022 | 5.06E-16 | 6.27E-15 | 4.86E-14 | 2.90E-14 |
| 7/22/2022 | 8.92E-16 | 4.78E-15 | 4.19E-14 | 2.21E-14 |
| 7/25/2022 | -1.60E-16 | 6.28E-15 | 2.39E-14 | 2.91E-14 |
| 7/29/2022 | 1.95E-15 | 4.88E-15 | 2.13E-14 | 2.26E-14 |
| 8/1/2022 | 2.15E-15 | 6.86E-15 | 5.05E-14 | 2.89E-14 |
| 8/5/2022 | 1.63E-15 | 5.18E-15 | 3.81E-14 | 2.19E-14 |
| 8/8/2022 | 1.47E-15 | 6.76E-15 | 5.25E-14 | 2.85E-14 |
| 8/12/2022 | 3.93E-15 | 5.23E-15 | 5.45E-14 | 2.21E-14 |
| 8/15/2022 | 5.29E-16 | 7.37E-15 | 6.83E-14 | 3.11E-14 |
| 8/19/2022 | 4.17E-15 | 5.22E-15 | 7.68E-14 | 2.20E-14 |
| 8/22/2022 | 1.63E-16 | 7.02E-15 | 2.62E-14 | 2.96E-14 |
| 8/26/2022 | 8.69E-16 | 5.15E-15 | 3.12E-14 | 2.17E-14 |
| 8/29/2022 | 1.61E-16 | 6.90E-15 | 3.32E-14 | 2.91E-14 |
| 9/2/2022 | 1.01E-15 | 4.82E-15 | 4.19E-14 | 2.18E-14 |
| 9/6/2022 | 5.49E-15 | 4.81E-15 | 7.47E-14 | 2.18E-14 |
| 9/9/2022 | 3.40E-15 | 6.54E-15 | 8.62E-14 | 2.96E-14 |
| 9/12/2022 | 2.38E-15 | 6.51E-15 | 6.53E-14 | 2.95E-14 |
| 9/16/2022 | 1.76E-15 | 4.82E-15 | 4.57E-14 | 2.18E-14 |
| 9/19/2022 | 6.78E-16 | 6.31E-15 | 7.27E-14 | 2.86E-14 |
| 9/23/2022 | -2.18E-16 | 4.60E-15 | 7.39E-15 | 2.08E-14 |
| 9/26/2022 | 4.70E-15 | 6.97E-15 | 5.44E-14 | 3.16E-14 |
| 9/30/2022 | -1.74E-15 | 4.89E-15 | 4.79E-14 | 2.21E-14 |

| Sample Collection Date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|---|---|---|---|---|
| **Sample location DOE-3** | | | | |
| 7/1/2022 | 4.53E-15 | 4.61E-15 | 4.30E-14 | 2.13E-14 |
| 7/5/2022 | 6.45E-16 | 4.83E-15 | 2.63E-14 | 2.23E-14 |
| 7/8/2022 | -1.61E-16 | 6.32E-15 | 4.17E-15 | 2.92E-14 |
| 7/11/2022 | 5.23E-16 | 6.48E-15 | 1.56E-14 | 3.00E-14 |
| 7/15/2022 | -1.64E-15 | 4.76E-15 | 1.52E-14 | 2.20E-14 |
| 7/18/2022 | -1.60E-16 | 6.28E-15 | 2.43E-14 | 2.91E-14 |
| 7/22/2022 | 8.93E-16 | 4.78E-15 | 1.90E-14 | 2.21E-14 |
| 7/25/2022 | -1.60E-16 | 6.28E-15 | 4.34E-14 | 2.91E-14 |
| 7/29/2022 | -1.16E-15 | 4.88E-15 | 3.86E-14 | 2.26E-14 |
| 8/1/2022 | 2.82E-15 | 6.86E-15 | 2.81E-14 | 2.89E-14 |
| 8/5/2022 | 3.39E-15 | 5.19E-15 | 4.51E-14 | 2.19E-14 |
| 8/8/2022 | 1.14E-15 | 6.76E-15 | 6.37E-14 | 2.85E-14 |
| 8/12/2022 | 2.15E-15 | 5.23E-15 | 2.79E-14 | 2.21E-14 |
| 8/15/2022 | -1.97E-15 | 7.37E-15 | 3.97E-14 | 3.11E-14 |
| 8/19/2022 | 3.66E-15 | 5.22E-15 | 6.89E-14 | 2.20E-14 |
| 8/22/2022 | 2.89E-15 | 7.03E-15 | 2.91E-14 | 2.96E-14 |
| 8/26/2022 | 1.62E-15 | 5.15E-15 | 5.10E-14 | 2.17E-14 |
| 8/29/2022 | -1.85E-15 | 6.90E-15 | 2.46E-14 | 2.91E-14 |
| 9/2/2022 | 2.75E-15 | 4.82E-15 | 4.80E-14 | 2.18E-14 |
| 9/6/2022 | 4.99E-15 | 4.81E-15 | 9.54E-14 | 2.18E-14 |
| 9/9/2022 | 5.09E-15 | 6.54E-15 | 8.66E-14 | 2.96E-14 |
| 9/12/2022 | 1.71E-15 | 6.51E-15 | 1.73E-14 | 2.95E-14 |
| 9/16/2022 | -4.78E-16 | 4.82E-15 | 1.68E-14 | 2.18E-14 |
| 9/19/2022 | -2.96E-16 | 6.24E-15 | 1.80E-14 | 2.83E-14 |
| 9/23/2022 | -1.18E-15 | 4.64E-15 | 1.75E-14 | 2.10E-14 |
| 9/26/2022 | 1.83E-15 | 6.96E-15 | 5.48E-14 | 3.16E-14 |
| 9/30/2022 | 1.28E-15 | 4.89E-15 | 6.42E-14 | 2.21E-14 |

| Sample Collection Date | Result Alpha (mCi/mL) | MDC – Alpha (mCi/mL) | Result Beta (mCi/mL) | MDC – Beta (mCi/mL) |
|---|---|---|---|---|
| **Sample location DOE-4** | | | | |
| 7/1/2022 | 3.80E-15 | 4.61E-15 | 4.07E-14 | 2.13E-14 |
| 7/5/2022 | 3.89E-16 | 4.83E-15 | 1.21E-14 | 2.23E-14 |
| 7/8/2022 | 1.18E-15 | 6.31E-15 | -4.36E-15 | 2.92E-14 |
| 7/11/2022 | 3.28E-15 | 6.49E-15 | 2.36E-14 | 3.00E-14 |
| 7/15/2022 | 1.39E-15 | 4.75E-15 | 5.37E-14 | 2.20E-14 |
| 7/18/2022 | 3.18E-15 | 6.29E-15 | 1.65E-14 | 2.91E-14 |
| 7/22/2022 | 2.16E-15 | 4.78E-15 | 5.27E-14 | 2.21E-14 |
| 7/25/2022 | -3.16E-15 | 6.28E-15 | 1.65E-14 | 2.91E-14 |
| 7/29/2022 | 3.50E-15 | 4.87E-15 | 2.13E-14 | 2.25E-14 |
| 8/1/2022 | 4.15E-15 | 6.87E-15 | 2.17E-14 | 2.90E-14 |
| 8/5/2022 | 3.14E-15 | 5.19E-15 | 1.64E-14 | 2.19E-14 |
| 8/8/2022 | 1.80E-15 | 6.76E-15 | 3.15E-14 | 2.85E-14 |
| 8/12/2022 | 2.66E-15 | 5.23E-15 | 5.28E-14 | 2.21E-14 |
| 8/15/2022 | 8.86E-16 | 7.37E-15 | 7.18E-14 | 3.11E-14 |
| 8/19/2022 | 2.40E-15 | 5.22E-15 | 6.70E-14 | 2.20E-14 |
| 8/22/2022 | 1.18E-15 | 7.03E-15 | 5.71E-14 | 2.96E-14 |
| 8/26/2022 | -6.29E-16 | 5.15E-15 | 3.42E-14 | 2.17E-14 |
| 8/29/2022 | -2.18E-15 | 6.90E-15 | 1.21E-14 | 2.91E-14 |
| 9/2/2022 | 6.48E-15 | 4.82E-15 | 3.95E-14 | 2.18E-14 |
| 9/6/2022 | 4.99E-15 | 4.81E-15 | 7.33E-14 | 2.18E-14 |
| 9/6/2022 | 6.44E-15 | 6.54E-15 | 7.13E-14 | 2.96E-14 |
| 9/12/2022 | 1.71E-15 | 6.52E-15 | 1.37E-14 | 2.95E-14 |
| 9/16/2022 | 1.02E-15 | 4.82E-15 | 4.70E-14 | 2.18E-14 |
| 9/19/2022 | 2.92E-15 | 6.24E-15 | 3.94E-14 | 2.83E-14 |
| 9/23/2022 | 4.98E-16 | 4.64E-15 | 2.39E-14 | 2.10E-14 |
| 9/26/2022 | 3.62E-15 | 6.96E-15 | 2.28E-14 | 3.16E-14 |
| 9/30/2022 | 2.02E-17 | 4.89E-15 | 5.14E-14 | 2.21E-14 |

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

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

| Radionuclide | Result (pCi/sample) | MDC (pCi/sample) | Data Qualifier | Airborne Concentration (µCi/mL) |
|---|---|---|---|---|
| **Location DOE-1 – Air volume/sample = 1.03E+09** | | | | |
| Cesium-137 | -0.359 | 7.6 | U U | -3.485E-16 |
| Strontium-90 | 0.957 | 2.89 | U U | 9.291E-16 |
| Cobalt-60 | -2.8 | 10 | U U | -2.718E-15 |
| Potassium-40 | 53 | 166 | U U | 5.146E-14 |
| Beryllium-7 | 119 | 74.9 | | 1.155E-13 |
| Plutonium-238 | 0.101 | 0.151 | U U | 9.806E-17 |
| Polonium-210 | 8.85 | 0.632 | J | 8.592E-15 |
| Plutonium-241 | 7.17 | 31 | U U | 6.961E-15 |
| Thorium-230 | 0.115 | 1.02 | U U | 1.117E-16 |
| Thorium-228 | 0.764 | 1.23 | U U | 7.417E-16 |
| Actinium-228 | -1.35 | 33.6 | U U | -1.311E-15 |
| Americium-241 | -0.216 | 0.912 | U U | -2.097E-16 |
| Plutonium-239 | 0.0262 | 0.279 | U U | 2.544E-17 |
| Ra-228 - total | 9.14 | 6.12 | UJ | 8.874E-15 |
| Radium-226, -228 combined | 0.536 | 2.74 | U U | 5.204E-16 |
| Thorium-232 | 0.0277 | 0.781 | U U | 2.689E-17 |
| Uranium-238 | 0.736 | 0.374 | UJ | 7.146E-16 |
| Uranium-233/234 | 0.495 | 0.527 | U U | 4.806E-16 |
| Uranium-235/236 | 0.0343 | 0.365 | U U | 3.330E-17 |
| **Location DOE-2 – Air volume/sample = 1.03E+09** | | | | |
| Cesium-137 | -1.88 | 4.65 | U U | -1.825E-15 |
| Strontium-90 | -1.01 | 2.34 | U U | -9.806E-16 |
| Cobalt-60 | -2.11 | 6.5 | U U | -2.049E-15 |
| Potassium-40 | 103 | 59.8 | UJ | 1.000E-13 |
| Beryllium-7 | 132 | 61.3 | | 1.282E-13 |
| Plutonium-238 | 0.0432 | 0.571 | U U | 4.194E-17 |
| Polonium-210 | 9.3 | 0.428 | J | 9.029E-15 |
| Plutonium-241 | 18 | 47.1 | U U | 1.748E-14 |
| Thorium-230 | 0.222 | 1.24 | U U | 2.155E-16 |
| Thorium-228 | 0.202 | 1.34 | U U | 1.961E-16 |
| Actinium-228 | 18.2 | 31.9 | U U | 1.767E-14 |
| Americium-241 | -0.171 | 0.837 | U U | -1.660E-16 |
| Plutonium-239 | -0.0524 | 0.597 | U U | -5.087E-17 |
| Ra-228 - total | 1.69 | 3.53 | U U | 1.641E-15 |
| Radium-226, -228 combined | 3.4 | 2.78 | UJ | 3.301E-15 |
| Thorium-232 | 0.822 | 0.713 | UJ | 7.981E-16 |
| Uranium-238 | 0.549 | 0.534 | UJ | 5.330E-16 |

