October 19, 2023

Kris Battleson
Manager, Health, Environment & Safety
Chevron Products Company
P.O. Box 1272
Richmond, CA 94802-0272

RE: Disapproval of Regulation 12, Rule 15 Fenceline Air Monitoring Plan and Quality Assurance Project Plan

Dear Ms. Battleson:

On September 5, 2023, Chevron Products Company (Chevron) submitted a revised fenceline air monitoring plan (AMP) and quality assurance project plan (QAPP) to the Bay Area Air Quality Management District (Air District). Chevron submitted the AMP and QAPP in response to the Air District's July 19, 2023 Notice of Deficiency (NOD), as required by Air District Regulation 12-15-404.4.

Having reviewed the AMP and QAPP, the Air District has determined that Chevron failed to correct several deficiencies with respect to Regulation 12-15 or the Air Monitoring Guidelines for Petroleum Refineries, which the Air District identified in the NOD; the specific deficiencies Chevron failed to correct are discussed in Attachment 1 to this letter. These remaining deficiencies are fundamental to compliance with Regulation 12-15. As a result, the AMP and QAPP do not meet the requirements in Section 12-15-403. Therefore, pursuant to Section 12-15-404.4, the Air District hereby disapproves Chevron's AMP and QAPP.

Chevron must develop an approvable AMP and QAPP that complies with Regulation 12-15; the Air District looks forward to working with you on that effort. If you have any questions regarding this notification, please contact me at jbovee@baaqmd.gov.

Sincerely,

Jerry Bovee, P.E., QSTI
Air Quality Engineering Manager

Attachment 1 - Basis for Disapproval of Chevron's Fenceline Air Monitoring Plan and Quality Assurance Project Plan

1. With regard to quality assurance and quality control (QA/QC), the Air Monitoring Guidelines for Petroleum Refineries (Guidelines; p. 10) established pursuant to District Regulation 12-15-406 in April 2016 require the air monitoring plan (AMP) to include a quality assurance project plan (QAPP) that follows EPA guidelines and specifies methodologies for ensuring appropriate levels of QA/QC, data acceptance criteria, levels of data quality, data management issues and procedures, and data review and validation procedures. The Air District's July 19, 2023 Notice of Deficiency (NOD) stated that the AMP, QAPP, and associated appendices contained an insufficient level of detail regarding the methods, procedures, equations, and calculations that will be used to carry out these activities.[1] The NOD also stated that the AMP and QAPP are unclear and ambiguous about how data are validated and what data are displayed to the public.[2] To address these deficiencies, the NOD stated that Chevron must provide standard operating procedures (SOPs) or other documentation to more fully describe these activities. Specifically, the NOD stated that Chevron must:

    a. attach to the QAPP detailed SOPs for all performance indicator checks, corrective actions, maintenance activities, QA/QC activities, data management activities, and reporting activities;

    b. for each performance indicator check, corrective action, maintenance activity, QA/QC activity, data management activity, or reporting activity identified in the AMP or QAPP, provide references to the relevant SOPs;

    c. include in the QAPP a detailed process flow diagram depicting the end-to-end data handling, review, and management process, from the moment of data acquisition to the quarterly submittal of final quality-controlled data to the Air District;

    d. revise the narrative descriptions of the data handling, review, and management process in the AMP and QAPP to clearly and fully describe the step-by-step process depicted in the flow diagram;

    e. articulate all decision rules used to automatically or manually screen data; and

    f. illustrate the application of all auto-screening rules using real data and screen shots depicting how the auto-screened data are depicted on the public website.[3]

    While the QAPP refers to the existence of SOPs (see pages 3, 6, and 26), it states that they will be provided to the Air District, "upon request and not on a routine basis," and Chevron's September 5, 2023, submittal did not include any SOPs beyond those previously provided to the Air District (e.g., Appendix D to the QAPP – *Unisearch LasIR Tunable Diode Laser System (TDLAS) Maintenance and Audit Procedure*). Furthermore, this SOP states that it is a, "working draft" for initial system validation and that it must be reviewed for compliance with local safety and quality assurance practices. Additionally, Chevron failed to reference that SOP throughout the QAPP as stated in the NOD. Chevron has not substantively addressed these issues identified in the NOD; many activities and the procedures for performing them remain poorly described in the AMP and QAPP. For example:

    - Page 4 of the QAPP explains that the TDL determines the concentration of hydrogen sulfide in the sample path by comparing the measured sample path absorbance to absorbance through an internal reference cell containing a known concentration of hydrogen sulfide. The QAPP provides

[1] See Attachment 1 to the July 19, 2023 NOD, issue number 5, p. 3

[2] See Attachment 2 to the July 19, 2023 NOD, issue number 18, pp. 7-8

[3] The Air District's July 19, 2023 NOD additionally stated that Chevron should improve transparency about the data on its website by providing alternative views that show invalidated data. In discussions with Chevron's contractor following issuance of the NOD, the Air District stated that such changes to the website need not be addressed at this time.

no other details about the internal reference cell such as the concentration of hydrogen sulfide it contains, and how it must be maintained to ensure proper operation of the equipment.

- Page 4 of the QAPP explains that because the Unisearch TDL operates in a wavelength range that also contains an absorbance feature for water vapor and carbon dioxide, the correlation coefficient of these gases can be used as a performance metric. It goes on to say that if the water vapor correlation drops below a threshold value, the carbon dioxide correlation is examined and if that is also below a threshold value the data are flagged as invalid. While Table 4-5 of the QAPP states that the water vapor correlation is measured continuously with an acceptance threshold of ≥ 0.95, the table does not similarly identify an instrument check and corresponding acceptance threshold for the carbon dioxide correlation coefficient. These checks are also not discussed in detail in the section of the QAPP pertaining to data validation, and it is unclear when and how these checks are applied to the data.
- With respect to monitoring instrument performance, Table 1-2 of the QAPP identifies potential problems and responses. However, page 5 of the QAPP states that this table is not all-inclusive. The QAPP is unclear about how Chevron intends to respond to other anticipated issues.
- Page 6 of the QAPP states that the IT operations team remotely monitors the status of the website and associated equipment using automated system checks "such as" those listed in Table 1-3 of the QAPP; this suggests Table 1-3 may not be inclusive of all checks.
- With respect to emergency maintenance procedures, page 7 of the QAPP states that corrective action will be taken to ensure that data quality objectives are met. The QAPP refers to Table 1-4, which identifies potential sampling and data reporting problems and corrective actions. Page 7 of the QAPP goes on to say that this table is not all-inclusive, the QAPP is unclear about how Chevron intends to respond to other anticipated issues.
- With respect to routine maintenance, page 8 of the QAPP states that Chevron's contractor will keep a small supply of critical consumable parts on site for the equipment as needed and that they will be replaced as they are used such that a supply is always on hand. The QAPP is unclear about what these consumables are, how much is kept on hand, and what procedures are in place to ensure they are ordered when necessary.
- Table 1-6 of the QAPP identifies several maintenance activities for the TDL including:
    - visually inspecting the system,
    - inspecting the optics on the detectors and cleaning them if necessary,
    - checking the alignment to verify there has not been significant physical movement,
    - downloading data older than 12 months from the analyzer hard drive, moving the data to a permanent archive, and deleting old files from the analyzer;
    - checking long term trends in the signal intensity to evaluate the health of the optical components, the effects of cleaning optical components, and the noise characteristics of the spectral data;
    - ensuring there are no obstructions between the detector and the retro-reflector, and
    - inspecting all electrical and optical cables for wear and replacing them as necessary.

  The AMP and QAPP are unclear about the following information, which should be included in SOPs according to guidance from the US Environmental Protection Agency:[4]

[4] United States Environmental Protection Agency, (2007). Guidance for Preparing Standard Operating Procedures (SOPs) [QA/G-6]. Available at https://www.epa.gov/quality/agency-wide-quality-program-documents.

- the scope of these activities,
- the step-by-step procedures for carrying out the activities,
- what personnel qualifications are needed to perform the activities,
- what equipment and supplies are necessary,
- the availability of spare parts and equipment,
- what health and safety warnings must be followed to prevent personal injury,
- and what other precautions must be followed to prevent equipment damage.

- With respect to maintenance of the visibility instruments, page 12 of the QAPP states that on a quarterly basis the instrument will be visually inspected, the glass window will be cleaned, the cable connections will be checked, and the hardware holding the sensors to the tower will be inspected. The QAPP additionally states that the instrument calibration will be checked annually, and Table 4-5 of the QAPP specifies an acceptance threshold of ±25% for the percent error of the instrument. The QAPP is unclear about the details for performing these activities (e.g., scope, step-by-step procedures, personnel qualifications, equipment and supplies, availability of parts and equipment, health and safety warnings, and other precautions).
- Page 14 of the QAPP states that whenever equipment is replaced or added, a factory acceptance test will be made at the manufacturer's location followed by a site acceptance test in the field during the startup phase. The QAPP is unclear about the procedures for performing the site acceptance test (e.g., scope, step-by-step procedures, personnel qualifications, equipment and supplies, availability of parts and equipment, health and safety warnings, and other precautions).
- With respect to measuring the system precision and accuracy, page 15 of the QAPP states that during these tests a number (N) of replicated measurements of a standard reference material of known magnitude will be measured and various statistics will be calculated. The QAPP states that an acceptable number of trials is defined as $7 \leq N \leq 15$, and that a *subset* of test data will be used for the subsequent calculations. The QAPP is unclear as to why a subset of the test data will be used and how it will be selected.
- With regard to QA/QC, page 16 of the QAPP states that all review criteria are *preliminary* and will be refined during the project based on actual observations. Page 21 of the QAPP includes a similar statement. While we encourage Chevron to periodically revise its AMP and QAPP to address new issues that arise, the versions it submits to the Air District for approval must not be draft or preliminary, and should be what Chevron considers to be final at the time of submission.
- Page 16 of the QAPP states that automated data review is conducted within the data management system upon data ingest and that the automated checks screen out invalid data from the public display. This is problematic given that one of the checks examines values that "change rapidly" without "reasonable cause." The QAPP is unclear about how a rapid change is defined and about how the automated system determines what the cause was and whether it was reasonable. The QAPP is similarly unclear about the use of other automated checks. For example, page 16 of the QAPP states that a range check is performed to verify the instrument is not reporting values outside of reasonable minimum and maximum concentrations. It states that the upper limit is three times the notification threshold for the respective compound. The QAPP is generally vague about what those notification thresholds are. However, Table 4-2 of the QAPP indicates that any hydrogen sulfide concentration above 25 ppb gets flagged and is apparently screened out from public view. In addition, to the extent that any flagged values do appear on the public website, the AMP and QAPP are unclear about an acceptable time frame for resolving the flags. The AMP and QAPP must be clear and unambiguous about all of the steps used to validate the data.

- After discussing the automated screening checks for measurement data, page 17 of the QAPP states that additional parameters such as signal strength and spectral matches *may* be monitored as indicators of data quality. The QAPP must be clear about all parameters that will be monitored.
- Page 17 of the QAPP states that data with real-time MDL values greater than 25 ppb are flagged for additional review. However, the flagging and review of MDL values greater than 25 ppb are not otherwise discussed in the sections of the AMP and QAPP pertaining to automated data screening or subsequent data validation. In addition, while Table 4-2 of the QAPP indicates that measured concentrations below the MDL are flagged, it does not indicate that MDL values themselves are checked and flagged. Similarly, while Table 4-1 of the QAPP includes an operational code for values below the MDL, there is no clear code for flagging values when the MDL is outside of the required range. It is thus unclear in the AMP and QAPP when and how this check is applied and what follow-up actions are taken.
- With regard to quarterly data validation, page 21 of the QAPP states that the QA Manager evaluates QA/QC procedures and ensures adherence to the methods for meeting data quality objectives. It is unclear how these activities are carried out.
- With regard to quarterly data validation, page 21 of the QAPP states that spectral features in flagged data are reviewed to verify the measurement. The procedures for this are unclear.
- With regard to quarterly data validation, page 21 of the QAPP states that the reasonableness of data is ensured by comparing concentrations to remote background and average urban concentrations. It is unclear how this is performed, what data are used, and what is done with the results of this comparison.
- With regard to quarterly data validation, page 21 of the QAPP states that instrument metadata are assessed to confirm reasonableness of the measurement data. The QAPP is unclear about which metadata are assessed and the procedures for doing so.

As the AMP and QAPP continue to lack sufficient detail regarding the procedures for maintenance activities, QA/QC activities, and data management, review, and validation, they are deficient. For guidance on the development of an adequate QAPP and SOPs, see EPA guidance document QA/G-5, *Guidance for Quality Assurance Project Plans*, and guidance document QA/G-6, *Guidance for Preparing Standard Operating Procedures (SOPs)*.

2. With regard to assessment of the tunable diode laser's (TDL) accuracy and precision during monthly bump tests, the NOD stated that the AMP and QAPP were inconsistent with the requirement that the TDL have a measurement accuracy within 15% of the reference standard, and a coefficient of variation (CV) not greater than 15%. To address this issue, the NOD stated the AMP, QAPP, and any SOPs must clearly state that the system's accuracy (as % Error) and precision (as % CV) will be assessed during each bump test, with acceptance criteria of ≤15% for both performance indicators.[5]

   While Chevron revised the AMP (p. 21) and QAPP (pages 14, 22, and 24) to include the ±15% acceptance criteria, both documents include footnotes, which state that the accuracy and repeatability specifications will be treated as objectives to become requirements at some future time, once it has been proven they can be reliably met for all seasons and atmospheric conditions.

   At a meeting with representatives from Chevron and other refineries on September 19, 2023, the Air District and refinery representatives discussed the need for the plans to lay out a pathway for meeting the performance specifications if they cannot be met at the present time. As currently written, Chevron's plan

[5] See Attachment 1 to the July 19, 2023 NOD, issue number 7, pp. 4-5; also see issue number 10, p. 6

treats the accuracy and repeatability specifications as future requirements, but lacks sufficient detail for approval by the Air District. Chevron must elaborate on the process it would use to prove the specifications can be met under varying conditions, suggest a time frame for making such a demonstration, or suggest a process by which the "objectives" would become actual requirements. The Air District can approve an adequately detailed plan for meeting the accuracy and precision specifications, but in their current form, the AMP and QAPP remain deficient.

3. With regard to assessment of the TDL's accuracy and precision during quarterly 3-point calibration checks, the NOD stated that the AMP and QAPP were inconsistent with the requirement that the TDL have a measurement accuracy within 15% of the reference standard and CV not greater than 15%. To address this issue, the NOD stated that the AMP, QAPP, and any SOPs must clearly state that both accuracy (as % Error) and precision (as %CV) will be assessed during each 3-point calibration check, with acceptance criteria of ≤15% for both performance indicators at each calibration point.[6]

   While Chevron revised the AMP (p. 21) and QAPP (pages 14, 22, and 24) to include the ±15% acceptance criteria, both tables reference the same footnotes discussed above regarding the acceptance criteria for the monthly bump tests. For the same reasons stated above regarding the bump tests, the revised AMP and QAPP remain deficient with respect to the acceptance criteria for the quarterly 3-point calibration checks.

4. With regard to the accuracy of the TDL, the NOD noted language in the QAPP, which states that whenever equipment is replaced or added, a factory acceptance test (FAT) and site acceptance test (SAT) will be performed to determine the percent error of the system, and that adjustments will be made until performance in the field is acceptable. The QAPP went on to say that the expected percent error was less than 25%. The NOD stated that this was inconsistent with the requirement that the TDL have a measurement accuracy within 15% of the reference standard, and stated that Chevron must revise the language regarding FATs, SATs, and an acceptable level of field performance so it is consistent with the established performance specifications.[7]

   While Chevron revised the QAPP to include the ±15% acceptance criteria, the QAPP references the same footnotes discussed above stating that the accuracy and repeatability specifications will be treated as objectives until it is proven they can be reliably met for all seasons and atmospheric conditions. Thus, for the same reasons stated above regarding the bump tests and 3-point calibration checks, the revised QAPP remains deficient.

5. With regard to the required 3-point calibration checks and bump tests, the Air District's December 22, 2022 letter stated that a failure to meet the stated accuracy and precision specifications must trigger repair, maintenance, and root cause analysis, followed by repeat calibration checks or bump tests, until a passing check or test is completed. The letter also stated that all steps in this process, including results of each passing and failed calibration check and bump test, and monitor response or calibration adjustments, must be fully documented in the quarterly report submitted to the Air District.

   The NOD explained that while the QAPP states that repair, maintenance, and root-cause analysis will be performed if monthly bump test accuracy and precision specifications are not met, the QAPP does not contain similar provisions for failed 3-point calibration checks. The NOD stated that the QAPP must be

[6] See Attachment 1 to the July 19, 2023 NOD, issue number 8, p. 5; also see issue number 10, p. 6

[7] See Attachment 1 to the July 19, 2023 NOD, issue number 9, p. 6

revised to include these requirements.[8] The required language cannot be found in the revised QAPP, so it remains deficient in this regard.

6. With regard to assessment of the hydrogen sulfide monitoring system's precision, the NOD identified a deficiency in which the QAPP states that precision will be calculated based on 5-minute data collected during periods of low variability, and that bump test data would be used if there are no periods of low variability with concentrations above the minimum detection limit. The NOD stated that this language must be removed from the QAPP because it is inconsistent with the requirements that compliance with the accuracy and precision specifications be demonstrated during monthly bump tests and 3-point calibration checks.[9] The language in question remains in the QAPP, and the QAPP therefore remains deficient.

7. With regard to the detection capabilities of the TDL, the Air District's December 22, 2022 letter stated that a TDL system used to monitor hydrogen sulfide must have a limit of quantitation (LOQ), which ranges from 3 to 25 ppb depending on environmental and operational conditions. The NOD stated that the AMP and QAPP were inconsistent with this requirement and that Chevron must revise the AMP and QAPP to reflect that the LOQ must be between 3 and 25 ppb.[10]

   In response to this issue in the NOD, Chevron revised the AMP and QAPP to state that the LOQ is considered to be equivalent to the MDL. While we are not taking issue with that approach per se, the AMP and QAPP contain multiple definitions of the LOQ. For example, page 17 of the QAPP states that it is calculated as three times the standard deviation of the last seven 5-minute average concentration values containing no measurable analyte. However, page 13 of the AMP states that the LOQ is calculated as twice the standard deviation of a blank sample. While it is not necessarily inappropriate to use various approaches for quantifying the detection capabilities of the monitoring equipment, the AMP and QAPP must be clear about when, how, and for what purpose those approaches are used. Because of the lack of clarity in the AMP and QAPP, they remain deficient in this regard.

[8] See Attachment 1 to the July 19, 2023 NOD, issue number 11, p. 6
[9] See Attachment 1 to the July 19, 2023 NOD, issue 13, p. 6
[10] See Attachment 1 to the July 19, 2023 NOD, issue number 14, p. 7