

Quarterly Report for Phillips 66 Denver Terminal Fenceline Monitoring Plan-Q3 2025

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

Prepared By:
Montrose 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

Document Number: 317AA-043819-RT-1068
Submittal Date: October 27, 2025

Table of Contents

Executive Summary	5
Contact Information	5
Methods.....	5
Site Description.....	5
Instrument Description.....	5
System Design.....	8
Data Validation and QA/QC Procedures.....	10
Results.....	16
Monthly Data Summary.....	16
Summary of Invalidated Data.....	18
Discussion of Invalidated Data.....	18
Discussion of Results.....	18
Summary Plots.....	19
Discussion of Changes to Monitoring System, Operations, and/or Procedures.....	31
Appendices.....	31
Appendix A: Calibration and QA/QC Data.....	31
Appendix B: Qualifier Codes.....	33
Appendix C: Field Data Sheets.....	35
Appendix D: Non-Conformance/Corrective Action Data Sheets.....	36
Appendix E: Calibration Verification Forms.....	37

Table of Figures

Figure 1: Approximate Layout of the Open-Path Analyzers, Retroreflector Locations, and Meteorological Station.....	9
Figure 2: Timeseries of Benzene Path 1.....	19
Figure 3: Timeseries of H ₂ S Path 1.....	19
Figure 4: Timeseries of HCN Path 1.....	20
Figure 5: Timeseries of Benzene Path 2.....	20
Figure 6: Timeseries of H ₂ S Path 2.....	21
Figure 7: Timeseries of HCN Path 2.....	21
Figure 8: Timeseries of Benzene Path 3.....	22
Figure 9: Timeseries of H ₂ S Path 3.....	22
Figure 10: Timeseries of HCN Path 3.....	23
Figure 11: Timeseries of Benzene Path 4.....	23
Figure 12: Timeseries of H ₂ S Path 4.....	24
Figure 13: Timeseries of HCN Path 4.....	24
Figure 14: Timeseries of Benzene Path 5.....	25
Figure 15: Timeseries of H ₂ S Path 5.....	25
Figure 16: Timeseries of HCN Path 5.....	26
Figure 17: Timeseries of Benzene Path 6.....	26
Figure 18: Timeseries of H ₂ S Path 6.....	27
Figure 19: Timeseries of HCN Path 6.....	27
Figure 20: Temperature Timeseries.....	28
Figure 21: Relative Humidity Timeseries.....	28
Figure 22: Barometric Pressure Timeseries.....	28
Figure 23: Wind Rose Plot.....	29
Figure 24: Benzene Box Plots for Paths 1 to 6.....	29
Figure 25: H ₂ S Box Plots for Paths 1 to 6.....	30
Figure 26: HCN Box Plots for Paths 1 to 6.....	30

Table of Tables

Table 1: Performance Specifications for Installed Meteorological Sensors.....	8
Table 2: Descriptions of Each Individual Path.....	9
Table 3: List of Automated Quality Control Parameters and Corresponding Evaluation Criteria.....	11
Table 4: UV DOAS QC Checks.....	12
Table 5: TDL QC Checks.....	13
Table 6: Monthly Data Summary.....	17
Table 7: Verification Activities.....	32
Table 8: Percent Recovery for Meteorological Parameters.....	32
Table 9: List of Data Invalidation Codes.....	33

I. Phillips 66 Denver Terminal Fenceline Monitoring Plan Quarterly Report- Q3 2025

II. Executive Summary

This report summarizes the findings related to the Phillips 66 fenceline monitoring plan during the period of July 1st of 2024 to September 30th of 2025 (Q3 of 2025). The data collected during this period were validated following all procedures described in the Phillips 66 fenceline monitoring plan. This report includes tables with the validated and invalidated data, statistical analysis results and timeseries of the compounds of interest and meteorological parameters.

III. Contact Information

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 or 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 Cyanide¹, 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, range and resolution (Table 1) and have been deemed appropriate for use in the fenceline monitoring

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”.

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 ($^{\circ}$)	± 3	0 to 360
Temperature	Met One 065	Degrees of Celsius ($^{\circ}\text{C}$)	± 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 cyanide² and hydrogen sulfide² 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.

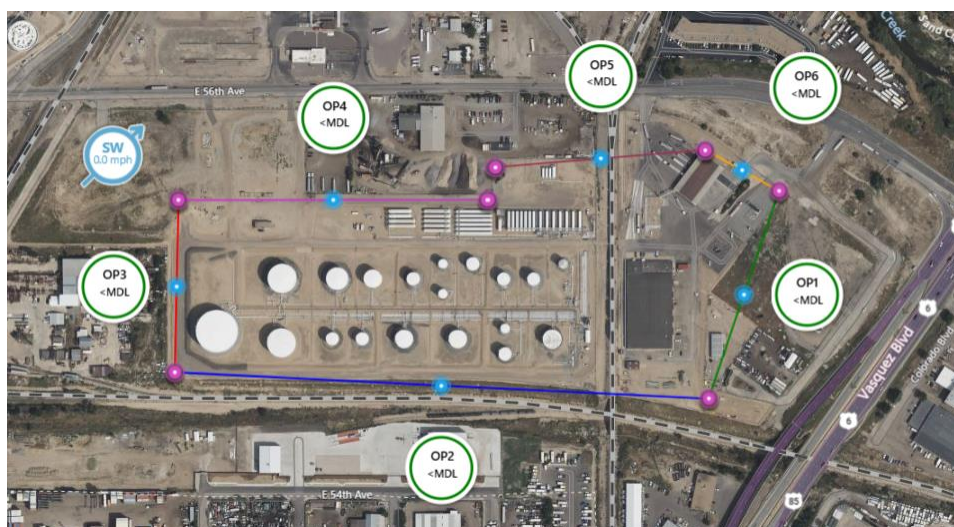


Figure 1: Approximate Layout of the Open-Path Analyzers, Retroreflector Locations, and Meteorological Station

Table 2: Descriptions of Each Individual Path

Path	Path Length	Compounds
------	-------------	-----------

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.

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		°C	35
TDL	MDL	Minimum detection limit	PPB	< 25% of alert threshold
	Absolute Signal	Detector Signal	mA	> 0.1
	Laser temperature stability	Absolute value of (laser temperature- laser temperature in long average) *100/ laser temperature in long average	%	< 5
	R	Peak correlation		> 0.8

-Instrument Quality Control Checks

Both the UV-DOAS and TDL systems are designed to require only modest service and maintenance. Section 5.4 of the FLMP summarizes the UV-DOAS and TDL maintenance activities as recommended by the manufacturer. These activities will help ensure data integrity and maximize up-time. For the UV-DOAS system, a calibration verification bump test is performed on a quarterly basis using a flow through cell. For the UV-DOAS system, precision is calculated by evaluating the variance of pollutant concentrations during a period of low atmospheric variability. Five-minute data are selected when concentrations are well above the minimum detection limit (MDL) during periods of low variability. The precision can then be determined by calculating the coefficient of variation (CV). For the UV-DOAS, robustness can be determined by

calculating the desired signal intensity in order for the benzene minimum detection limit to be lower than 25% of the notification threshold. If the measured signal intensity is found to be below the desired value, corrective action will be required (e.g., replace light source, instrument alignment, etc.). The QC checks for the UVDOAS are summarized in Table 4.

Table 4: UV DOAS QC Checks

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

Wind speed, wind direction, temperature, relative humidity and barometric pressure measurement systems will be aligned, tested and calibrated at the time of installation and at six-month intervals thereafter using test equipment traceable to NIST or other authoritative standards and following standard operating procedures. Calibrations are performed immediately following scheduled semi-annual meteorological audits and performance of scheduled preventive and/or corrective maintenance for the monitoring instruments. Following initial startup calibrations and continuing throughout the monitoring program, the field operator performs quarterly site checks on the meteorological monitoring systems. 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 Montrose’s local Denver office and are reviewed against the electronic data record on a monthly basis in support of data processing and validation. Monthly review of the field monitoring documentation will include:

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

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

“Level 3” data validation review is performed by senior project personnel other than the data processing analyst. During the Level 3 data validation process, data losses due to activity or instrument malfunction are corroborated against documentation noted by the station field operators on completed field forms. The field form record identifying data affected by these activities and events are 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
Jul-25	1	Benzene	0	0.3	0.8	1.1	1.5	10.8	1.3	0.53%	93.52%	1.5
Aug-25	1	Benzene	0	0.3	0.7	1.0	1.4	16.0	1.2	3.47%	98.88%	1.3
Sep-25	1	Benzene	0	0.2	0.5	0.8	1.1	10.7	0.9	6.34%	98.73%	1.0
Jul-25	1	H2S	0	0.7	5.2	8.9	15.6	69.3	12.1	0.16%	89.44%	12.7
Aug-25	1	H2S	0	0.5	4.5	7.3	11.8	48.1	9.2	0.00%	97.05%	10.5
Sep-25	1	H2S	0	0.8	4.6	6.9	10.7	49.4	8.7	0.05%	96.01%	9.8
Jul-25	1	HCN	0	0.0	0.3	0.7	1.3	16.9	1.0	0.12%	98.64%	1.0
Aug-25	1	HCN	0	0.0	0.2	0.4	0.9	5.8	0.7	0.00%	99.72%	0.6
Sep-25	1	HCN	0	0.0	0.2	0.3	0.4	2.1	0.3	0.00%	99.17%	0.4
Jul-25	2	Benzene	0	0.0	0.1	0.2	0.2	90.4	0.3	0.13%	96.94%	0.3
Aug-25	2	Benzene	0	0.0	0.1	0.3	0.6	24.6	0.4	0.00%	99.73%	0.5
Sep-25	2	Benzene	0	0.1	0.4	0.7	2.5	18.2	1.7	0.00%	80.84%	1.0
Jul-25	2	H2S	0	0.2	7.3	13.1	22.8	56.6	16.1	0.26%	90.98%	18.7
Aug-25	2	H2S	0	0.2	7.0	12.7	22.7	57.7	15.7	1.08%	90.31%	18.2
Sep-25	2	H2S	0	0.5	9.0	15.6	25.6	69.2	18.2	0.43%	84.10%	22.6
Jul-25	2	HCN	0	0.0	0.1	0.1	0.2	7.7	0.3	0.14%	96.06%	0.2
Aug-25	2	HCN	0	0.0	0.1	0.1	0.3	2.8	0.3	0.00%	99.16%	0.2
Sep-25	2	HCN	0	0.0	0.1	0.1	0.2	2.7	0.2	0.15%	98.98%	0.2
Jul-25	3	Benzene	0	0.2	1.6	2.3	3.3	110.6	2.7	0.87%	91.46%	3.3
Aug-25	3	Benzene	0	0.2	0.3	0.5	0.7	6.7	0.6	8.61%	99.53%	0.6
Sep-25	3	Benzene	0	0.2	0.4	0.5	0.7	4.4	0.6	8.61%	99.01%	0.6
Jul-25	3	H2S	0	0.8	6.9	11.7	20.0	89.0	15.5	0.00%	95.27%	16.7
Aug-25	3	H2S	0	0.4	6.9	11.3	17.9	80.6	14.3	0.02%	98.91%	16.2
Sep-25	3	H2S	0	0.9	8.3	14.9	25.7	126.0	20.0	0.19%	90.52%	21.3
Jul-25	3	HCN	0	0.0	0.2	0.4	0.6	6.3	0.6	0.13%	96.14%	0.5
Aug-25	3	HCN	0	0.0	0.2	0.4	1.0	8.2	0.8	0.05%	99.26%	0.6
Sep-25	3	HCN	0	0.0	0.2	0.3	0.6	9.7	0.6	0.07%	99.37%	0.5
Jul-25	4	Benzene	0	1.0	5.8	11.9	18.7	45.4	13.3	0.22%	99.87%	16.8
Aug-25	4	Benzene	0	2.7	6.4	10.9	18.4	54.6	13.2	0.63%	99.56%	15.1
Sep-25	4	Benzene	0	0.0	0.6	17.2	26.9	47.9	14.8	0.64%	97.82%	24.3
Jul-25	4	H2S	0	1.3	21.7	37.6	59.1	130.9	42.3	0.32%	70.97%	54.7
Aug-25	4	H2S	0	1.5	23.8	40.4	62.0	170.7	44.4	0.59%	65.90%	59.2
Sep-25	4	H2S	0	2.1	32.4	50.8	69.5	179.0	51.9	1.21%	66.29%	73.6
Jul-25	4	HCN	0	0.0	0.9	1.7	3.4	15.4	2.4	0.00%	97.19%	2.5
Aug-25	4	HCN	0	0.1	0.9	1.8	3.1	14.3	2.2	0.00%	99.37%	2.5
Sep-25	4	HCN	0	0.1	0.8	1.4	2.4	14.4	1.9	0.00%	99.46%	2.0
Jul-25	5	Benzene	0	0.2	0.5	0.6	0.8	5.1	0.7	10.44%	100.00%	0.8
Aug-25	5	Benzene	0	0.1	0.2	0.3	0.5	4.9	0.4	43.16%	99.98%	0.3
Sep-25	5	Benzene	0	0.1	0.2	0.3	0.5	3.3	0.4	48.04%	97.70%	0.3
Jul-25	5	H2S	0	2.4	12.7	19.1	27.8	56.2	20.9	0.00%	81.13%	27.9
Aug-25	5	H2S	0	1.4	12.0	18.1	26.4	74.8	20.2	0.08%	83.78%	26.2
Sep-25	5	H2S	0	1.2	10.7	16.7	25.5	61.0	19.0	0.23%	84.91%	23.9
Jul-25	5	HCN	0	0.2	1.1	1.8	2.8	11.1	2.2	0.46%	97.53%	2.6
Aug-25	5	HCN	0	0.2	1.2	1.8	3.0	15.0	2.5	0.43%	99.63%	2.6
Sep-25	5	HCN	0	0.2	0.8	1.3	1.9	8.9	1.5	0.13%	98.07%	1.8
Jul-25	6	Benzene	0	0.0	3.5	5.2	8.3	57.0	6.6	5.14%	54.53%	7.4
Aug-25	6	Benzene	0	0.0	0.2	0.3	1.8	63.9	1.8	43.36%	98.67%	0.4
Sep-25	6	Benzene	0	0.0	0.2	0.6	3.0	40.6	2.4	58.46%	98.82%	0.4
Jul-25	6	H2S	0	1.1	14.1	26.2	43.7	116.9	30.9	0.00%	92.93%	37.3
Aug-25	6	H2S	0	1.2	14.1	26.4	44.7	108.0	31.4	0.00%	94.93%	38.0
Sep-25	6	H2S	0	1.6	14.1	25.0	44.1	107.0	31.3	0.00%	92.34%	35.9
Jul-25	6	HCN	0	0.0	0.4	1.1	4.3	65.2	4.4	5.27%	70.65%	1.6
Aug-25	6	HCN	0	0.0	0.5	1.5	7.2	50.2	5.4	3.63%	97.48%	2.1
Sep-25	6	HCN	0	0.0	0.4	3.0	11.5	60.2	7.3	6.61%	99.20%	3.8

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_Q3 2025”. All 5min data have been validated based on the procedures described in the P66 fenceline monitoring plan.

C. Discussion of Invalidated Data

The data was validated based on the procedures mentioned in the fenceline monitoring plan. There was a high data invalidation rate for benzene Path 6 for the month of July. All instrument parameters were normal (integration time, peak match percentage, system temperature and pressure) but the minimum detection limit was zero which caused the data to be invalid. Montrose is investigating the reason for this issue and it is likely a CMS software issue that they are in the process of resolving. Path 4 H2S had a valid data percentage of approximately 65% during this quarter due to higher observed MDLs. Path 4 is next to an asphalt plant and dust can affect the MDLs. Phillips 66 does not store nor produce H2S.

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 4.2 ppb, for H2S the average median MDL value was approximately 29.1 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

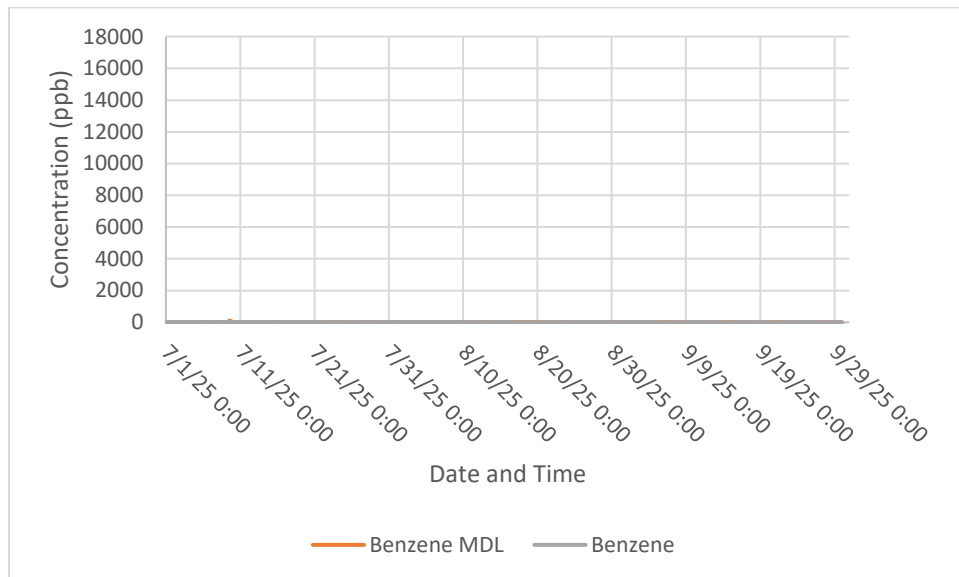


Figure 2. Timeseries of Benzene Path 1

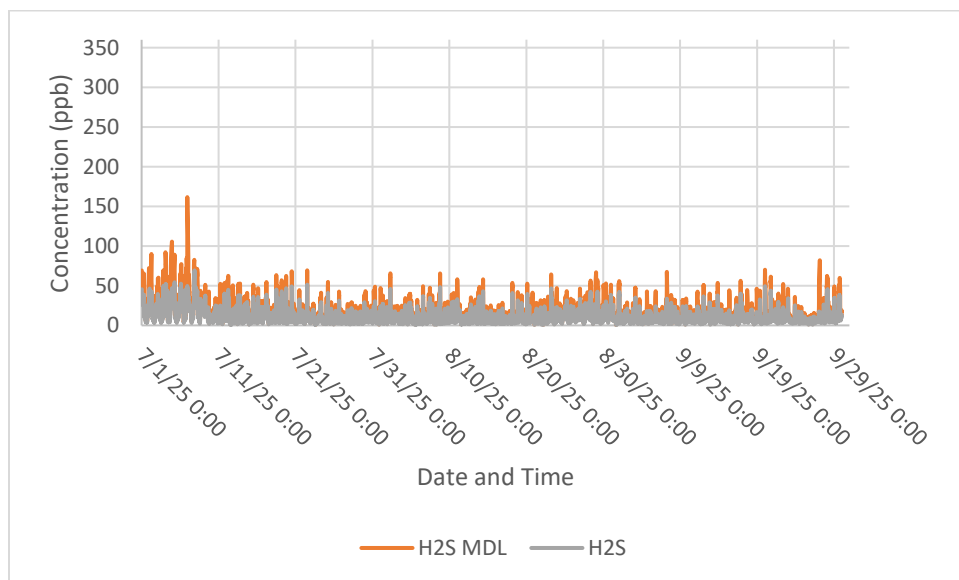


Figure 3. Timeseries of H₂S Path 1

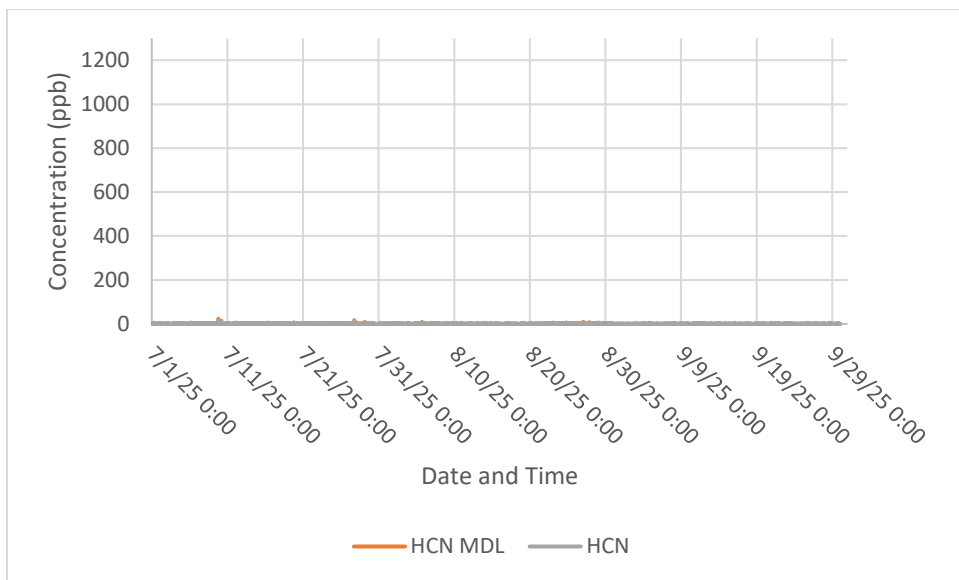


Figure 4. Timeseries of HCN Path 1

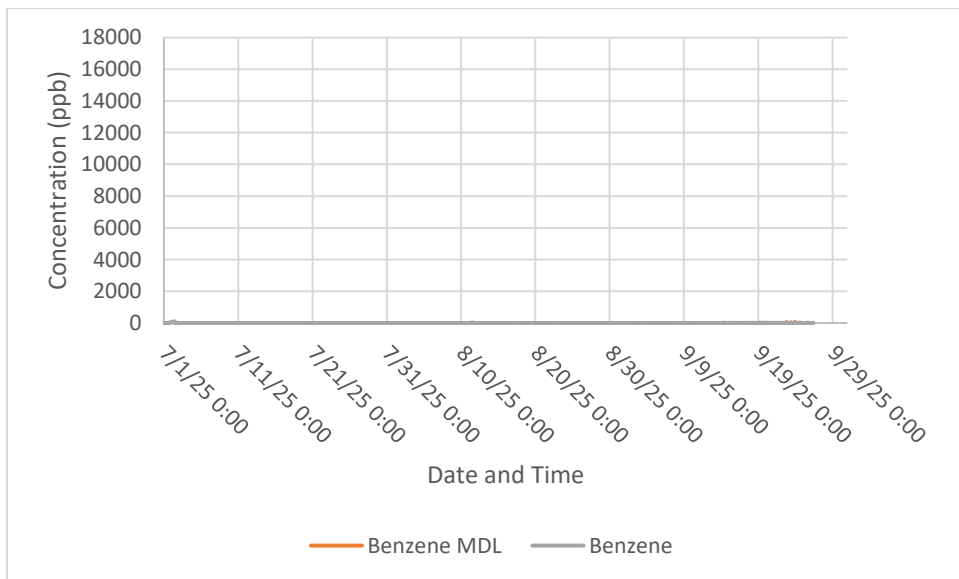


Figure 5. Timeseries of Benzene Path 2

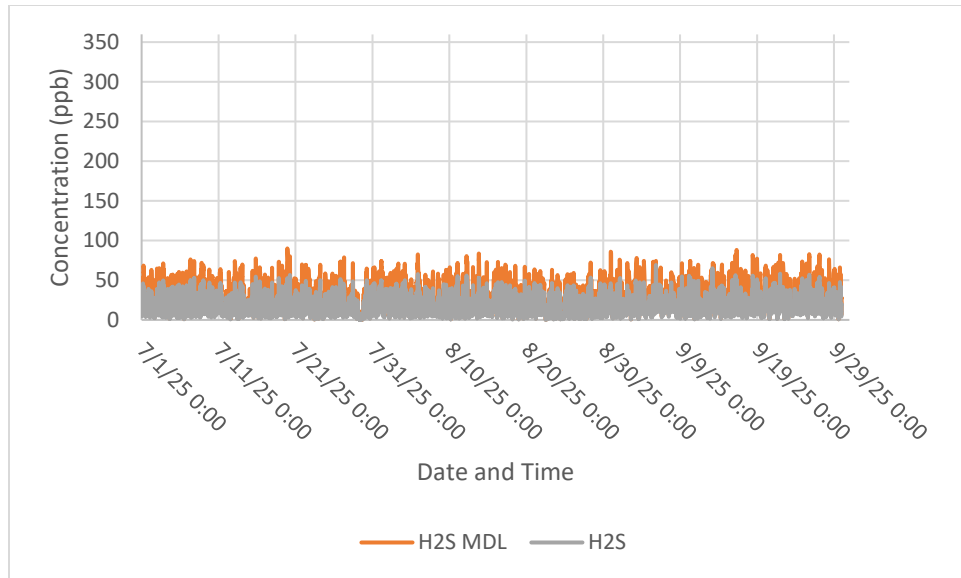


Figure 6. Timeseries of H₂S Path 2

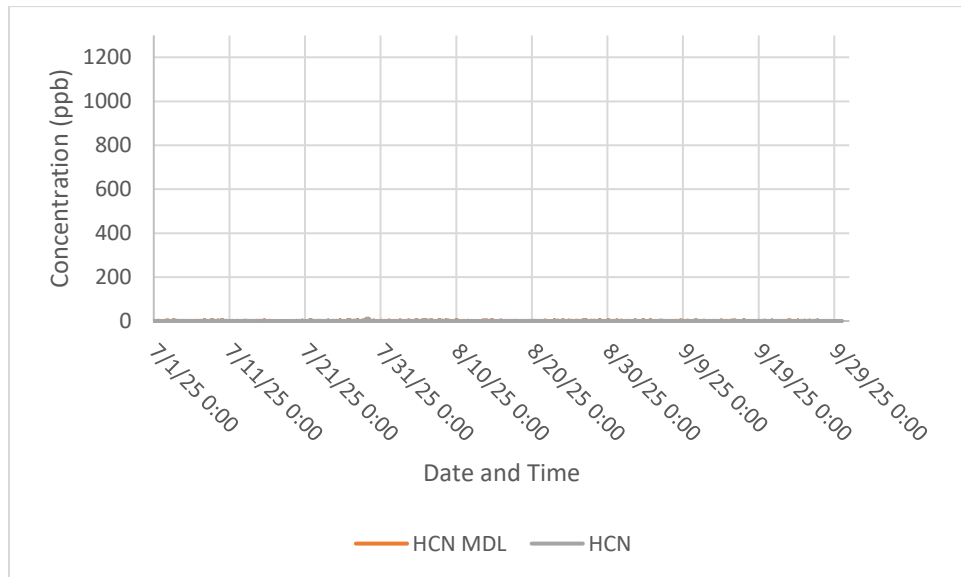


Figure 7. Timeseries of HCN Path 2

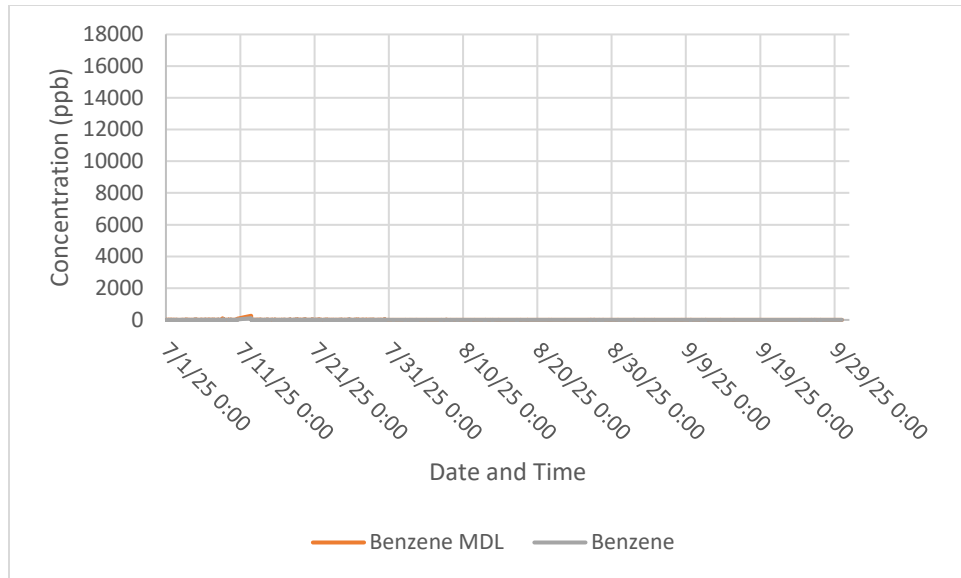


Figure 8. Timeseries of Benzene Path 3

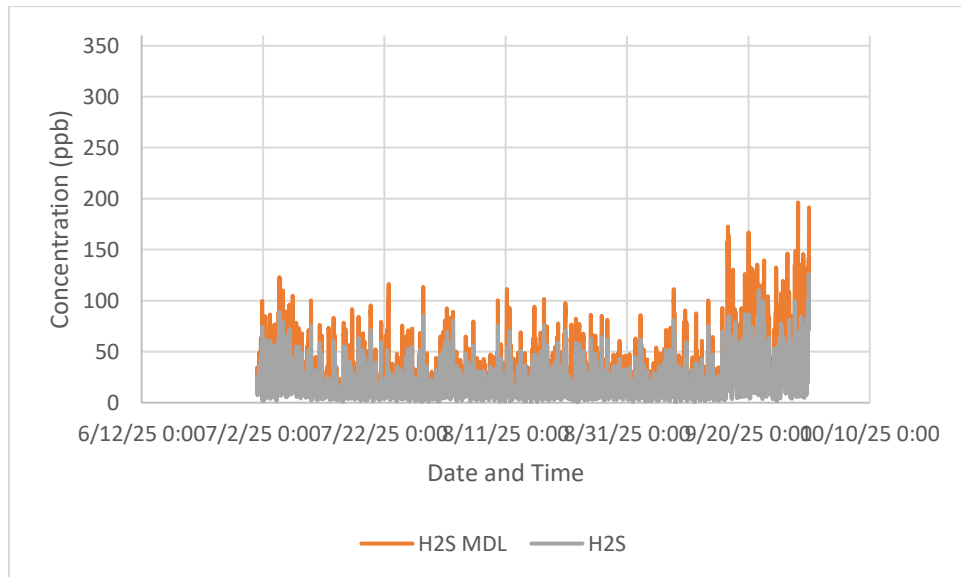


Figure 9. Timeseries of H₂S Path 3

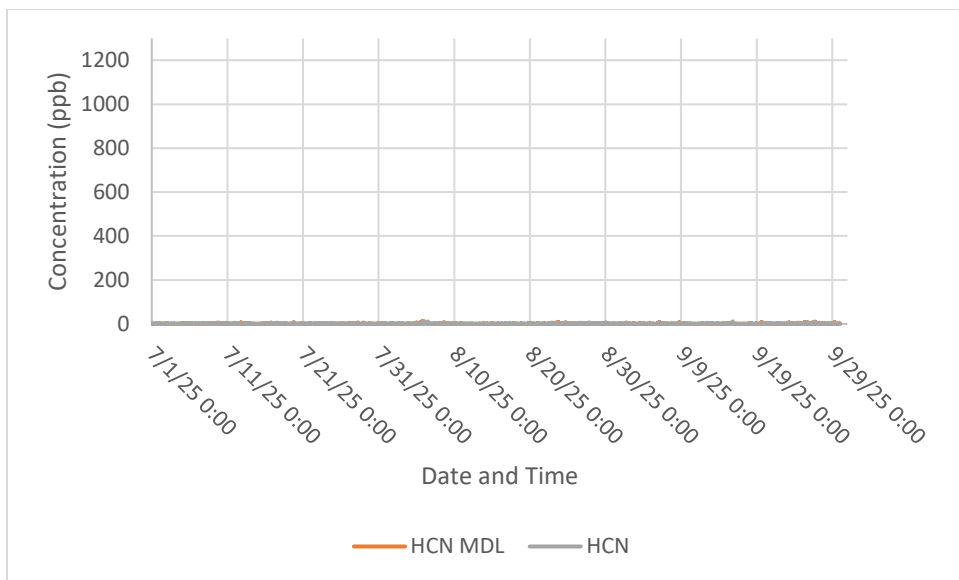


Figure 10. Timeseries of HCN Path 3

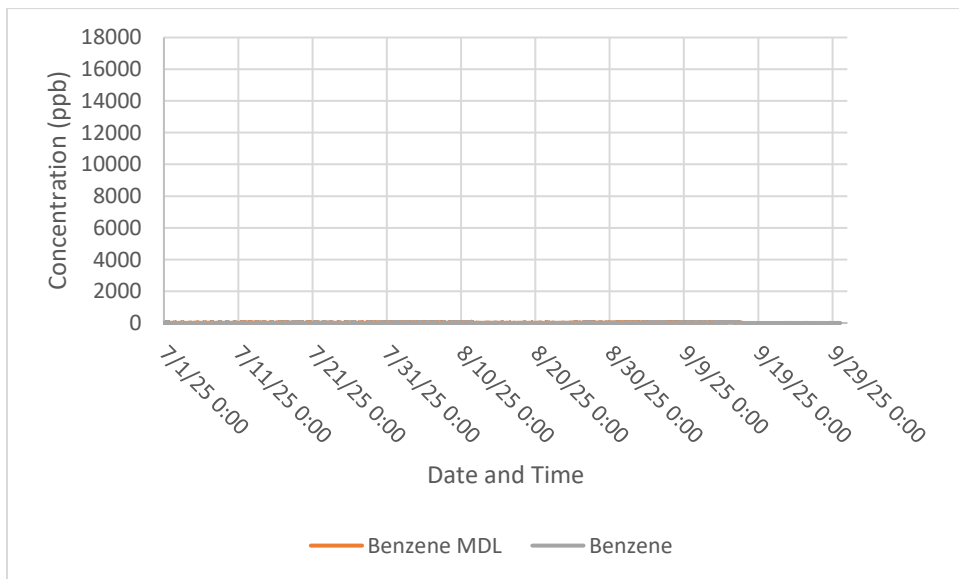


Figure 11. Timeseries of Benzene Path 4

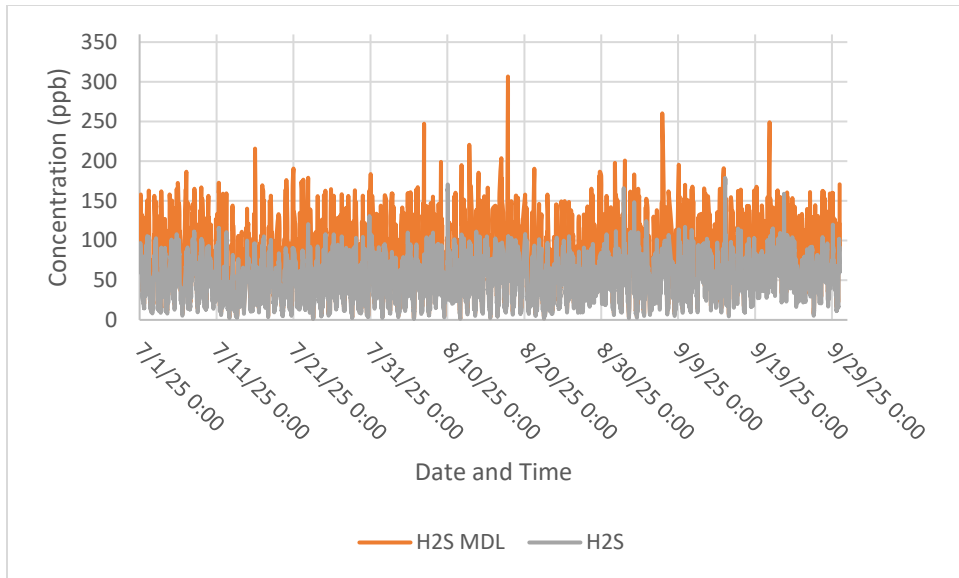


Figure 12. Timeseries of H₂S Path 4

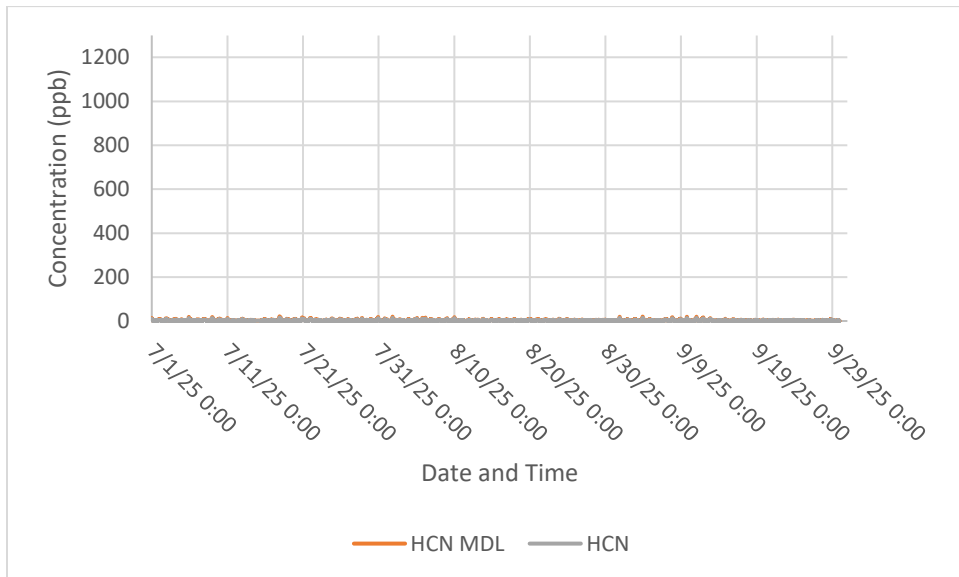


Figure 13. Timeseries of HCN Path 4

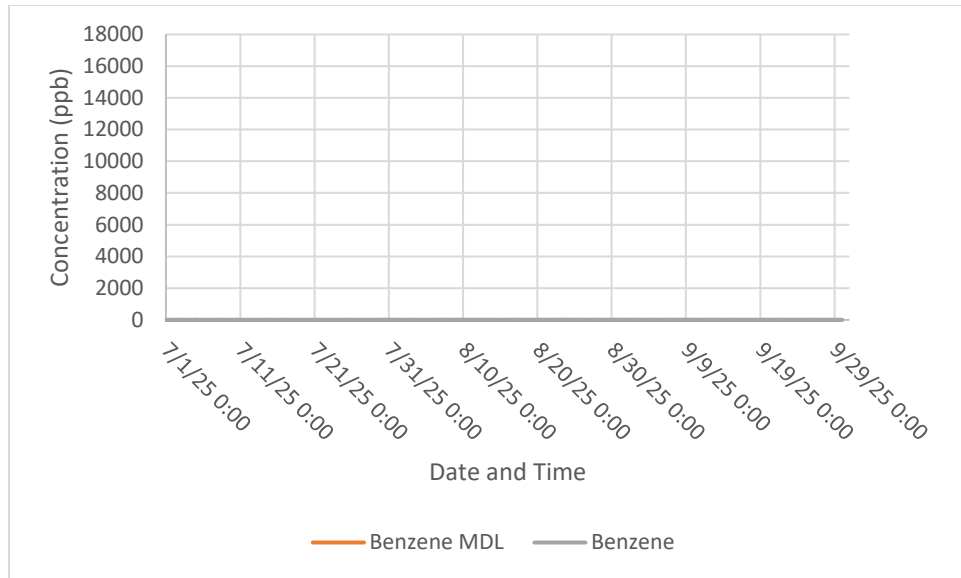


Figure 14. Timeseries of Benzene Path 5

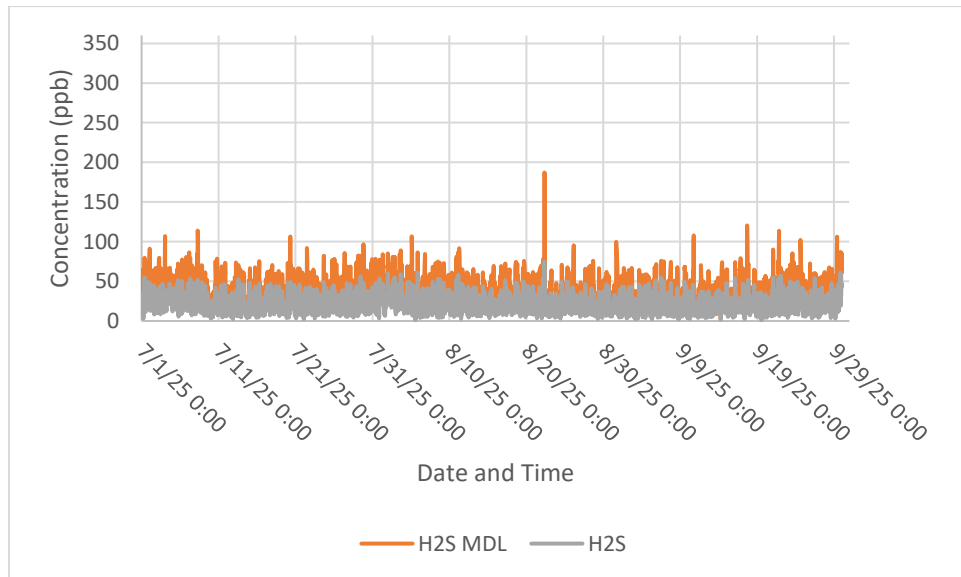


Figure 15. Timeseries of H₂S Path 5

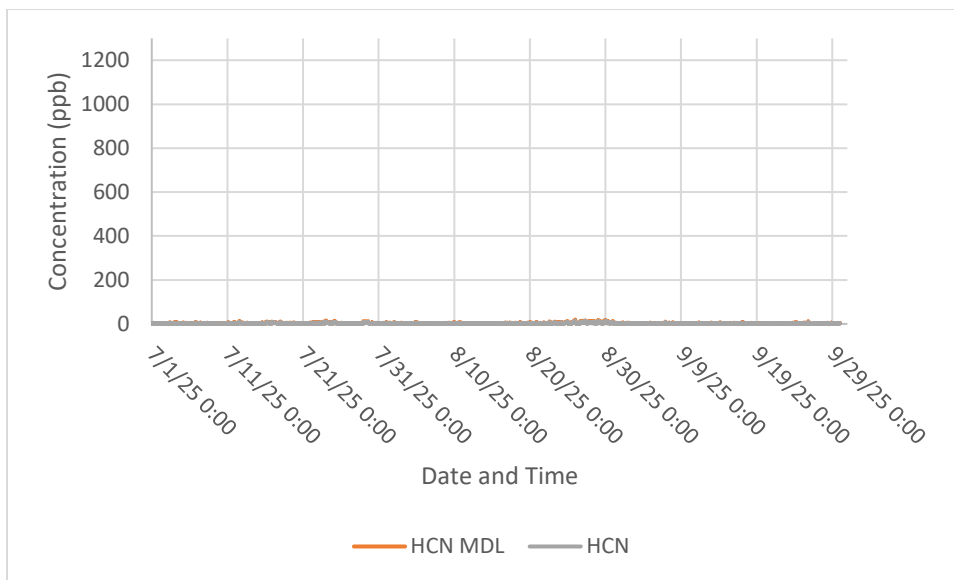


Figure 16. Timeseries of HCN Path 5

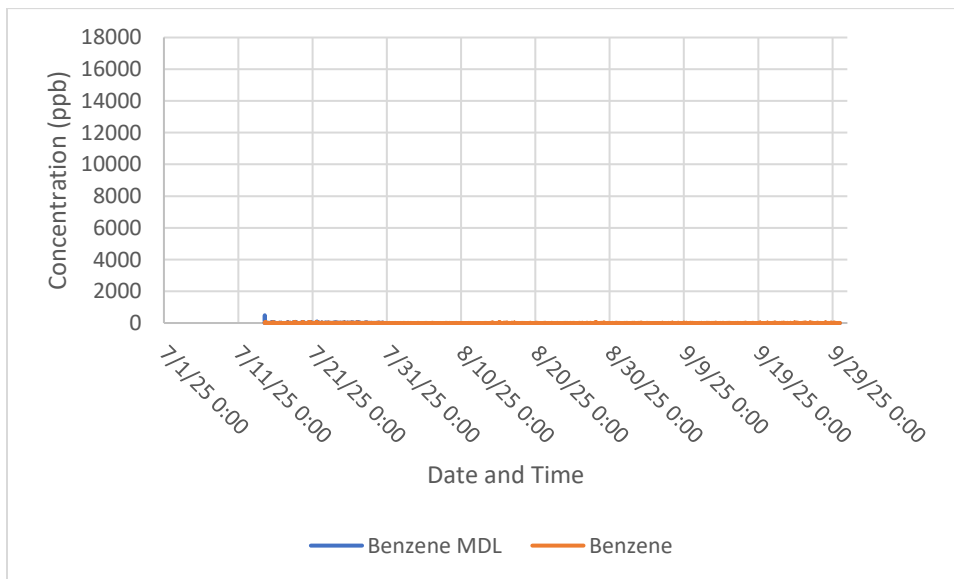


Figure 17. Timeseries of Benzene Path 6

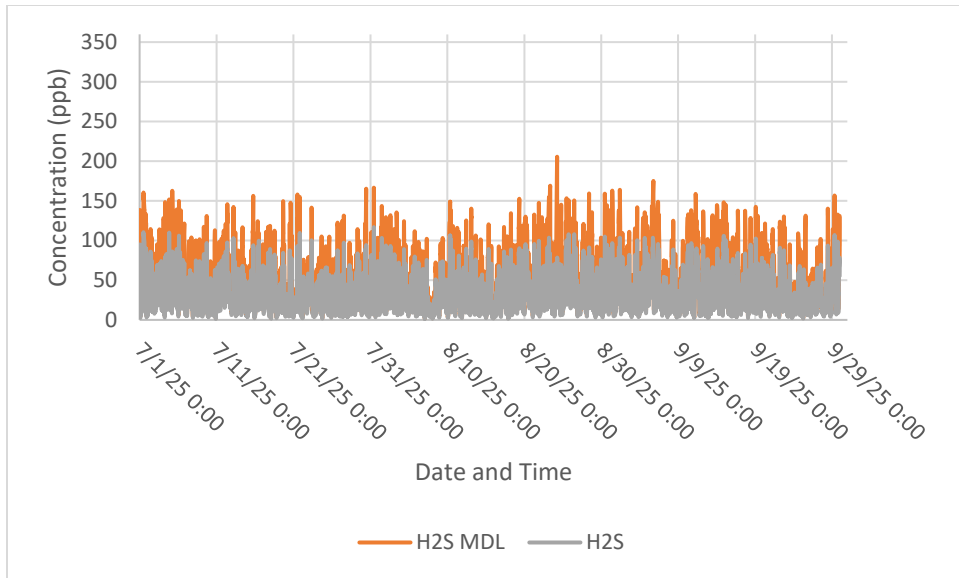


Figure 18. Timeseries of H₂S Path 6

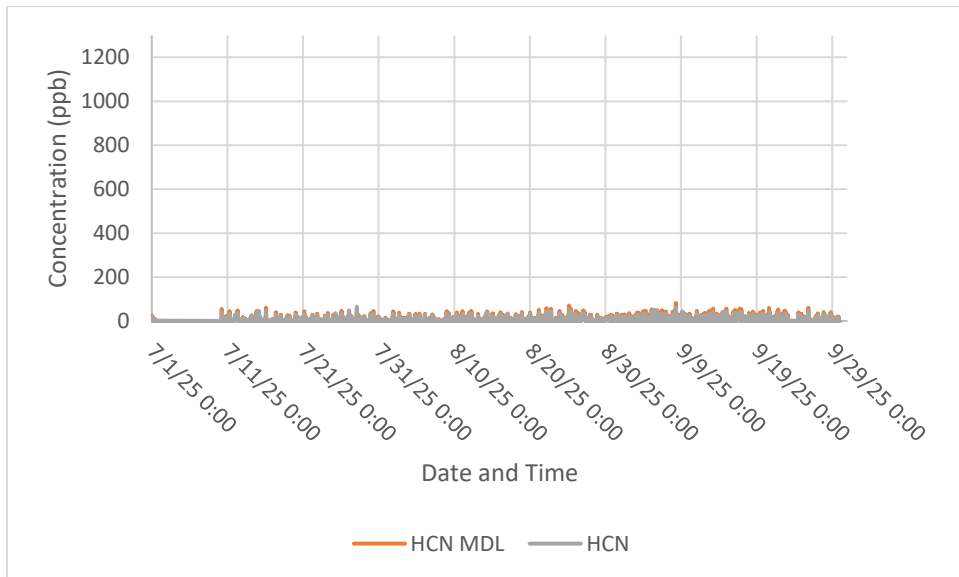


Figure 19. Timeseries of HCN Path 6

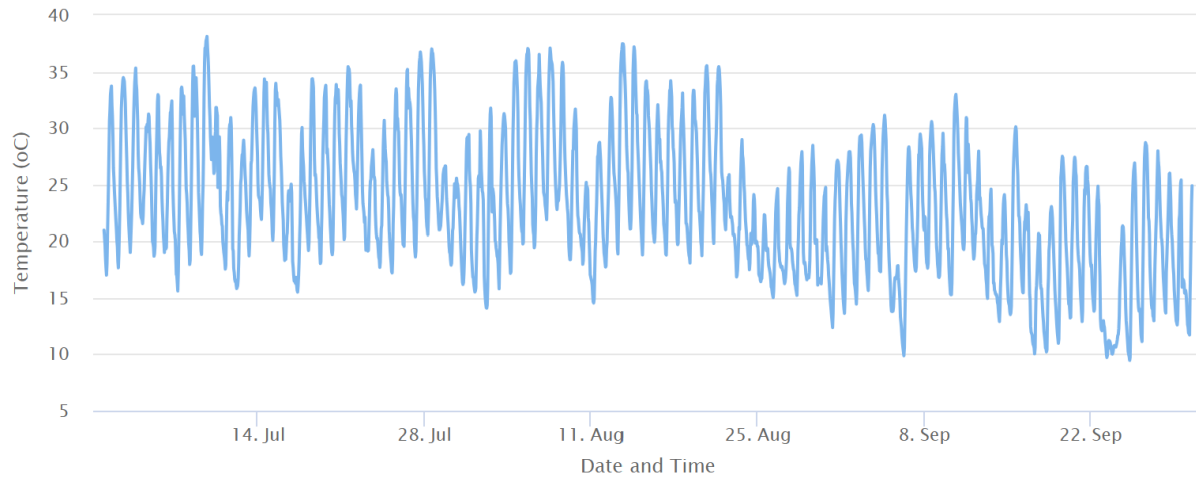


Figure 20. Temperature Timeseries (2025)

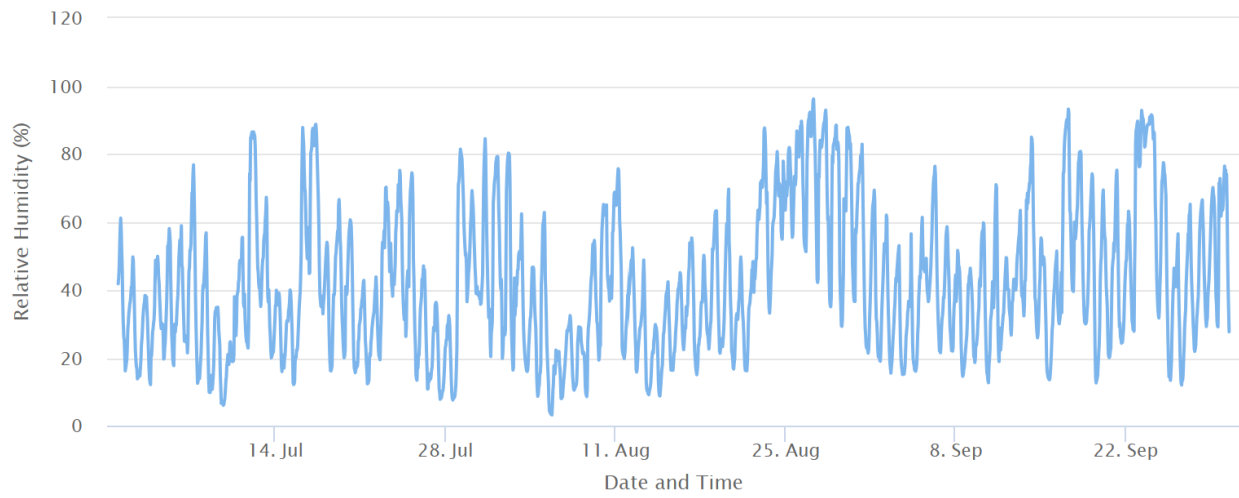


Figure 21. Relative Humidity Timeseries (2025)

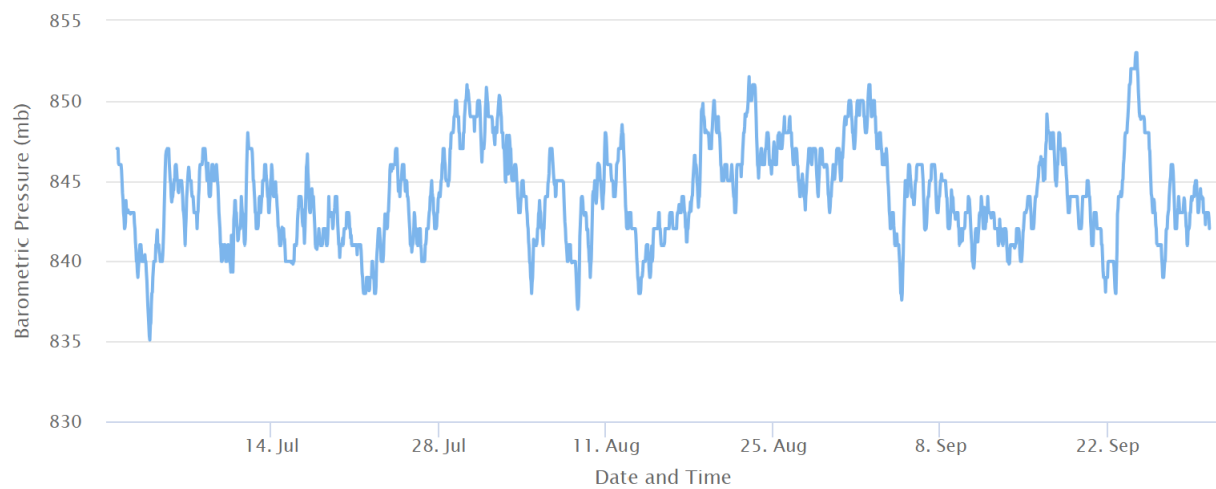


Figure 22. Barometric Pressure Timeseries (2025)

- 0–1 MPH (6%)
- 1–2 MPH (28%)
- 2–3 MPH (31%)
- 3–5 MPH (26%)
- 5–10 MPH (8%)
- >10 MPH (0%)

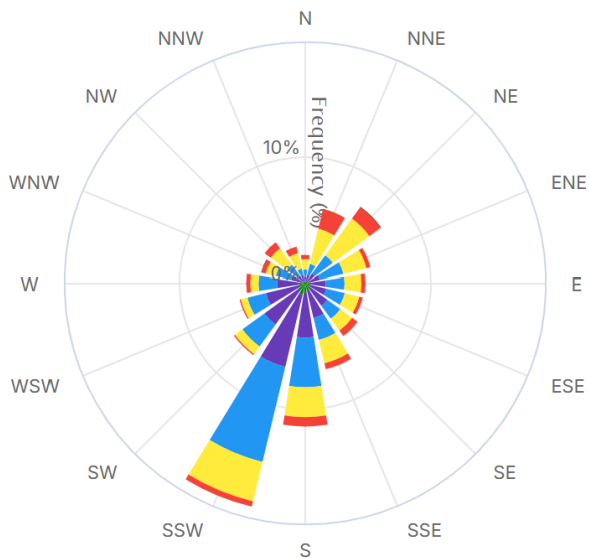


Figure 23. Wind Rose Plot

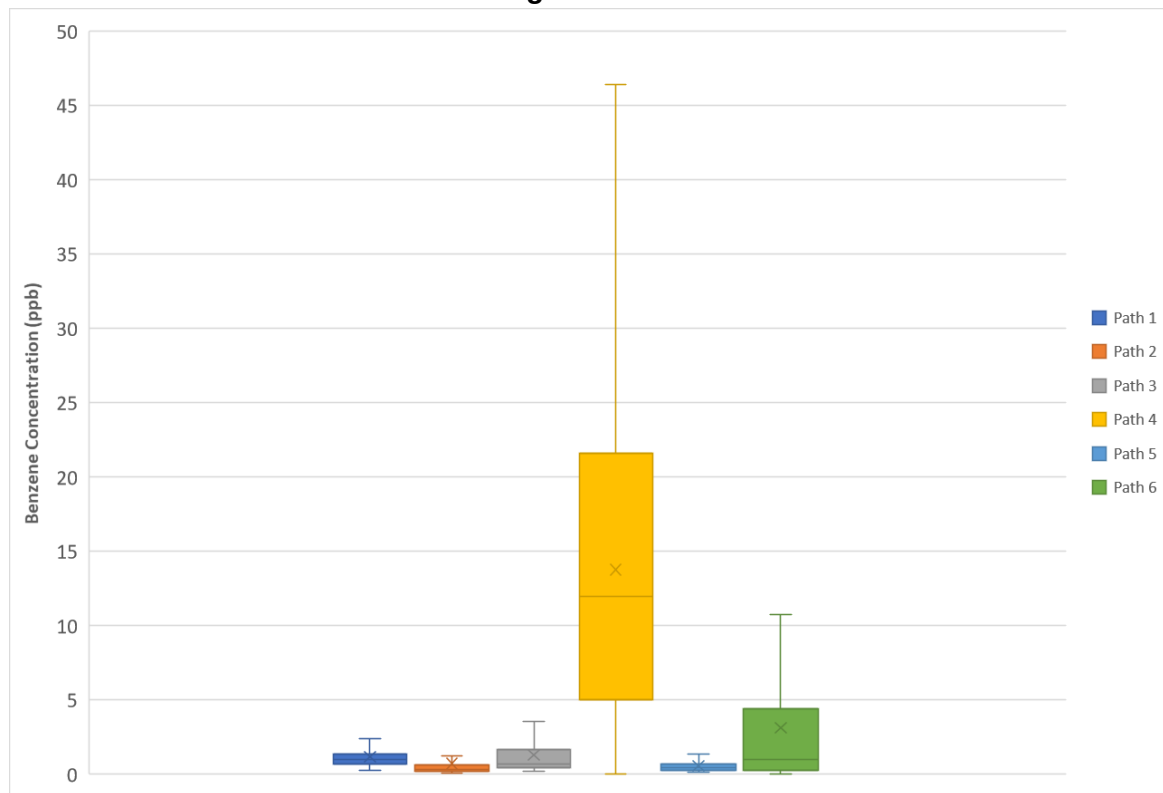


Figure 24. Benzene Box Plots for Paths 1 to 6

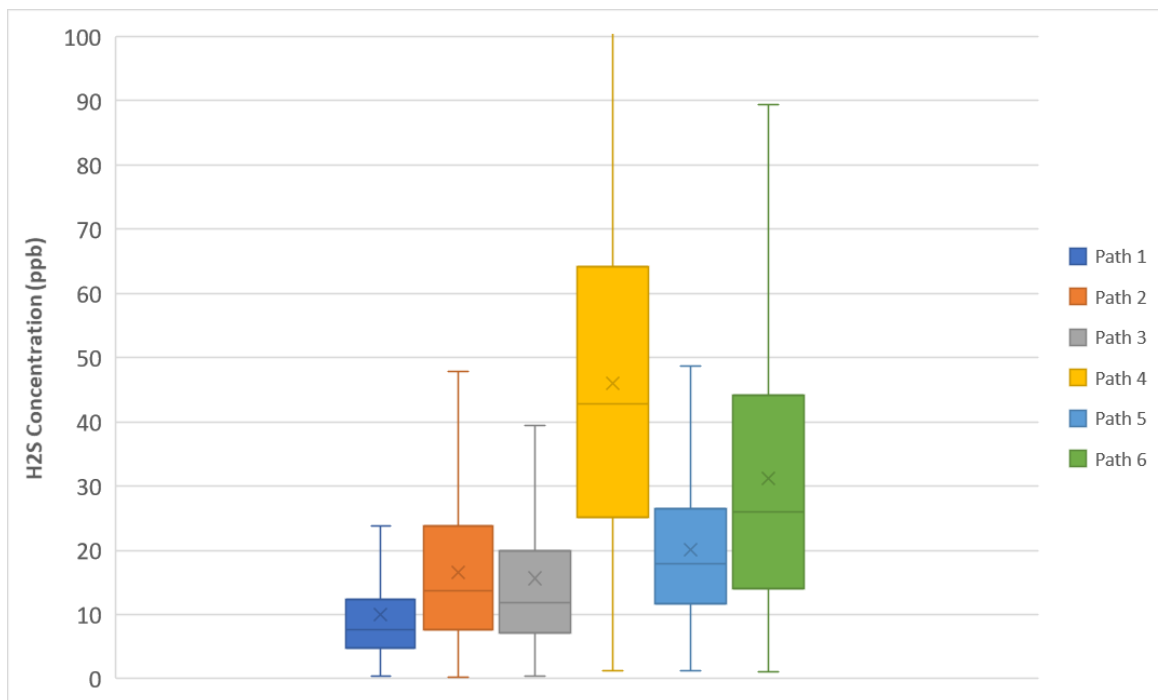


Figure 25. H₂S Box Plots for Paths 1 to 6.

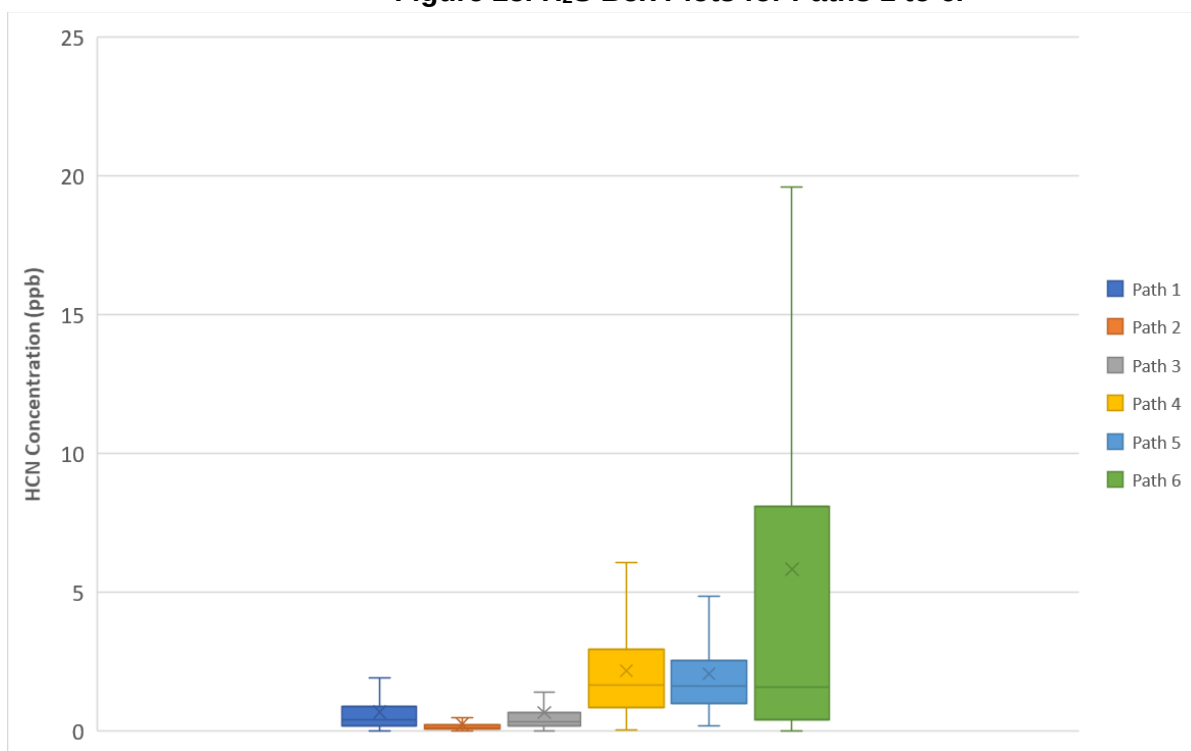


Figure 26. HCN Box Plots for Paths 1 to 6.

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

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

1. UV spectrometer temperature: the UV spectrometers were calibrated by the manufacturer at 35°C instead of the 39°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 to monitor the absolute detector power instead of the signal intensity. The reason was related to the fact that the laser signal intensity is affected by multiple instrument parameters (I/O Gain, Signal Gain, signal collimation etc.). Due to these interferences, the signal intensity values that are reported by the analyzer could potentially not be representative of the actual signal power that is measured by the detector. To avoid these issues, we replaced the “signal intensity” parameter on the automated QA/QC checks with the parameter “absolute detector power”. The criteria for the data to be considered valid is the absolute detector power to be >0.1 mA.
3. MDL for H2S Paths 3,5 and 6: The minimum detection limit was set to 50% of the threshold for H2S for these three paths due to 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 (%)
9/16/2025	Bump test	1	452	UVDOAS	Benzene	100 ppm	109	11.8	13.3
9/16/2025	Bump test	1	452	UVDOAS	Benzene	200 ppm	219	9.4	6.9
10/6/2025	Bump test	2	1100	UVDOAS	Benzene	100 ppm	102	5.6	9.2
10/6/2025	Bump test	2	1100	UVDOAS	Benzene	200 ppm	180	10.4	8.2
9/16/2025	Bump test	3	330	UVDOAS	Benzene	100 ppm	99.4	2.6	4.3
9/16/2025	Bump test	3	330	UVDOAS	Benzene	200 ppm	192	3.9	2
9/16/2025	Bump test	4	630	UVDOAS	Benzene	100 ppm	126	25.8	4.8
9/16/2025	Bump test	4	630	UVDOAS	Benzene	200 ppm	211	5.4	1.7
9/16/2025	Bump test	5	444	UVDOAS	Benzene	100 ppm	107	7.4	2.6
9/16/2025	Bump test	5	444	UVDOAS	Benzene	200 ppm	204	2.4	2.3
9/16/2025	Bump test	6	276	UVDOAS	Benzene	100 ppm	96	4	2.1
9/16/2025	Bump test	6	276	UVDOAS	Benzene	200 ppm	191	4.6	1.9
9/16/2025	Audit Module	1	452	TDL	H2S	500 ppmm	364	27.2	3.3
9/16/2025	Audit Module	1	452	TDL	H2S	625 ppmm	556	11	6.3
9/16/2025	Audit Module	2	1100	TDL	H2S	500 ppmm	456	8.9	2.2
9/16/2025	Audit Module	2	1100	TDL	H2S	625 ppmm	642	3.1	2.9
9/16/2025	Audit Module	3	330	TDL	H2S	500 ppmm	364	27.1	6.9
9/16/2025	Audit Module	3	330	TDL	H2S	625 ppmm	638	3.2	3.9
9/16/2025	Audit Module	4	630	TDL	H2S	500 ppmm	426	14.7	3.9
9/24/2025	Audit Module	4	630	TDL	H2S	625 ppmm	532	14.9	8.9
9/16/2025	Audit Module	5	444	TDL	H2S	500 ppmm	438	12.5	6.4
9/16/2025	Audit Module	5	444	TDL	H2S	625 ppmm	484	22.5	1.9
9/16/2025	Audit Module	6	276	TDL	H2S	500 ppmm	511	5.9	8
9/16/2025	Audit Module	6	276	TDL	H2S	625 ppmm	591	5.7	3.9
9/16/2025	Audit Module	1	452	TDL	HCN	1010 ppmm	968	4.2	0.1
9/16/2025	Audit Module	1	452	TDL	HCN	420ppmm	410	3	2.4
9/16/2025	Audit Module	2	1100	TDL	HCN	1010 ppmm	972	3.8	0.3
9/16/2025	Audit Module	2	1100	TDL	HCN	420ppmm	402	4.2	1.4
9/16/2025	Audit Module	3	330	TDL	HCN	1010 ppmm	995	1.5	0.2
9/16/2025	Audit Module	3	330	TDL	HCN	420 ppmm	448	7.5	6.3
9/16/2025	Audit Module	4	630	TDL	HCN	1010 ppmm	953	5.7	0.3
9/16/2025	Audit Module	4	630	TDL	HCN	420 ppmm	448	6.7	0.3
9/16/2025	Audit Module	5	444	TDL	HCN	1010 ppmm	982	2.8	0.1
9/16/2025	Audit Module	5	444	TDL	HCN	420 ppmm	435	3.6	0.7
9/16/2025	Audit Module	6	276	TDL	HCN	1010 ppmm	959	5.1	0.1
9/16/2025	Audit Module	6	276	TDL	HCN	420 ppmm	435	3.5	0.5

¹path length in meters

Table 8: Percent Recovery for Meteorological Parameters

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

B. Appendix B: Qualifier Codes

Table 9: List of Data Invalidation Codes

Qualifier Code	AQS Definition <i>*(additional information added in parentheses)</i>	Type or Related Action
AB	Technician Unavailable. <i>*(use if this affects scheduled QA/QC or necessary maintenance)</i>	Null Data Qualifier
AD	Shelter Storm Damage.	Null Data Qualifier
AG	Sample Time out of Limits. <i>*(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)</i>	Null Data Qualifier
AI	Insufficient Data. (cannot calculate)	Null Data Qualifier
AL	Voided by Operator. <i>*(e.g., Datum rejected by data validators)</i>	Null Data Qualifier
AM	Miscellaneous Void.	Null Data Qualifier
AN	Machine Malfunction <i>*(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)</i>	Null Data Qualifier
AO	Bad Weather. <i>*(Use if weather impacts open-path instrument operation/function)</i>	Null Data Qualifier
AP	Vandalism. <i>*(Use if vandalism impacts open-path instrument operation/function)</i>	Null Data Qualifier
AQ	Collection Error. <i>*(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)</i>	Null Data Qualifier
AT	Calibration.	Null Data Qualifier
AU	Monitoring Waived.	Null Data Qualifier
AV	Power Failure.	Null Data Qualifier
AW	Wildlife Damage. <i>*(Use if damage impacts open-path instrument operation/function)</i>	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. <i>*(use when data exceeds critical criteria, such as for MDL)</i>	Null Data Qualifier
IA	African Dust. <i>*(use for any dust event)</i>	Informational
IT	Wildfire-U.S. <i>*(use for any wildfire event)</i>	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. <i>*(e.g., in the event of emissions influenced by nearby sources)</i>	Quality Assurance Qualifier
QP	Pressure Sensor Questionable. <i>*(e.g., use if cell pressure is out of range, indicating malfunction)</i>	Quality Assurance Qualifier
QT	Temperature Sensor Questionable. <i>*(e.g., use if cell temperature is out of range, indicating malfunction)</i>	Quality Assurance Qualifier
QV	Quality Control Multi-point Verification.	Null Data Qualifier
QX	Does not meet QC criteria. <i>*(e.g., data exceeds automatic criteria for rejection)</i>	Quality Assurance Qualifier
SC	Sampler Contamination.	Null Data Qualifier
ST	Calibration Verification Standard.	Null Data Qualifier
TC	Component Check & Retention Time Standard. <i>*(use this code for additional instrument checks, e.g., a robustness tests)</i>	Null Data Qualifier

C. Appendix C: Field Data Sheets

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

ALIGNED PATH 6 UV

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

ALIGNED PATH 6 UV

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

Aligned H2S path 5

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

Aligned H2S Path 1 after cleaning retro

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

Aligned H2S and HCN path 6 after cleaning retro

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

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

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

Aligned H2S Path 1 and HCN Path 6

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

Aligned H2S Path 5 TDL

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

PLANT SHUTDOWN

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

Aligned H2S path 1

Cleaned TDL path 5 retro

Aligned H2S and HCN path 5

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

Aligned TDL H2S path 5

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

Aligned HCN path 5

Cleaned reflector

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

Aligned TDL H2S and HCN path 5

Aligned UV path 5

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

Quarterly tdl calibration

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

system audit

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

Swapped arduino port on UV path 2

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

Aligned HCN path 4

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

Aligned HCN Path 3 and cleaned retro reflectors

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

Aligned HCN path 4 TDL

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

Aligned HCN path 4 and cleaned retro

Aligned UV path 2

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

Aligned HCN path 4

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

ligned HCN path 4

Cleaned Reflector

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

Aligned HCN PAth 4 and H2S path 4

Aligned UV path 4

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

quarterly tdl calibration

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

calibrated tdl

replaced bulb at uv2

collimated signal at tdl paths 4 and 5

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

replaced uv head at path 2

calibrated path 2 100ppm

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

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-13
Revision Number: R0

Implementation Date: February 07, 2024
Form Owner (Department): MAQS
Form Approval: AHeitmann

Non-Conformance Report

Project: PROJ-029623	Month: September 2025
----------------------	-----------------------

LOCATION/SITE: P66 Denver Terminal	Parameter(s) Affected: Benzene Concentration		
Begin Date and Time (LST): 9/24/2025 9am	End Date and Time (LST): 10/6/2025 12:50pm		
Equipment: UVDOAS OP2	S/N#: N/A		
Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s).			
During calibration the technician encountered an issue with the operation of the UV.			
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 issue was investigated. The head was replaced and the original head was sent for troubleshooting.			
Corrective Action Taken: Make specific reference to all dates, times and performance test results.			
The UV head secondary optics were replaced. Additionally the fiber cable was replaced with a different kind. It looks like the fiber cable had been degraded from the UV light. The instrument was then calibrated and the calibration verification passed. Additional backup measures were also implemented. A passive benzene tube was installed in the middle of the path on 10/1/2025 and will be collecting sample for 14days according to Method 325.			
Is Problem Fully Resolved? Yes ☒ No ☐ If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved)			
Additional Attachments or Information? Yes ☐ No ☒ Client Notified? Yes ☒ No ☐ If so, date <u>9/24/2025</u>			
Field Operator's Assessment of Data Status: (Check One)	☐ Valid	☐ Suspect	☒ Invalid
Additional notes on Data Validity Status: No UV data was collected during this time.			

A.Liangou

Originator's Signature: _____

QA Review: Aricia Boyd

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-13
Number: R0 **Form Approval:** AHeitmann

Implementation Date: February 07, 2024
Form Owner (Department): MAQS Revision

Non-Conformance Report

Project: PROJ-029623		Month: June 2025	
LOCATION/SITE: P66 Denver Terminal		Parameter(s) Affected: Benzene Concentration	
Begin Date and Time (LST): 6/27/2025 9am		End Date and Time (LST): 6/27/2024 4pm	
Equipment: UVDOAS OP2		S/N#: N/A	
Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s). During calibration the UVDOAS Path 2 cell glass 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 technician performing the calibration noticed that the benzene standard gas flowrate was higher than the recommended.			
Corrective Action Taken: Make specific reference to all dates, times and performance test results. The technician replaced the UVDOAS Path 2 head.			
Is Problem Fully Resolved? Yes ____ No <u>X</u> If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved) The issue has been temporarily resolved. A new cell has been ordered and the UV head will be replaced again once it arrives.			
Additional Attachments or Information? Yes ____ No <u>X</u> Client Notified? Yes ____ No <u>x</u> 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 this time.

A.Liangou

Originator's Signature: _____

QA Review: Aricia Boyd

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-13
Revision Number: R0

Implementation Date: February 07, 2024
Form Owner (Department): MAQS
Form Approval: AHeitmann

Non-Conformance Report

Project: PROJ-029623	Month: September 2025
-----------------------------	------------------------------

LOCATION/SITE: P66 Denver Terminal	Parameter(s) Affected: Benzene Concentration		
Begin Date and Time (LST): 9/16/2025 16:00		End Date and Time (LST): 9/17/2025 1:35pm	
Equipment: UVDOAS OP2	S/N#: N/A		
Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s). A change in configuration (split signal) caused the instrument to be offline.			
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 issue was investigated and a solution was provided.			
Corrective Action Taken: Make specific reference to all dates, times and performance test results. Original configuration was set and issue was resolved.			
Is Problem Fully Resolved? Yes ☒ No ☐ If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved)			
Additional Attachments or Information? Yes ☐ No ☒ Client Notified? Yes ☐ No ☒ 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 this time.			

A.Liangou

Originator's Signature: _____

QA Review: Aricia Boyd

Form Title: Non-Conformance Report
Document Number: 331AA-QMS-FM-13
Number: R0 Form Approval: AHeitmann

Implementation Date: February 07, 2024
Form Owner (Department): MAQS Revision

Non-Conformance Report

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

LOCATION/SITE: P66 Denver Terminal	Parameter(s) Affected: Benzene Concentration Path 6
Begin Date and Time (LST): 6/1/2025 12am	End Date and Time (LST): 6/30/2025 12am
Equipment: UVDOAS OP6	S/N#:
Description of Malfunction or Problem: Make specific reference to Assignable Cause(s). All tests results should be documented on appropriate form(s). During data validation we noticed that there was a high invalidation rate of 90% during the month of June for Benzene Path 6.	
Investigative Actions: Describe Assignable Cause(s). Make specific reference to all dates, times and performance test results. All tests results should be documented on appropriate form(s). We checked the instrument parameters like integration time, peak percent match, temperature and pressure of the cell and all were correct and within appropriate ranges. The MDL of the instrument was 0 during long periods of time which caused the data to be invalid. We updated the CMS software and the issue was fixed.	
Corrective Action Taken: Make specific reference to all dates, times and performance test results. Updated the CMS software and computer.	
Is Problem Fully Resolved? Yes ☒ No ☐ If "NO", Describe Further Action Required: (File updated NC/CA Report when problem is fully resolved) The issue has been temporarily resolved, but we will have to replace the fan on the original optical head instrument and replace it back by 7/13.	
Additional Attachments or Information? Yes ☐ No ☒ Client Notified? Yes ☐ No ☒ If so, date _____	
Field Operator's Assessment of Data Status: (Check One)	☐ Valid ☐ Suspect ☒ Invalid

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

A.Liangou

Originator's Signature:

QA Review: Aricia Boyd

E. Appendix E: Calibration Verification Forms

Page 1 of 2
TDL Calibration Form

Form Title: TDL Calibration Form

Document Number: 331AA-OPS-FM-15

Revision Number: Rev. 1

Implementation Date: August 8, 2024

Form Owner (Department): MAQS

Form Approval: Katia Liangou

 Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

 Instrument Model: H2S Path 1 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	348	30.4
2	500	352	29.6
3	500	362	27.6
4	500	390	22
5	500	370	26
Averages	500	364	27.2

	Calculated Values	Expected Values
Overall Percent Precision	96.7%	≥ 80%
Overall Percent Error	27.2%	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
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): 9/16/25

Instrument Model: H2S Path 1 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	618	1.1
2	625	512	18
3	625	542	13.3
4	625	564	9.8
5	625	546	12.6
Averages	625	556	11

	Calculated Values	Expected Values
Overall Percent Precision	93.7 %	≥ 80%
Overall Percent Error	11 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
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): 9/16/25

Instrument Model: H2S Path 2 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	468	6.4
2	500	438	12.4
3	500	460	8
4	500	454	9.2
5	500	458	8.4
Averages	500	456	8.9

	Calculated Values	Expected Values
Overall Percent Precision	97.8 %	≥ 80%
Overall Percent Error	8.9 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

Form Title: TDL Calibration Form

Document Number: 331AA-OPS-FM-15

Revision Number: Rev. 1

Implementation Date: August 8, 2024

Form Owner (Department): MAQS

Form Approval: Katia Liangou

 Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

 Instrument Model: H2S Path 2 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	630	0.8
2	625	646	3.4
3	625	666	6.6
4	625	618	1.1
5	625	648	3.7
Averages	625	642	3.1

	Calculated Values	Expected Values
Overall Percent Precision	97.1 %	≥ 80%
Overall Percent Error	3.1 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
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): 9/16/25

Instrument Model: H2S Path 3 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	410	18
2	500	390	22
3	500	354	29.2
4	500	332	33.6
5	500	336	32.8
Averages	500	364	27.1

	Calculated Values	Expected Values
Overall Percent Precision	93.1 %	≥ 80%
Overall Percent Error	27.1 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: H2S Path 3 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	614	1.8
2	625	620	0.8
3	625	674	7.8
4	625	632	1.1
5	625	652	4.3
Averages	625	638	3.2

	Calculated Values	Expected Values
Overall Percent Precision	96.1 %	≥ 80%
Overall Percent Error	3.2 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: H2S Path 4 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	392	21.6
2	500	416	16.8
3	500	456	8.8
4	500	422	15.6
5	500	446	10.8
Averages	500	426	14.7

	Calculated Values	Expected Values
Overall Percent Precision	96.1 %	≥ 80%
Overall Percent Error	14.7 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/24/25

Instrument Model: H2S Path 4 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	580	7.2
2	625	590	5.6
3	625	456	27
4	625	502	20
5	625	532	14.9
Averages	625	532	14.9

	Calculated Values	Expected Values
Overall Percent Precision	91.1 %	≥ 80%
Overall Percent Error	14.9 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: H2S Path 5 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	458	8.4
2	500	478	4.4
3	500	404	19.2
4	500	440	12
5	500	408	18.4
Averages	500	438	12.5

	Calculated Values	Expected Values
Overall Percent Precision	93.6 %	≥ 80%
Overall Percent Error	12.5 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
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): 9/16/25

Instrument Model: H2S Path 5 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	492	21.3
2	625	500	20
3	625	470	24.8
4	625	478	23.5
5	625	482	22.9
Averages	625	484	22.5

	Calculated Values	Expected Values
Overall Percent Precision	98.1 %	≥ 80%
Overall Percent Error	22.5%	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: H2S Path 6 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	500	502	0.4
2	500	478	4.4
3	500	528	5.6
4	500	476	4.8
5	500	572	14.4
Averages	500	511	5.9

	Calculated Values	Expected Values
Overall Percent Precision	92%	≥ 80%
Overall Percent Error	5.9 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: H2S Path 6 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	625	580	7.2
2	625	562	10
3	625	598	4.3
4	625	586	6.2
5	625	628	0.5
Averages	625	591	5.7

	Calculated Values	Expected Values
Overall Percent Precision	96.1 %	≥ 80%
Overall Percent Error	5.7 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
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): 9/16/25

Instrument Model: HCN Path 1 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	426	1.4
2	420	412	1.9
3	420	408	2.9
4	420	402	4.3
5	420	402	4.3
Averages	420	410	3

	Calculated Values	Expected Values
Overall Percent Precision	97.6 %	≥ 80%
Overall Percent Error	3 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 1 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	968	4.1
2	1010	970	4
3	1010	968	4.2
4	1010	968	4.2
5	1010	966	4.4
Averages	1010	968	4.2

	Calculated Values	Expected Values
Overall Percent Precision	99.9 %	≥ 80%
Overall Percent Error	4.2 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 2 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	398	5.2
2	420	400	4.8
3	420	412	1.9
4	420	404	3.8
5	420	398	5.2
Averages	420	402	4.2

	Calculated Values	Expected Values
Overall Percent Precision	98.6 %	≥ 80%
Overall Percent Error	4.2 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 2 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	976	3.3
2	1010	970	4
3	1010	970	4
4	1010	972	3.8
5	1010	970	4
Averages	1010	972	3.8

	Calculated Values	Expected Values
Overall Percent Precision	99.7%	≥ 80%
Overall Percent Error	3.8 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

Form Title: TDL Calibration Form

Document Number: 331AA-OPS-FM-15

Revision Number: Rev. 1

Implementation Date: August 8, 2024

Form Owner (Department): MAQS

Form Approval: Katia Liangou

 Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

 Instrument Model: HCN Path 3 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	436	3.8
2	420	412	1.9
3	420	454	8
4	420	484	15.2
5	420	456	8.5
Averages	420	448	7.5

	Calculated Values	Expected Values
Overall Percent Precision	93.7%	≥ 80%
Overall Percent Error	7.5%	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 3 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	998	1.2
2	1010	994	1.6
3	1010	994	1.6
4	1010	994	1.6
5	1010	994	1.6
Averages	1010	995	1.5

	Calculated Values	Expected Values
Overall Percent Precision	99.8%	≥ 80%
Overall Percent Error	1.5 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 4 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	444	5.7
2	420	434	3.3
3	420	450	7.1
4	420	452	7.6
5	420	460	9.5
Averages	420	448	6.7

	Calculated Values	Expected Values
Overall Percent Precision	99.7 %	≥ 80%
Overall Percent Error	6.7 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 4 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	956	5.3
2	1010	954	5.5
3	1010	954	5.5
4	1010	950	5.9
5	1010	950	5.9
Averages	1010	953	5.7

	Calculated Values	Expected Values
Overall Percent Precision	99.7 %	≥ 80%
Overall Percent Error	5.7 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
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): 9/16/25

Instrument Model: HCN Path 5 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	432	2.9
2	420	438	4.3
3	420	432	2.9
4	420	436	3.8
5	420	438	4.3
Averages	420	435	3.6

	Calculated Values	Expected Values
Overall Percent Precision	99.3 %	≥ 80%
Overall Percent Error	3.6 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
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): 9/16/25

Instrument Model: HCN Path 5 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	1010	982	2.8
2	1010	980	3
3	1010	982	2.8
4	1010	982	2.8
5	1010	982	2.8
Averages	1010	982	2.8

	Calculated Values	Expected Values
Overall Percent Precision	99.9 %	≥ 80%
Overall Percent Error	2.8 %	≤ 30%

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

Calibration verification passed.

Operator Signature(s):



Witness Signature(s):



Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 6 Instrument Serial Number: _____

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

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

File #	Compound Concentration (PPMM)	Measured Concentration (PPMM)	Error (% Reading)
1	420	434	3.3
2	420	438	4.3
3	420	436	3.8
4	420	432	2.9
5	420	434	3.3
Averages	420	435	3.5

	Calculated Values	Expected Values
Overall Percent Precision	99.5 %	≥ 80%
Overall Percent Error	3.5 %	≤ 30%

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

Calibration verification passed.

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

Page 1 of 2
TDL Calibration Form

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

Instrument Model: HCN Path 6 Instrument Serial Number: _____

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

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

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

	Calculated Values	Expected Values
Overall Percent Precision	99.9%	≥ 80%
Overall Percent Error	5.1 %	≤ 30%

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

Calibration verification passed.

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

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	452 m/ 0.047m
Maximum Intensity (%)	83
Integration Time (ms)	88

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	98	2
2	100	94	6
3	100	119	19
4	100	107	7
5	100	125	25
Averages	100	109	11.8

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

	Calculated Values	Expected Values
Overall Percent Precision	86.7	≥ 75%
Overall Percent Error	11.8	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	452 m/ 0.047m
Maximum Intensity (%)	83
Integration Time (ms)	88

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	204	2
2	200	207	3.5
3	200	229	14.5
4	200	218	9
5	200	236	18
Averages	200	219	9.4

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

	Calculated Values	Expected Values
Overall Percent Precision	93.1 %	≥ 75%
Overall Percent Error	9.4%	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

Form Title: UVDOAS Calibration Form
Document Number: 331AA-OPS-FM-13
Revision Number: Rev. 0

Implementation Date: July 10, 2024
Form Owner (Department): MAQS
Form Approval: Katia Liangou

 Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 10/6/25
 Instrument Model: UV Mono Path 2 Instrument Serial Number: _____

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	95
Integration Time (ms)	30

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	117	17
2	100	92	8
3	100	100	0
4	100	102	2
5	100	99	1
Averages	100	102	5.6

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

	Calculated Values	Expected Values
Overall Percent Precision	90.8	≥ 75%
Overall Percent Error	5.6	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 10/6/25

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

Instrument Parameters	
Optical Path Length (meters)	1100 m/ 0.047m
Maximum Intensity (%)	95
Integration Time (ms)	30

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	177	11.5
2	200	156	22
3	200	193	3.5
4	200	197	1.5
5	200	173	13.5
Averages	200	180	10.4

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

	Calculated Values	Expected Values
Overall Percent Precision	91.8	$\geq 75\%$
Overall Percent Error	10.4	$\leq 30\%$

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	93
Integration Time (ms)	36

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	101	1
2	100	100	0
3	100	92	8
4	100	101	1
5	100	103	3
Averages	100	99.4	2.6

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

	Calculated Values	Expected Values
Overall Percent Precision	95.7	$\geq 75\%$
Overall Percent Error	2.6	$\leq 30\%$

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/2025

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

Instrument Parameters	
Optical Path Length (meters)	330 m/ 0.047m
Maximum Intensity (%)	93
Integration Time (ms)	36

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	193	3.5
2	200	186	7
3	200	197	1.5
4	200	192	4
5	200	193	3.5
Averages	200	192	3.9

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

	Calculated Values	Expected Values
Overall Percent Precision	98	$\geq 75\%$
Overall Percent Error	3.9	$\leq 30\%$

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

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

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	118	18
2	100	127	27
3	100	129	29
4	100	125	25
5	100	130	30
Averages	100	126	25.8

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

	Calculated Values	Expected Values
Overall Percent Precision	95.2	≥ 75%
Overall Percent Error	25.8	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

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

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	205	2.5
2	200	211	5.5
3	200	212	6
4	200	213	6.5
5	200	213	6.5
Averages	200	211	5.4

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

	Calculated Values	Expected Values
Overall Percent Precision	98.3	≥ 75%
Overall Percent Error	5.4	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	94
Integration Time (ms)	30

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	103	3
2	100	109	9
3	100	107	7
4	100	109	9
5	100	109	9
Averages	100	107	7.4

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

	Calculated Values	Expected Values
Overall Percent Precision	97.4	≥ 75%
Overall Percent Error	7.4	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	444 m/ 0.047m
Maximum Intensity (%)	94
Integration Time (ms)	30

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	197	1.5
2	200	202	1
3	200	207	3.5
4	200	209	4.5
5	200	203	1.5
Averages	200	204	2.4

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

	Calculated Values	Expected Values
Overall Percent Precision	97.7	≥ 75%
Overall Percent Error	2.4	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	88
Integration Time (ms)	20

Standard Information	
Benzene Standard Concentration (PPM)	100

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	100	93	7
2	100	96	4
3	100	98	2
4	100	95	5
5	100	98	2
Averages	100	96	4

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

	Calculated Values	Expected Values
Overall Percent Precision	97.9	≥ 75%
Overall Percent Error	4	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*

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

Operator Name(s): Katia Liangou Test Date (YYYY/MM/DD): 9/16/25

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

Instrument Parameters	
Optical Path Length (meters)	276 m/ 0.047m
Maximum Intensity (%)	88
Integration Time (ms)	20

Standard Information	
Benzene Standard Concentration (PPM)	200

File #	Benzene Concentration (PPM)	Measured Concentration (PPM)	Error (%)
1	200	184	8
2	200	192	4
3	200	193	3.5
4	200	193	3.5
5	200	192	4
Averages	200	191	4.6

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

	Calculated Values	Expected Values
Overall Percent Precision	98.1	≥ 75%
Overall Percent Error	4.6	≤ 30%

Notes:

Calibration verification passed.

Operator's Signature *Katia Liangou*Witness's Signature *James Garrett*