| Radionuclide | Result (pCi/sample) | MDC (pCi/sample) | Data Qualifier | Airborne Concentration (µCi/mL) |
|---|---|---|---|---|
| Uranium-233/234 | 0.0781 | 0.712 | U U | 7.583E-17 |
| Uranium-235/236 | 0.0821 | 0.518 | U U | 7.971E-17 |
| **Location DOE-3 – Air volume/sample = 1.03E+09** | | | | |
| Cesium-137 | 3.72 | 8.56 | U U | 3.612E-15 |
| Strontium-90 | -0.464 | 2.92 | U U | -4.505E-16 |
| Cobalt-60 | -0.647 | 7.68 | U U | -6.282E-16 |
| Potassium-40 | 38.6 | 83.3 | U U | 3.748E-14 |
| Beryllium-7 | 115 | 120 | U U | 1.117E-13 |
| Plutonium-238 | -0.0492 | 0.432 | U U | -4.777E-17 |
| Polonium-210 | 10.4 | 0.469 | | 1.010E-14 |
| Plutonium-241 | -0.273 | 33.1 | U U | -2.650E-16 |
| Thorium-230 | 0.111 | 1.01 | U U | 1.078E-16 |
| Thorium-228 | 0.31 | 0.431 | U U | 3.010E-16 |
| Actinium-228 | 15.5 | 39.8 | U U | 1.505E-14 |
| Americium-241 | -0.0184 | 0.647 | U U | -1.786E-17 |
| Plutonium-239 | 0.0577 | 0.432 | U U | 5.602E-17 |
| Ra-228 - total | 9.74 | 3.16 | J | 9.456E-15 |
| Radium-226, -228 combined | 2.77 | 3.48 | U U | 2.689E-15 |
| Thorium-232 | 0.443 | 0.578 | U U | 4.301E-16 |
| Uranium-238 | 0.686 | 0.531 | UJ | 6.660E-16 |
| Uranium-233/234 | 0.418 | 0.743 | U U | 4.058E-16 |
| Uranium-235/236 | 0.00355 | 0.585 | U U | 3.447E-18 |
| **Location DOE-4 – Air volume/sample = 1.03E+09** | | | | |
| Cesium-137 | 0.685 | 4.83 | U U | 6.650E-16 |
| Strontium-90 | -0.823 | 2.94 | U U | -7.990E-16 |
| Cobalt-60 | -0.375 | 6.28 | U U | -3.641E-16 |
| Potassium-40 | 76 | 71.6 | UI UJ | 7.379E-14 |
| Beryllium-7 | 186 | 59.5 | | 1.806E-13 |
| Plutonium-238 | -0.0528 | 0.448 | U U | -5.126E-17 |
| Polonium-210 | 9.68 | 0.434 | | 9.398E-15 |
| Plutonium-241 | 17.7 | 50.3 | U U | 1.718E-14 |
| Thorium-230 | 0.343 | 1.08 | U U | 3.330E-16 |
| Thorium-228 | 0.605 | 0.984 | U U | 5.874E-16 |
| Actinium-228 | -14 | 26.2 | U U | -1.359E-14 |
| Americium-241 | 0.0106 | 0.818 | U U | 1.029E-17 |
| Plutonium-239 | 0.0615 | 0.614 | U U | 5.971E-17 |
| Ra-228 - total | 0.842 | 3.94 | U U | 8.175E-16 |
| Radium-226, -228 combined | 2.68 | 2.47 | UJ | 2.602E-15 |
| Thorium-232 | 0.798 | 0.797 | UJ | 7.748E-16 |

| Radionuclide | Result (pCi/sample) | MDC (pCi/sample) | Data Qualifier | Airborne Concentration (µCi/mL) |
|---|---|---|---|---|
| Uranium-238 | 0.888 | 0.393 | UJ | 8.621E-16 |
| Uranium-233/234 | 0.423 | 0.568 | U U | 4.107E-16 |
| Uranium-235/236 | -0.021 | 0.42 | U U | -2.039E-17 |

Note - Data Qualifier meanings:

**UU** – Analyte was analyzed for but not detected and is qualified as a non-detect.

**U** – The analyte was analyzed for, but not detected or is qualified as non-detect because of blank contamination.

**J** – The analyte was positively identified; the quantitation is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

**UJ** – The analyte was not detected; however, the result is estimated because of discrepancies in meeting certain analyte-specific QC criteria.

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# APPENDIX D

# $PM_{10}$ Monthly Audit Reports and Flow Verification Results

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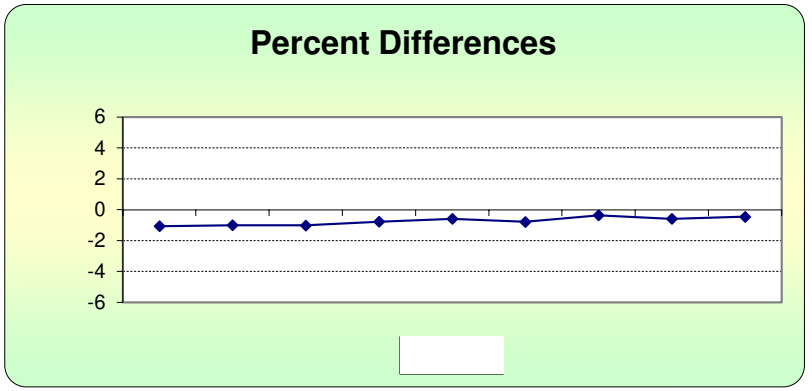
# One-Point Flow Rate Bias Estimate

| | | | | | d (Eqn. 1) | Percentile | $d^2$ | $\|d\|$ | $\|d\|^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | -1.060 | | 1.124 | 1.060 | 1.124 |
| | | | | | -1.008 | **25th** | 1.015 | 1.008 | 1.015 |
| | | | | | -1.018 | -1.008 | 1.037 | 1.018 | 1.037 |
| | | | | | -0.780 | | 0.608 | 0.780 | 0.608 |
| | | | | | -0.595 | **75th** | 0.354 | 0.595 | 0.354 |
| | | | | | -0.794 | -0.595 | 0.630 | 0.794 | 0.630 |
| | | | | | -0.356 | | 0.127 | 0.356 | 0.127 |
| | | | | | -0.595 | | 0.354 | 0.595 | 0.354 |
| | | | | | -0.455 | | 0.207 | 0.455 | 0.207 |

| n | $\sum\|d\|$ | |
|---|---|---|
| 9 | 6.661 | |
| **n-1** | $\sum\|d\|^2$ | |
| 8 | 5.456 | |

| **Bias (%) (Eqn 3)** | Both Signs Positive |
|---|---|
| 0.90 | FALSE |
| **Signed Bias (%)** | Both Signs Negative |
| -0.90 | TRUE |

Note: No quality issues reported this quarter.




Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statistical Calculator - Software to calculate precision and bias statistics
MS EXCEL filename - "*11/3/2017 (dasc)11_3_17.xls)*"
https://www3.epa.gov/tnn/amtic/qareport.html

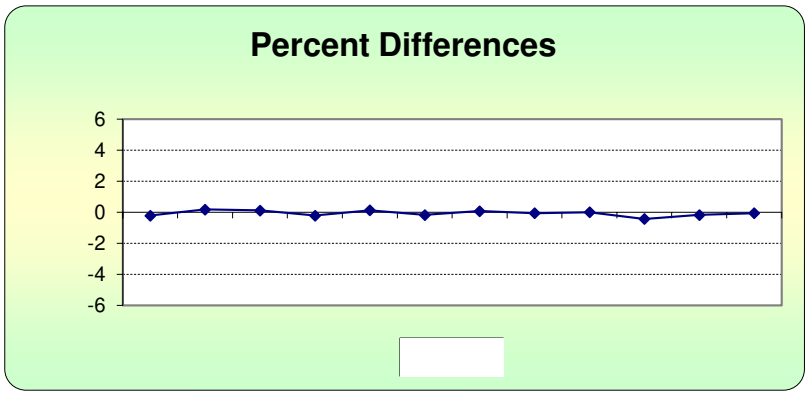
# One-Point Flow Rate Bias Estimate

| | | | | | d (Eqn. 1) | Percentile | $d^2$ | \|d\| | $\|d\|^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | -0.214 | | 0.046 | 0.214 | 0.046 |
| | | | | | 0.180 | **25th** | 0.032 | 0.180 | 0.032 |
| | | | | | 0.114 | -0.188 | 0.013 | 0.114 | 0.013 |
| | | | | | -0.214 | | 0.046 | 0.214 | 0.046 |
| | | | | | 0.120 | **75th** | 0.014 | 0.120 | 0.014 |
| | | | | | -0.171 | 0.082 | 0.029 | 0.171 | 0.029 |
| | | | | | 0.071 | | 0.005 | 0.071 | 0.005 |
| | | | | | -0.060 | | 0.004 | 0.060 | 0.004 |
| | | | | | 0.000 | | 0.000 | 0.000 | 0.000 |
| | | | | | -0.427 | | 0.182 | 0.427 | 0.182 |
| | | | | | -0.179 | | 0.032 | 0.179 | 0.032 |
| | | | | | -0.057 | | 0.003 | 0.057 | 0.003 |

| n | $\sum\|d\|$ | |
|---|---|---|
| 12 | 1.808 | |
| **n-1** | $\sum\|d\|^2$ | |
| 11 | 0.407 | |

| | |
|---|---|
| **Bias (%) (Eqn 3)** | Both Signs Positive |
| 0.21 | FALSE |
| **Signed Bias (%)** | Both Signs Negative |
| +/-0.21 | FALSE |

Note: E-BAM unit Y12096 replaced with unit W23313. Initial audit for unit W23313 on 8/11/2022.




Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statistical Calculator - Software to calculate precision and bias statistics
MS EXCEL filename - "*11/3/2017 (dasc)11_3_17.xls)*"
https://www3.epa.gov/tnn/amtic/qareport.html

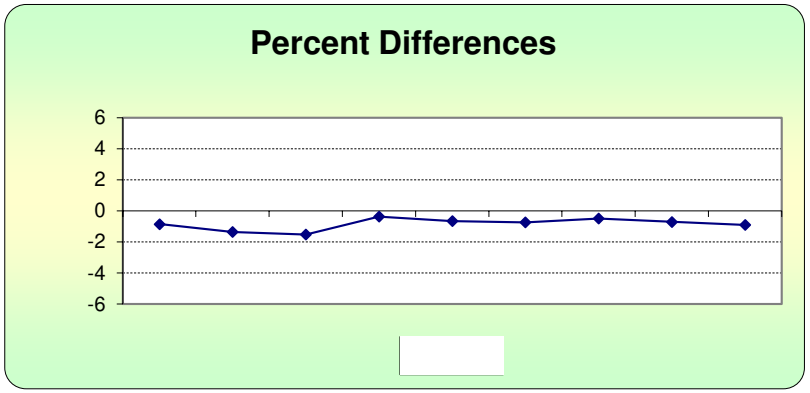
# One-Point Flow Rate Bias Estimate

| | | | | | d (Eqn. 1) | Percentile | $d^2$ | $\|d\|$ | $\|d\|^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | -0.850 | | 0.722 | 0.850 | 0.722 |
| | | | | | -1.359 | **25th** | 1.846 | 1.359 | 1.846 |
| | | | | | -1.519 | -0.906 | 2.309 | 1.519 | 2.309 |
| | | | | | -0.356 | | 0.127 | 0.356 | 0.127 |
| | | | | | -0.654 | **75th** | 0.428 | 0.654 | 0.428 |
| | | | | | -0.737 | -0.654 | 0.544 | 0.737 | 0.544 |
| | | | | | -0.498 | | 0.248 | 0.498 | 0.248 |
| | | | | | -0.713 | | 0.509 | 0.713 | 0.509 |
| | | | | | -0.906 | | 0.821 | 0.906 | 0.821 |

| n | $\sum\|d\|$ | |
|---|---|---|
| 9 | 7.592 | |
| **n-1** | $\sum\|d\|^2$ | |
| 8 | 7.552 | |

| **Bias (%) (Eqn 3)** | Both Signs Positive |
|---|---|
| 1.08 | FALSE |
| **Signed Bias (%)** | Both Signs Negative |
| -1.08 | TRUE |

Note: No quality issues reported this quarter.




Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statistical Calculator - Software to calculate precision and bias statistics
MS EXCEL filename - "*11/3/2017 (dasc)11_3_17.xls)*"
https://www3.epa.gov/tnn/amtic/qareport.html

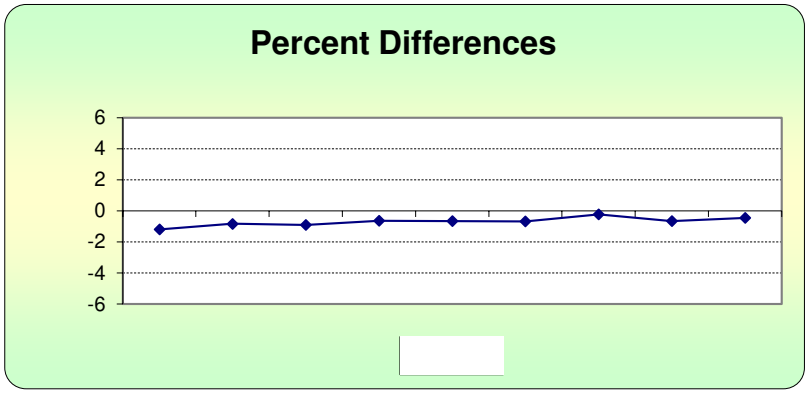
# One-Point Flow Rate Bias Estimate

| | | | | | d (Eqn. 1) | Percentile | $d^2$ | $\|d\|$ | $\|d\|^2$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | -1.200 | | 1.439 | 1.200 | 1.439 |
| | | | | | -0.831 | **25th** | 0.691 | 0.831 | 0.691 |
| | | | | | -0.906 | -0.831 | 0.821 | 0.906 | 0.821 |
| | | | | | -0.639 | | 0.408 | 0.639 | 0.408 |
| | | | | | -0.654 | **75th** | 0.428 | 0.654 | 0.428 |
| | | | | | -0.681 | -0.639 | 0.464 | 0.681 | 0.464 |
| | | | | | -0.214 | | 0.046 | 0.214 | 0.046 |
| | | | | | -0.654 | | 0.428 | 0.654 | 0.428 |
| | | | | | -0.455 | | 0.207 | 0.455 | 0.207 |

| n | $\sum\|d\|$ |
|---|---|
| 9 | 6.235 |
| **n-1** | $\sum\|d\|^2$ |
| 8 | 4.932 |

| **Bias (%) (Eqn 3)** | Both Signs Positive |
|---|---|
| 0.86 | FALSE |
| **Signed Bias (%)** | Both Signs Negative |
| -0.86 | TRUE |

Note: No quality issues reported this quarter.




Reference: U.S. EPA, Ambient Monitoring Technology Information Center (AMTIC)
Quality Indicator Assessment Reports
Data Assessment Statistical Calculator - Software to calculate precision and bias statistics
MS EXCEL filename - "*11/3/2017 (dasc)11_3_17.xls)*"
https://www3.epa.gov/tnn/amtic/qareport.html

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-1 Serial # X16067

Audit Date: 7/21/2022 Audited By : TBWilliford

| Flow Audit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Flow Audit Device Model: | BGI Delta Cal DC-1A | Serial No: | 158047 | Calibration Date: | 3/23/2022 | | | | |
| Leak Check Value: | as found: | 0.4 | | as left: | 0.4 | | | | |
| | | E-BAM | | Ref. Std. | | | E-BAM | | Ref. Std. |
| Ambient Temperature: | as found: | 22.5 °C | | 21.8 °C | | as left: | 22.5 °C | | 21.8 °C |
| Barometric Pressure: | as found: | 715.1 mmHg | | 715.0 mmHg | | as left: | 715.1 mmHg | | 715.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | | 16.87 lpm | | as left: | 16.7 lpm | | 16.87 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | | 14.15 lpm | | as left: | 14.0 lpm | | 14.15 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | | 17.68 lpm | | as left: | 17.5 lpm | | 17.68 lpm |

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.950 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.933 | | | |
| Difference (mg/cm2) : 0.017 | | | |
| % Difference / ~~Pass~~ or Fail: 1.81 % | 14.3 | 415.1 | Marginal |

Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0627 | 0627 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 1 | 1 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60 min | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | Off |

Last 6 Errors in E-BAM Error Log

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 No new messages | 7/21/22 | 0633 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-2 Serial # Y12096

Audit Date: 7/21/2022 Audited By : TS. Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 24.5 °C | 23.8 °C | as left: | 24.5 °C | 23.8 °C |
| Barometric Pressure: | as found: | 709.8 mmHg | 712.0 mmHg | as left: | 709.8 mmHg | 712.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.67 lpm | as left: | 16.7 lpm | 16.67 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.03 lpm | as left: | 14.0 lpm | 14.03 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.48 lpm | as left: | 17.5 lpm | 17.48 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.891 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.902 | | | |
| Difference (mg/cm2) : 0.011 | | | |
| % Difference / ~~Pass~~ or Fail: 1.23% | 14.3 | 412.3 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0711 | 0711 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 2 | 2 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5 v |
| Tape Advance | 24 hrs | 24hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15°C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | 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 | 7/21/22 | 0719 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-3 Serial # W23314

Audit Date: 7/21/2022 Audited By : TS Willeford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

Leak Check Value: as found: 0.3 as left: 0.3

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 24.5 °C | 25.4 °C | as left: | 24.5 °C | 25.4 °C |
| Barometric Pressure: | as found: | 711.8 mmHg | 714.5 mmHg | as left: | 711.8 mmHg | 714.5 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.93 lpm | as left: | 16.7 lpm | 16.93 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.12 lpm | as left: | 14.0 lpm | 14.12 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.77 lpm | as left: | 17.5 lpm | 17.77 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.919 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.925 | | | |
| Difference (mg/cm2) : 0.006 | | | |
| % Difference / (Pass) or Fail: 0.65% | 14.3 | 419.8 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0904 | 0904 | 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 | 24hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15 C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | 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 | 7/21/22 | 0910 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-4 Serial # W23310

Audit Date: 7/21/2022 Audited By : TS Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 32.8 °C | 31.3 °C | as left: | 32.8 °C | 31.3 °C |
| Barometric Pressure: | as found: | 705.1 mmHg | 707.0 mmHg | as left: | 705.1 mmHg | 707.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.84 lpm | as left: | 16.7 lpm | 16.84 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.17 lpm | as left: | 14.0 lpm | 14.17 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.66 lpm | as left: | 17.5 lpm | 17.66 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.915 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.912 | | | |
| Difference (mg/cm2) : 0.003 | | | |
| % Difference / Pass or Fail: ~~0.0~~ TSW 0.33% | 15.0 | 403.7 | Good |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 1042 | 1042 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 4 | 4 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24 hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60 min | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0V |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | off |

## Last 6 Errors in E-BAM Error Log

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 No new messages | 7/21/22 | 1051 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-2 Serial # W23313

Audit Date: 8/11/2022 Audited By : T.S. Williford

| Flow Audit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Flow Audit Device Model: | BGI Delta Cal DC-1A | Serial No: | 158047 | Calibration Date: | 3/23/2022 | | | | |
| Leak Check Value: | as found: | 0.5 | | as left: | 0.5 | | | | |
| | | E-BAM | | Ref. Std. | | | E-BAM | | Ref. Std. |
| Ambient Temperature: | as found: | 33.8 | °C | 32.9 | °C | as left: | 33.8 | °C | 32.9 °C |
| Barometric Pressure: | as found: | 713.8 | mmHg | 714.0 | mmHg | as left: | 713.8 | mmHg | 714.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 | lpm | 16.68 | lpm | as left: | 16.7 | lpm | 16.68 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 | lpm | 14.03 | lpm | as left: | 14.0 | lpm | 14.03 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 | lpm | 17.53 | lpm | as left: | 17.5 | lpm | 17.53 lpm |

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.885 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.908 | | | |
| Difference (mg/cm2) : 0.023 | | | |
| % Difference / Pass or Fail: 2.57% | 14.8 | 421.2 | ~~Good~~ TSW / Marginal |

Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 1116 | 1116 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 2 | 2 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24hr | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60 | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | NO |
| Analog FS | 1.0 v | 1.0v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | Off |

Last 6 Errors in E-BAM Error Log

| | Error | Date | Time | | Error | Date | Time |
|---|---|---|---|---|---|---|---|
| 1 | No New Messages | 8/11/22 | 1126 | 4 | | | |
| 2 | | | | 5 | | | |
| 3 | | | | 6 | | | |

Audit Notes:

* This is the initial Audit for unit W23313. Which replaced unit Y12096.

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-1 Serial # X16067

Audit Date: 8/30/2022 Audited By : TS Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 21.1 °C | 21.2 °C | as left: | 21.1 °C | 21.2 °C |
| Barometric Pressure: | as found: | 714.7 mmHg | 714.5 mmHg | as left: | 714.7 mmHg | 714.5 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.80 lpm | as left: | 16.7 lpm | 16.8 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.11 lpm | as left: | 14.0 lpm | 14.11 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.64 lpm | as left: | 17.5 lpm | 17.64 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.950 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.935 | | | |
| Difference (mg/cm2) : 0.015 | | | |
| % Difference / ~~Pass~~ or Fail: 1.60% | 14.0 | 416.3 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0548 | 0548 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | DOE-1 | DOE-1 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5 v |
| Tape Advance | 24 hrs | 24 hr | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25 C |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15 C | DAC | 8.0 v | 8.0V |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | NO |
| Analog FS | 1.0 v | 1.0 v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | off |

## Last 6 Errors in E-BAM Error Log

| | Error | Date | Time | | Error | Date | Time |
|---|---|---|---|---|---|---|---|
| 1 | No new messages | 8/30/2022 | 0556 | 4 | | | |
| 2 | | | | 5 | | | |
| 3 | | | | 6 | | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-2 Serial # W23313

Audit Date: 8/30/2022 Audited By : T.S. Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 21.3 °C | 21.0 °C | as left: | 21.3 °C | 21.0 °C |
| Barometric Pressure: | as found: | 712.7 mmHg | 712.0 mmHg | as left: | 712.7 mmHg | 712.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.71 lpm | as left: | 16.7 lpm | 16.71 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 13.99 lpm | as left: | 14.0 lpm | 13.99 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.50 lpm | as left: | 17.5 lpm | 17.50 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.885 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.881 | | | |
| Difference (mg/cm2) : 0.004 | | | |
| % Difference / (Pass) or Fail: 0.45% | 14.0 | 406.7 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0638 | 0638 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 2 | 2 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24 hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60 min | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0 v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | Off |

## Last 6 Errors in E-BAM Error Log

| | Error | Date | Time | | Error | Date | Time |
|---|---|---|---|---|---|---|---|
| 1 | No new messages | 8/30/22 | 0648 | 4 | | | |
| 2 | | | | 5 | | | |
| 3 | | | | 6 | | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-3 Serial # W23314

Audit Date: 8/30/2022 Audited By : T.S. Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 25.7 °C | 24.8 °C | as left: | 25.7 °C | 24.8 °C |
| Barometric Pressure: | as found: | 711.7 mmHg | 714.0 mmHg | as left: | 711.7 mmHg | 714.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.81 lpm | as left: | 16.7 lpm | 16.81 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.05 lpm | as left: | 14.0 lpm | 14.05 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.63 lpm | as left: | 17.5 lpm | 17.63 lpm |

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

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

| Manual Span Membrane Test | | Pump Test | | |
|---|---|---|---|---|
| Expected Span Mass (mg/cm2) : | 0.919 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : | 0.922 | | | |
| Difference (mg/cm2) : | 0.003 | | | |
| % Difference / ~~Pass~~ or Fail: | 0.33% | 15.0 | 421.3 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0741 | 0741 | 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 | 8/30/22 | 0750 | 4 | | | |
| 2 | | | | 5 | | | |
| 3 | | | | 6 | | | |

Audit Notes:

✓

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-4 Serial # W23310

Audit Date: 8/30/2022 Audited By : T.S. Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

Leak Check Value: as found: 0.4 ~~0 TSW~~ as left: 0.4

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 28.8 °C | 27.9 °C | as left: | 28.8 °C | 27.9 °C |
| Barometric Pressure: | as found: | 704.8 mmHg | 706.0 mmHg | as left: | 704.8 mmHg | 706.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.81 lpm | as left: | 16.7 lpm | 16.81 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.09 lpm | as left: | 14.0 lpm | 14.09 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.62 lpm | as left: | 17.5 lpm | 17.62 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.915 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.906 | | | |
| Difference (mg/cm2) : 0.009 | | | |
| % Difference / ~~Pass~~ or Fail: 0.99% | 14.8 | 4/11.3 | Good/Marg |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0824 | 0824 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 4 | 4 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24 hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60 min | Delta T Setpoint | 15 C | 15% | 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 | 8/30/2022 | 0835 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-1 Serial # X16067

Audit Date: 9/22/2022 Audited By : T.S. Williford

**Flow Audit**

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 25.0 °C | 23.9 °C | as left: | 25.0 °C | 23.9 °C |
| Barometric Pressure: | as found: | 715.4 mmHg | 715.5 mmHg | as left: | 715.4 mmHg | 715.5 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.80 lpm | as left: | 16.7 lpm | 16.80 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.05 lpm | as left: | 14.0 lpm | 14.05 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.58 lpm | as left: | 17.5 lpm | 17.58 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.950 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.930 | | | |
| Difference (mg/cm2) : 0.02 | | | |
| % Difference / (Pass) or Fail: 2.13% | 14.0 | 4/12.3 | Marginal |

**Setup and Calibration Values**

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 0919 | 0919 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 1 | 1 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5V |
| Tape Advance | 24 hrs | 24hr | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0V |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0V | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | off |

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

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 Sensor failure - filter Pressure | 9/17/22 | 0644 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

On 9/17/2022 at 0300 the unit (X16067) shut down due to "Sensor failure - filter Pressure - 231.8". The sample nozzle and vane were cleaned and the unit was restarted on 9/20/2022 @ 0800.

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-2 Serial # W23313

Audit Date: 9/22/2022 Audited By : TS Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 26.7 °C | 25.9 °C | as left: | 26.7 °C | 25.9 °C |
| Barometric Pressure: | as found: | 712.8 mmHg | 712.5 mmHg | as left: | 712.8 mmHg | 712.5 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.73 lpm | as left: | 16.7 lpm | 16.73 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.06 lpm | as left: | 14.0 lpm | 14.06 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.51 lpm | as left: | 17.5 lpm | 17.51 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.885 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.887 | | | |
| Difference (mg/cm2) : 0.002 | | | |
| % Difference / ~~Pass~~ or Fail: 0.23% | 14.5 | 420.2 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 1014 | 1014 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 2 | 2 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24hr | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25C° |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | Off |

## Last 6 Errors in E-BAM Error Log

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 No new messages | 9/22/22 | 1020 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-3 Serial # W23314

Audit Date: 9/22/2022 Audited By : TS Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 29.7 °C | 28.6 °C | as left: | 29.7 °C | 28.6 °C |
| Barometric Pressure: | as found: | 711.5 mmHg | 714.0 mmHg | as left: | 711.5 mmHg | 714.0 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.82 lpm | as left: | 16.7 lpm | 16.82 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.07 lpm | as left: | 14.0 lpm | 14.07 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.66 lpm | as left: | 17.5 lpm | 17.66 lpm |

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

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

| Manual Span Membrane Test | Pump Test | | |
|---|---|---|---|
| Expected Span Mass (mg/cm2) : 0.919 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : 0.920 | | | |
| Difference (mg/cm2) : 0.001 | | | |
| % Difference / (Pass) or Fail: 0.110% | 14.0 | 407.3 | Marginal |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 1103 | 1103 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 3 | 3 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5v |
| Tape Advance | 24 hrs | 24hr | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25 C |
| Realtime Avg | 60 mins | 60min | Delta T Setpoint | 15 C | 15°C | DAC | 8.0 v | 8.0v |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0v | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | Off |

## Last 6 Errors in E-BAM Error Log

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 No new Messages | 9/22/22 | 1110 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes:

NORTHWIND INC.

**Baseline Air Monitoring Program - DOE**

**E-BAM Monthly Audit and Maintenance**

Station # DOE-4 Serial # W23310

Audit Date: 9/22/2022 Audited By : JS Williford

## Flow Audit

Flow Audit Device Model: BGI Delta Cal DC-1A Serial No: 158047 Calibration Date: 3/23/2022

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

| | | E-BAM | Ref. Std. | | E-BAM | Ref. Std. |
|---|---|---|---|---|---|---|
| Ambient Temperature: | as found: | 31.5 °C | 29.8 °C | as left: | 31.5 °C | 29.8 °C |
| Barometric Pressure: | as found: | 704.2 mmHg | 705.5 mmHg | as left: | 704.2 mmHg | 705.5 mmHg |
| 16.7 lpm Flow Rate | as found: | 16.7 lpm | 16.81 lpm | as left: | 16.7 lpm | 16.81 lpm |
| 14.0 lpm Flow Rate | as found: | 14.0 lpm | 14.03 lpm | as left: | 14.0 lpm | 14.03 lpm |
| 17.5 lpm Flow Rate | as found: | 17.5 lpm | 17.58 lpm | as left: | 17.5 lpm | 17.58 lpm |

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

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

| Manual Span Membrane Test | | Pump Test | | |
|---|---|---|---|---|
| Expected Span Mass (mg/cm2) : | 0.915 | Flow Rate 14.0 - 15.0 (lpm) | Vacuum Value (Hg) | Quality Category Good / Marginal / Poor |
| Measured Span Mass (mg/cm2) : | 0.911 | | | |
| Difference (mg/cm2) : | 0.004 | | | |
| % Difference / (Pass) or Fail: | 0.44% | 14.1 | 388.8 | Good |

## Setup and Calibration Values

| Parameter | Expected | Found | Parameter | Expected | Found | Parameter | Expected | Found |
|---|---|---|---|---|---|---|---|---|
| Clock | 1159 | 1159 | Analog Mode | Hourly | Hourly | Flow Type | Actual | Act |
| Location | 4 | 4 | Baud Rate | 9600 | 9600 | Restart Voltage | 12.5 v | 12.5 ✓ |
| Tape Advance | 24 hrs | 24 hrs | RH Setpoint | 45% | 45% | Std Cond Temp | 25 C | 25 C |
| Realtime Avg | 60 mins | 60 min | Delta T Setpoint | 15 C | 15 C | DAC | 8.0 v | 8.0 ✓ |
| Machine Type | PM-10 | PM-10 | RH Control | On | On | RH Connect | No | No |
| Analog FS | 1.0 v | 1.0 ✓ | Flow Setpoint | 16.7 | 16.7 | Pump Protect | Off | off |

## Last 6 Errors in E-BAM Error Log

| Error | Date | Time | Error | Date | Time |
|---|---|---|---|---|---|
| 1 No new Messages | 9/22/22 | 1206 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Audit Notes: