Quarterly Report for Phillips 66 Denver Terminal Fenceline Monitoring Plan-Q2 2025

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Document Number: 317AA-043819-RT-1018
Submittal Date: August 21, 2025

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II. Executive Summary

This report summarizes the findings related to the Phillips 66 fenceline monitoring plan during the period of April 1st of 2025 to June 30th of 2025 (Q2 of 2025). The data collected during this period were validated following all procedures described in the Phillips 66 fenceline monitoring plan. This report includes tables with the validated and invalidated data, statistical analysis results and timeseries of the compounds of interest and meteorological parameters.

III. Contact Information

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IV. Methods

A. Site Description

Phillips 66 operates a bulk fuel storage and distribution terminal at 3960 East 56th Avenue, Commerce City (Adams County), Colorado. Gasoline, Ethanol, Jet and Diesel fuel products are received from a pipeline, stored and distributed to market by tank trucks. The principal components of the facility are as follows:

- Gasoline aboveground storage tanks
- Butane aboveground storage tanks
- Jet aboveground storage tanks
- Diesel aboveground storage tanks
- Additive aboveground storage tanks
- Ethanol aboveground storage tank
- Vapor combustor unit (VCU)

The facility lies in an industrial area near the Suncor refinery to the north and east, another bulk terminal, two asphalt plants and a wastewater treatment facility and other nearby industrial sources of Covered Air Toxics.

B. Instrument Description

1. Open-Path Monitors

The Phillips 66 Denver Terminal fenceline air monitoring system includes both open-path tunable diode laser spectrometers (TDLAS), and open-path ultraviolet Doppler optical absorption spectrometers (UVDOAS). Open-path monitors operate by projecting a beam of light through open air to retroreflectors

that reflect the light back to the monitor where spectral absorption characteristics are measured. As the light travels along the path length a certain amount of this light will be absorbed by the various chemical species present in the air. Because all gases absorb light differently according to their own unique spectral characteristics, it is possible to use measurements of absorption intensity at specific wavelengths as a proxy for measuring a target gas' concentration in the air.

Therefore, along a known path length, an absorption measurement taken at the appropriate wavelength for the target molecule can easily be used to solve for its average concentration over the length of the beam.

The Phillips 66 open-path system will consist of four analyzers at the locations shown in Figure 1 and as outlined in Table 2. The light is transmitted to a retroreflector and back to a detector co-located with the transmitter. The analyzer software will provide five-minute and hourly-average concentration measurements for each path.

- ***Open Path (OP) Ultra Violet Differential Optical Absorption Spectroscopy (UVDOAS)***

For the monitoring of benzene, the Phillips 66 Denver Terminal uses Open Path (OP) Ultraviolet Differential Optical Absorption Spectroscopy (UVDOAS). This technology quantifies concentrations of gaseous compounds by measuring the absorption of ultraviolet light by chemical compounds in the air and applying the Beer-Lambert Law. UVDOAS typically uses unique absorptions of specific wavelengths of ultraviolet light in a wavelength range of 245 to 380 nanometers (nm). Benzene peaks are found close to the 253 nm wavelength.

Open path UVDOAS instrumentation consists of a light source, transmitting and receiving optics (telescopes), a spectrometer, a reflector, a detector, and a data processing computer. A Xenon light source provides light, which is focused in a collimated beam before it is sent through a transmitting telescope and into the measurement path. A receiving telescope collects the light and directs it to the spectrometer which diffracts the light onto the detector. The detector is typically a solid-state array such as a charge-coupled device (CCD). This allows the detector to collect light of different wavelengths without moving parts. The spectra bands can be extracted from the spectrum and compared to reference spectra to determine which compounds were present along the path and at what concentrations.

Monostatic (as opposed to bistatic) open path instruments have been selected to reduce the need for substantial power at the retroreflector sites and improve detection limits by increasing effective path lengths. Thus, only the light-source/detector end of the monitoring path requires substantial power, communications equipment, and a large shelter.

The Phillips 66 Denver Terminal uses the UV Sentry Open Path Multi-Gas Analyzer (UV Sentry) manufactured by Cerex Monitoring Solutions, LLC for the monitoring of benzene. The UV Sentry uses no moving parts to wear out, it should not fail or require calibration, which keeps consumables and maintenance to a minimum. The UV Sentry has an on-board computer and saves raw spectral data independent of calibration. These spectra may be used at any time to verify real time measurements. Additionally, the UV Sentry records signal intensity and minimum detection limits (MDLs) for benzene in real time as data quality indicators. Real time MDL output supports both American Society for Testing and Materials (ASTM) and USEPA methods. The UV Sentry also has a flow through calibration cell to allow for regular QA audits and bump tests.

- ***Open Path (OP) Tunable Diode Laser Absorption Spectroscopy (TDLAS)***

For the monitoring of Hydrogen Sulfide and Hydrogen Cyanide[1], an Open Path (OP) Tunable Diode Laser Absorption Spectroscopy (TDLAS) is used. OP-TDLAS offers some significant operational and cost

[1] These two compounds are neither used nor stored at, nor are they emitted from the Phillips 66 Denver Terminal. Therefore, the facility does not have the potential to emit either of these compounds,

advantages over other measurement technologies such as Fourier Transform Infrared Spectroscopy (FTIR). Tunable diode lasers (TDL) are designed to focus on single absorption wavelengths specific to a compound of concern in the gaseous form. They are capable of achieving low detection limits and are generally interferent-free. Similar to UVDOAS, quantitative measurements in direct gas phase laser absorption spectroscopy are based on the Beer-Lambert Law. A TDL uses a diode to generate light within a narrow frequency range that contains a relatively unique absorption wavelength of the chemical of interest. The laser frequency is "tuned" by changing the temperature of the diode or the current being fed to the diode or both so that it matches the spectral absorption line of interest.

Similar to the UVDOAS system, the OP-TDLAS system consists of a light source, a spectrometer, a reflector, a photodiode detector, and a data processing computer. Monostatic (as opposed to bistatic) open path instruments have once again been selected to reduce the need for substantial power at the retroreflector sites, and improve detection limits by increasing effective path lengths.

The Phillips 66 Denver Terminal uses the LasIR™ Fence Line Monitoring Gas Analyzer manufactured by Unisearch Associates Inc. for the monitoring of Hydrogen Sulfide and Hydrogen Cyanide.[1] The LasIR™ allows one laser to send beams at two different wavelengths down each path length (one for each compound). Additionally, the beam can be split allowing it to monitor two path lengths with one laser. The controller uses a near infrared (NIR) Tunable Diode Laser Absorption Spectrometer System utilizing a single mode laser mounted in a thermoelectric cooler. A Windows based software package displays the data on a host laptop PC. The LasIR™ also has a flow through calibration cell to allow for regular QA audits and bump tests.

2. Meteorological Monitors

The meteorological instrumentation are installed on a 10m, heavy-duty aluminum tower. The 3-sided, open latticework tower is fabricated using a high-strength aluminum alloy in three, 10-foot sections and is engineered for the specified wind load per EIA RS-222G. The tower is designed not to twist, rotate or sway, providing a rigid platform for mounting the sensors. It features hinged base leg brackets that permit the tower to be pivoted down into a horizontal position for easy servicing of the sensors. The tower incorporates a lightning rod with a full height ground cable and ground rod.

The meteorological monitoring tower is located at the west end of the Phillips 66 property. This tower is outfitted with high quality meteorological instruments, as outlined in Table 1, and are capable of making accurate real time measurements continuously. All sensors will be connected to a datalogger which will store the data, as well as broadcast it out to a cellular modem so that data can be viewed or downloaded at any time, from anywhere. The specific meteorological instruments chosen meet EPA specifications for accuracy, range and resolution (Table 1) and have been deemed appropriate for use in the fenceline monitoring system. Data from these sensors will be used to calculate 1-hour rolling averages updated every five minutes.

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which comprise "Covered Air Toxics" under HB21-1189. Therefore, in the event an Alert Threshold (Table 1-2 of the Fenceline Monitoring Plan) for either of these compounds is monitored, the monitored concentrations will be assigned a NS qualifier code and attributed to one or more of the near-by facilities described in Section 2.1 and Table 2-1 of the Fenceline Monitoring Plan, titled, "Other Industrial Facilities near the Phillips 66 Facility" .

Table 1: Performance Specifications for Installed Meteorological Sensors

Parameter	Sensor Make and model	Reporting units	Accuracy	Range
Horizontal wind speed	Met One 010C	Meters per second (m/s)	± 0.1	0 to 55
Horizontal wind direction	Met One 020D	Degrees (°)	± 3	0 to 360
Temperature	Met One 065	Degrees of Celsius (°C)	± 0.15	-30 to +50
Relative humidity	Met One 083F/0/35	Percentage (%)	± 2	0 to 100
Barometric pressure	Met One 0192	Atmospheres (atm)	± 0.001	0.3 to 1.09

C. System Design

The fenceline monitoring system utilizes four primary shelters to house the open path analyzers, identified as the orange and blue pins in Figure 1. Each orange pin shelter houses one (1) monostatic open-path tunable diode laser 4-channel H_2S (TDL) analyzer, one (1) monostatic open-path tunable diode laser 4-channel HCN (TDL) analyzer, and two (2) monostatic open-path ultraviolet differential optical absorption (UV-DOAS) analyzers. Each blue pin shelter houses one (1) fiber optic line from the monostatic open-path tunable diode laser 4-channel H_2S (TDL) analyzer in the orange pin shelter, one (1) fiber optic line from the monostatic open-path tunable diode laser 4-channel HCN (TDL) analyzer in the orange pin shelter, and one (1) monostatic open-path ultraviolet differential optical absorption (UV-DOAS) analyzer.

Each open-path analyzer location has multiple paths identified numerically 1 through 6. At the end of each path there is a retroreflector opposite the analyzer. For example, the line from the analyzer shelter to the retroreflector forms the path. The specific locations for all open path equipment were selected to provide coverage of all facility emission sources within the constraints of the facility footprint.

For the hydrogen cyanide[2] and hydrogen sulfide[2] northwest path (Path 6) and northeast path (Path 1), laser light is transmitted from the most local orange pinned shelters under or above ground via fiber optic cable to the blue pinned shelters then transmitted above ground to monitor the northwest path (Path 6) and northeast path (Path 1). The laser light reflects back to a telescope mounted on the northwest path (Path 6) and northeast path (Path 1) instrument shelters then

[2] These two compounds are neither used nor stored at, nor are they emitted from the Phillips 66 Denver Terminal. Therefore, the facility does not have the potential to emit either of these compounds, which comprise "Covered Air Toxics" under HB21-1189.

transmitted back underground to the detector in the most local orange pinned shelter that the laser light originated from.

This monitoring program also includes meteorological monitoring as required in HB21-1189. Meteorological monitoring allows for the characterization of wind patterns for understanding the movement of the three covered air toxics and potential sources of emissions, and whether they are from the Phillips 66 bulk terminal or a neighboring facility. Since the Phillips 66 Denver Terminal does not store, emit or have the potential to emit hydrogen cyanide or hydrogen sulfide, in the event concentrations of those covered air toxics are detected by the Phillips 66 fenceline monitoring system, the source of the detected emissions will necessarily indicate hydrogen cyanide or hydrogen sulfide emissions from a neighboring facility or source. A 10-meter meteorological tower will be installed near the Path 6 instrument shelter (Figure 1), so that power can be shared.

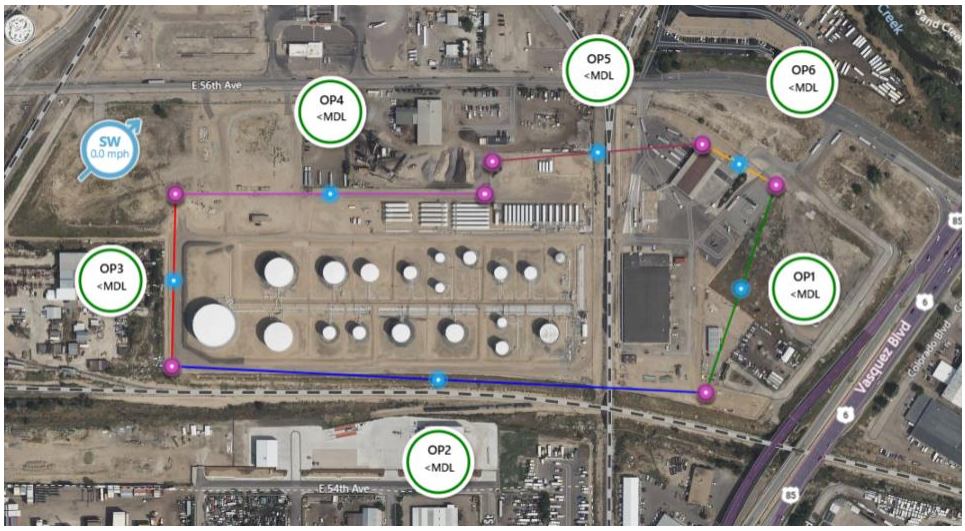

Figure 1: Approximate Layout of the Open-Path Analyzers, Retroreflector Locations, and Meteorological Station

Table 2: Descriptions of Each Individual Path

Path	Path Length	Compounds
1	226 meters	Hydrogen sulfide Hydrogen cyanide Benzene
2	550 meters	Hydrogen sulfide Hydrogen cyanide Benzene

3	165 meters	Hydrogen sulfide Hydrogen cyanide Benzene
4	315 meters	Hydrogen sulfide Hydrogen cyanide Benzene
5	222 meters	Hydrogen sulfide Hydrogen cyanide Benzene
6	138 meters	Hydrogen sulfide Hydrogen cyanide Benzene

D. Data Validation and QA/QC Procedures

-Automated Quality Control Procedures

Many Quality Control procedures for the fenceline monitoring network are integrated directly into the AirSense data platform and are outlined as follows. These automated procedures allow for the ability to screen data not suitable for public display due to atmospheric or operational issues. These automated quality control checks include:

- Inspection of daily reports generated by the AirSense platform which summarize data recovery for each analyzer/sensor and suspect data flags;
- Monitoring of real time alerts and daily reports generated by the AirSense data platform that flag:
    - No data;
    - Data sticking – if values are repeated for a number of sampling intervals (does not apply to data below the detection limit);
    - Range exceedances – if values are outside a reasonable minimum or maximum value;
    - Data recovery;
    - Monitoring instrument parameters that may indicate equipment degradation / failure or a need for maintenance and / or cleaning;
    - Signal intensity (open path instruments);
    - Instrument or sensor alarms or error codes;
    - Analyzer and shelter temperatures; and
    - Laser parameters (TDL instruments)

Table 3: List of automated quality control parameters and corresponding evaluation criteria

Instrument	Automated Quality Control Parameter	Definition	Units	Evaluation criteria
UV-DOAS	MDL	Minimum detection limit	PPB	< 25% of alert threshold
	R^2	Percentage peak match	%	> 64
	Signal intensity	Signal intensity at full scale	%	> 40
	UV spectrometer temperature		^oC	35
TDL	MDL	Minimum detection limit	PPB	< 25% of alert threshold
	Absolute Signal	Detector Signal	mA	> 0.1
	Laser temperature stability	Absolute value of (laser temperature- laser temperature in long average) *100/ laser temperature in long average	%	< 5
	R	Peak correlation		> 0.8

-Instrument Quality Control Checks

Both the UV-DOAS and TDL systems are designed to require only modest service and maintenance. Section 5.4 of the FLMP summarizes the UV-DOAS and TDL maintenance activities as recommended by the manufacturer. These activities will help ensure data integrity and maximize up-time. For the UV-DOAS system, a calibration verification bump test is performed on a quarterly basis using a flow through cell. For the UV-DOAS system, precision is calculated by evaluating the variance of pollutant concentrations during a period of low atmospheric variability. Five-minute data are selected when concentrations are well above the minimum detection limit (MDL) during periods of low variability. The precision can then be determined by calculating the coefficient of variation (CV). For the UV-DOAS, robustness can be determined by calculating the desired signal intensity in order for the benzene minimum detection limit to be lower than 25% of the notification threshold. If the measured signal intensity is found to be below the desired value, corrective action will be required (e.g., replace light source, instrument alignment, etc.). The QC checks for the UVDOAS are summarized in Table 4.

Table 4: UV DOAS QC Checks

QA/QC Check	Frequency	Acceptance Criteria
Accuracy and precision (Bump Test)	Quarterly	Accuracy: ≤ 30% of reference gas value Precision: ± 25%
Baseline Stability	Continuous	± 5%
Signal intensity	Continuous	>60%
Robustness	Continuous	Compound MDL lower than 25% of notification threshold

For the TDL system, a calibration verification bump test is performed on a quarterly basis. The bump test simulates system-observed gas content at the required path average concentration and is used to verify that the system can detect concentrations at or below the levels of concern. For the TDL system, precision will be calculated by evaluating the variance of pollutant concentrations during a period of low atmospheric variability. Five-minute data will be selected when concentrations are well above the minimum detection limit during periods of low variability. The precision can then be determined by calculating the coefficient of variation (CV). If there are no periods of low variability with concentrations above the minimum detection limit, bump test data will be used for the precision determination. For the TDL system, robustness can be determined by calculating the desired signal intensity for the hydrogen sulfide and hydrogen cyanide minimum detection limit to be lower than 25% of the corresponding notification thresholds. If the measured signal intensity is found to be below the desired value, corrective action will be required (e.g., replace laser, instrument alignment, etc.). The QC checks for the TDL are summarized in the table as follows.

Table 5: TDL QC Checks

QA/QC Check	Frequency	Acceptance Criteria
Accuracy and precision (Bump Test)	Quarterly	Accuracy: ≤ 30% of reference gas value Precision: ± 25%
Baseline Stability	Continuous	± 5%
Signal intensity (Absolute Power)	Continuous	>0.1 mA
Robustness	Continuous	Compound MDL < 25% of notification threshold

Wind speed, wind direction, temperature, relative humidity and barometric pressure measurement systems will be aligned, tested and calibrated at the time of installation and at six-month intervals thereafter using test equipment traceable to NIST or other authoritative standards and following standard operating procedures. Calibrations are performed immediately following scheduled semi-annual meteorological audits and performance of scheduled preventive and/or corrective maintenance for the monitoring instruments. Following initial startup calibrations and continuing throughout the monitoring program, the field operator performs quarterly site checks on the meteorological monitoring systems. In the course of these checks, sensors will be observed for proper operation. The monitoring instruments and support equipment are visually inspected to confirm operational integrity. The current data logger readings are assessed for agreement with prevailing conditions.

-Data Quality Assurance

All continuous data from the monitoring equipment are transferred to the cloud-based servers every five minutes. Each business day, a data technician checks the data files to ensure that all data were successfully transmitted and stored in the database. If data are missing, they are manually retrieved from the computers that control each piece of equipment or the on-site data logger for the meteorological equipment. This data is the raw data collected from the instrument computers or data logger and is considered “Level 1” data. These data are used to monitor instrument operations on a regular basis but are not used for reporting until subject to further review and validation. Level 1 (raw) data files are kept intact and unedited. These data are not subject to reduction or reformatting.

“Level 1” data are “raw” data; i.e., data obtained directly from the instrument computers or data logger that have not yet been subjected to quality assurance review. Electronic files of the raw data record are archived "as is"; no alteration is made to the raw data files. All data processing, editing and validation work is accomplished by working with copies of the raw data files produced by the data management system software upon request. Level 1 data are manually reviewed for reasonableness and completeness. Initial (daily) review of the data occurs no more than four days after sample acquisition because of weekends and holidays. Daily data review includes checking for status or event flags, reasonableness of reported averaged data values (out-of-range, inconsistent or excessive transition values) and any missing data periods. The operating status of each instrument is also reviewed (e.g., sample flow rates; other internal operating parameters). Meteorological data are reviewed for agreement with local seasonal and prevailing conditions and internal consistency. These daily reviews support “Level 2” validation of the data and provide a decision basis for investigative actions, instrument adjustment and calibration. The data analyst annotates the separate data processing file (i.e., an electronic copy of the original raw data file) and produces a summary report of any suspect data or out-of-tolerance operating conditions. Any situation requiring investigative and/or corrective action is immediately brought to the attention of the Project Manager and Technical Lead. A “Non-Conformance / Corrective Action” (NC/CA) report documenting all pertinent information regarding suspect data, a non-conformance event or out-of-tolerance operating condition is generated and updated with further information as it becomes available until the problem is fully resolved.

All data reporting forms and activity logs completed during the previous month are stored in Montrose’s local Denver office and are reviewed against the electronic data record on a monthly basis in support of data processing and validation. Monthly review of the field monitoring documentation will include:

- All completed routine site check forms;
- Documentation of the QC tests performed on the monitors during the previous month;

- Documentation of any maintenance activities performed on the monitors during the previous month;
- Documentation of any quality assurance audits performed on the meteorological sensors during the previous month; and
- Documentation of any Non-Conformance/Corrective Action (NC/CA) events that occurred during the previous month.

During “Level 2” data validation, the data file of each continuously-monitored parameter is processed at monthly intervals to develop an initial data report to be reviewed for completeness and correctness. Any corrections or additions to the raw “Level 1” data file are annotated in the processing data file with explanatory comments. Any hours incorporating a test, calibration or other quality control check, corrective or preventive maintenance, instrument malfunction, power failures, weather event, etc. are removed from the data set and annotated with the appropriate null data code (for detail on null data codes and corresponding descriptions see Table 11 of Appendix F). Results of this review, including any data losses equal to or greater than one hourly block average, are documented and dated by the data technician in “Level 2” data files. The data technician enters and annotates any null data codes or corrections required in the “Level 2” electronic data file. When all entries or corrections are complete, the data are designated as “Level 2 - Final” data, and are archived for subsequent final data validation review.

“Level 3” data validation review is performed by senior project personnel other than the data processing analyst. During the Level 3 data validation process, data losses due to activity or instrument malfunction are corroborated against documentation noted by the station field operators on completed field forms. The field form record identifying data affected by these activities and events are inter-compared with corresponding status flags entered by the operator in the digital data record. Documented results of QA/QC checks performed on each analyzer are evaluated with respect to relevant acceptance and performance criteria outlined in the fenceline monitoring plan. Reports documenting unacceptable operating conditions or non-conformance/corrective action (NC/CA) events that may have adversely impacted data quality are also reviewed. If discrepancies or questionable data values are identified during the validation process, the entire data record is reviewed (including all annotated corrections made for Level 2 data). Any additional corrections or revisions made to the data report file during the data validation review are documented, dated and signed by the validation reviewer. The corrections are then entered into the electronic data file and re-processed. A separate file containing the corrections is checked for accuracy against the documented corrections. When all corrections are complete and checked, a final “Level 3 - Validated” data file is produced.

V. Results

A. Monthly Data Summary

Table 6: Monthly Data Summary

Month	Path	Compound	Number of Exceedances[1]	0th[2]	25th[2]	50th[2]	75th[2]	100th[2]	Avg	Pct Detect[3]	Pct Valid[4]	Median 1hr DL[5]
Apr-25	1	Benzene	0	0.15	0.33	0.44	0.69	19.6	0.66	0.50%	96.88%	0.64
May-25	1	Benzene	0	0.15	0.33	0.42	0.58	35.9	0.61	0%	90.48%	0.6
Jun-25	1	Benzene	0	0.2	0.5	0.7	1.2	9.8	0.97	0%	94.76%	1.04
Apr-25	1	H2S	0	0.12	1.65	3	5.7	54.3	4.9	0.65%	97.78%	4.3
May-25	1	H2S	0	0.16	2.5	5.3	9.2	54.4	7.3	1.24%	90.04%	7.6
Jun-25	1	H2S	0	0.2	2.4	4.8	9.1	54.1	7.3	1.34%	96%	6.8
Apr-25	1	HCN	0	0.04	0.8	2.6	5.6	20.6	3.7	1.93%	98.65%	3.7
May-25	1	HCN	0	0.02	0.35	0.88	2.5	20.9	2.1	0.01%	91.78%	1.25
Jun-25	1	HCN	0	0.02	0.29	0.61	1.15	7.75	0.86	0%	96.72%	0.87
Apr-25	2	Benzene	0	0.08	0.28	0.44	0.71	16.62	0.63	0.00%	97.71%	0.62
May-25	2	Benzene	0	0.10	0.31	0.52	0.82	27.46	0.67	0.00%	86.42%	0.74
Jun-25	2	Benzene	0	0.07	0.40	0.70	1.09	8.35	0.80	0.04%	82.78%	1.00
Apr-25	2	H2S	0	0.50	9.75	16.20	25.96	59.17	18.70	0.00%	84.88%	23.08
May-25	2	H2S	0	0.58	10.21	17.11	26.16	63.20	19.26	0.44%	81.71%	24.38
Jun-25	2	H2S	0	0.73	8.12	14.95	25.39	57.98	17.71	0.50%	87.78%	21.23
Apr-25	2	HCN	0	0.01	0.05	0.11	0.29	2.97	0.25	0.28%	95.63%	0.16
May-25	2	HCN	0	0.01	0.06	0.10	0.20	3.53	0.19	0.15%	94.22%	0.14
Jun-25	2	HCN	0	0.01	0.07	0.11	0.22	2.73	0.23	0.00%	97.63%	0.16
Apr-25	3	Benzene	0	0.53	1.09	1.49	2.22	201.19	3.13	0.15%	99.88%	2.12
May-25	3	Benzene	0	0.70	1.62	2.30	3.51	210.70	4.19	0%	94.63%	3.27
Jun-25	3	Benzene	0	0.57	1.35	1.94	3.03	59.46	2.74	0.58%	96.96%	2.73
Apr-25	3	H2S	0	0.68	4.46	7.50	12.24	77.46	9.98	0.14%	98.12%	10.73
May-25	3	H2S	0	0.85	5.56	8.74	13.86	89.99	11.39	0.00%	94.58%	12.51
Jun-25	3	H2S	0	0.38	5.52	10.02	16.29	109.73	13.40	0.15%	97.08%	14.29
Apr-25	3	HCN	0	0.02	2.21	3.57	5.09	13.69	3.74	0.14%	100.00%	5.05
May-25	3	HCN	0	0.03	0.34	0.82	2.94	12.33	1.86	0.00%	95.45%	1.17
Jun-25	3	HCN	0	0.05	0.21	0.37	0.65	10.32	0.66	0.00%	99.21%	0.63
Apr-25	4	Benzene	0	0.51	1.09	1.39	1.81	16.18	1.70	0.14%	97.87%	1.97
May-25	4	Benzene	0	0.65	1.21	1.51	1.95	18.05	1.85	0.17%	93.97%	2.15
Jun-25	4	Benzene	0	0.00	1.44	2.03	6.62	72.63	5.81	0.98%	99.61%	2.87
Apr-25	4	H2S	0	4.58	26.07	37.35	54.03	108.11	41.53	0.35%	85.58%	53.45
May-25	4	H2S	0	3.29	27.16	43.62	62.93	136.88	46.28	0.54%	75.09%	62.44
Jun-25	4	H2S	0	5.75	26.86	44.21	65.73	137.96	47.62	0.17%	72.23%	62.99
Apr-25	4	HCN	0	0.03	0.47	1.05	1.87	18.76	1.47	0.19%	100.00%	1.49
May-25	4	HCN	0	0.07	0.63	1.29	2.32	14.79	1.76	0.13%	95.23%	1.83
Jun-25	4	HCN	0	0.15	1.00	1.75	2.82	15.42	2.23	0.00%	98.98%	2.48
Apr-25	5	Benzene	0	0.15	0.28	0.38	0.58	16.90	0.58	4.00%	99.58%	0.53
May-25	5	Benzene	0	0.17	0.35	0.48	0.74	18.11	0.66	3.96%	92.71%	0.66
Jun-25	5	Benzene	0	0.16	0.33	0.44	0.62	8.84	0.55	7.50%	99.55%	0.59
Apr-25	5	H2S	0	1.02	7.51	13.15	21.77	55.32	15.80	0.00%	86.23%	18.96
May-25	5	H2S	0	2.37	11.92	19.08	29.41	58.57	21.06	0.00%	69.96%	27.62
Jun-25	5	H2S	0	1.90	15.25	22.48	31.20	60.03	23.73	0.00%	70.43%	32.68
Apr-25	5	HCN	0	0.07	1.39	2.73	4.52	24.12	3.30	4.02%	96.33%	3.62
May-25	5	HCN	0	0.08	0.99	1.78	2.99	14.07	2.29	0.61%	85.13%	2.50
Jun-25	5	HCN	0	0.16	1.18	1.81	2.72	9.97	2.14	0.26%	91.95%	2.56
Apr-25	6	Benzene	0	0.00	0.69	1.14	3.03	85.79	2.90	4.73%	98.32%	1.55
May-25	6	Benzene	0	0.00	0.60	0.81	1.42	291.39	4.03	4.20%	20.54%	1.12
Jun-25	6	Benzene	0	0.00	0.48	0.60	0.88	4.96	0.82	7.48%	10.40%	0.84
Apr-25	6	H2S	0	1.01	16.01	29.72	47.80	119.81	34.14	0.03%	84.23%	43.63
May-25	6	H2S	0	2.11	24.06	44.69	66.10	143.19	46.61	0.49%	58.94%	66.96
Jun-25	6	H2S	0	3.64	22.88	42.13	63.95	113.58	45.01	0.00%	64.21%	62.39
Apr-25	6	HCN	0	0.02	0.22	0.85	1.66	48.84	1.81	1.51%	95.10%	1.22
May-25	6	HCN	0	0.01	0.17	0.34	1.31	33.57	1.48	1.07%	91.01%	0.48
Jun-25	6	HCN	0	0.02	0.44	1.07	3.22	40.18	2.94	1.59%	94.69%	1.52

[1] number of 1-hour measurements above the notification threshold value
[2] data quartiles = the value at which a defined percentage of data existing below this value (valid data only)
[3] the percentage of hourly averages above the detection limit (DL) as compared to the total possible hourly averages (excluding data collected during QA/QC activities, calibration, or maintenance).
[4] the proportion of the 1h measurements that pass all data verification measures compared to the possible hourly averages.
[5] the median 1-hr detection limit observed across validated measurements per compound for the month specified.

B. Summary of Invalidated Data

The invalidated data can be found in file “P66 FLMP Data Packet_Q2 2025”. All 5min data have been validated based on the procedures described in the P66 fenceline monitoring plan.

C. Discussion of Invalidated Data

The data was validated based on the procedures mentioned in the fenceline monitoring plan. There was a high data invalidation rate for benzene Path 6 for the month of June. All instrument parameters was normal (integration time, peak match percentage, system temperature and pressure) but the minimum detection limit was zero which cause the data to be invalid. Montrose investigated the reason for this issue and concluded that it was probably a CMS software issue. The CMS software was updated and the issue was fixed.

D. Discussion of Results

As shown in the summary plots, the concentration of the three compounds of interest was below detection limit in most cases. There were no threshold exceedances during this period of the fenceline monitoring for any of the compounds. For benzene, the average MDL value was around 1.4 ppb, for H2S the average MDL value was approximately 31 ppb, and for HCN the corresponding average MDL was around 1.7 ppb. As discussed in Section C, the higher H2S MDL values are related to the path lengths being shorter than 500 meters. Phillips 66 does not store nor emit H2S and HCN.

E. Summary Plots

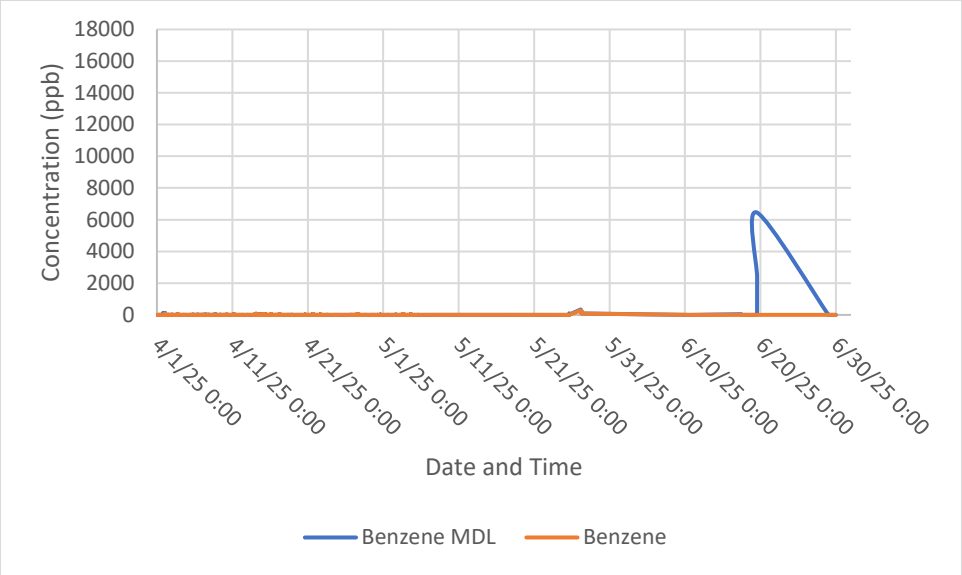

Figure 2. Timeseries of Benzene Path 1

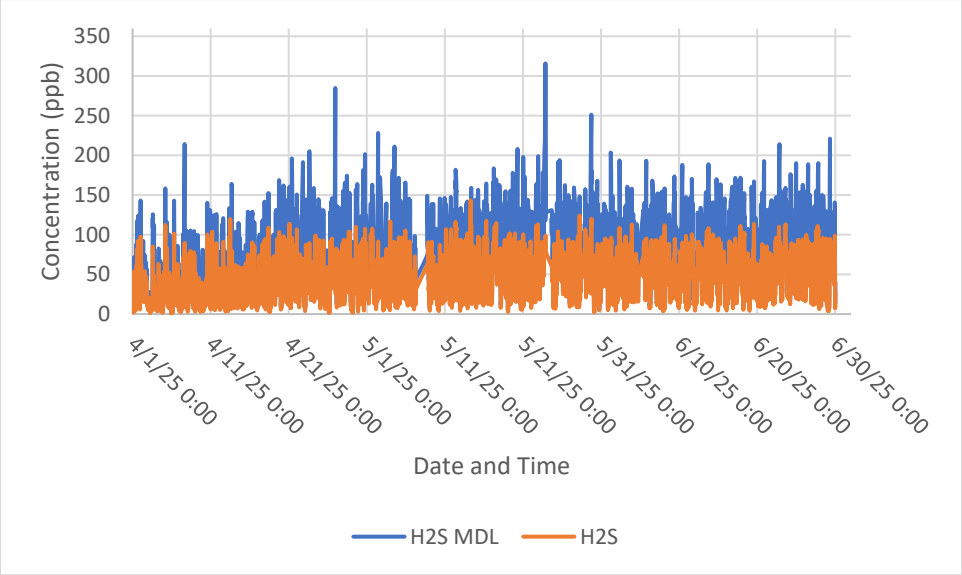

Figure 3. Timeseries of H_2S Path 1

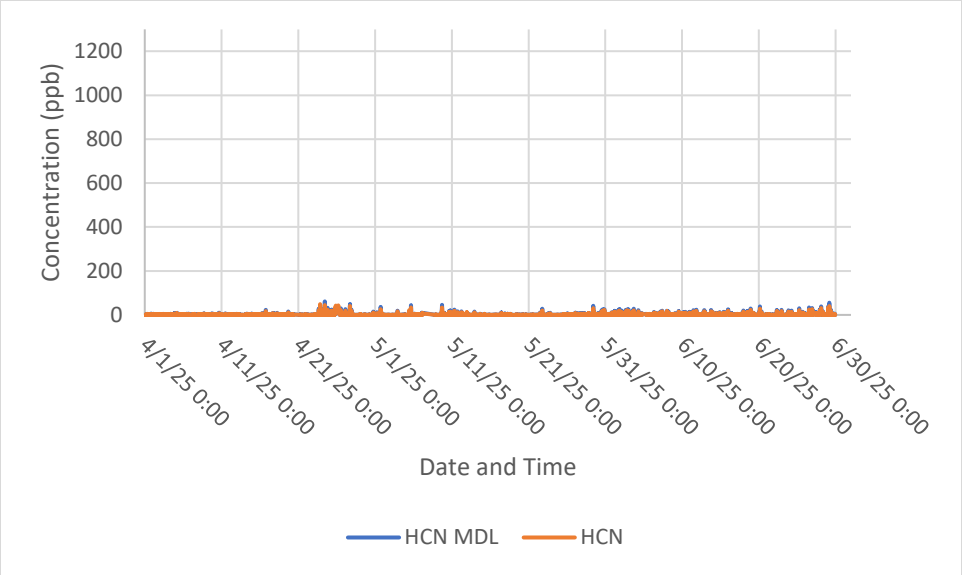

Figure 4. Timeseries of HCN Path 1

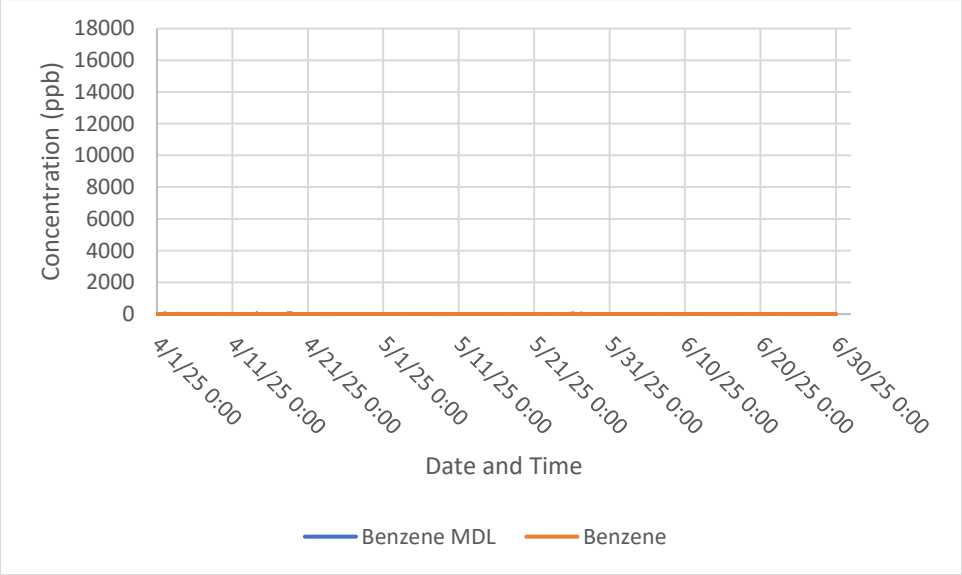

Figure 5. Timeseries of Benzene Path 2

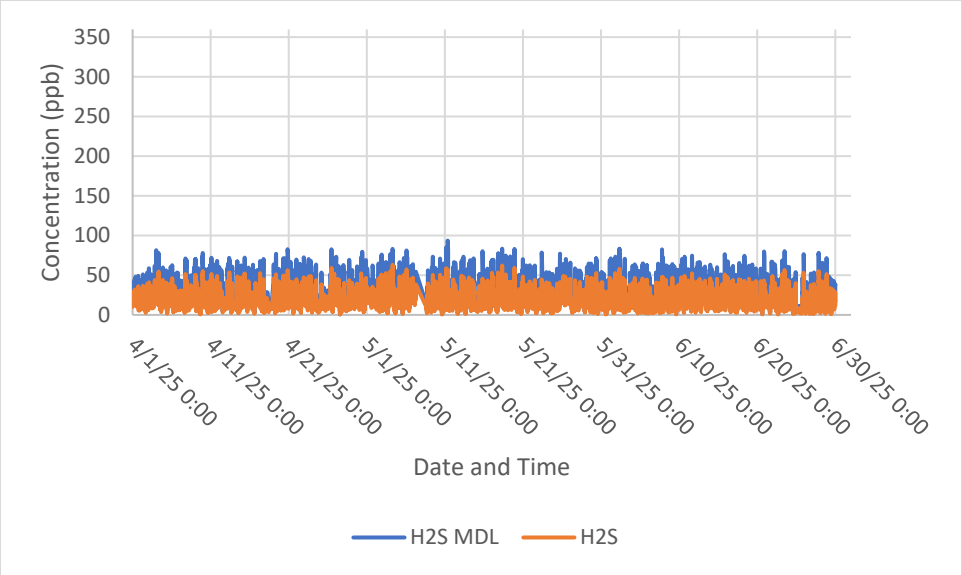

Figure 6. Timeseries of H_2S Path 2

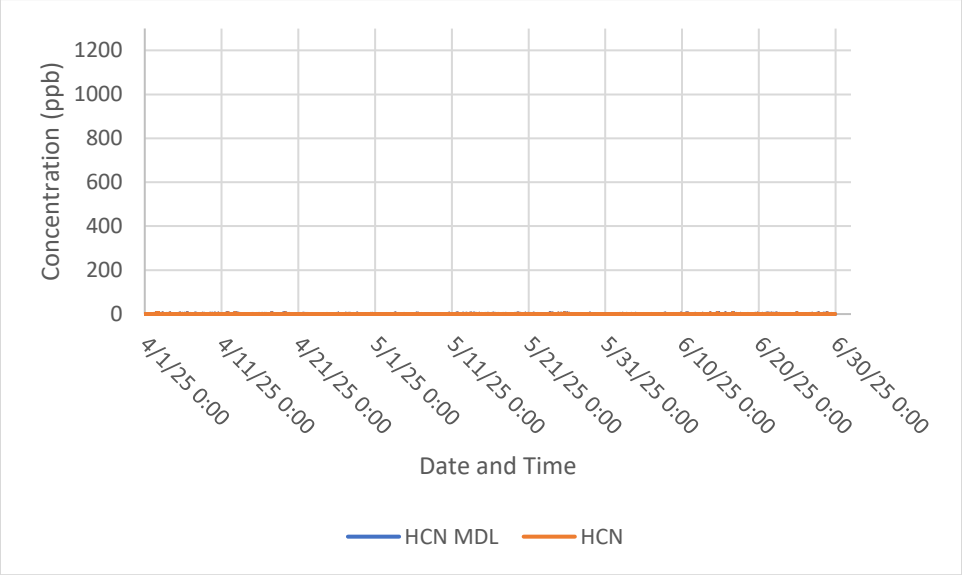

Figure 7. Timeseries of HCN Path 2

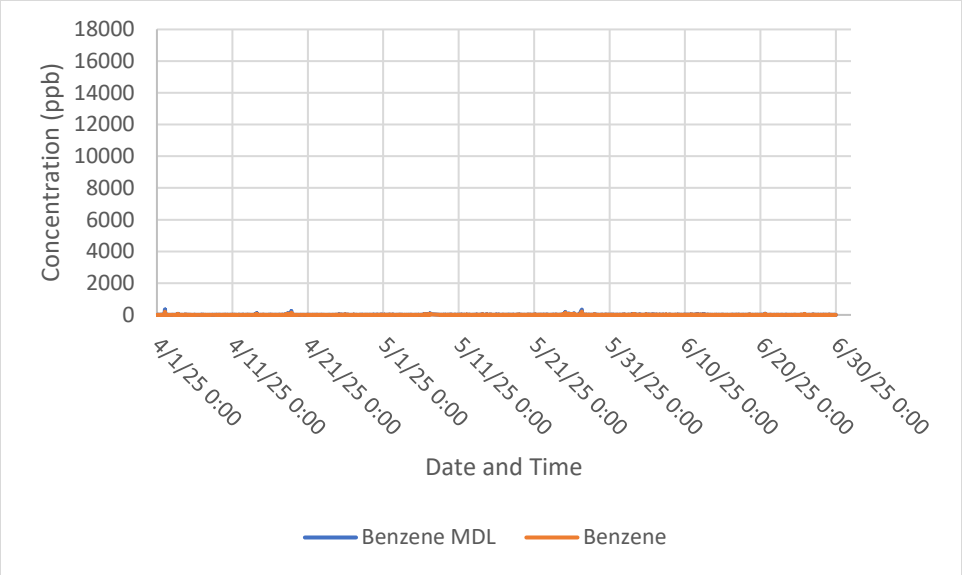

Figure 8. Timeseries of Benzene Path 3

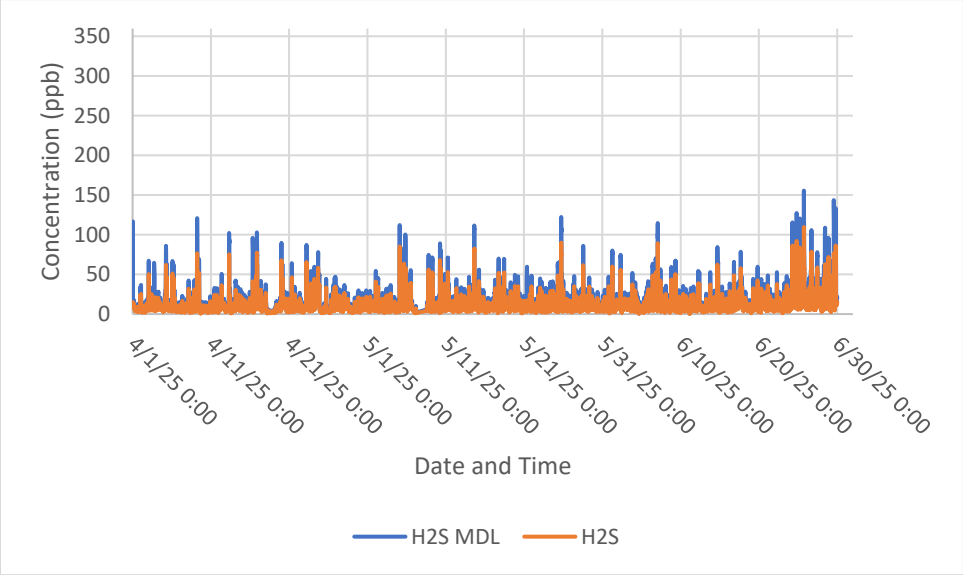

Figure 9. Timeseries of H_2S Path 3

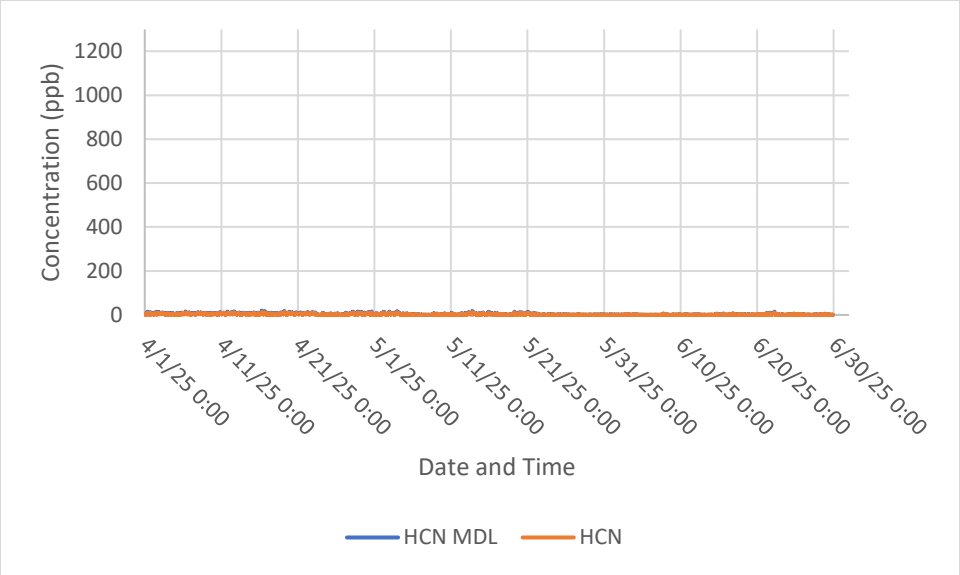

Figure 10. Timeseries of HCN Path 3

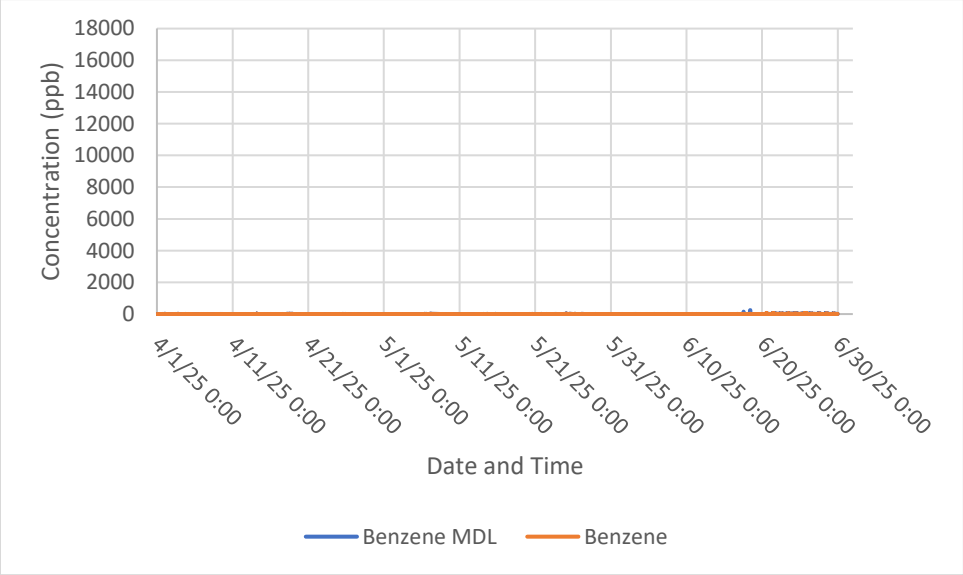

Figure 11. Timeseries of Benzene Path 4

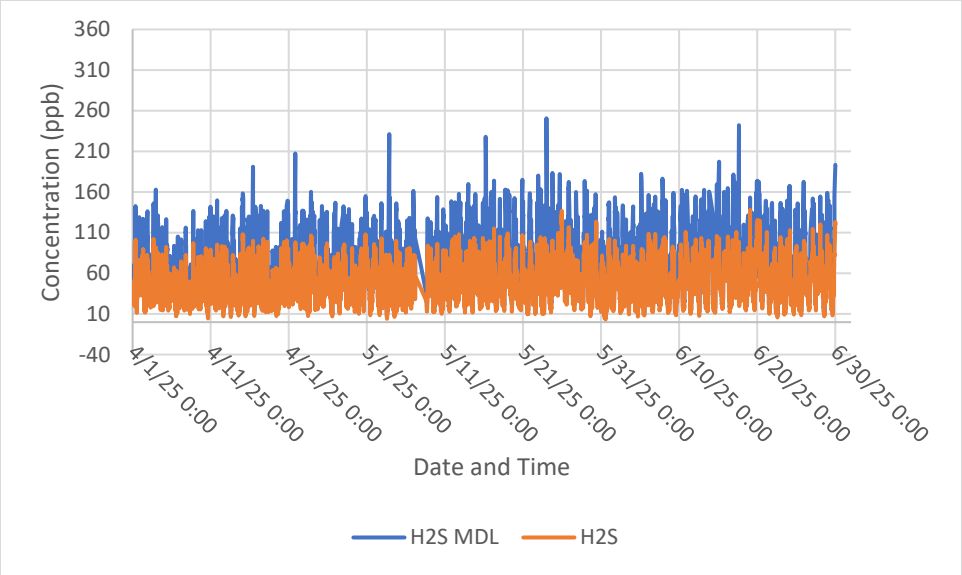

Figure 12. Timeseries of H_2S Path 4

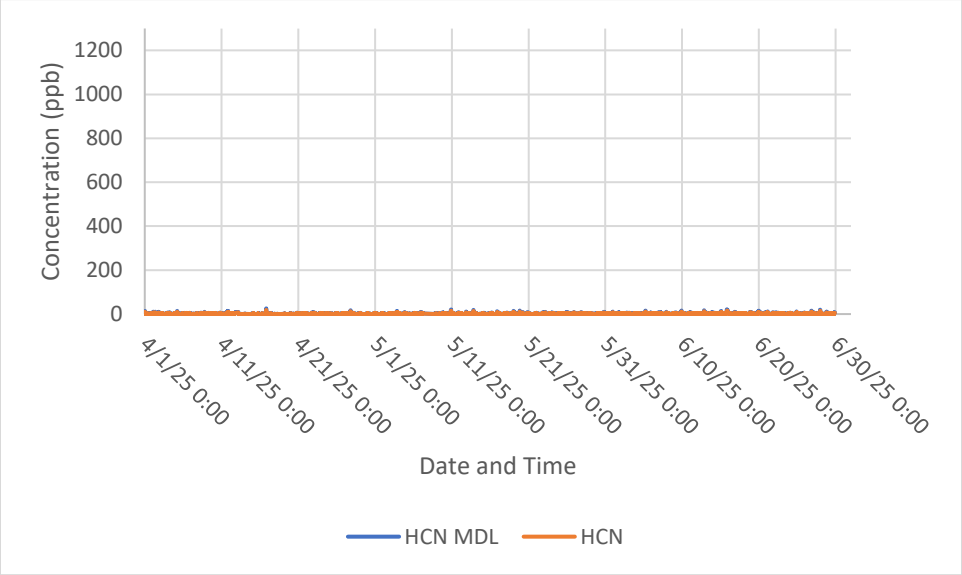

Figure 13. Timeseries of HCN Path 4

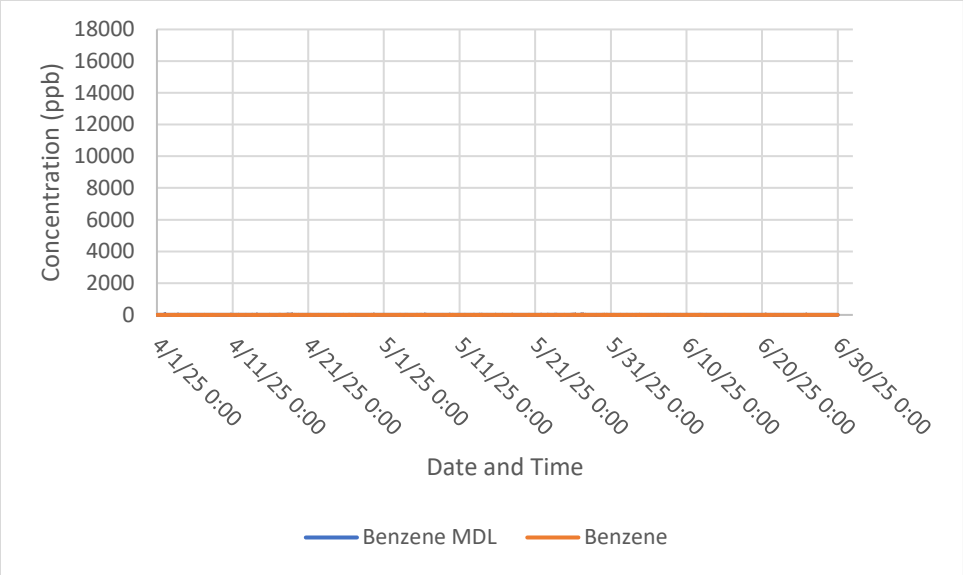

Figure 14. Timeseries of Benzene Path 5

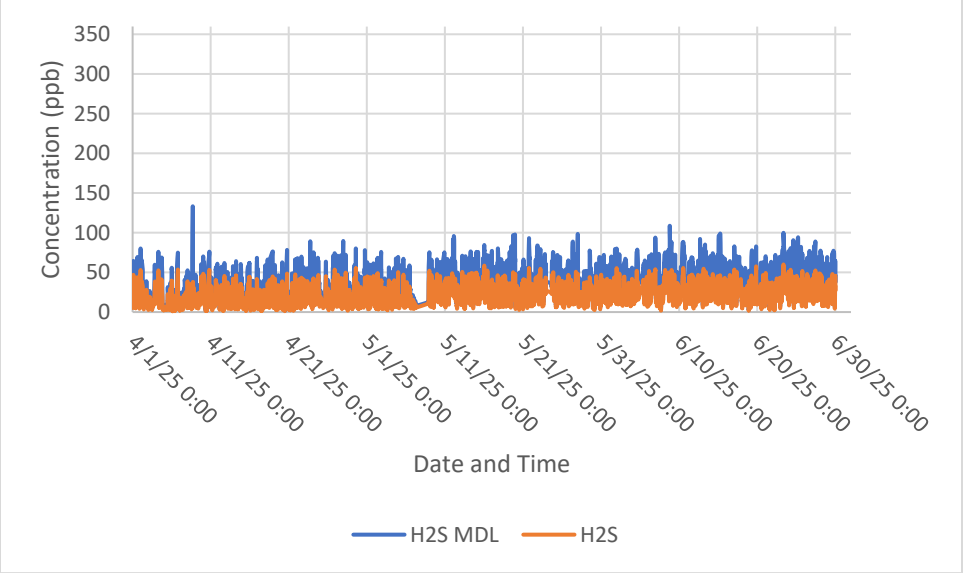

Figure 15. Timeseries of H_2S Path 5

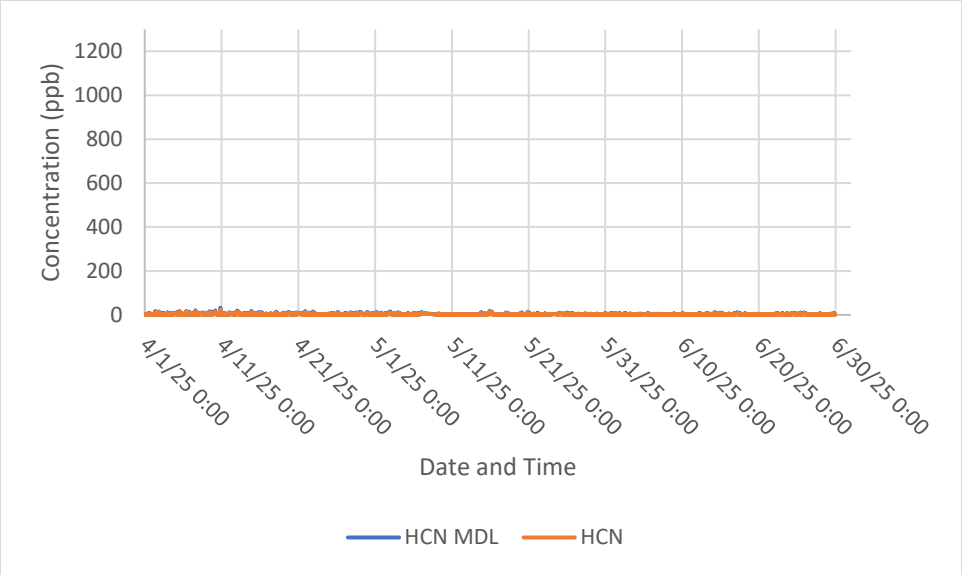

Figure 16. Timeseries of HCN Path 5

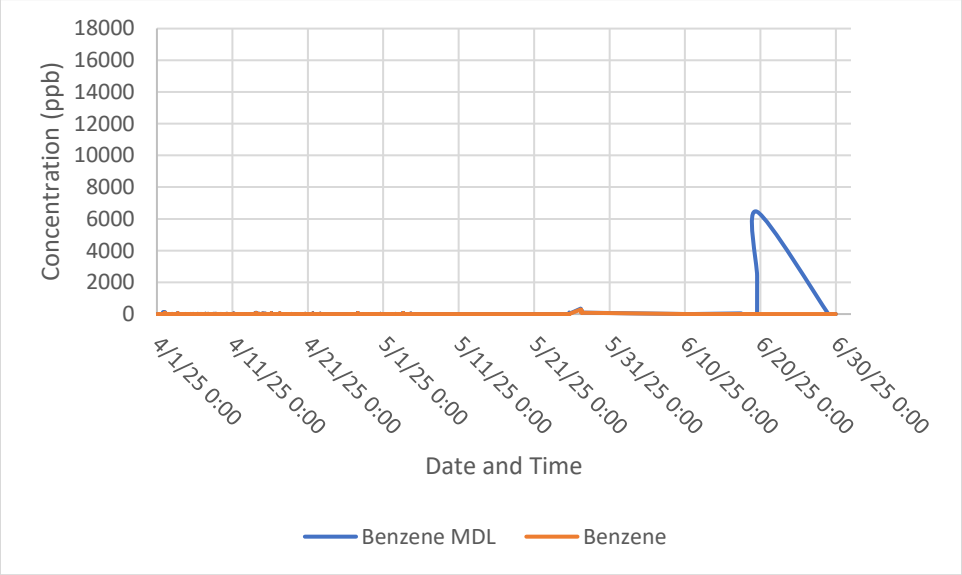

Figure 17. Timeseries of Benzene Path 6

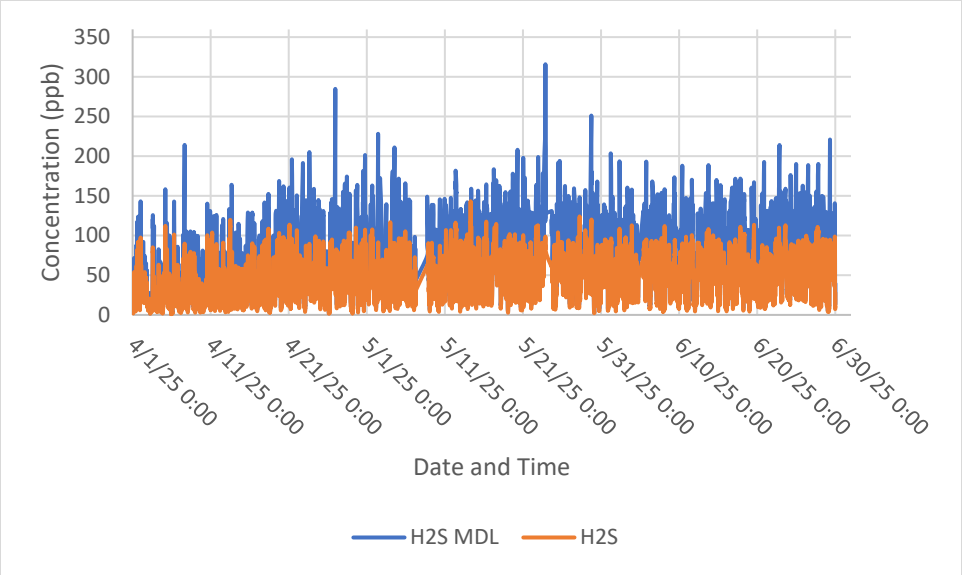

Figure 18. Timeseries of H_2S Path 6

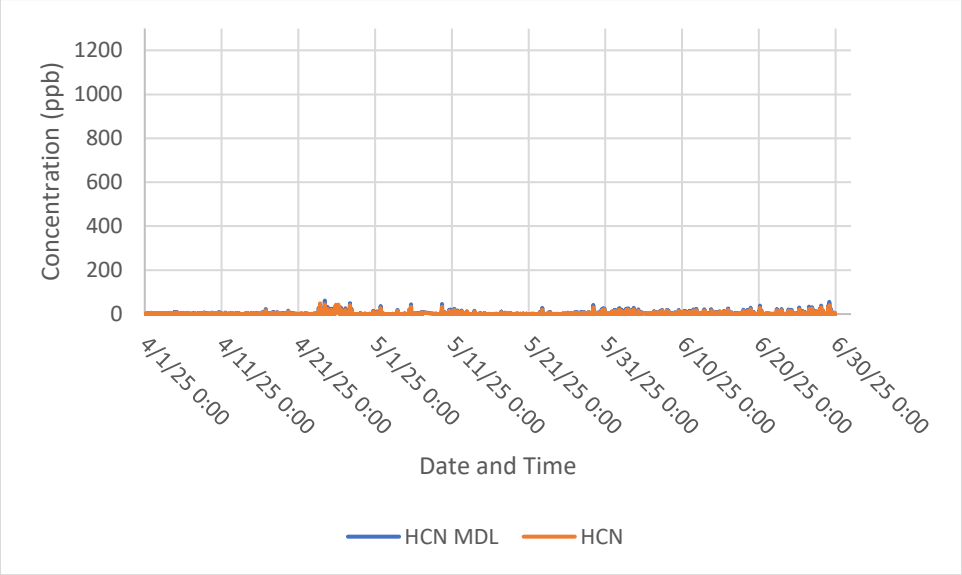

Figure 19. Timeseries of HCN Path 6

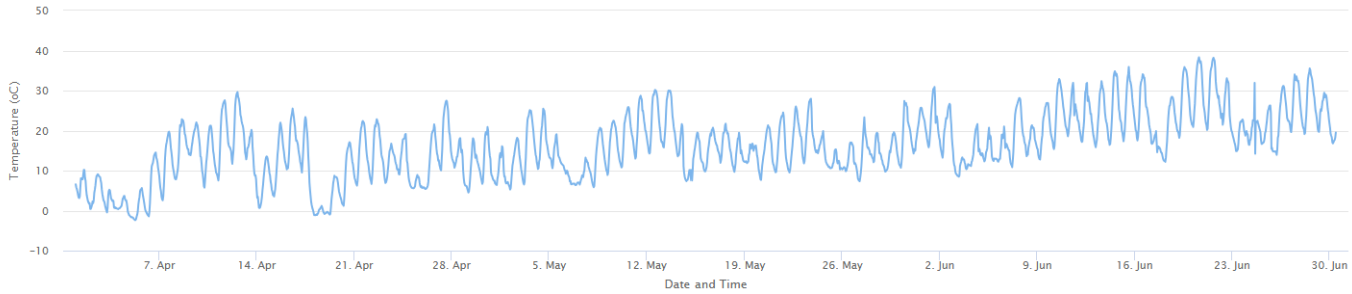

Figure 20. Temperature Timeseries (2025)

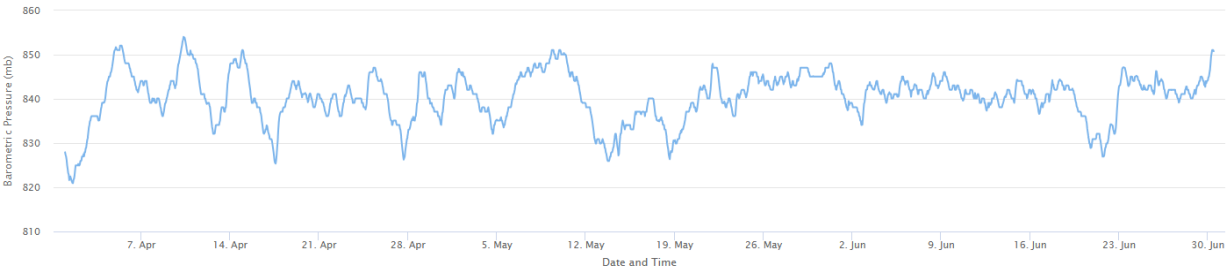

Figure 21. Relative Humidity Timeseries (2025)

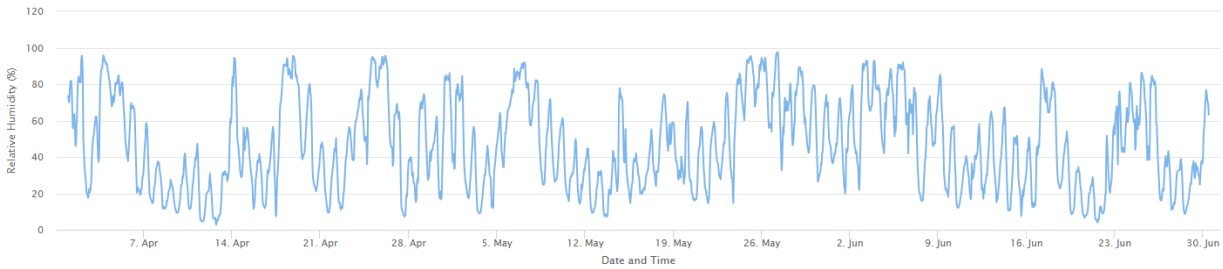

Figure 22. Barometric Pressure Timeseries (2025)

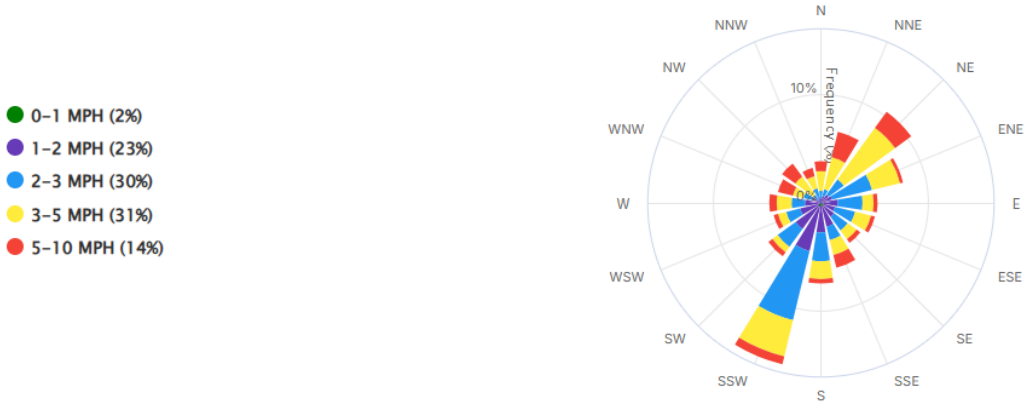

Figure 23. Wind Rose Plot

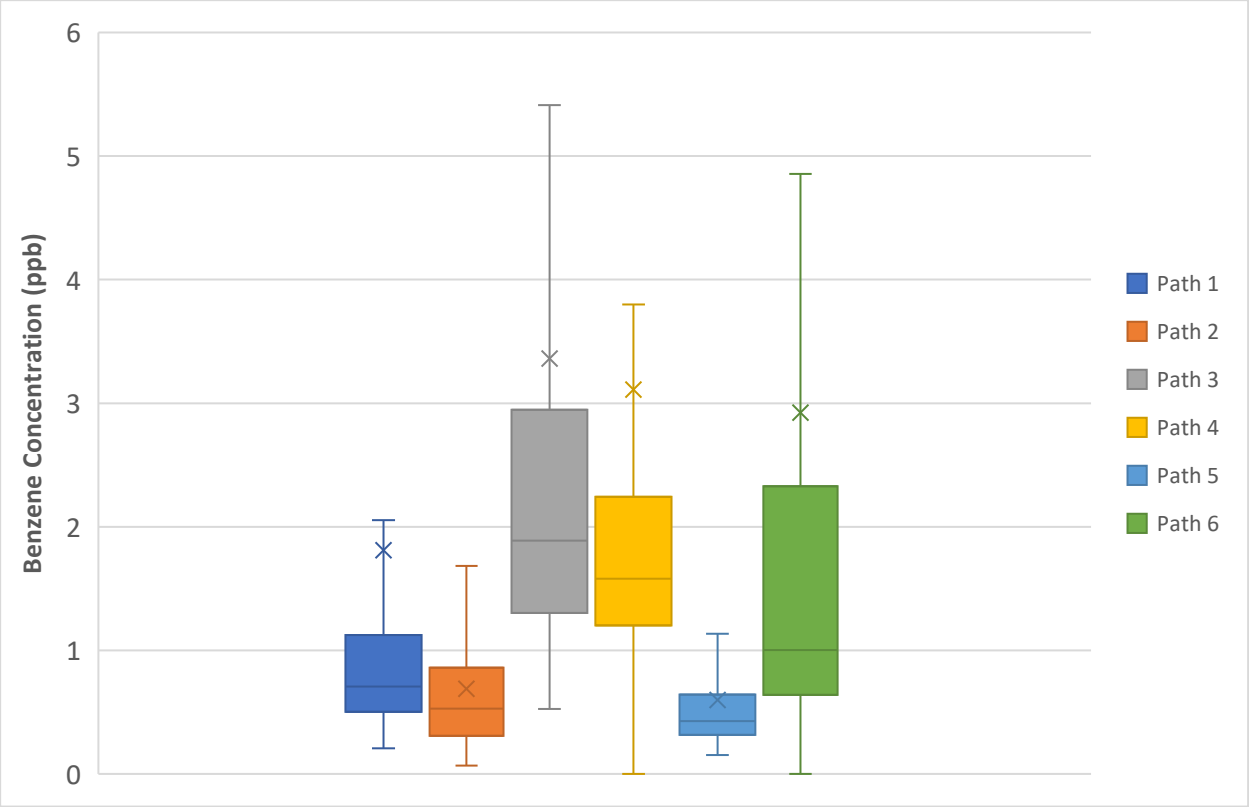

Figure 24. Benzene box plots for Paths 1 to 6.

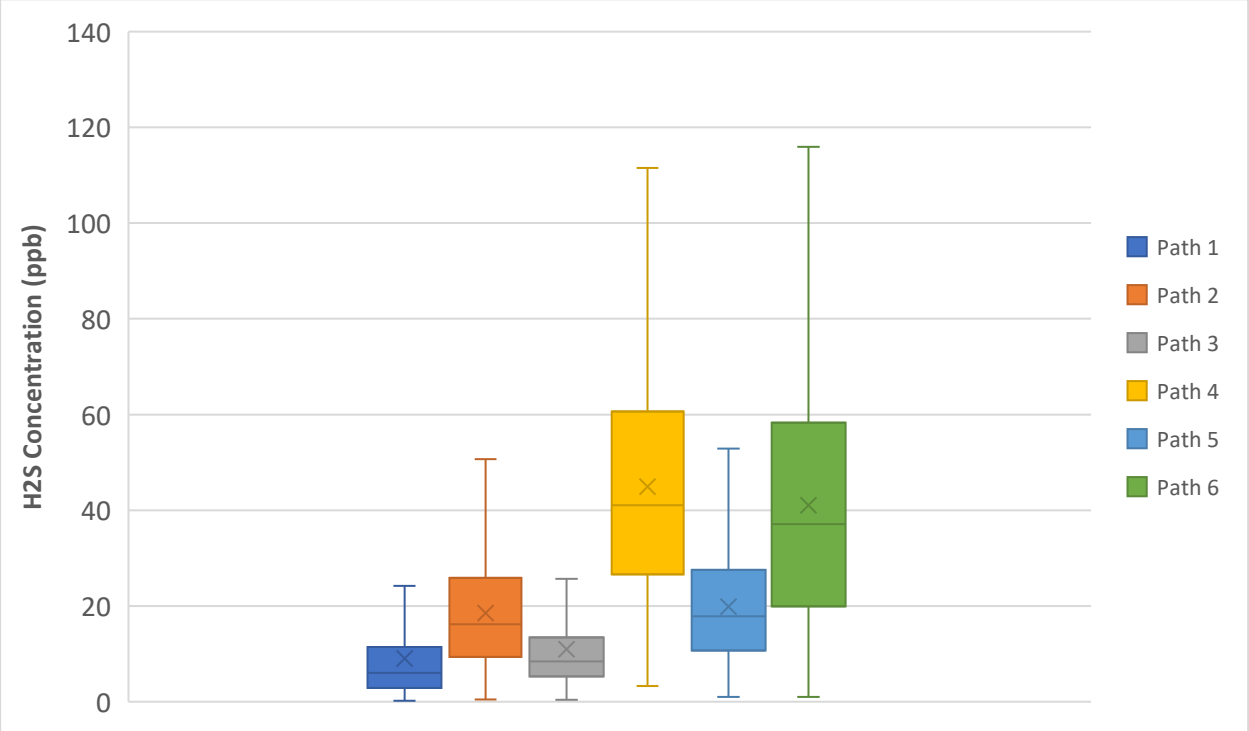

Figure 25. H_2S box plots for Paths 1 to 6.

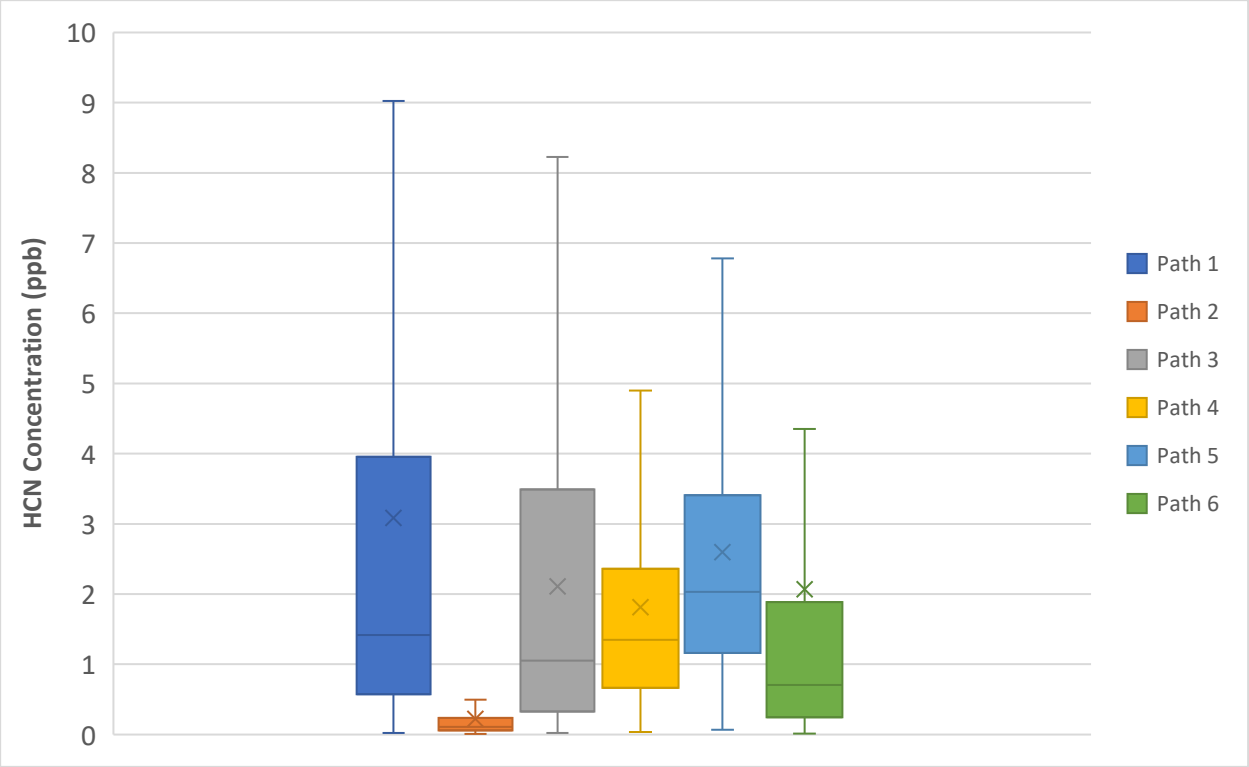

Figure 26. HCN box plots for Paths 1 to 6.

F. Discussion of Changes to Monitoring System, Operations and/or Procedures

Three main changes were performed to the fenceline monitoring plan procedures which are related with the automated QA/QC checks.

1. UV spectrometer temperature: the UV spectrometers were calibrated by the manufacturer at 35ºC instead of the 39ºC that the older models were used to be calibrated at. Thus, for the automated QA/QC checks, we changed the acceptance criteria to accommodate the updated spectrometer calibration conditions.
2. TDL signal intensity: the manufacturer recommended to monitor the absolute detector power instead of the signal intensity. The reason was related to the fact that the laser signal intensity is affected by multiple instrument parameters (I/O Gain, Signal Gain, signal collimation etc.). Due to these interferences, the signal intensity values that are reported by the analyzer could potentially not be representative of the actual signal power that is measured by the detector. To avoid these issues, we replaced the “signa intensity” parameter on the automated QA/QC checks with the parameter “absolute detector power”. The criteria for the data to be considered valid is the absolute detector power to be >0.1 mA.
3. MDL for H2S Paths 3,5 and 6: The minimum detection limit was set to 50% of the threshold for H2S for these three paths due to the fact that these paths are shorter than the rest.

VI. Appendices

A. Appendix A: Calibration and QA/QC Data

Table 7: Verification Activities

Path	Path Length[1]	Analyzer	Compound	Expected Concentration	Measured Concentration	Accuracy (%)	Precision (%)
1	452	UVDOAS	Benzene	100 ppm	113	13	4.4
1	452	UVDOAS	Benzene	200 ppm	198	1.1	0.8
2	1100	UVDOAS	Benzene	100 ppm	104.6	11.6	14.1
2	1100	UVDOAS	Benzene	200 ppm	192	5.9	7.1
3	330	UVDOAS	Benzene	100 ppm	107	8.8	8.3
3	330	UVDOAS	Benzene	200 ppm	215	7.4	4.6
4	630	UVDOAS	Benzene	100 ppm	104	5.8	3.8
4	630	UVDOAS	Benzene	200 ppm	201	3.7	4.8
5	444	UVDOAS	Benzene	100 ppm	101	5	7.4
5	444	UVDOAS	Benzene	200 ppm	199	2	2.6
6	276	UVDOAS	Benzene	100 ppm	103	3.4	3.2
6	276	UVDOAS	Benzene	200 ppm	196	2.5	2.7
1	452	TDL	H2S	500 ppmm	393	21.4	3.2
1	452	TDL	H2S	625 ppmm	483	22.8	2.3
2	1100	TDL	H2S	500 ppmm	463	7.4	4.5
2	1100	TDL	H2S	625 ppmm	538	13.9	3.7
3	330	TDL	H2S	500 ppmm	440	12.1	2.7
3	330	TDL	H2S	625 ppmm	534	14.5	4.9
4	630	TDL	H2S	500 ppmm	532	6.5	6.5
4	630	TDL	H2S	625 ppmm	489	21.8	4.1
5	444	TDL	H2S	500 ppmm	354	29.1	3.8
5	444	TDL	H2S	625 ppmm	512	18	2.6
6	276	TDL	H2S	500 ppmm	395	21.04	1.1
6	276	TDL	H2S	625 ppmm	477	28.4	2.4
1	452	TDL	HCN	1010 ppmm	967	4.2	0.3
1	452	TDL	HCN	420ppmm	428	2	0.3
2	1100	TDL	HCN	1010 ppmm	935	7.4	1.4
2	1100	TDL	HCN	420ppmm	384	8.6	0.3
3	330	TDL	HCN	1010 ppmm	959	5	0.2
3	330	TDL	HCN	420 ppmm	426	1.4	0.3
4	630	TDL	HCN	1010 ppmm	932	7.7	0.1
4	630	TDL	HCN	420 ppmm	409	2.7	0.3
5	444	TDL	HCN	1010 ppmm	974	3.6	0.2
5	444	TDL	HCN	420 ppmm	430	2.3	0.2
6	276	TDL	HCN	1010 ppmm	974	3.5	0.1
6	276	TDL	HCN	420 ppmm	445	6	0.3

[1]path length in meters

Table 8: Percent Recovery for Meteorological Parameters

Parameter	Percent Data Recovery
Wind Speed	100%
Wind Direction	100%
Temperature	100%
Humidity	100%
Pressure	100%

B. Appendix B: Qualifier Codes

Table 9: List of Data Invalidation Codes

Qualifier Code	AQS Definition *(additional information added in parentheses)*	Type or Related Action
AB	Technician Unavailable. *(use if this affects scheduled QA/QC or necessary maintenance)*	Null Data Qualifier
AD	Shelter Storm Damage.	Null Data Qualifier
AG	Sample Time out of Limits. *(e.g., use if integration time is out of manufacturer recommended range and signal intensity and MDL cannot meet the critical criteria mentioned in the FLMP)*	Null Data Qualifier
AI	Insufficient Data. (cannot calculate)	Null Data Qualifier
AL	Voided by Operator. *(e.g., Datum rejected by data validators)*	Null Data Qualifier
AM	Miscellaneous Void.	Null Data Qualifier
AN	Machine Malfunction *(can be used for issues such as an instrument being out of alignment, or an analyzer being offline due to connection problems or instrument failure)*	Null Data Qualifier
AO	Bad Weather. *(Use if weather impacts open-path instrument operation/function)*	Null Data Qualifier
AP	Vandalism. *(Use if vandalism impacts open-path instrument operation/function)*	Null Data Qualifier
AQ	Collection Error. *(use specifically for low analyzer signal events, or when a low analyzer signal prevents the reported data from meeting the critical criteria, while the calculated MDL is lower than 25% of notification threshold)*	Null Data Qualifier
AT	Calibration.	Null Data Qualifier
AU	Monitoring Waived.	Null Data Qualifier
AV	Power Failure.	Null Data Qualifier
AW	Wildlife Damage. *(Use if damage impacts open-path instrument operation/function)*	Null Data Qualifier
AX	Precision Check.	Null Data Qualifier

AY	QC Control Points (zero/span).	Null Data Qualifier
AZ	QC Audit.	Null Data Qualifier
BA	Maintenance/Routine Repairs.	Null Data Qualifier
BH	Interference/co-elution/misidentification.	Null Data Qualifier
BJ	Operator Error.	Null Data Qualifier
BK	Site computer/data logger down.	Null Data Qualifier
BL	QA Audit.	Null Data Qualifier
BM	Accuracy check.	Null Data Qualifier
DA	Aberrant Data (Corrupt Files, Spikes, Shifts).	Null Data Qualifier
DL	Detection Limit Analyses.	Null Data Qualifier
EC	Exceeds Critical Criteria. **(use when data exceeds critical criteria, such as for MDL)*	Null Data Qualifier
IA	African Dust. **(use for any dust event)*	Informational
IT	Wildfire-U.S. **(use for any wildfire event)*	Informational
J	Construction/Repairs in Area.	Informational
LJ	Identification of Analyte Is Acceptable; Reported Value Is An Estimate.	Quality Assurance Qualifier
MD	Value less than MDL.	Quality Assurance Qualifier
NS	Influenced by nearby sources. **(e.g., in the event of emissions influenced by nearby sources)*	Quality Assurance Qualifier
QP	Pressure Sensor Questionable. **(e.g., use if cell pressure is out of range, indicating malfunction)*	Quality Assurance Qualifier
QT	Temperature Sensor Questionable. **(e.g., use if cell temperature is out of range, indicating malfunction)*	Quality Assurance Qualifier
QV	Quality Control Multi-point Verification.	Null Data Qualifier
QX	Does not meet QC criteria. **(e.g., data exceeds automatic criteria for rejection)*	Quality Assurance Qualifier
SC	Sampler Contamination.	Null Data Qualifier
ST	Calibration Verification Standard.	Null Data Qualifier
TC	Component Check & Retention Time Standard. **(use this code for additional instrument checks, e.g., a robustness tests)*	Null Data Qualifier

C. Appendix C: Field Data Sheets

2:00 PM 4/7/25 MONTROSE ONSITE CF

ALIGNED PATH 6 UV

12:54PM 4/9/25 MONTROSE ONSITE CF

ALIGNED PATH 6 UV

12:02 PM 4/17/2025 Montrose Onsite ML

Aligned H2S path 5

12:29 PM 4/17/2025 Montrose Onsite ML

Aligned H2S Path 1 after cleaning retro

12:36 PM 4/17/2025 Montrose Onsite ML

Aligned H2S and HCN path 6 after cleaning retro

2:00 PM 4/21/25 MONTROSE ONSITE CF

ALIGNED PATH 1 H2S, PATH 6 HCN & H2S, & PATH 6 UV

2:13 PM 4/28/2025 Montrose Onsite ML

ALigned H2S Path 1 and HCN Path 6

2:35 PM 4/28/2025 Montrose Onsite ML

Aligned H2S Path 5 TDL

6:54 AM 5/7/25 MONTROSE ONSITE CF

PLANT SHUTDOWN

11:47 AM 5/13/2025 Montrose Onsite ML

Aligned H2S path 1

Cleaned TDL path 5 retro

Aligned H2S and HCN path 5

12:43 PM 5/16/2025 Montrose Onsite ML

Aligned TDL H2S path 5

4:15 PM 5/19/2025 Montrose Onsite ML

Aligned HCN path 5

Cleaned reflector

12:17 PM 5/29/2025 Montrose Onsite ML

Aligned TDL H2S and HCN path 5

Aligned UV path 5

3:54 PM 6/24/2025 Montrose Onsite KL

Quarterly tdl calibration

11:31 AM 6/18/2025 montrose onsite rc

system audit

11:37 AM 4/1/2025 Montrose Onsite ML

Swapped arduino port on UV path 2

11:45 AM 4/17/2025 Montrose Onsite ML

Aligned HCN path 4

11:52 AM 4/17/2025 Montrose Onsite ML

Aligned HCN Path 3 and cleaned retro reflectors

2:32 PM 4/28/2025 Montrose Onsite ML

Aligned HCN path 4 TDL

11:37 AM 5/13/2025 Montrose Onsite ML

Aligned HCN path 4 and cleaned retro

Aligned UV path 2

12:52 PM 5/16/2025 Montrose Onsite ML

Aligned HCN path 4

4:07 PM 5/19/2025 Montrose Onsite ML

ligned HCN path 4

Cleaned Reflector

11:51 AM 5/29/2025 Montrose Onsite ML

Aligned HCN PAth 4 and H2S path 4

Aligned UV path 4

3:52 PM 6/24/2025 montrose onsite kl

quarterly tdl calibration

11:31 AM 6/26/2025 montrose onsite kl

calibrated tdls

replaced bulb at uv2

collimated signal at tdls paths 4 and 5

5:04 PM 6/27/2025 montrose onsite ml

replaced uv head at path 2

calibrated path 2 100ppm

D. Appendix D: Non-Conformance/Corrective Action Data Sheets

Form Title: Non-Conformance Report **Implementation Date:** February 07, 2024
Document Number: 331AA-QMS-FM-13 **Form Owner (Department):** MAQS **Revision Number:** R0 **Form Approval:** AHeitmann

Non-Conformance Report

Project: PROJ-043819	**Month: August 2025**

LOCATION/SITE: P66 Denver Terminal	**Parameter(s) Affected: Benzene Concentration Path 6**
Begin Date and Time (LST): 6/1/2025 12am	**End Date and Time (LST): 6/30/2025 12am**
Equipment: UVDOAS OP6	**S/N#:**

Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s).

During data validation we noticed that there was a high invalidation rate of 90% during the month of June for Benzene Path 6.

Investigative Actions: Describe Assignable Cause(s). Make specific reference to all dates, times and performance test results. All tests results should be documented on appropriate form(s).

We checked the instrument parameters like integration time, peak percent match, temperature and pressure of the cell and all were correct and within appropriate ranges. The MDL of the instrument was 0 during long periods of time which caused the data to be invalid. We updated the CMS software and the issue was fixed.

Corrective Action Taken: Make specific reference to all dates, times and performance test results.

Updated the CMS software and computer.

Is Problem Fully Resolved? **Yes** __x__ **No** ____ If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved) The issue has been temporarily resolved, but we will have to replace the fan on the original optical head instrument and replace it back by 7/13.

Additional Attachments or Information? **Yes** _____ **No**__X__ Client Notified? **Yes** _____ **No**__x__If so, **date**_____

Field Operator's Assessment of Data Status: (Check One)	☐ **Valid**	☐ **Suspect**	☒ **Invalid**

Additional notes on Data Validity Status: Data with MDL=0 were invalid.

A.Liangou

Originator's Signature:

QA Review: Aricia Boyd

Non-Conformance Report

Project: PROJ-043819	**Month: May 2025**

LOCATION/SITE: Phillips 66 Denver	**Parameter(s) Affected: All equipment**
Begin Date and Time (LST): 5/07/25 8AM	**End Date and Time (LST): 5/7/25 8PM**
Equipment: All equipment	**S/N#: N/A**

Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s).

A scheduled power outage took place at the P66 facility on May 7th.

Investigative Actions: Describe Assignable Cause(s). Make specific reference to all dates, times and performance test results. All tests results should be documented on appropriate form(s).

Scheduled outage no investigation needed at this time.

Corrective Action Taken: Make specific reference to all dates, times and performance test results.

All instruments were shut down to prevent any issues during the power outage. No data was collected during this time.

Is Problem Fully Resolved? **Yes** **x** **No** _____ If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved)

Additional Attachments or Information? **Yes** _____ **No** **x** Client Notified? **Yes** **x** **no** _____ If so, **date_4/29/25**_____

Field Operator's Assessment of Data Status: (Check One)	☐ **Valid**	☐ **Suspect**	☒ **Invalid**

Additional notes on Data Validity Status: No data was collected during the power outage.

Originator's Signature: **Katia Liangou**

QA Review: Aricia Boyd

E. Appendix E: Calibration verification forms

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	226 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	394	21.2
2	500	382	23.6
3	500	374	25.2
4	500	414	17.2
5	500	402	19.6
Averages	500	393	21.4

	Calculated Values	Expected Values
Overall Percent Precision	96.8%	**≥ 80%**
Overall Percent Error	21.4%	**≤ 30%**

TDL Calibration Form

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Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): 

Montrose Air Quality Services
5120 Northshore Dr. North Little Rock, AR 72218
T: (501-)900-6400
www.montrose-env.com

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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	226 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	474	24.2
2	625	464	25.8
3	625	500	20
4	625	494	21
5	625	482	22.9
Averages	625	483	22.8

	Calculated Values	Expected Values
Overall Percent Precision	97.7 %	**≥ 80%**
Overall Percent Error	22.8 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	550 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	500	440	12
2	500	486	2.8
3	500	438	12.4
4	500	472	5.6
5	500	480	4
Averages	500	463	7.4

	Calculated Values	**Expected Values**
Overall Percent Precision	95.5 %	**≥ 80%**
Overall Percent Error	7.4 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	550 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	625	508	18.7
2	625	568	9.1
3	625	524	16.2
4	625	552	11.7
5	625	540	13.6
Averages	625	538	13.9

	Calculated Values	**Expected Values**
Overall Percent Precision	96.3 %	**≥ 80%**
Overall Percent Error	13.9 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: H2S Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	165 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	500	446	10.8
2	500	452	9.6
3	500	436	12.8
4	500	446	10.8
5	500	418	16.4
Averages	500	440	12.1

	Calculated Values	**Expected Values**
Overall Percent Precision	97.3 %	**≥ 80%**
Overall Percent Error	12.1%	**≤ 30%**

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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/26/25

Instrument Model: H2S Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	165 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	625	520	16.8
2	625	534	14.6
3	625	576	7.8
4	625	548	12.3
5	625	494	21
Averages	625	534	14.5

	Calculated Values	**Expected Values**
Overall Percent Precision	95.1%	**≥ 80%**
Overall Percent Error	14.5 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/26/25

Instrument Model: H2S Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	315 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	548	9.6
2	500	552	10.4
3	500	504	0.8
4	500	506	1.2
5	500	552	10.4
Averages	500	532	6.5

	Calculated Values	Expected Values
Overall Percent Precision	95 %	**≥ 80%**
Overall Percent Error	6.5 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	315 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	524	16.2
2	625	478	23.5
3	625	462	26.1
4	625	506	19
5	625	474	24.2
Averages	625	489	21.8

	Calculated Values	Expected Values
Overall Percent Precision	95.9 %	**≥ 80%**
Overall Percent Error	21.8 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	222 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	382	23.6
2	500	334	33.2
3	500	338	32.4
4	500	354	29.2
5	500	366	26.8
Averages	500	354	29.1

	Calculated Values	Expected Values
Overall Percent Precision	96.02 %	**≥ 80%**
Overall Percent Error	29.1 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	222 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	488	21.9
2	625	522	16.5
3	625	524	16.2
4	625	524	16.2
5	625	504	19.4
Averages	625	512	18

	Calculated Values	Expected Values
Overall Percent Precision	97.4 %	**≥ 80%**
Overall Percent Error	18 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	138 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	500 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	500	386	22.8
2	500	400	20
3	500	396	20.8
4	500	394	21.2
5	500	398	20.4
Averages	500	395	21.04

	Calculated Values	**Expected Values**
Overall Percent Precision	98.9%	**≥ 80%**
Overall Percent Error	21.04 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: H2S Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	138 m
Compound (H2S/HCN)	H2S

Standard Information	
Compound External Audit Cell Concentration (PPMM)	625 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	464	25.8
2	625	464	25.8
3	625	434	30.6
4	625	436	30.2
5	625	440	29.6
Averages	625	477	28.4

	Calculated Values	Expected Values
Overall Percent Precision	97.6 %	**≥ 80%**
Overall Percent Error	28.4 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	226 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	428	2
2	420	428	2
3	420	426	1.4
4	420	428	2
5	420	430	2.4
Averages	420	428	2

	Calculated Values	**Expected Values**
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	2 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	226 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	966	4.4
2	1010	968	4.2
3	1010	966	4.4
4	1010	968	4.2
5	1010	968	4.2
Averages	1010	967	4.2

	Calculated Values	Expected Values
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	4.2 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	550 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	384	8.6
2	420	382	9
3	420	386	8.1
4	420	384	8.6
5	420	384	8.6
Averages	420	384	8.6

	Calculated Values	**Expected Values**
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	8.6 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	550 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	1010	960	5
2	1010	928	8.1
3	1010	928	8.1
4	1010	928	8.1
5	1010	932	7.7
Averages	1010	935	7.4

	Calculated Values	**Expected Values**
Overall Percent Precision	98.6%	**≥ 80%**
Overall Percent Error	7.4 %	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: HCN Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	165 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	426	1.4
2	420	424	1
3	420	428	1.9
4	420	426	1.4
5	420	426	1.4
Averages	420	426	1.4

	Calculated Values	**Expected Values**
Overall Percent Precision	99.7%	**≥ 80%**
Overall Percent Error	1.4%	**≤ 30%**

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Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: HCN Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	165 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	962	4.8
2	1010	956	5.3
3	1010	960	5
4	1010	958	5.1
5	1010	960	5
Averages	1010	959	5

	Calculated Values	Expected Values
Overall Percent Precision	99.8%	**≥ 80%**
Overall Percent Error	5 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	315 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	410	2.4
2	420	408	2.9
3	420	408	2,9
4	420	408	2.9
5	420	410	2.4
Averages	420	409	2.7

	Calculated Values	**Expected Values**
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	2.7 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: HCN Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	315 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	934	7.5
2	1010	932	7.7
3	1010	932	7.7
4	1010	932	7.7
5	1010	932	7.7
Averages	1010	932	7.7

	Calculated Values	Expected Values
Overall Percent Precision	99.9 %	**≥ 80%**
Overall Percent Error	7.7 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

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TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	222 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	428	1.9
2	420	430	2.4
3	420	430	2.4
4	420	430	2.4
5	420	430	2.4
Averages	420	430	2.3

	Calculated Values	**Expected Values**
Overall Percent Precision	99.8 %	**≥ 80%**
Overall Percent Error	2.3 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

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TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/24/25

Instrument Model: HCN Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	222 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	1010	974	3.6
2	1010	976	3.4
3	1010	1094	3.8
4	1010	974	3.6
5	1010	972	3.8
Averages	1010	974	3.6

	Calculated Values	**Expected Values**
Overall Percent Precision	99.8 %	**≥ 80%**
Overall Percent Error	3.6 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: HCN Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	138 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	420 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	420	446	6.2
2	420	446	6.2
3	420	444	5.7
4	420	446	6.2
5	420	444	5.7
Averages	420	445	6

	Calculated Values	**Expected Values**
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	6 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 4/26/25

Instrument Model: HCN Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path separation(meters-one-way)	138 m
Compound (H2S/HCN)	HCN

Standard Information	
Compound External Audit Cell Concentration (PPMM)	1010 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	976	3.4
2	1010	974	3.6
3	1010	974	3.6
4	1010	974	3.6
5	1010	974	3.6
Averages	1010	974	3.5

	Calculated Values	Expected Values
Overall Percent Precision	99.9%	**≥ 80%**
Overall Percent Error	3.5 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

Operator Signature(s):  Witness Signature(s): James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/17/25

Instrument Model: UV Mono Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	452 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	90

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	112	12
2	100	112	12
3	100	113	13
4	100	120	20
5	100	108	8
Averages	100	113	13

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	95.6	**≥ 75%**
Overall Percent Error	13	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/17/25

Instrument Model: UV Mono Path 1 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	452 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	90

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	197	1.5
2	200	196	2
3	200	200	0
4	200	197	1.5
5	200	199	0.5
Averages	200	198	1.1

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	99.2 %	**≥ 75%**
Overall Percent Error	1.1 %	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/27/25

Instrument Model: UV Mono Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	96.6
Integration Time (ms)	80

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	84.6	15.4
2	100	97.9	2.1
3	100	112.2	12.2
4	100	106.4	6.4
5	100	121.7	21.7
Averages	100	104.6	11.6

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	85.9	**≥ 75%**
Overall Percent Error	11.6	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/18/25

Instrument Model: UV Mono Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	150
Integration Time (ms)	74

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	195	2.5
2	200	200	0
3	200	177	11.5
4	200	180	10
5	200	211	5.5
Averages	200	192	5.9

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	5.9	**≥ 75%**
Overall Percent Error	92.9	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/18/25

Instrument Model: UV Mono Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	50

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	113	13
2	100	115	15
3	100	109	9
4	100	102	2
5	100	95	5
Averages	100	107	8.8

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	91.7	**≥ 75%**
Overall Percent Error	8.8	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/18/2025

Instrument Model: UV Mono Path 3 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	97
Integration Time (ms)	50

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	209	4.5
2	200	219	9.5
3	200	216	8
4	200	203	1.5
5	200	227	13.5
Averages	200	215	7.4

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	95.4	**≥ 75%**
Overall Percent Error	7.4	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/18/25

Instrument Model: UV Mono Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	630 m/ 0.047m
Maximum Intensity (%)	20
Integration Time (ms)	97

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	95	5
2	100	105	5
3	100	108	8
4	100	102	2
5	100	109	9
Averages	100	104	5.8

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	103.8	**≥ 75%**
Overall Percent Error	5.8	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/18/25

Instrument Model: UV Mono Path 4 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	630 m/ 0.047m
Maximum Intensity (%)	97
Integration Time (ms)	20

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	185	7.5
2	200	198	1
3	200	205	2.5
4	200	206	3
5	200	209	4.5
Averages	200	201	3.7

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	95.2	**≥ 75%**
Overall Percent Error	3.7	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/1725

Instrument Model: UV Mono Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	94
Integration Time (ms)	90

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	102	2
2	100	113	13
3	100	98	2
4	100	101	1
5	100	93	7
Averages	100	101	5

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	92.6	**≥ 75%**
Overall Percent Error	5	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/17/25

Instrument Model: UV Mono Path 5 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	94
Integration Time (ms)	90

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	195	2.5
2	200	203	1.5
3	200	205	2.5
4	200	200	0
5	200	193	3.5
Averages	200	199	2

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	97.4	**≥ 75%**
Overall Percent Error	2	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature ……

UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/17/25

Instrument Model: UV Mono Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	95
Integration Time (ms)	45

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	103	3
2	100	102	2
3	100	103	3
4	100	107	7
5	100	98	2
Averages	100	103	3.4

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	96.8	**≥ 75%**
Overall Percent Error	3.4	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

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UVDOAS Calibration Form

Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/17/25

Instrument Model: UV Mono Path 6 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	95
Integration Time (ms)	45

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	193	3.5
2	200	203	1.5
3	200	199	0.5
4	200	197	1.5
5	200	189	5.5
Averages	200	196	2.5

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Form Title: UVDOAS Calibration Form	**Implementation Date:** July 10, 2024
Document Number: 331AA-OPS-FM-13	**Form Owner (Department):** MAQS
Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	97.3	**≥ 75%**
Overall Percent Error	2.5	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

Montrose Air Quality Services
5120 Northshore Dr. North Little Rock, AR 72218
T: (501-)900-6400
www.montrose-env.com

Form Title: Audit Checklist **Implementation Date:** July 07, 2025
Document Number: 317AA-OPS-FM25 **Form Owner (Department):** MAQS **Revision Number:** R0 **Form Approval:** KLiangou

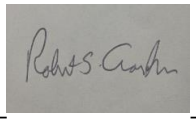
Audit Checklist

Business Name: ____P-66_____
Audit Period: __June 2025 on site plus historical data_____
Auditor's Name: ____Robert S. Crampton Ph.D._____
Date: _____August 12 / 2025_____

Audit Instruments:
Cerex UV D.O.A.S. Benzene monitors

Task	Passed/Failed	Comments
Check if instruments are operational	Passed	
Check if data is collected	Passed	
Check if scripts are running correctly	Passed	
Check if instruments are aligned	Passed	Minor adjustments from good to better
Check calibration verification	Passed	
Check housekeeping	Passed	
Check historical data	Passed	
Check instrument parameters (e.g. laser, UV bulb etc.)	Passed	Replaced bulbs
Check if additional maintenance is required	No	

Comments:__
_All units Had UV signal to noise level to perform as designed and responded within Spec to bump tests
_____

Auditor's Signature: ____  _____

MONTROSE
AIR QUALITY SERVICES

Station Monitoring Log

Project: Phillips 66

Station ID: Commerce City - Met 1
Operator: Andrew Boxell
Purpose of Visit: Semi-annual met audit

Date: June 24, 2025
Time In: 2:50pm
Time Out: 5:00pm

Sensor Check

☒ Anemometers ☐ Aspirator Fans ☐ Net Rad. ☐ Precip ☒ Pressure ☐ Solar Rad. ☒ Tower
☒ Solar Panels ☒ Temp/RH-Radiation Shields ☒ Wind Vanes ☐ Other _____

Datalogger Check

Current Program _____

Datalogger Clock-

Time: _____
Year: _____
Day: _____

Clock Reset? (Criteria +/- 5 Minutes)
YES ○
NO ○

Parameter Value and Unit

☐ PV Battery Enclosure Check ☐ PV Battery Voltage Check

Activities

Performed Semi-annual met audit

☐ No ☒ Yes Site Operational Upon Leaving? (Note any issues or failures detected) _____

Parts/Supplies Needed: _____

Montrose Air Quality Services, LLC
A Division of Montrose Environmental Group
3500 Comanche Road NE Suite G
Albuquerque, NM 87107-4546

T: 505.830.9680 ext. 11700
F: 505.830.9678
Email: sales@montrose-env.com
www.montrose-env.com

MONTROSE
AIR QUALITY SERVICES

Wind Speed Audit Log

60 Meter 10 Meter 2 Meter Other

Client: Phillips 66	Site: Commerce City, Met 1	Date: June 24, 2025	
Sensor Manufacturer: MetOne	Height: 10m	Model: 010C	S/N: D14298
Start Time: 4:00pm	Stop Time: 5:00pm		

Bearing Check			Torque Watch Manufacturer:
Clockwise: < 0.2	Counter Clockwise: < 0.2	Acceptable Reading:	≤ 0.216

Synchronous Motor Test

RPM	AC Frequency of Motor	Sensor Output (volts)	Sensor Output (m/s)	Expected Output (m/s)	Percent Difference (sensor-exp)/exp
0.0			0.27	0.27	0
100					
300					
600			16.27	16.27	0
900					
1200					
1500					
1800			48.27	48.27	0

Synchronous Motor

Manufacturer:	Model No.:	S/N:	Date of Last Calibration:
RM Young	18802	CA3616	May 19, 2025

Data Verification Test

Datalogger Time of Test (MST)	Max Wind Speed Audit	Max Wind Speed Database	Verified By

Auditor Comments and Notes

Signature: _____

MONTROSE
AIR QUALITY SERVICES

Wind Direction Audit Log

60 Meter 10 Meter 2 Meter Other

Client: Phillips 66	Site: Commerce City, Met 1		Date: June 24, 2025
Sensor Manufacturer: MetOne	Height: 10m	Model: 020D	S/N: D14548
Start Time: 4:00pm	Stop Time: 5:00pm		
Bearing Check	Torque Watch Manufacturer: RM Young		
Clockwise: < 5.0	Counter Clockwise: < 5.0	Acceptable Reading:	≤ 6.45

Solar Reference/Azimuth Check

Reference Point	Compass Degrees (Add Mag. Decl.)	Sensor Output (Degrees)	Solar Angle/Azimuth (Degrees)	Degrees Difference
Cross Arm Align.	270	269		-1
	90	88		-2

Sigma Theta Test

Datalogger Start Time:		Sensor Output:	Wheel Output:
Datalogger Stop Time:		Sensor Output:	Wheel Output:
Sigma Theta Sensor:	Sigma Theta Calc:	Avg. WD Sensor:	Avg WD Calc:

Linearity Check

Dial	Degrees	Delta Degrees	Dial	Degrees	Delta Degrees
0	0	—	210	208.5	-1.2
30	26.6	+ 3.4	240	238.6	-0.1
60	57.0	- 0.4	270	269.2	-0.6
90	87.2	- 0.2	300	299.7	-0.5
120	117.2	0	330	329.9	-0.2
150	146.7	+0.5	360	0	+0.1
180	177.3	-0.6	r = 0.999	m = 1.0069	b = -2.9495

Data Verification Check		**Verified By:**	
Datalogger Start Time (MST)	Datalogger Stop Time (MST)	Avg. Wind Direction Sensor	Avg. Wind Direction Database

Auditor Comments and Notes

Signature: _____

MONTROSE
AIR QUALITY SERVICES

Temperature Co-Located Audit Log

60 Meter 10 Meter 2 Meter Other

Client: Phillips 66	Site: Commerce City, Met 1	Date: June 24, 2025	
Sensor Manufacturer: MetOne	Height: 2m	Model: 065	S/N: D15619
Start Time: 3:30 pm	Stop Time: 4:30 pm		
Field Thermometer Manufacturer: Brooklyn 6666-FC # 1075			

Co-Located Test				
	Repetition #1	Repetition #2	Repetition #3	Repetition #4
Time	3:30 pm	4:14 pm	4:30 pm	
Co-Located NIST Thermometer °C (A)	~~53.1~~ 52.9	4.1	23.7	
Sensor Output °C (B)	53.0	3.9	23.7	
Difference °C (B-A)	0.1	-0.2	0	

Data Verification Test		Verified By:	
Start Time (MST)	Stop Time (MST)	Audit Temperature (°C)	Database Temperature (°C)

Auditor Comments and Notes

Signature: _____

MONTROSE
AIR QUALITY SERVICES

Relative Humidity Co-Located Audit Log

60 Meter 10 Meter 2 Meter Other

Client: Phillips 66	Site: Commerce City, Met 1	Date: June 24, 2025	
Sensor Manufacturer: MetOne	Height: 2m	Model: 083F	S/N: D14154
Start Time: 3:10 pm	Stop Time: 4:15 pm		

Co-Located Test

	Repetition #1	Repetition #2	Repetition #3	Repetition #4
Time	3:10 pm	3:25 pm	4:15 pm	
Co-Located NIST Relative Humidity % (A)	44.9	40.9	47.7	
Sensor Output % (B)	46.0	41.0	47.7	
Difference % (B-A)	1.1	0.1	0	

Does temperature sensor contain a motorized Aspirator: ~~O~~ Yes O No O N/A
If no, explain:

Time Averaged Test

Start Time	End Time	Audit Average RH %	Sensor Average RH %	Measured Difference %

Auditor Notes and Comments

Signature: _____

MONTROSE AIR QUALITY SERVICES

Barometric Pressure Audit Log

Client: Phillips 66	Site: Commerce City-Met1	Date: June 24, 2025	
Sensor Manufacturer: MetOne	Height: 2m	Model: 092	S/N: C18610

NIST Barometer Comparison		
Field Barometer Manufacturer: Meriam	Model: 946ON	S/N: 2501000018
Date of last comparison to NIST Barometer: January 6, 2025		

Co-Located Ambient Test

Time	Audit Pressure (A)	Sensor Pressure (B)	Absolute Difference
3:10	843.6	844	0.4
3:20	843.6	844	0.4
3:30	843.3	843	0.7
			0
			0

Auditor Calculations

Auditor Comments and Notes

Signature: _____

Certification - Selectable Speed Anemometer

Certificaton Type	Owner	Performed By	Certificaton Date	Temp	RH
Select Speed Anemom	Montrose	ALDAVIDS	May 19, 2025	71.6	37.6

Transfer Standard

Serial Number	Brand	Model	Range
CA3616	Young	18802	

Primary Standard

Serial Number	Brand	Model
20901074	AMETEK	1726

Certification Data

Run 1				Run 2				Transfer Std Setpoint	Transfer Std MPH	Enter a Conversion factor for Young Model 18802 RPM to MPH
CW		CCW		CW		CCW				
Primary (x)	Transfer (y)	Primary (x)	Transfer (y)	Primary (x)	Transfer (y)	Primary (x)	Transfer (y)			
200	200	200	200	200	200	200	200	200	2.2	0.01096
600	600	600	600	600	600	600	600	600	6.6	
1000	1000	1000	1000	1000	1000	1000	1000	1000	11.0	
2000	2000	2000	2000	2000	2000	2000	2000	2000	21.9	
5000	5000	5000	5000	5000	5000	5000	5000	5000	54.8	
10000	10000	10000	10000	10000	10000	10000	10000	10000	109.6	
14999	14999	14999	14999	14999	14999	14999	14999	15000	164.4	

Recertification is Due: May 19, 2026

Conversion Factors
mph = rpm * 0.01096
mph = rpm * 0.01145

ISO 9001:2015
Certifed By
UL DQS
10001297 QM15

Certificate of Calibration

TEST # 50219-C01
ITEM # 63491

ISSUED BY

MCS Calibration, Inc.

1533 LINCOLN AVENUE HOLBROOK, NEW YORK 11741
(631) 471-6900 FAX (631) 471-6902

CUSTOMER MONTROSE AIR QUALITY SERVICES, LLC
DESCRIPTION THERMOMETER / DIGITAL
MFR. BROOKLYN
MODEL 6660-FC & 1075
RANGE -40 TO 300 DEG F (-40 TO 150 DEG C)

Calibration Date 2/21/2025
Calibration Due 2/21/2026
PO # CALL FOR CC
S/N 341242 & 9014/0199
ID #

This certificate was prepared by MCS Calibration, Inc. in compliance with MIL-STD-45662A, ANSI/NCSL Z540 & ISO 9001. This instrument was calibrated using test equipment whose accuracy is traceable through the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY or accepted values of natural physical constants, to the International System of Units(SI units).This instrument has been added to the MCS RECALIBRATION PROGRAM.
 This instrument was calibrated at MCS's facility "MCS CERTIFIES THAT THE REQUIREMENTS OF THE PURCHASE ORDER HAVE BEEN MET."

TEST DATA

DEGREES READS	DEGREES ACTUAL
-0.1	0.00
20.0	20.00
34.9	35.00

ALL TEMPERATURES ARE GIVEN IN DEGREES CENTIGRADE (DEG C)

REQUIRED ACCURACY: +/- 0.5% OF READING or +/- 0.2C (MFR)

SERVICE NOTE: THIS UNIT MEETS THE REQUIRED ACCURACY, "AS FOUND, AS LEFT"

ENVIRONMENTAL CONDITIONS
72 DEG F
30 % RH

Quality Manual Rev. 25

PROCEDURE MCS2046 rev. 02
CYCLE 12
BY PA

MCS TRACEABILITY

MCS ITEM #	EQUIPMENT USED	TRACEABILITY #	CURRENTLY DUE
49585	THERMOMETER / SUPER / DIGITAL	31023-Z02	10/23/2026
78284	RTD TEMPERATURE PROBE / PLATINUM	40627-Z01	9/26/2028

Q.A. MCS

VALID ONLY WHEN APPROVED BY MCS QUALITY ASSURANCE PERSONNEL

ISO 9001:2015
Certifed By
UL DQS
10001297 QM15

Certificate of Calibration

TEST # 50219-C03
ITEM # 134351

ISSUED BY

MCS Calibration, Inc.

1533 LINCOLN AVENUE HOLBROOK, NEW YORK 11741
(631) 471-6900 FAX (631) 471-6902

CUSTOMER MONTROSE AIR QUALITY SERVICES, LLC
DESCRIPTION HYGRO / THERMOMETER / DIGITAL
MFR. VAISALA
MODEL HM41 / HMP113
RANGE 0-120 DEG F, 0-100 % RH

Calibration Date 2/21/2025
Calibration Due 2/21/2026
PO # CALL FOR CC
S/N P1010693 / P0760115
ID #

This certificate was prepared by MCS Calibration, Inc. in compliance with MIL-STD-45662A, ANSI/NCSL Z540 & ISO 9001. This instrument was calibrated using test equipment whose accuracy is traceable through the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY or accepted values of natural physical constants, to the International System of Units(SI units).This instrument has been added to the MCS RECALIBRATION PROGRAM.
 This instrument was calibrated at MCS's facility "MCS CERTIFIES THAT THE REQUIREMENTS OF THE PURCHASE ORDER HAVE BEEN MET."

TEST DATA

% RH READS	% RH ACTUAL	DEG C READS	DEG C ACTUAL
25.4	25.0	15.0	15.00
50.6	50.0	24.9	25.00
75.2	75.0		

ALL TEMPERATURES GIVEN IN DEGREES CELSIUS (DEG C)

REQUIRED ACCURACY: +/- 1.5% RH, +/-0. 2 DEG C

SERVICE NOTE: THIS UNIT MEETS THE REQUIRED ACCURACY, "AS FOUND, AS LEFT"

ENVIRONMENTAL CONDITIONS
72 DEG F
30 % RH

Quality Manual Rev. 25

PROCEDURE MCS2012 rev. 04
CYCLE 12
BY PA

MCS TRACEABILITY

MCS ITEM #	EQUIPMENT USED	TRACEABILITY #	CURRENTLY DUE
109385	HYGROMETER / PRECISION / DIGITAL	20623-Z01	6/29/2025

Q.A. MCS

VALID ONLY WHEN APPROVED BY MCS QUALITY ASSURANCE PERSONNEL

meriam®

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Cleveland | Ohio | 44102 | USA
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(800) 817-7849

A trusted leader in measurement and calibration solutions.

Calibration Certificate

Date of Calibration	**2025-01-06**	Certificate Number	**2501000036**

Instrument Model Name	Smart Manometer
Instrument Model Number	ZM2000N-AI0030
Serial Number	**2501000018**

Manufacturer	Meriam
Sensor Model Number	Z9A1656-2
Sensor Serial Number	2437000045
Sensor Description	Absolute Isolated 0 to 30 psi
Instrument Accuracy	±(0.005% of Reading + 0.02% of Full Scale) Temperature Compensated: -20 °C to +50 °C

The certification of the instrument identified above is traceable to the International System of Units (SI) through the National Institute of Standards and Technology, or through globally recognized natural physical constants.

The above mentioned certification was completed in accordance with Meriam Quality System document A35924. Test reports without signatures are not valid

ISO 9001:2015 Certified

Verified by Calibration Technician — James G. Mortach

James G. Mortach

Report Date: **2025-01-06**

Form Title: Audit Checklist	**Implementation Date:** July 07, 2025
Document Number: 317AA-OPS-FM25	**Form Owner (Department):** MAQS
Revision Number: R0	**Form Approval:** KLiangou

Audit Checklist

Business Name: Phillips 66 Denver Terminal
Audit Period: 7/8-10/2025
Auditor's Name: Randy Gibbons, Terra Applied Systems
Date: 8/15/2025

Audit Instruments:
Unisearch LasIR H2S analyzers s/n LAS23-063, -064 Unisearch LasIR HCN analyzers s/n LAS23-065, -066 6 sets of optics for H2S 6 sets of optics for HCN 6 shared retroreflectors 2 Cabinet/HMI

Task	Passed/Failed	Comments
Check if instruments are operational	PASS	Transceiver windows and reflector cubes found fouled, cleaned. Reflectors 1, 2, 5, & 6 lack windows.
Check if data is collected	PASS	July data collected
Check if scripts are running correctly	PASS	Yes
Check if instruments are aligned	PASS	Some adjusted.
Check calibration verification	PASS	All paths bump tested
Check housekeeping	PASS	Generally clean and well kept. Some spider webs.
Check historical data	PASS	Collected.
Check instrument parameters (e.g. laser, UV bulb etc.)	PASS	
Check if additional maintenance is required		See below for reflector cleaning, pest control.

Comments: Have pest control treat for pests – spider webs cause noise. OPT3, 4, 7: Be aware of sharp turns in fiber. Many reflector cells have abrasions.
Recommended retro cleaning method:

- •Remove reflector array
- •Apply dish detergent
- •lightly brush with clean China bristle brush
- •Multiple rinse with demineralized water
- •Rinse with >90% isopropanol
- •Air dry
- •Remount reflector
- •Continue air dry

Auditor's Signature: