Quarterly Report for Phillips 66 Denver Terminal Fenceline Monitoring Plan-Q2 2026

Prepared For:
Phillips 66 Pipeline LLC
3960 E 56th Ave
Commerce City, CO 80022

Prepared By:
Onterris Air Quality Services, LLC
6270 Joyce Dr. Unit B
Golden, CO 80403

For Submission To:
Colorado Department of Public Health and Environment
4300 Cherry Creek S Dr.
Denver, Colorado 80246

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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 2026 to June 30th of 2026 (Q2 of 2026). 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

For any questions related to this report please contact:
-Royce Conger (Royce.W.Conger@p66.com) and
-Beth Eisenmann (Beth.M.Eisenmann@p66.com)

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 and are 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, another bulk terminal, two asphalt plants, 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) Ultraviolet 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 should not fail nor require calibration due to having no moving parts, therefore keeping maintenance and consumables 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 U.S. Environmental Protection Agency (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 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 can achieve 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 is 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 is capable of continuous and accurate real time measurements. 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 anytime from anywhere. The specific meteorological instruments chosen meet EPA specifications for accuracy,

[1] These two compounds are neither used, stored, 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. 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".

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.

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 to a telescope mounted on the northwest path (Path 6) and northeast path (Path 1) instrument shelters then transmits 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 toxins 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, nor have the potential to emit hydrogen cyanide or hydrogen sulfide, the source of any potential detection by the Phillips 66 fenceline monitoring system will likely indicate 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.

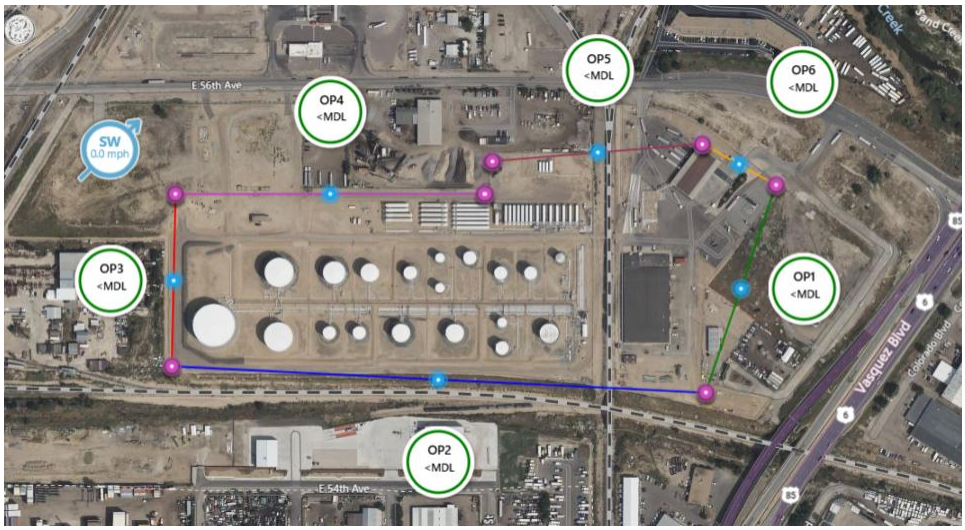

Figure 1: Approximate Layout of the Open-Path Analyzers, Retroreflector Locations, and Meteorological Station

[2] These two compounds are neither used, stored, 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.

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 for all paths except H2S Paths 3,4 and 6 where the threshold is set to <50% 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 alert threshold for all paths except H2S Paths 3,4 and 6 where the threshold is set to <50% of alert 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. During 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 Onterris’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 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 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-26	1	Benzene	0	0.09	0.22	0.31	0.46	1.76	0.38	0.00%	98.95%	0.44
May-26	1	Benzene	0	0.09	0.16	0.21	0.33	4.99	0.32	0.02%	99.62%	0.31
Jun-26	1	Benzene	0	0.10	0.16	0.25	0.77	6.36	0.57	0.19%	96.22%	0.35
Apr-26	1	H2S	0	0.25	3.25	7.30	14.69	54.91	10.31	0.00%	93.17%	10.40
May-26	1	H2S	0	0.67	4.61	7.88	12.53	50.55	9.62	0.00%	97.67%	11.27
Jun-26	1	H2S	0	0.39	3.60	6.99	13.02	62.67	9.65	0.13%	91.74%	10.02
Apr-26	1	HCN	0	0.02	0.10	0.25	0.93	10.58	0.66	0.01%	98.04%	0.37
May-26	1	HCN	0	0.01	0.08	0.13	0.20	2.07	0.19	0.00%	99.46%	0.18
Jun-26	1	HCN	0	0.03	0.17	0.33	1.06	10.87	0.81	0.23%	94.82%	0.48
Apr-26	2	Benzene	0	0.08	0.12	0.14	0.17	0.30	0.15	0.00%	98.75%	0.20
May-26	2	Benzene	0	0.11	0.18	0.21	0.26	1.26	0.23	0.00%	99.65%	0.30
Jun-26	2	Benzene	0	0.12	0.30	0.44	0.62	5.08	0.50	0.48%	95.46%	0.62
Apr-26	2	H2S	0	0.50	9.43	15.85	24.42	57.91	17.92	0.46%	87.69%	22.68
May-26	2	H2S	0	0.20	9.38	16.27	25.84	60.15	18.59	0.61%	69.75%	22.96
Jun-26	2	H2S	0	0.28	6.27	13.46	24.64	54.55	16.40	0.76%	90.18%	18.95
Apr-26	2	HCN	0	0.01	0.04	0.11	0.45	3.98	0.33	0.63%	97.66%	0.15
May-26	2	HCN	0	0.01	0.04	0.07	0.20	2.21	0.18	0.04%	92.56%	0.11
Jun-26	2	HCN	0	0.01	0.08	0.13	0.27	10.54	0.26	0.34%	88.77%	0.18
Apr-26	3	Benzene	0	0.41	1.01	1.44	2.32	104.09	2.35	0.19%	97.57%	2.03
May-26	3	Benzene	0	0.20	0.46	0.70	1.28	36.32	1.19	3.01%	99.24%	0.94
Jun-26	3	Benzene	0	0.24	0.59	0.93	1.66	16.91	1.29	2.79%	91.52%	1.27
Apr-26	3	H2S	0	0.94	5.34	8.13	13.81	87.14	11.61	0.15%	95.71%	11.56
May-26	3	H2S	0	0.48	4.06	6.86	11.50	100.95	9.94	0.14%	99.10%	9.79
Jun-26	3	H2S	0	2.27	10.71	19.12	33.31	119.81	24.74	0.60%	89.15%	27.76
Apr-26	3	HCN	0	0.06	2.07	3.26	4.83	14.53	3.68	4.53%	97.56%	4.38
May-26	3	HCN	0	0.01	0.28	1.37	2.76	13.91	1.81	1.78%	94.98%	1.89
Jun-26	3	HCN	0	0.01	0.16	0.30	0.90	122.14	1.02	0.38%	99.60%	0.43
Apr-26	4	Benzene	0	0.07	0.18	0.26	0.42	11.58	0.45	12.98%	96.66%	0.32
May-26	4	Benzene	0	0.07	0.20	0.31	0.49	17.57	0.53	5.72%	99.65%	0.40
Jun-26	4	Benzene	0	0.07	0.23	0.35	0.58	8.35	0.50	11.08%	96.11%	0.44
Apr-26	4	H2S	0	2.70	24.40	39.22	56.80	122.39	42.34	0.50%	85.25%	56.06

May-26	4	H2S	0	4.00	24.91	40.55	60.88	124.93	44.71	0.27%	83.89%	58.05
Jun-26	4	H2S	0	0.98	15.01	34.31	59.66	125.66	40.59	0.44%	70.07%	50.14
Apr-26	4	HCN	0	0.02	0.64	1.58	3.30	25.49	2.52	0.81%	94.47%	2.24
May-26	4	HCN	0	0.04	0.48	0.99	1.75	23.30	1.51	0.12%	86.76%	1.41
Jun-26	4	HCN	0	0.04	0.63	1.39	2.35	53.79	1.87	0.24%	76.34%	1.98
Apr-26	5	Benzene	0	0.11	0.23	0.31	0.43	12.96	0.44	19.51%	98.17%	0.38
May-26	5	Benzene	0	0.11	0.21	0.28	0.39	5.49	0.36	19.96%	99.44%	0.34
Jun-26	5	Benzene	0	0.09	0.23	0.30	0.42	5.06	0.38	14.01%	96.89%	0.39
Apr-26	5	H2S	0	1.01	11.42	20.23	31.95	55.80	22.26	0.00%	74.92%	29.66
May-26	5	H2S	0	1.40	11.03	17.55	26.60	58.69	19.70	0.16%	86.67%	25.52
Jun-26	5	H2S	0	2.48	16.75	25.65	34.55	119.26	26.01	0.65%	75.61%	37.01
Apr-26	5	HCN	0	0.06	0.65	1.45	3.75	19.16	2.60	2.14%	93.74%	2.04
May-26	5	HCN	0	0.06	0.61	1.04	1.90	17.81	1.52	0.42%	93.99%	1.47
Jun-26	5	HCN	0	0.00	0.86	1.54	2.60	14.29	1.91	0.23%	93.20%	2.18
Apr-26	6	Benzene	0	0.19	0.33	0.52	1.21	40.89	1.27	37.76%	94.13%	0.59
May-26	6	Benzene	0	0.21	0.38	0.53	1.04	14.27	1.09	33.09%	99.64%	0.65
Jun-26	6	Benzene	0	0.25	0.46	0.59	0.92	62.99	1.05	24.59%	81.02%	0.77
Apr-26	6	H2S	0	2.76	26.97	44.90	64.60	125.20	46.95	0.36%	68.32%	67.47
May-26	6	H2S	0	1.87	20.97	35.10	52.09	134.34	38.39	0.20%	80.33%	52.08
Jun-26	6	H2S	0	0.83	18.60	34.41	57.72	134.02	39.57	0.64%	60.28%	51.37
Apr-26	6	HCN	0	0.03	0.33	0.85	1.92	28.49	1.50	0.15%	98.68%	1.21
May-26	6	HCN	0	0.02	0.19	0.51	1.59	44.90	1.84	1.27%	99.65%	0.74
Jun-26	6	HCN	0	0.03	0.76	2.41	5.84	89.23	5.30	4.81%	90.84%	3.37

[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 2026”. 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 were some months with higher invalidation rates on the H2S data related to higher than usual minimum detection limits which are partially related to the environmental conditions. Phillips 66 does not emit nor store H2S. The wind speed sensor was malfunctioning for the period June 8th to June 30th of 2026. More specifically, the plastic cups that are connected to the sensor broke down and replacements have been ordered and Onterris will be replacing them once received.

D. Discussion of Results

As shown in the summary plots, the concentrations of the three compounds of interest were 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 median MDL value was 0.6 ppb, for H2S the average median MDL value was approximately 31.8 ppb, and for HCN the corresponding average median MDL was around 1.4 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

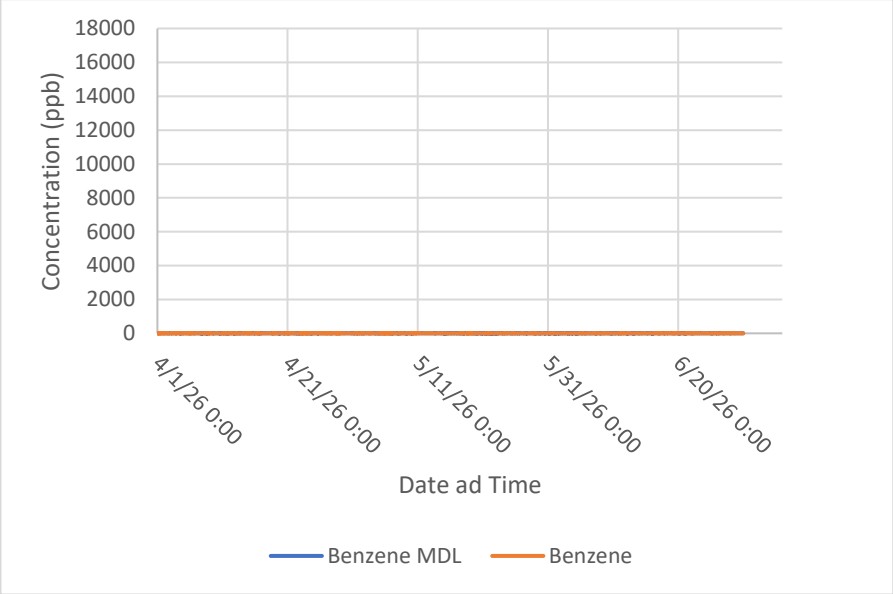

Figure 2. Timeseries of Benzene Path 1

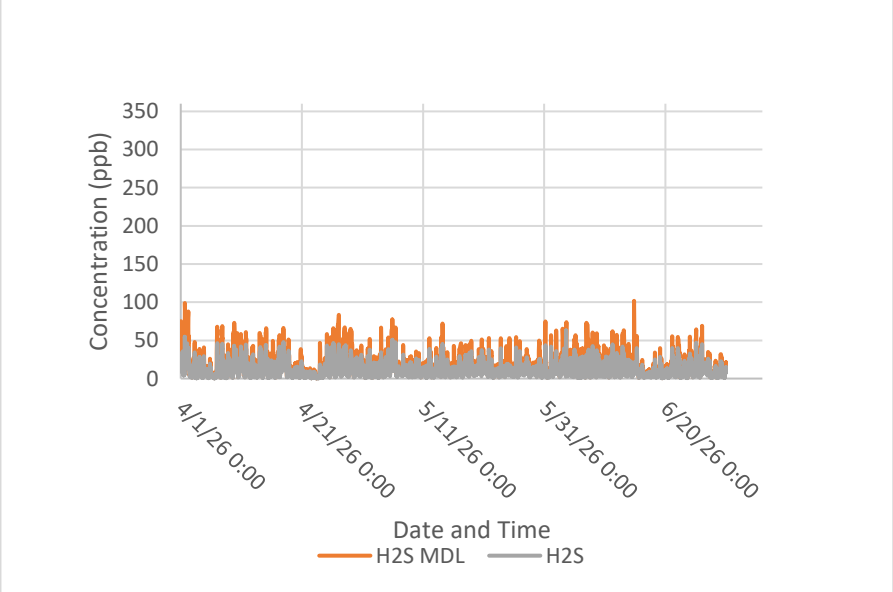

Figure 3. Timeseries of H_2S Path 1

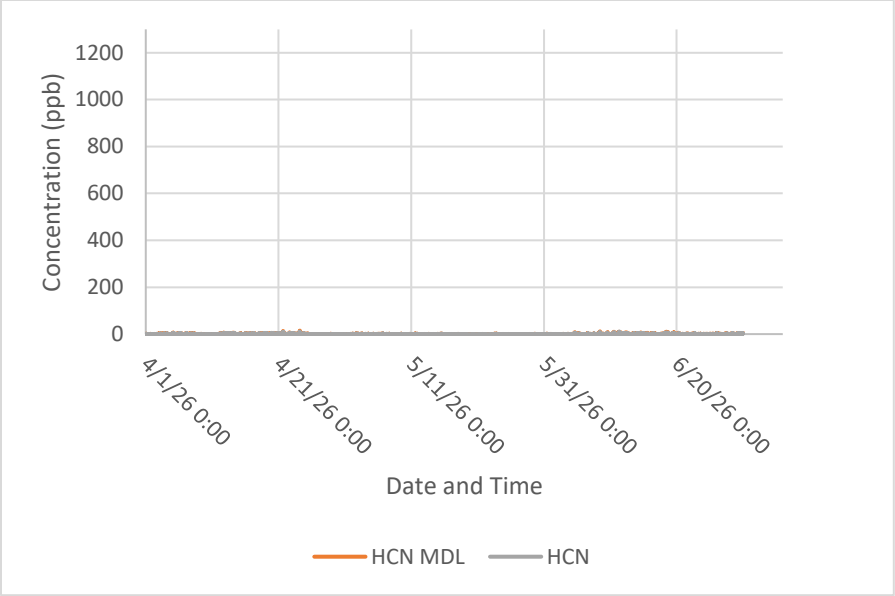

Figure 4. Timeseries of HCN Path 1

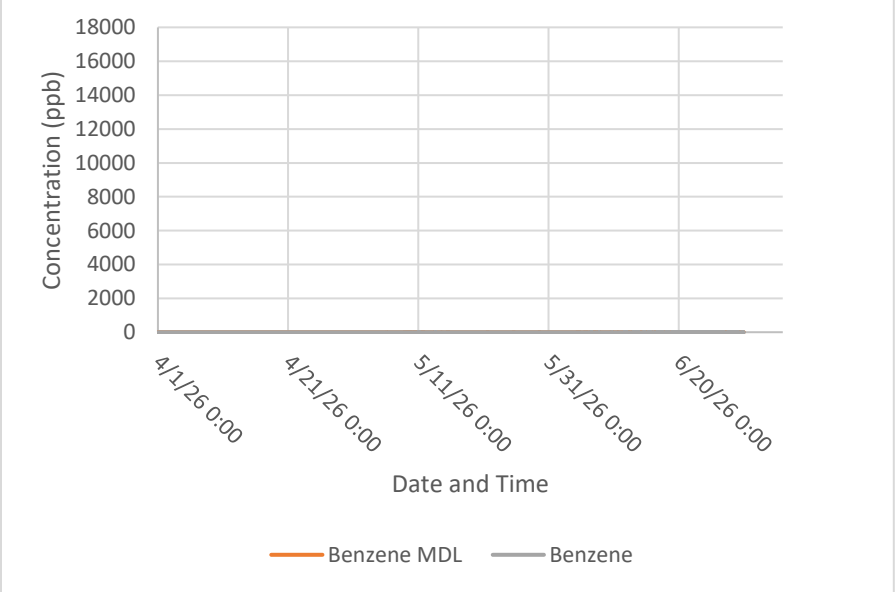

Figure 5. Timeseries of Benzene Path 2

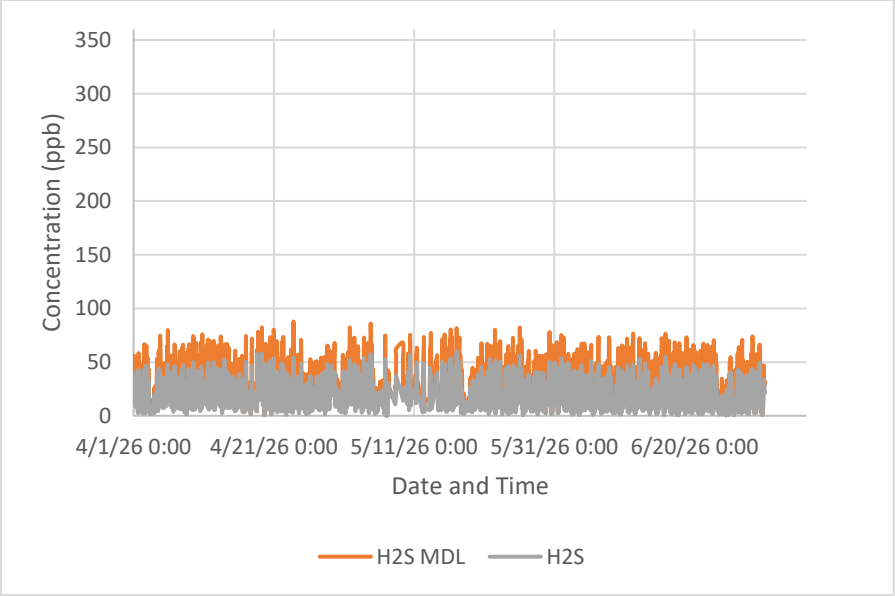

Figure 6. Timeseries of H_2S Path 2

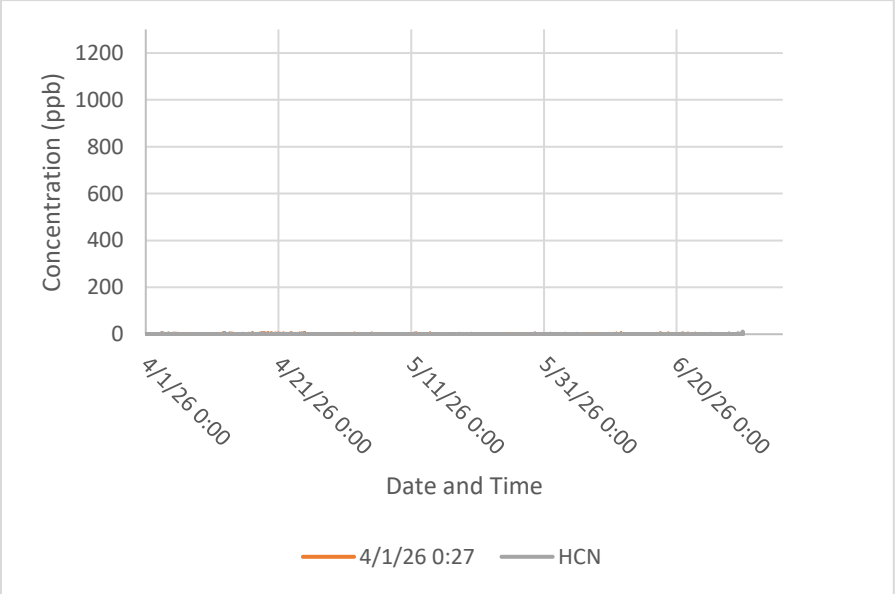

Figure 7. Timeseries of HCN Path 2

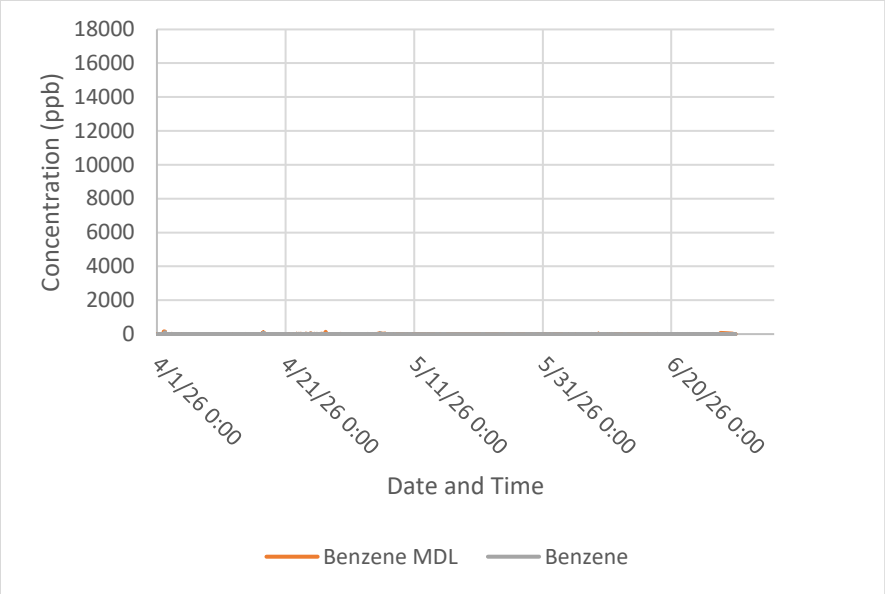

Figure 8. Timeseries of Benzene Path 3

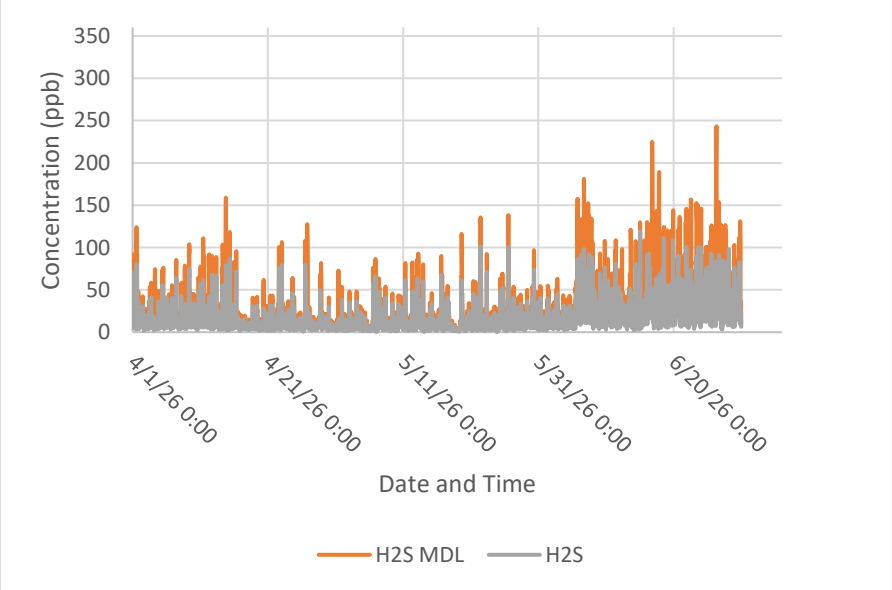

Figure 9. Timeseries of H_2S Path 3

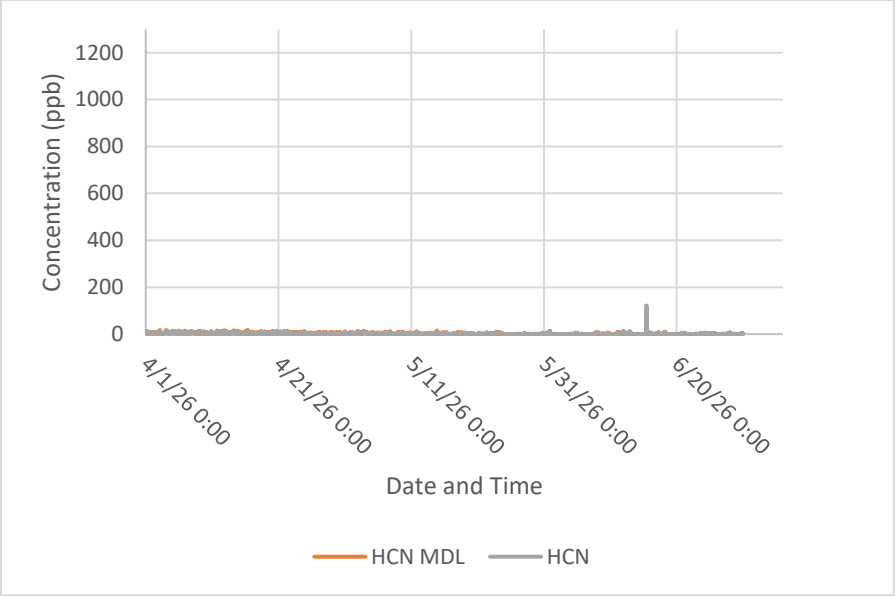

Figure 10. Timeseries of HCN Path 3

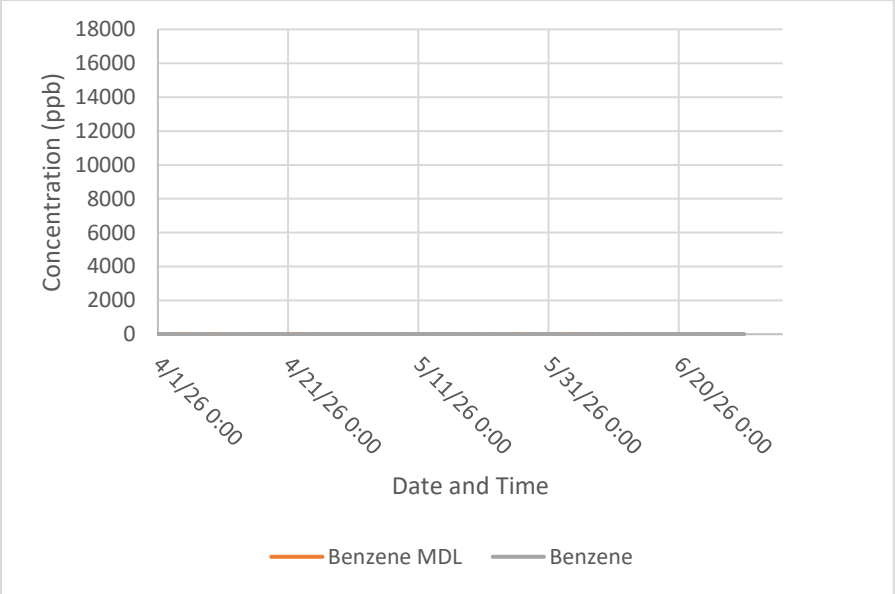

Figure 11. Timeseries of Benzene Path 4

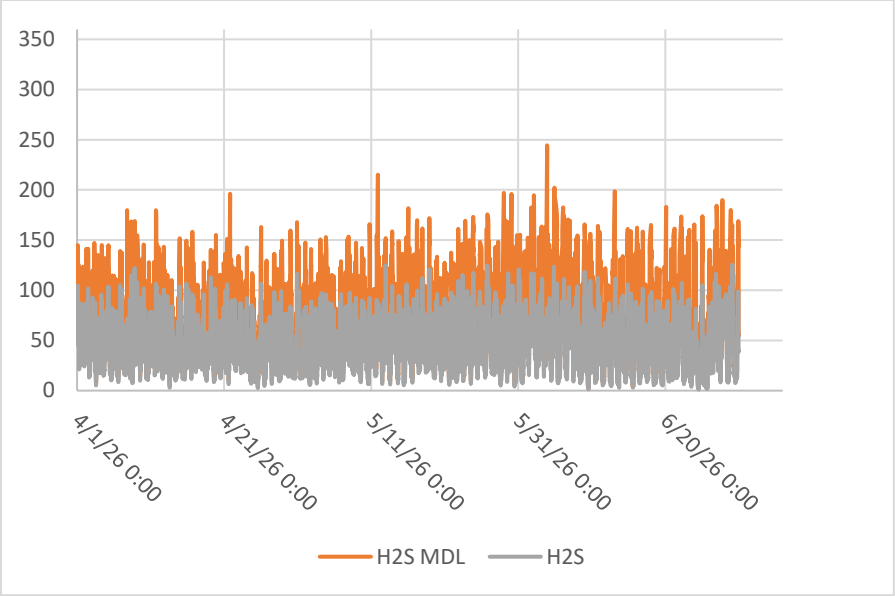

Figure 12. Timeseries of H_2S Path 4

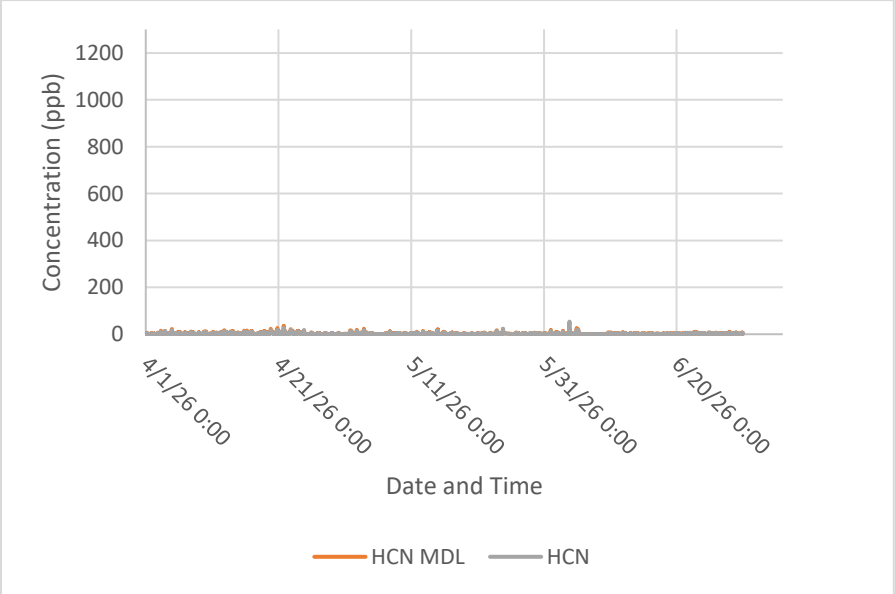

Figure 13. Timeseries of HCN Path 4

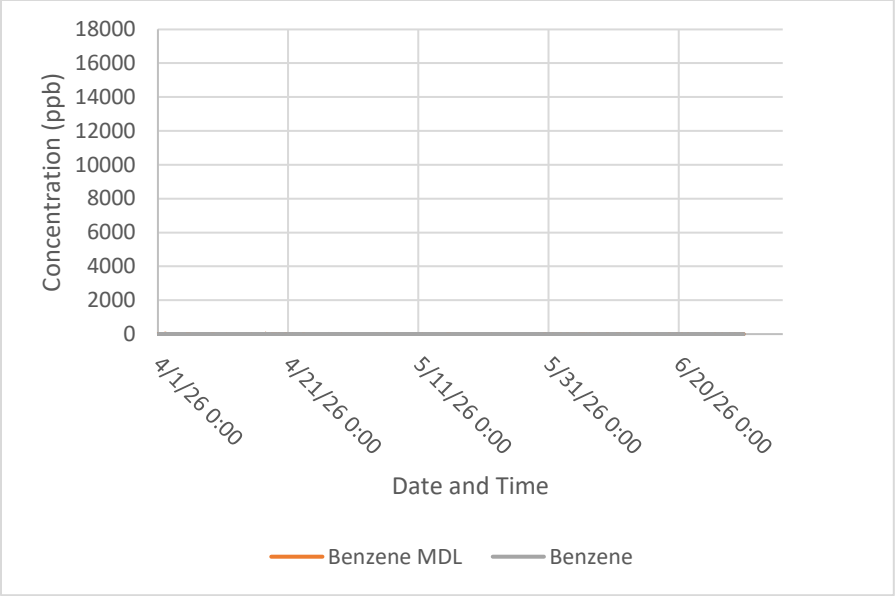

Figure 14. Timeseries of Benzene Path 5

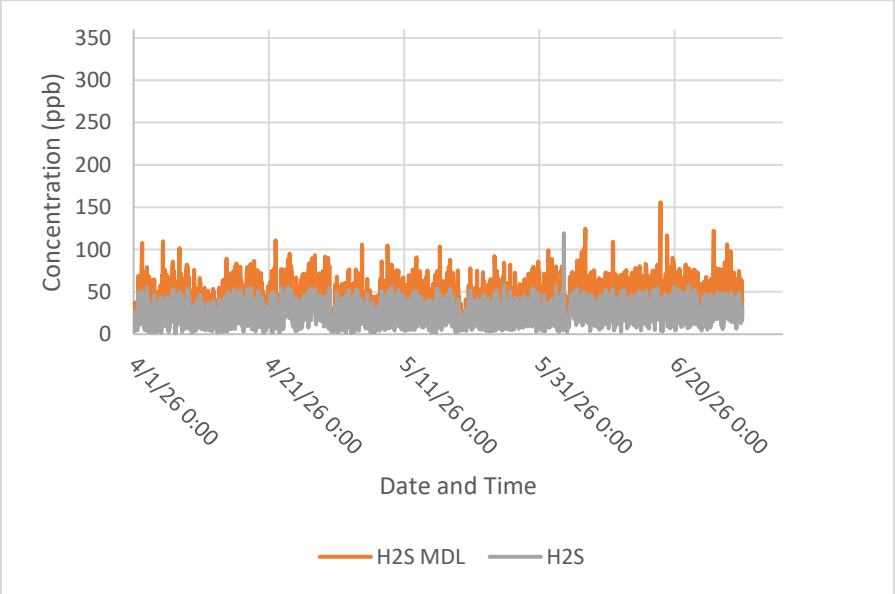

Figure 15. Timeseries of H_2S Path 5

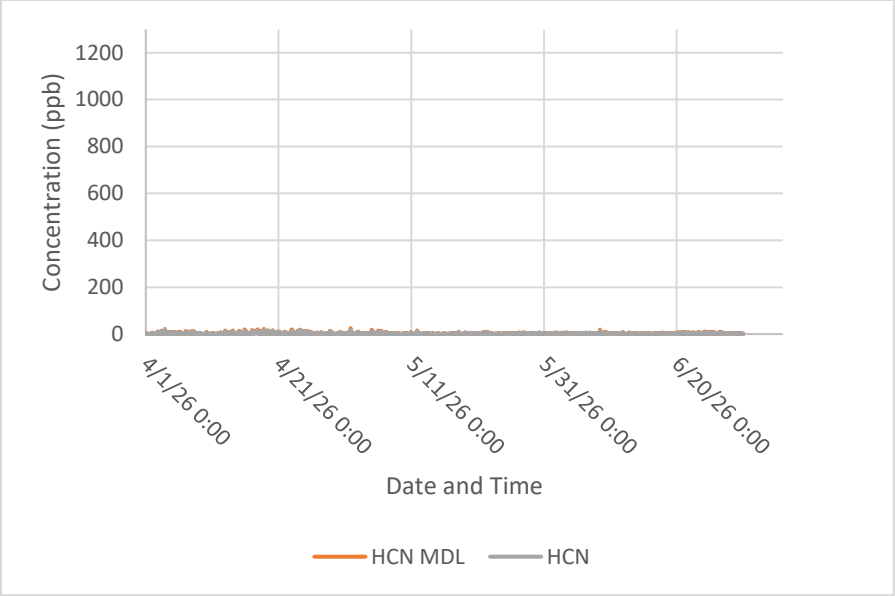

Figure 16. Timeseries of HCN Path 5

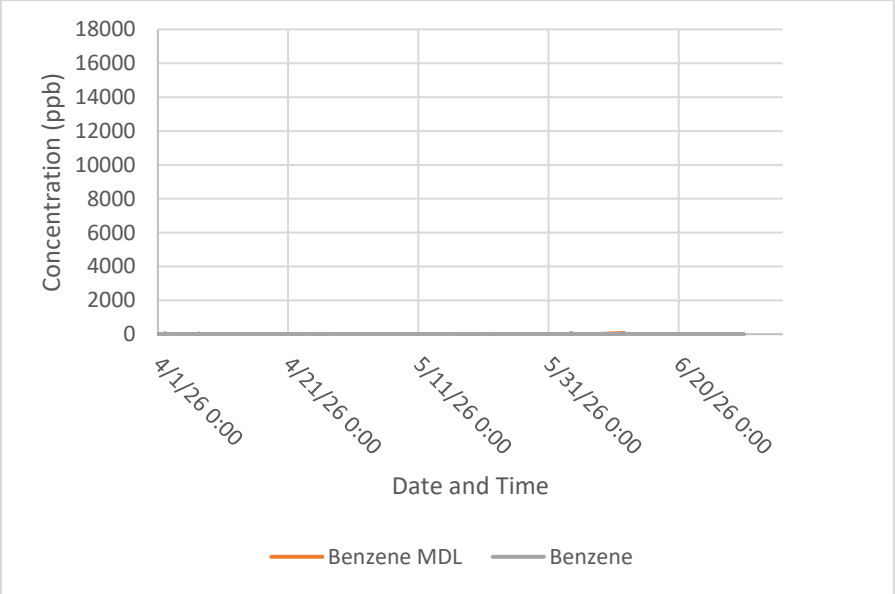

Figure 17. Timeseries of Benzene Path 6

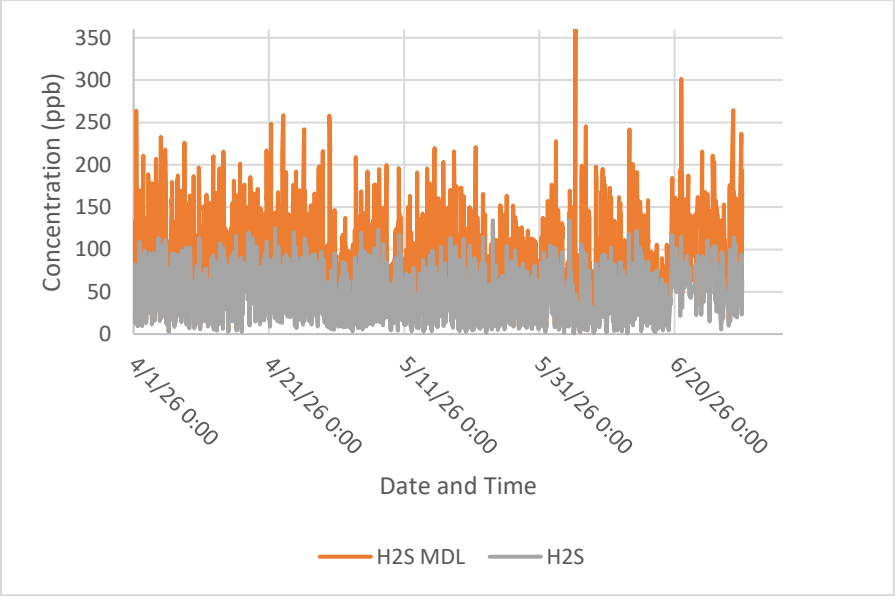

Figure 18. Timeseries of H_2S Path 6

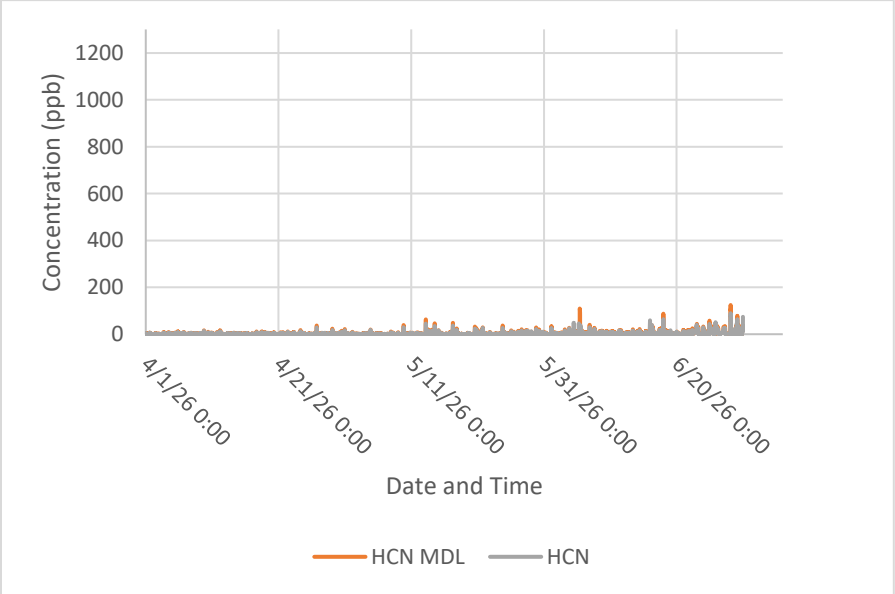

Figure 19. Timeseries of HCN Path 6

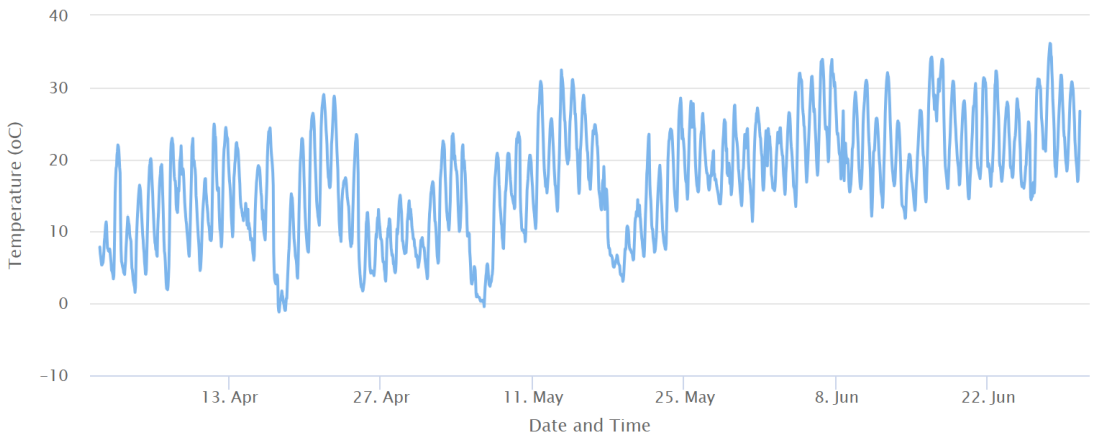

Figure 20. Temperature Timeseries (2026)

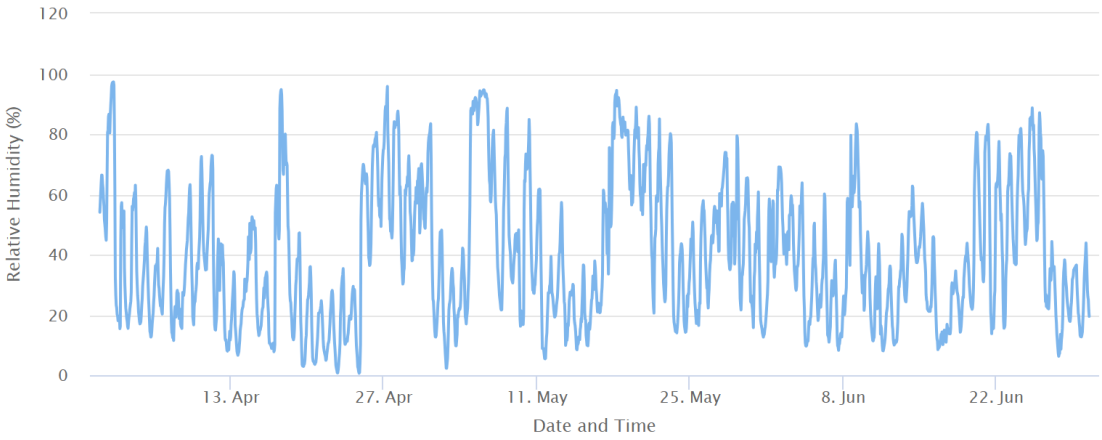

Figure 21. Relative Humidity Timeseries (2026)

Figure 22. Barometric Pressure Timeseries (2026)

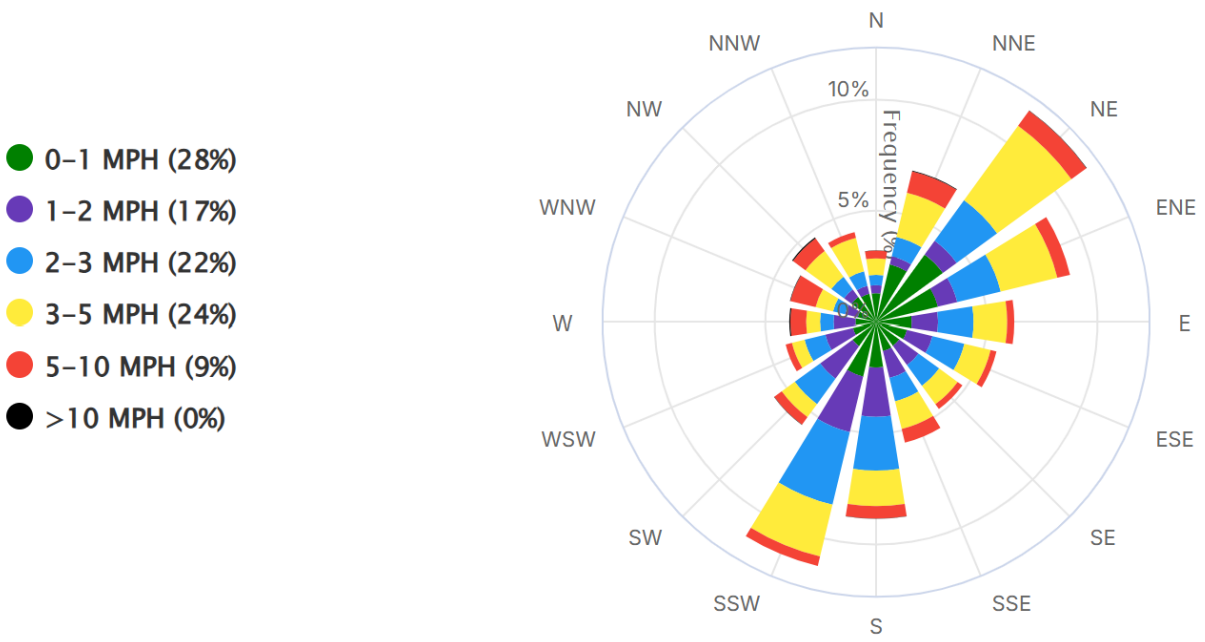

Figure 23. Wind Rose Plot

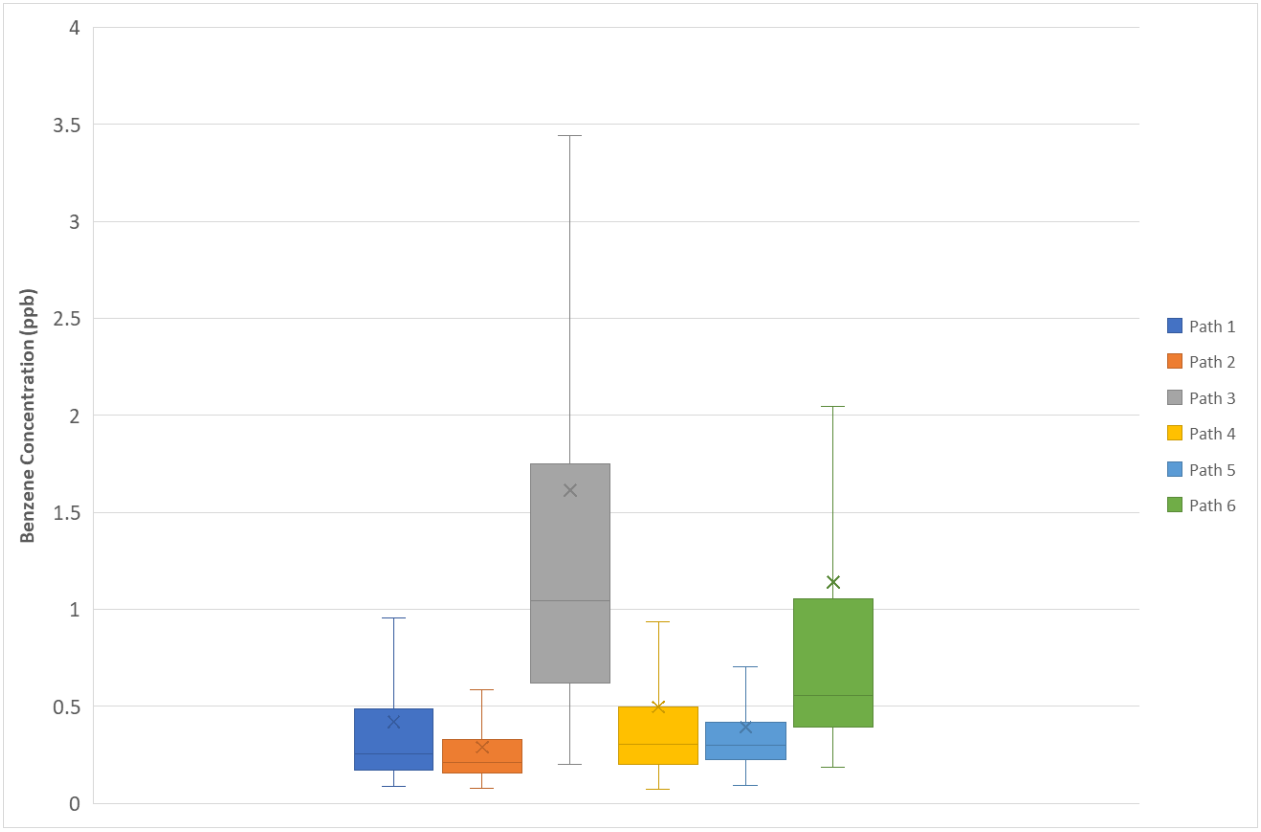

Figure 24. Benzene Box Plots for Paths 1 to 6

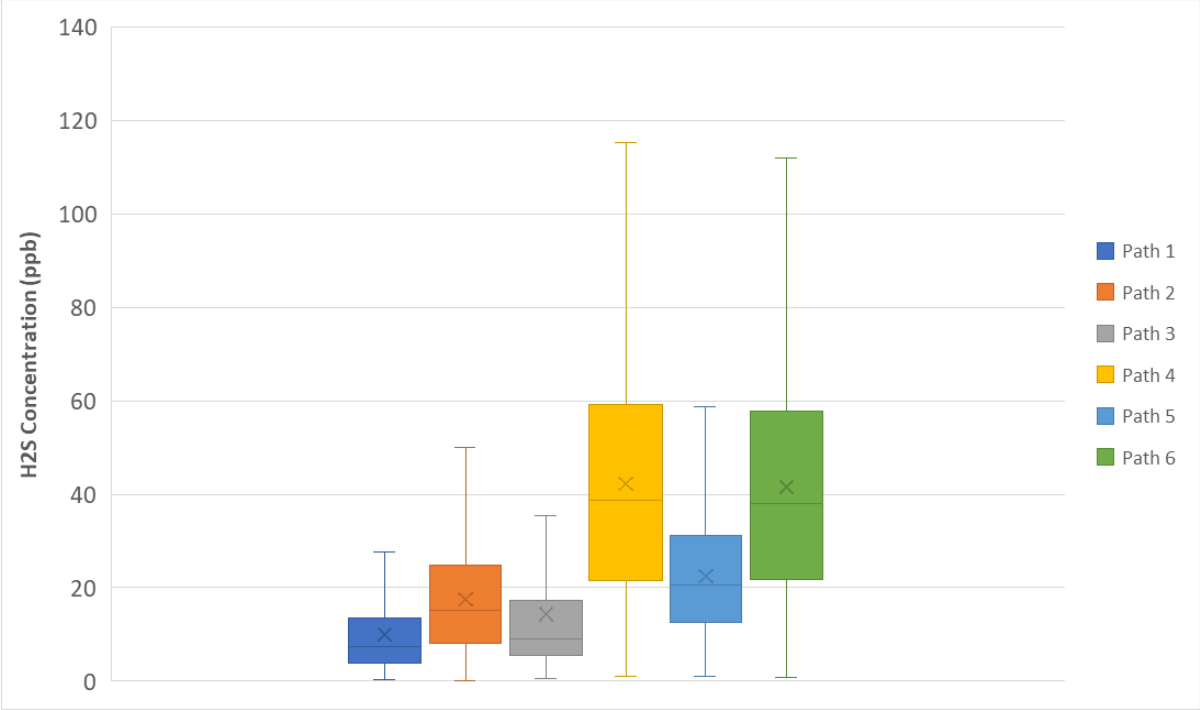

Figure 25. H_2S Box Plots for Paths 1 to 6.

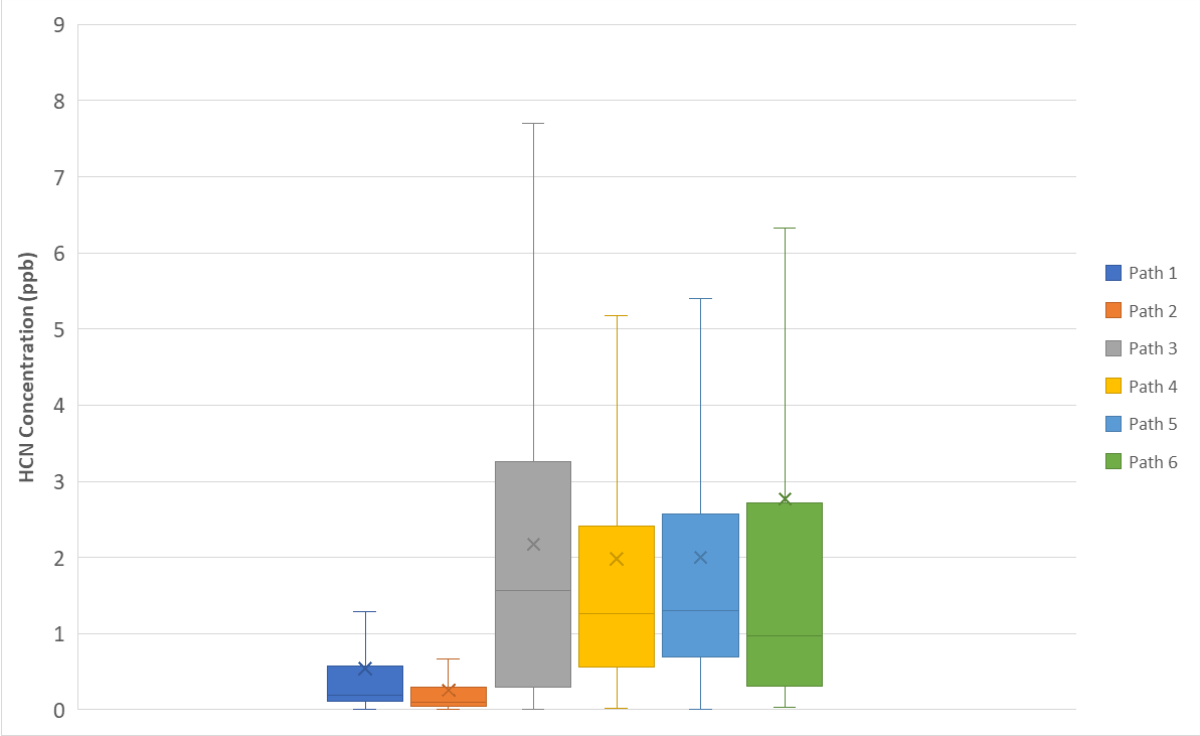

Figure 26. HCN Box Plots for Paths 1 to 6.

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

Three main changes were made 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 35^{o}C instead of the 39^{o}C that the older models were 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 monitoring 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 "signal intensity" parameter on the automated QA/QC checks with the parameter "absolute detector power". For the data to be considered valid, the absolute detector value must be >0.1mA.
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 these paths being shorter than the rest.

VI. Appendices

A. Appendix A: Calibration and QA/QC Data

Table 7: Verification Activities

Date	Type of Verification	Path	Path Length[1]	Analyzer	Compound	Expected Concentration	Measured Concentration	Accuracy (%)	Precision (%)
6/19/2026	Bump test	1	452	UVDOAS	Benzene	100 ppm	103	3.4	1.8
6/19/2026	Bump test	1	452	UVDOAS	Benzene	200 ppm	196	1.9	1.1
6/16/2026	Bump test	2	1100	UVDOAS	Benzene	100 ppm	104	12.4	14.6
6/16/2026	Bump test	2	1100	UVDOAS	Benzene	200 ppm	180	9.7	8.9
6/16/2026	Bump test	3	330	UVDOAS	Benzene	100 ppm	116	23.6	20.9
6/16/2026	Bump test	3	330	UVDOAS	Benzene	200 ppm	227	14.5	9.4
6/16/2026	Bump test	4	630	UVDOAS	Benzene	100 ppm	111	11.2	6.8
6/16/2026	Bump test	4	630	UVDOAS	Benzene	200 ppm	211	8.3	7.1
6/16/2026	Bump test	5	444	UVDOAS	Benzene	100 ppm	80.6	19.4	5.5
6/16/2026	Bump test	5	444	UVDOAS	Benzene	200 ppm	158	21.1	1.8
6/16/2026	Bump test	6	276	UVDOAS	Benzene	100 ppm	88	12	5.8
6/16/2026	Bump test	6	276	UVDOAS	Benzene	200 ppm	185	7.9	5.5
6/15/2026	Audit Module	1	452	TDL	H2S	500 ppmm	410	18.1	3.5
6/15/2026	Audit Module	1	452	TDL	H2S	410 ppmm	302	26.3	2.6
6/16/2026	Audit Module	2	1100	TDL	H2S	500 ppmm	417	16.6	2.1
6/15/2026	Audit Module	2	1100	TDL	H2S	410 ppmm	389	7.5	4.3
6/16/2026	Audit Module	3	330	TDL	H2S	500 ppmm	539	10.1	12.4
6/15/2026	Audit Module	3	330	TDL	H2S	410 ppmm	313	236	3.2
6/15/2026	Audit Module	4	630	TDL	H2S	500 ppmm	449	10.2	3.9
6/15/2026	Audit Module	4	630	TDL	H2S	410 ppmm	430	4.9	1.2
6/15/2026	Audit Module	5	444	TDL	H2S	500 ppmm	390	22	2.8
6/15/2026	Audit Module	5	444	TDL	H2S	410 ppmm	431	6.8	4.2
6/15/2026	Audit Module	6	276	TDL	H2S	500 ppmm	416	16.9	1.1
6/15/2026	Audit Module	6	276	TDL	H2S	410 ppmm	322	21.5	1.6
6/15/2026	Audit Module	1	452	TDL	HCN	1010 ppmm	981	2.9	0.3
6/15/2026	Audit Module	1	452	TDL	HCN	445ppmm	456	2.5	1
6/15/2026	Audit Module	2	1100	TDL	HCN	1010 ppmm	954	5.5	0.2
6/15/2026	Audit Module	2	1100	TDL	HCN	445ppmm	417	6.2	1.5
6/15/2026	Audit Module	3	330	TDL	HCN	1010 ppmm	982	2.8	0.1
6/15/2026	Audit Module	3	330	TDL	HCN	445ppmm	438	1.5	0.9
6/15/2026	Audit Module	4	630	TDL	HCN	1010 ppmm	981	2.9	0.1
6/15/2026	Audit Module	4	630	TDL	HCN	445ppmm	442	0.8	0.2
6/15/2026	Audit Module	5	444	TDL	HCN	1010 ppmm	988	2.2	0
6/15/2026	Audit Module	5	444	TDL	HCN	445ppmm	440	1	0.2
6/15/2026	Audit Module	6	276	TDL	HCN	1010 ppmm	973	3.7	0.2
6/15/2026	Audit Module	6	276	TDL	HCN	445ppmm	416	6.4	0.4

[1]path length in meters

Table 8: Percent Recovery for Meteorological Parameters

Parameter	Percent Data Recovery
Wind Speed	75.8%
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

10:35 AM 4/6/26 MONTROSE ONSITE EO

Restarted and Troubleshoot UV Path 6

12:12 PM 4/9/26 MONTROSE ONSITE CF

CLEANED PATH 5 RETROS

ALIGNED PATH 5 H2S

ALIGNED PATH 6 H2S

SWAPED ARDUINO PORTS PATH 1 UV

DUSTED SHELTERS 1 & 5

10:44 am 4/14/2026 Montrose Onsite ML

Aligned H2S path 6 TDL

11:34 AM 4/14/2026 Montrose ONsite ML

Aligned H2S and HCN path 5TDL

11:55 AM 4/23/26 ONTERRIS ONSITE EO

Restarted and Troubleshoot UV Path 6

12:15 PM 4/29/26 ONTERRIS ONSITE CF

REPLACE FILTERS ON BOTH UVS & REALIGNED

SWAPPED ARDUINO PORTS UV 1 & 5

ALIGNED PATH 5 TDLS, CLEANED RETRO

1:00 PM 5/4/26 ONTERRIS ONSITE EO

ALIGNED UV PATH 1

10:44 am 5/14/2026 Onterris Onsite ML

Aligned HCN path 1 TDL

Replaced bulbs for UV path 1 & 6

Aligned HCN path 5 TDL

Replaced Bulb in UV path 5 and realigned

12:31 PM 5/18/26 ONTERRIS ONSITE CF

ALIGNED PATH 6 TDLS

ALIGNED PATHE 5 TDLS, CLEANED RAIN FROM RETRO

11:19 am 5/26/2026 Onterris ONsite ML

Aligned HCN path 5 TDL

Aligned UV path 5

2:00 PM 6/01/2026 Onterris Onsite EO

Aligned H2S & HCN PATH 5

11:30 AM 6/15/26 ONTERRIS ONSITE CF

QUARTERLY CALIBRATION OF TDLS

1:30 PM 6/16/2026 Onterris Onsite ML CS

UVDOAS Quarterly Calibrations UV path 1,5,& 6

12:14 PM 6/22/2026 Onterris Onsite ML MF

Aligned H2S and HCN path 6 TDL

Fixed No data on sensor tab uv path 6

Aligned UV path 1

11:00 am 6/26/2026 Onterris Onsite ML

Aligned H2S path 6 TDL

Checked arduino port on UV path 1 (Damaged and needs to be replaced)

12:40 PM 6/29/2026 Onterris Onsite EO

Aligned both TDL'S FOR PATH 1.

Decreased power for H2S Path 6.

Data back - up for UV Path 5.

5:33 pm 6/29/2026 Onterris Onsite ML CS

Aligned H2S path 6 TDL

Arduino port maintenance UV path 1 & UV path 6

12:08 PM 4/9/26 MONTROSE ONSITE CF

CLEAND PATH 4 RETROS

SWAPPED ARDUINO PORTS PATH 4 UV

DUSTED SHELTER 4

10:52 AM 4/14/2026 Montrose ONsite ML

Aligned H2S and HCN path 3 TDL

11:42 am Montrose osite ML

Aligned h2s and HCN path 4 TDL

1:38 PM 4/27/26 Onterris Onsite MF

Aligned UV Path 3

12:15 PM 4/29/26 ONTRERRIS ONSITE CF

REPLACED FILTERS ON ALL UVS, CLEANED RETROS & REALIGNED

SWAPPED ARDUINO PORTS ON UV 2 & 4

ALIGNED PATH 4 TDLS & CLEANED RETROS

1:00 PM 5/5/26 ONTERRIS ONSITE EO

ALIGNED UV PATH 3, HCN & H2S PATH 2

11:19 am 5/14/2026 Onterris Onsite ML

Aligned H2S path 4 TDL

Replaced bulb in UVpath 4 and Aligned

11:30 am 5/14/2026 Onterris Onsite ML

Aligned H2S path 2 TDL

Reaplced bulb in UV path 2 & 3

12:45 PM 5/18/26 ONTERRIS ONSITE CF

ALIGNED PATH 2 TDLS

CLEANED RETRO PATH 4 TDLS

11:55 am 5/26/2026 Onterris Onsite ML

Aligned UV path 3

Aligned H2S path 2 TDL

Aligned HCN and H2S path 4 TDL

Power cycled TDL shelter 3

10:00 AM 6/08/2026 Onterris Onsite EO

Aligned HCN's Paths 2,3 & 4 TDLS

Aligned H2S Path 3

1:28 PM 6/09/2026 TAS Onsite Matt

replaced fft at tdl path 4

12:30 PM 6/15/26 ONTERRIS ONSITE CF

QUARTERLY CALIBRATION OF TDLS

12:30 PM 6/16/2026 Onterris Onsite ML

UVDOAS Calibrations UV path 2,3,& 4

Data backup UV path 2

12:18 PM 6/22/2026 Onterris Onsite ML MF

Aligned Uv path 4

Data backup UV path 3

11:04 am 6/26/2026 Onterris Onsite ML

Data backup UV path 4

12:40 PM 6/29/2026 Onterris Onsite EO

Aligned HCN PATH 4.

Aligned UV Path 3.

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

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-14
Revision Number: R0
Implementation Date: February 07, 2024
Form Owner (Department): MAQS
Form Approval: AHeitmann

Non-Conformance Report

Project: PROJ-062420	**Month: June 2026**

LOCATION/SITE: Phillips 66 Denver Terminal	**Parameter(s) Affected: Benzene Path 6**
Begin Date and Time (LST):06/07/26 06:14am	**End Date and Time (LST): 06/11/26 12PM**
Equipment: UVDOAS Path 6	**S/N#:**

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

The instrument stopped reporting data.

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).

A technician went on site and noticed that the computer was not working.

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

A new computer was ordered, received and installed.

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** _____ **No** _x_ If so, **date** _____

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

Additional notes on Data Validity Status: No data was collected during that time

Originator's Signature: **Katia Liangou**

QA Review: James Garrett

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-14
Revision Number: R0
Implementation Date: February 07, 2024
Form Owner (Department): MAQS
Form Approval: AHeitmann

Non-Conformance Report

Project: PROJ-062420	**Month: June 2026**

LOCATION/SITE: Phillips 66 Denver Terminal	**Parameter(s) Affected: Benzene Path 5**
Begin Date and Time (LST):06/10/26 10:14am	**End Date and Time (LST): 06/11/26 12PM**
Equipment: UVDOAS Path 5	**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 UV instrumentation audit the UV DOAS Path 5 cell broke.

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).

The auditor informed the PM from Onterris

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

A new UV QA Cell was ordered, received and installed.

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** _____ **No** _x_ If so, **date** _____

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

Additional notes on Data Validity Status: No data was collected during that time

Originator's Signature: **Katia Liangou**

QA Review: James Garrett

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): 6/15/26

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	438	12.4
2	500	394	21.2
3	500	398	20.4
4	500	404	19.2
5	500	414	17.2
Averages	500	410	18.1

	Calculated Values	Expected Values
Overall Percent Precision	96.5%	**≥ 80%**
Overall Percent Error	18.1%	**≤ 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): 6/15/26

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)	410 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	410	282	31.2
2	410	322	21.4
3	410	292	28.8
4	410	300	26.8
5	410	314	23.4
Averages	410	302	26.3

	Calculated Values	Expected Values
Overall Percent Precision	97.4%	**≥ 80%**
Overall Percent Error	26.3 %	**≤ 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

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): 6/16/26

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	430	14
2	500	404	19.2
3	500	410	18
4	500	422	15.6
5	500	420	16
Averages	500	417	16.6

	Calculated Values	**Expected Values**
Overall Percent Precision	97.9 %	**≥ 80%**
Overall Percent Error	16.6 %	**≤ 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

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

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): 6/15/26

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)	410 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	410	434	5.9
2	410	394	3.9
3	410	370	9.8
4	410	376	8.3
5	410	370	9.8
Averages	410	389	7.5

	Calculated Values	Expected Values
Overall Percent Precision	95.7 %	**≥ 80%**
Overall Percent Error	7.5 %	**≤ 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:
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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): 6/16/26

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	478	4.4
2	500	514	2.8
3	500	494	1.2
4	500	594	18.8
5	500	616	23.2
Averages	500	539	10.1

	Calculated Values	Expected Values
Overall Percent Precision	87.6 %	**≥ 80%**
Overall Percent Error	10.1 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

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

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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)	410 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	410	316	22.9
2	410	278	32.2
3	410	320	22
4	410	326	20.5
5	410	326	2-.5
Averages	410	313	23.6

	Calculated Values	**Expected Values**
Overall Percent Precision	96.8 %	**≥ 80%**
Overall Percent Error	23.6 %	**≤ 30%**

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

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

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	434	13.2
2	500	430	14
3	500	478	4.4
4	500	458	8.4
5	500	444	11.2
Averages	500	449	10.2

	Calculated Values	**Expected Values**
Overall Percent Precision	96.1 %	**≥ 80%**
Overall Percent Error	10.2%	**≤ 30%**

TDL Calibration Form

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

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

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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)	410 PPMM

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	410	434	5.9
2	410	434	5.9
3	410	438	6.8
4	410	420	2.4
5	410	424	3.4
Averages	410	430	4.9

	Calculated Values	Expected Values
Overall Percent Precision	98.8 %	**≥ 80%**
Overall Percent Error	4.9 %	**≤ 30%**

TDL Calibration Form

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

TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	408	18.4
2	500	390	22
3	500	370	26
4	500	386	22.8
5	500	396	20.8
Averages	500	390	22

	Calculated Values	**Expected Values**
Overall Percent Precision	97.2%	**≥ 80%**
Overall Percent Error	22 %	**≤ 30%**

TDL Calibration Form

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Notes:
Calibration verification passed.

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

TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 5/16/26

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)	410 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	410	392	4.4
2	410	430	4.9
3	410	466	13.7
4	410	438	6.8
5	410	428	4.4
Averages	410	431	6.8

	Calculated Values	**Expected Values**
Overall Percent Precision	95.8 %	**≥ 80%**
Overall Percent Error	6.8%	**≤ 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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	422	15.6
2	500	420	16
3	500	416	16.8
4	500	410	18
5	500	410	18
Averages	500	416	16.9

	Calculated Values	**Expected Values**
Overall Percent Precision	98.9%	**≥ 80%**
Overall Percent Error	16.9%	**≤ 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
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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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)	410 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	410	320	22
2	410	336	18
3	410	312	23.9
4	410	314	23.4
5	410	328	20
Averages	410	322	21.5

	Calculated Values	**Expected Values**
Overall Percent Precision	98.4 %	**≥ 80%**
Overall Percent Error	21.5 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
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Revision Number: Rev. 1	**Form Approval:** Katia Liangou

Notes:
Calibration verification passed.

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

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	460	3.3
2	445	450	1.1
3	445	458	2.9
4	445	454	2
5	445	458	2.9
Averages	445	456	2.5

	Calculated Values	**Expected Values**
Overall Percent Precision	99%	**≥ 80%**
Overall Percent Error	2.5%	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
Document Number: 331AA-OPS-FM-15	**Form Owner (Department):** MAQS
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Notes:
Calibration verification passed.

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

TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	984	2.5
2	1010	982	2.8
3	1010	982	2.8
4	1010	978	3.1
5	1010	978	3.1
Averages	1010	981	2.9

	Calculated Values	Expected Values
Overall Percent Precision	99.7 %	**≥ 80%**
Overall Percent Error	2.9 %	**≤ 30%**

TDL Calibration Form

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

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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): 9/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	424	4.7
2	445	414	7
3	445	414	7
4	445	424	4.7
5	445	410	7.9
Averages	445	417	6.2

	Calculated Values	**Expected Values**
Overall Percent Precision	98.5 %	**≥ 80%**
Overall Percent Error	6.2 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
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Notes:
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Operator Signature(s): 

Witness Signature(s): James Garrett

TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	956	5.3
2	1010	956	5.3
3	1010	952	5.7
4	1010	954	5.5
5	1010	954	5.5
Averages	1010	954	5.5

	Calculated Values	**Expected Values**
Overall Percent Precision	99.8%	**≥ 80%**
Overall Percent Error	5.5 %	**≤ 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:
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Operator Signature(s):  Witness Signature(s): James Garrett

TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	432	2.9
2	445	440	1.1
3	445	440	1.1
4	445	440	1.1
5	445	440	1.1
Averages	445	438	1.5

	Calculated Values	**Expected Values**
Overall Percent Precision	99.1%	**≥ 80%**
Overall Percent Error	1.5%	**≤ 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): 6/15/26

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	982	2.8
2	1010	982	2.8
3	1010	982	2.8
4	1010	982	2.8
5	1010	980	3
Averages	1010	982	2.8

	Calculated Values	Expected Values
Overall Percent Precision	99.9%	**≥ 80%**
Overall Percent Error	2.8 %	**≤ 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): 

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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): 6/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	442	0.7
2	445	440	1.1
3	445	442	0.7
4	445	442	0.7
5	445	442	0.7
Averages	445	442	0.8

	Calculated Values	**Expected Values**
Overall Percent Precision	99.8 %	**≥ 80%**
Overall Percent Error	0.8 %	**≤ 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): 6/15/26

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	982	2.8
2	1010	982	2.8
3	1010	982	2.8
4	1010	980	3
5	1010	980	3
Averages	1010	981	2.9

	Calculated Values	**Expected Values**
Overall Percent Precision	99.9 %	**≥ 80%**
Overall Percent Error	2.9 %	**≤ 30%**

TDL Calibration Form

Form Title: TDL Calibration Form	**Implementation Date:** August 8, 2024
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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): 6/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	440	1.1
2	445	440	1.1
3	445	440	1.1
4	445	442	0.7
5	445	440	1.1
Averages	445	440	1

	Calculated Values	**Expected Values**
Overall Percent Precision	99.8%	**≥ 80%**
Overall Percent Error	1 %	**≤ 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

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/15/26

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	988	2.2
2	1010	988	2.2
3	1010	988	2.2
4	1010	988	2.2
5	1010	988	2.2
Averages	1010	988	2.2

	Calculated Values	**Expected Values**
Overall Percent Precision	100 %	**≥ 80%**
Overall Percent Error	2.2 %	**≤ 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

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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): 6/15/26

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)	445 PPMM

File #	**Compound Concentration (PPMM)**	**Measured Concentration (PPMM)**	**Error (% Reading)**
1	445	414	7
2	445	416	6.5
3	445	418	6.1
4	445	416	6.5
5	445	418	6.1
Averages	445	416	6.4

	Calculated Values	**Expected Values**
Overall Percent Precision	99.6 %	**≥ 80%**
Overall Percent Error	6.4%	**≤ 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): 6/15/26

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	972	3.8
2	1010	974	3.6
3	1010	974	3.6
4	1010	970	4
5	1010	974	3.6
Averages	1010	973	3.7

	Calculated Values	Expected Values
Overall Percent Precision	99.8%	**≥ 80%**
Overall Percent Error	3.7%	**≤ 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

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): 6/19/26

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

Instrument Parameters	
Optical Path Length (meters)	452 m/ 0.047m
Maximum Intensity (%)	96.7
Integration Time (ms)	59

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	101	1
2	100	102	2
3	100	104	4
4	100	105	5
5	100	105	5
Averages	100	103	3.4

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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	98.2	**≥ 75%**
Overall Percent Error	3.4	**≤ 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): 6/19/26

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)	59

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	194	3
2	200	198	1
3	200	194	3
4	200	198	1
5	200	197	1.5
Averages	200	196	1.9

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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	98.9%	**≥ 75%**
Overall Percent Error	1.9%	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	92
Integration Time (ms)	56

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	108	8
2	100	116	16
3	100	105	5
4	100	112	12
5	100	79	21
Averages	100	104	12.4

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UVDOAS Calibration Form

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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	85.4	**≥ 75%**
Overall Percent Error	12.4	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	92
Integration Time (ms)	56

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	184	8
2	200	189	5.5
3	200	201	0.5
4	200	178	11
5	200	153	23.5
Averages	200	180	9.7

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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	91.1	**≥ 75%**
Overall Percent Error	9.7	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	85
Integration Time (ms)	57

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	81	19
2	100	114	14
3	100	123	23
4	100	128	28
5	100	134	34
Averages	100	116	23.6

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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	79.1	**≥ 75%**
Overall Percent Error	23.6	**≤ 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): 6/16/2026

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

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	85
Integration Time (ms)	57

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	195	2.5
2	200	226	13
3	200	241	20.5
4	200	237	18.5
5	200	236	18
Averages	200	227	14.5

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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	90.6	**≥ 75%**
Overall Percent Error	14.5	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	630 m/ 0.047m
Maximum Intensity (%)	99
Integration Time (ms)	40

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	100	0
2	100	116	16
3	100	110	10
4	100	117	17
5	100	113	13
Averages	100	111	11.2

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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	93.2	**≥ 75%**
Overall Percent Error	11.2	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

Montrose Air Quality Services
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UVDOAS Calibration Form

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Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	630 m/ 0.047m
Maximum Intensity (%)	99
Integration Time (ms)	40

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	186	7
2	200	214	7
3	200	218	9
4	200	220	10
5	200	217	8.5
Averages	200	211	8.3

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UVDOAS Calibration Form

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Revision Number: Rev. 0	**Form Approval:** Katia Liangou

	Calculated Values	**Expected Values**
Overall Percent Precision	92.9	**≥ 75%**
Overall Percent Error	8.3	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

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UVDOAS Calibration Form

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Revision Number: Rev. 0	**Form Approval:** Katia Liangou

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	46

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	84	16
2	100	81	19
3	100	71	29
4	100	84	16
5	100	83	17
Averages	100	80.6	19.4

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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	94.5	**≥ 75%**
Overall Percent Error	19.4	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	46

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	157	21.5
2	200	157	21.5
3	200	153	23.5
4	200	163	18.5
5	200	159	20.5
Averages	200	158	21.1

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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	98.2	**≥ 75%**
Overall Percent Error	21.1	**≤ 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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	61

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	100	80	20
2	100	87	13
3	100	90	10
4	100	96	4
5	100	87	13
Averages	100	88	12

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

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	94.2	**≥ 75%**
Overall Percent Error	12	**≤ 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

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): 6/16/26

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

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	96
Integration Time (ms)	61

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	**Benzene Concentration (PPM)**	**Measured Concentration (PPM)**	**Error (%)**
1	200	173	13.5
2	200	180	10
3	200	189	5.5
4	200	181	9.5
5	200	202	1
Averages	200	185	7.9

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

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	94.5	**≥ 75%**
Overall Percent Error	7.9	**≤ 30%**

Notes:
Calibration verification passed.

Operator's Signature Katia Liangou

Witness's Signature James Garrett

F. Appendix F: Audits

Air Monitoring Program Audit Report

Third Quarter 2026 Performance Audit

Prepared for: Phillips 66
3960 W 56th Ave.
Commerce City, CO 80022

Prepared by: Onterris Air Quality Services
9100 2nd ST NE, Suite 200
Albuquerque, Colorado 87114

Audit Date: July 17, 2026
Submittal Date: July 31, 2026

9100 2nd St NE, Suite 200
Albuquerque, NM, USA 87114
T: +1.505.830.9680
Onterris.com

For Planet & Progress™

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Executive Summary

Onterris Air Quality Services (Onterris) conducted a field performance audit on the meteorological tower at Phillips 66 on July 17, 2026. The tower is in Pueblo, Colorado, and measures wind direction, wind speed, temperature, precipitation, relative humidity, solar radiation and barometric pressure.

Site coordinates for the meteorological tower are provided in Table E.1 and the tower location is shown in Figure E.1.

Table E.1 Site Information for Phillips 66 Meteorological Tower

Site ID	North Latitude, deg	West Longitude, deg	Elevation, feet
Met 1	39.796738	-104.945296	5,167

Brief results summaries are presented in the following text.

Wind Direction: Sensor responded within audit criteria for torque, linearity and alignment.

Sigma Theta: Sigma theta test responded within audit criteria.

Wind Speed: Sensor responded within audit criteria for the synchronous motor and the bearing torque tests.

Temperature: Sensors responded within audit criteria.

Relative Humidity: Sensor responded within audit criteria.

Barometric Pressure: Sensor responded within audit criteria.

Figure E.1 Phillips 66 Met Tower Location

1 Introduction

Onterris Air Quality Services (Onterris) conducted a field performance audit on the Phillips 66 Met 1 meteorological tower on July 17, 2026. The purpose of the performance audit was to check the accuracy of the meteorological sensors against calibrated equipment.

The Phillips 66 meteorological tower is located on Phillips 66 property in Pueblo, Colorado. Onterris provided the auditor and audit assistant for the field audit. Onterris provided all test instrumentation and tools required to conduct audits of each sensor. The above measures ensure the requirements for independence as specified by the EPA Quality Assurance Guidelines.

The Phillips 66 meteorological station collects data for wind direction, wind speed, temperature, relative humidity, and barometric pressure. Table 1.1 details the parameters measured at the tower, along with technical details of sensor placement and specifications.

Table 1.1 Phillips 66 Meteorological Sensors Technical Data

Parameter	Sensor Height Above Ground Level, m	Manufacturer	Model Number	Serial Number	Operating Range
Wind Direction	10.0	Met One	020D	D14548	0° to 360°
Wind Speed	10.0	Met One	010C	D14298	0 m/s to 50 m/s
Temperature	2.0	Met One	065	D15619	-30°C to 50°C
Relative Humidity	2.0	Met One	083F-0-35	D14154	0% to 100%
Barometric Pressure	2.0	Met One	092	C18610	600 – 1100 mbar

The procedures followed by the auditors conform to those specified in the following technical references:

- Title 40 CFR, Part 58, Appendix B: Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring.
- EPA Quality Assurance Handbook for Air Pollution Measurement Systems: “Volume IV: Meteorological Measurements Version 2.0” (EPA-454/B-08-002, March 2008)

Each meteorological sensor was evaluated based on the comparison of performance versus the guidelines above.

The audit results and supporting documentation are presented in the remainder of this report. Section 2.0 presents detailed sensor readings, audit values, and accuracy criteria. Section 3.0 presents a summary of results and recommendations for the meteorological tower. Appendix A contains the criteria used to determine the accuracy of response of each sensor, per EPA PSD criteria and manufacturer’s specifications. Quality assurance procedures are contained in Appendix

B. The audit field logs are presented in Appendix C. The audit equipment calibration certifications are in Appendix D.

2 Performance Results

The following tables present the performance results for each sensor at the Phillips 66 Met 1 tower.

Table 2.1 Wind Direction Linearity and Torque

Data Point	Calibration Wheel Direction, deg	Sensor Output, deg	Difference [1], deg	CW Bearing Torque[2], g-cm	CCW Bearing Torque[2], g-cm
1	0	1	-	< 3	< 3
2	30	30	-1		
3	60	61	+1		
4	90	91	0		
5	120	122	+1		
6	150	152	0		
7	180	183	+1		
8	210	215	+2		
9	240	245	0		
10	270	275	0	Slope:	1.0108
11	300	304	-1	Intercept:	9.1282
12	330	333	-1	R^2:	0.9999

"Notes: 1 The difference at a given data point (n) is calculated as
[Sensor Output at Data Point (n+1)] – [Sensor Output at Data Point (n)] – 30°,
where 30° represents the ideal difference between each sequential Data Point. Acceptance criteria is ± 5°
2 Acceptance criteria is ≤ 6.45 g-cm"

Table 2.2 Wind Direction Alignment Accuracy

Reference Point	Audit Output, deg	Sensor Output, deg	Difference [1], deg	Acceptance Criteria, deg	Magnetic Declination, deg
Cross Arm	90	89	-1	± 5	8.1
Reciprocal	270	272	+2	± 5	8.1
Method Used for Audit Wind Direction Bearing:			X Compass	__ Transit /Compass	__Transit/Solar Angles

Note: 1 Difference = (Sensor Output) – (Audit Output).

Table 2.3 Sigma Theta of Wind Direction

Start-End Times:	0915 - 0920
Sigma Theta	
Sensor Output, deg	15.10
Calculated, deg	15.00
Difference (Sensor – Calculated), deg	**+0.1**
Acceptance Criteria, deg	± 5
Average Wind Direction	
Sensor Output, deg	19.01
Calculated, deg	17.00
Difference (Sensor – Calculated), deg	**+2.01**
Acceptance Criteria, deg	± 5

Table 2.4 Wind Speed Synchronous Motor and Torque Test

Synchronous Motor Test					Bearing Torque Test		
Audit Motor Speed, rpm	Expected Speed, m/s	Sensor Speed, m/s	Difference[1], %	Acceptance Criteria	CW Torque, g-cm	CCW Torque, g-cm	Acceptance Criteria, g-cm
0	0.27	0.27	0.00	0.25 m/s at wind speeds < 5 m/s	< 0.2	< 0.2	≤ 0.216
600	16.27	16.27	0.00	± 5% at wind speeds ≥ 5 m/s			
1800	48.27	48.27	0.00				

Note: 1 Percent difference = [(Sensor Speed – Expected Speed)/Expected Speed] *100%

Table 2.5 Temperature

Type of Comparison	Collocated Audit Thermometer Output, °C	Sensor Output, °C	Difference (Sensor – Audit), °C	Acceptance Criteria, °C
1	31.0	30.8	-0.2	± 1.0
2	31.0	30.8	-0.2	± 1.0
3	30.5	30.5	0.0	± 1.0

Table 2.6 Relative Humidity

Repetition Number	Collocated Audit Output, %RH	Sensor Output, %RH	Difference, %RH	Acceptance Criteria, %RH
1	31.9	30.5	-1.4	± 7
2	32.0	31.1	-0.9	± 7
3	30.0	30.8	0.8	± 7

Table 2.7 Barometric Pressure

Repetition Number	Audit Pressure, mbar	Sensor Pressure, mbar	Absolute Difference, mbar	Acceptance Criteria, mbar
1	844.1	844.6	0.5	± 3.0
2	844.1	844.6	0.5	± 3.0
3	844.1	844.6	0.5	± 3.0

3 Summary and Recommendations

Below is a summary of the results of Phillips 66 meteorological tower performance audit and recommendations for future action.

Wind Direction:	Sensor responded within audit criteria for torque, linearity.
Sigma Theta:	Sigma theta test responded within audit criteria. No recommendations.
Wind Speed:	Sensor responded within audit criteria for the synchronous motor and the bearing torque tests. No recommendations.
Temperature:	Sensors responded within audit criteria. No recommendations.
Relative Humidity:	Sensor responded within audit criteria. No recommendations.
Barometric Pressure:	Sensor responded within audit criteria. No recommendations.

Appendix A EPA Accuracy Criteria and Manufacturer's Specifications

Table A.1 contains the EPA PSD accuracy criteria and manufacturer's specifications used to determine the accuracy of each sensor response.

Table A.1 Summary of Accuracy Criteria and Manufacturers Specifications

Parameter	PSD / Modeling Criteria	Manufacture Specifications (Varies Depending on Model)
Horizontal Wind Direction		
Accuracy	± 5°	--
Bearing Torque	--	≤ 6.45 gram-cm
Sigma Theta of Wind Direction	± 5°	--
Horizontal Wind Speed		
Accuracy	±0.25 m/s at wind speeds < 5 m/s ± 5% at wind speeds ≥ 5 m/s (Maximum error 2.5 m/s)	--
Bearing Torque	--	≤ 0.216 gram-cm
Temperature	± 1 °C	--
Relative Humidity	± 7%	--
Barometric Pressure	± 3.0 mbar	--

Appendix B Audit Procedures

B Quality Assurance Procedures for Meteorological Stations

Each meteorological sensor is evaluated based on the comparison of performance versus the EPA guidelines and manufacturer specifications. If any performance values are outside the recommended ranges, the results are immediately reported to field personnel so that any field repair and/or re-calibrations can be performed expeditiously. The formal written report will include these results for documentation purposes.

Each meteorological sensor is calibrated using procedures specifically designed to test its accuracy of response. General descriptions are given below. The procedures used by Onterris to audit the meteorological sensors reflect the requirements described in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems: “Volume IV: Meteorological Measurements Version 2.0.”

Upon arrival at the site, each variable is observed for reasonableness. Next the appropriate channels are taken offline and the audit manipulations to each sensor are conducted. While manipulating each sensor, the data logger sensor outputs are recorded and compared to audit input values. If the bias between the audit and site values exceeds the prescribed limits, the appropriate troubleshooting is conducted to determine the cause of the discrepancy. At the completion of the field performance audit, the sensors are put back online and are checked for reasonableness.

B.1 Check of Sensor Heights

The height of each sensor above ground is measured with a standard tape measure. The auditor may use a tripod mounted transit in conjunction with a tape measure for taller towers. The measured heights are then compared to those stated in the air monitoring program plan.

B.2 Wind Direction

B.2.1 Vane Calibration

The wind vane orientation marker's stated azimuth is checked using the following technique. The solar azimuth angle technique is used to determine a known direction (solar azimuth). This measurement is conducted using a surveyor's transit mounted either on a field tripod or directly onto the wind direction sensor mounting plate. The auditor records the solar azimuth, elevation, date and time to verify accuracy. The auditor determines solar azimuth (sun angle) in degrees from true north based on solar ephemeris tables. The solar tables are specific to the site for current date and time. The transit is then used to measure the angle to a local topographical point or the sensor on the crossarm. This point will become the reference marker. The difference between that value and the known solar azimuth is used to determine a calculated azimuth angle for the reference marker. The now known azimuth for the reference marker is then used in a like manner to determine the orientation of the set pin of the sensor mounting plate. The solar azimuth check is normally done only once to establish a known direction for measurement of the orientation of the reference marker. A minimum of two reference points are taken for this test. In the event the solar azimuth

angle technique cannot be used, or simultaneous compass readings have been verified, the azimuth angles will be measured with compass bearings.

For determining compass bearings, the auditors utilize a Brunton pocket transit to measure the azimuth of each wind direction cross arm. The pocket transit compass is set to the local magnetic declination in degrees to establish the cross arm bearing from true north.

The wind direction sensor azimuth bearings are recorded with the wind vane aligned with the cross arm in both directions. The sensor outputs are compared to the measured true north bearings to determine accuracy.

B.2.2 Sensor Linearity and Overall Accuracy

The wind sensor's ability to measure winds from any direction is tested by visually aligning the sensor with the reference markers established above. The sensor output values from the data logger are recorded and compared to the previously determined azimuths. An additional check for accuracy is conducted by checking the cross-arm alignment to ensure further accuracy. In order to perform the cross-arm alignment, the wind vane is aligned with the cross arm, and the corresponding sensor output is recorded.

The horizontal wind direction sensor is checked for accuracy of response by aligning the wind vane with the crossarm. The crossarm bearings are measures with a pocket transit compass set to a local magnetic declination in degrees to establish the cross arm bearing from true north.

Sensor linearity is checked by removing the wind vane and replacing the vane with a protractor and vane angle fixture whenever available and is the preferred method. The sensor will be manipulated on the vane angle fixture and protractor at 30-degree intervals. The sensor manipulation will start at the zero-degree value and end at the 360-degree value for a total of twelve points.

B.2.3 Sigma Theta Test

The wind direction sigma theta check is a test of the data logger sigma theta calculation. Any system errors attributable to the program algorithm and/or the signal from the sensors would be detected in the sigma theta output to the data logger. The sigma theta test is conducted by fixing the wind vane at a given direction for a given period and then moving the vane approximately 30 degrees for the same period of time. This interval is selected to correspond to one averaging period of the data logger. During this time, the wind speed sensor is set to a constant non-zero output on the logger. Installations that have a zero (0.0) wind speed output when the cups are removed will be set at a constant rotation of 300 to 600 rpm depending on the sensor transfer standard. Sensor output of the sigma theta and average wind direction are recorded from the data logger and compared to the expected calculated values.

B.2.4 Starting Threshold Torque

The wind vane's starting threshold torque is measured using a NIST calibrated torque gauge. The gauge is applied to the wind vane shaft at the sensor's center of rotation and then a constant force is applied. The test is repeated 3-4 times, beginning at different points for a 360-degree rotation. The highest value (grams-cm) observed during the test is recorded as the torque of the sensor.

B.3 Horizontal Wind Speed

B.3.1 Sensor Calibration

The sensor is audited by removing the anemometer cups and applying a constant rate of rotation in the normal direction of spin, using a synchronous motor. This is done by connecting the motor shaft to the anemometer shaft using a non-rigid, non-slip connector. Using the anemometer specifications, the rpm is converted to wind speed and is compared to the sensor instantaneous output values recorded by the data logger.

B.3.2 Starting Threshold Torque

The starting threshold torque measurement of the anemometer shaft follows the same procedure as that described for the horizontal wind direction. Due to the lower resistance of the wind speed sensor, a more sensitive torque watch is used.

B.4 Temperature

The tower-mounted temperature sensor is audited using a single point ambient collocation with a NIST-traceable digital thermometer. This thermometer has a range of -40 to 150 °C in 0.1 °C graduations. The equilibrated thermometer reading is compared to the instantaneous sensor output on the data logger. In addition, the aspirator is checked for proper ventilation by inspecting operation of the fans, if applicable, and checking the air pathway for obstructions.

B.5 Relative Humidity

The relative humidity sensor is checked for accuracy with a collocated digital sensor. The collocated test is performed by placing a second relative humidity sensor adjacent to and at the same level as the sensor located on the tower. The collocated sensor is carefully placed to match the exposure and setting of the tower sensor.

B.6 Barometric Pressure

The barometric pressure sensor is audited by placing a certified NIST-traceable barometer adjacent to and at the same level as the tower sensor. The barometric pressure readings from the collocated barometer are compared to those from the tower sensor to determine the accuracy of the sensor response.

Appendix C Audit Field Logs

Wind Direction Audit Log

Client: Philips 66	Site: Met 1		Date: 17-Jul-26
Sensor Manufacturer: Met One	Height: 10m	Model: 020D	S/N: D14548
Start Time:		Stop Time:	
Bearing Check	Torque Watch Manufacturer:		
Clockwise: < 3.0	Counter Clockwise: < 3.0		Acceptable Reading: ≤ 6.45

Azimuth Check

Reference Point	Compass Degrees	Sensor Output (Degrees)	Degrees Difference
Cross Arm Alignment	90	89	-1
Reciprocal	270	272	+2

Sigma Theta Test

Datalogger Start Time:	0915	Sensor Output:	2	Wheel Output:	0
Datalogger Stop Time:	0920	Sensor Output:	32	Wheel Output:	30
Sigma Theta Sensor: 15.10		Sigma Theta Calc: 15.00		Avg WD Sensor: 19.01	Avg WD Calc: 17.00

Linearity Check

Dial	Degrees	Delta Degrees	Dial	Degrees	Delta Degrees
0	1	-	210	215	+2
30	30	-1	240	245	0
60	61	+1	270	275	0
90	91	0	300	304	-1
120	122	+1	330	333	-1
150	152	0	360	3	0
180	183	+1	r= 0.9999	m= 1.0135	b= 0.4359

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

Audit Notes

Wind Speed Audit Log

Client: Philips 66	Site: Met 1		Date: 17-Jul-26
Sensor Manufacturer: Met One	Height: 10m	Model: 010C	S/N: D14928
Start Time:		Stop Time:	
Bearing Check	Torque Watch Manufacturer:		
Clockwise:	Counter Clockwise:		Acceptable Reading:

Synchronous Motor			
Manufacturer:	Model No:	S/N:	Date of Last Calibration:

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**	0.0
100					
300					
600			16.27	**16.27**	0.0
900					
1200					
1500					
1800			48.27	**48.27**	0.0

Data Verification Test			
Time of Test	Max Wind Speed	Max Wind Speed (DB)	Verified By

Audit Notes

Temperature Co-Located Audit Log

Client: Phillips 66	Site: Met 1		Date: 17-Jul-26
Sensor Manufacturer: Met One	Height: 2m	Model: 065	S/N: D15619
Start Time:		Stop Time:	
Field Thermometer Manufacturer:			

Co-Located Test				
	Repetition #1	Repetition #2	Repetition #3	Repetition #4
Time				
Co-Located °C (A)	31.0	31.0	30.5	
Sensor Output °C (B)	30.8	30.8	30.5	
Difference °C (B-A)	-0.2	-0.2	0.0	

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

Audit Notes

Relative Humidity Co-Located Audit Log

Client: Phillips 66	Site: Met 1		Date: 17-Jul-26
Sensor Manufacturer: Met One	Height: 2m	Model: 083F-0-35	S/N: D14154
Start Time:		Stop Time:	

Co-Located Test				
	Repetition #1	Repetition #2	Repetition #3	Repetition #4
Time				
Co-Located % (A)	31.9	32.0	30.0	29.78
Sensor Output % (B)	30.5	31.1	30.8	30.75
Difference % (B-A)	-1.4	-0.9	0.8	1.0
Does the humidity sensor contain a motorized aspirator? ☐Yes ☐No ☐N/A				

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

Audit Notes

Barometric Pressure

Client: Phillips 66	Site: Met 1		Date: 17-Jul-26
Sensor Manufacturer: Met One	Height: 2	Model: 092	S/N: C18610
Start Time:		Stop Time:	

NIST Barometer Comparison			
Field Barometer Manufacturer:		Mode:	S/N:
Date of Last Comparison to NIST Barometer:			

Co-Located Test				
	Repetition #1	Repetition #2	Repetition #3	Repetition #4
Time				
Co-Located NIST (A)	844.1	844.1	844.1	
Sensor Pressure (B)	844.6	844.6	844.59	
Absolute Difference	0.5	0.5	0.5	

Audit Notes

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

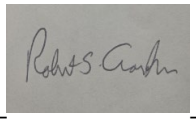
Audit Checklist

Business Name: ____P-66_____
Audit Period: __June 8-11 2026 on site plus historical data_____
Auditor's Name: ____Robert S. Crampton Ph.D._____
Date: _____July 8 2026

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 only
Check calibration verification	Passed	
Check housekeeping	Passed	
Check historical data	Passed	
Check instrument parameters (e.g. laser, UV bulb etc.)	Passed	
Check if additional maintenance is required	No	

Comments:__
All units Had good UV signal to noise level to perform as designed
Have suggested to Cerex to make software setting easier to Calibrate

Auditor's Signature: ____  _____

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: June 2-5, 9, 2026
Auditor's Name: Randy Gibbons, Terra Applied Systems
Date: July 31, 2026

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	All paths have adequate signal. Noise levels appear acceptable. Most reflectors show some abrasion.
Check if data is collected	PASS	Scripts are running and reporting.
Check if scripts are running correctly	PASS	
Check if instruments are aligned	PASS	Alignment verified and some adjusted.
Check calibration verification	PASS	Initial response checks showed responses.
Check housekeeping	PASS	Light dust on scopes and optics. Spider webs in optical paths causing noise. Follow up on spider prevention.
Check historical data	PASS	Recording.
Check instrument parameters (e.g. laser, UV bulb etc.)	PASS	Collected
Check if additional maintenance is required		Performed some maintenance and follow-up.

Auditor's Signature: