



**BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT**

July 15, 2022

VIA ELECTRONIC MAIL

Shawn Lee
HSE Manager, Richmond Refinery
Chevron Products Company
841 Chevron Way
Richmond, CA 94801

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

Dear Mr. Lee:

Thank you for submitting a revised Fenceline Air Monitoring Plan (AMP) and Quality Assurance Project Plan (QAPP) on June 1, 2022 pursuant to Section 403 of Bay Area Air Quality Management District (Air District) Regulation 12, Rule 15. Chevron revised the AMP to accommodate installation of a new open path H₂S monitoring system.

In accordance with Regulation 12, Rule 15, the Air District has 45 days from receipt of a new or modified AMP to identify any deficiencies. We are writing to notify you that the Air District has reviewed the revised AMP and associated QAPP, and has identified several deficiencies, which must be corrected before the Air District can proceed to solicit public comment on the documents as outlined in Section 404 of Regulation 12, Rule 15. Pursuant to Section 404.2 of the same rule, Chevron has 45 days from the date of this letter to address the issues outlined in the enclosed document and resubmit a proposed plan. Failure to submit a revised plan or adequately address the deficiencies in the enclosure may result in disapproval of the plan.

We are committed to working with you to resolve the issues we have identified as expeditiously as possible. If you have any questions concerning these issues, please contact me at (415) 749-4601 or jbovee@baaqmd.gov.

Sincerely,

Jerry Bovee, P.E., QSTI
Air Quality Engineering Manager
Meteorology & Measurement Division

Enclosure

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ENCLOSURE

Air District Comments on Chevron's Revised Fenceline Air Monitoring Plan and Quality Assurance Project Plan, Submitted June 1, 2022

1. In a letter dated October 6, 2021, the Air District outlined the minimum requirements that any open-path H₂S monitoring system must have. Among them is a requirement for the confirmed minimum detection limit to be between 3 ppb and 25 ppb H₂S depending on environmental and operational conditions. The Air District has the following comments regarding this requirement:
 - a. While Table 4-4 of the QAPP states that the minimum detection limit (MDL) is less than 25 ppb for all paths, the QAPP should discuss whether and under what conditions MDLs at the lower end of the specified range can be achieved and demonstrated for each path.
 - b. The AMP and the QAPP inappropriately characterize the detection limits of the open-path monitors as "expected" (AMP, p. 25) and "approximate" (QAPP, p. 24). Instead, the AMP and QAPP should state that the 25 ppb MDL for H₂S is not to be exceeded.
2. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H₂S monitoring system specified that it should have a repeatable detection limit of 25 ppb at a light transmission less than 1%. This specification could not be found in the AMP or QAPP and must be added, including verifiable procedures and metrics for how it is determined.
3. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H₂S monitoring system specified that it should have an accuracy of 2% and repeatability of 1% over the measurement range. These specifications and how they will be assessed and documented could not be found in the AMP or QAPP and must be added.
4. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H₂S monitoring system stated that the detection limit must be quantified and verified continuously in real time, reported in near real time on the refinery fenceline monitoring website, and included in the quarterly reports along with the measurement data. The Air District has the following comments regarding these requirements:
 - a. While page 23 of the QAPP states that real-time MDLs for the TDLAS will be provided on the public-facing website, neither the AMP nor the QAPP otherwise state that the detection limit will be continuously quantified and verified. The AMP and QAPP also do not identify and explain the method that will be used to continuously quantify the MDLs, or identify acceptance criteria that will be used for quality assurance purposes. Chevron must update the AMP and QAPP to include this information.
 - b. Section 3 of the AMP and Section 5 of the QAPP state that final data sets are compiled quarterly and provided to the Air District. However, neither section states that the detection limit data will be among the information provided in the quarterly reports. Please revise the AMP and QAPP accordingly and specify that the data will be provided in CSV format.
5. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H₂S monitoring system stated that the signal intensity must be measured in real time and provided to the Air District in the quarterly reports. The Air District has the following comments regarding these requirements:
 - a. While Table 4-5 of the QAPP states the signal power will be measured continuously, Table 1-6 states that the light and signal levels will be reviewed and tested quarterly. Please clarify the difference between these activities.

- b. Please explain the significance of 0.4 as the acceptance criterion for signal intensity.
 - c. Section 3 of the AMP and Section 5 of the QAPP state that final data sets are compiled quarterly and provided to the Air District. However, neither section states that the signal intensity data will be among the information provided in the quarterly reports. Please revise the AMP and QAPP accordingly and specify that the data will be provided in CSV format.
 - d. Include in the QAPP a description of the real time data assessment procedures that will be implemented to determine signal intensity.
6. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H₂S monitoring system stated that it should include real time data validation using measurement of another common ambient air component present in the spectra. Table 4-5 of the QAPP (p. 26) indicates that instrument QA/QC checks will include H₂O correlation on a continuous basis. However, this is not otherwise explained in the document. Please include a narrative explanation of this data validation process and fully document why H₂O is an appropriate measurement parameter for ongoing data validation.
7. Tables 1-6 and 4-5 of the QAPP identify the maintenance activities and QA/QC checks that will be performed on the open-path H₂S systems. As a general matter, the QAPP contains an insufficient level of detail regarding the methods, procedures, equations, and calculations that will be used to perform these actions. For example, Table 1-6 states that system performance indicators will be checked on a quarterly basis but it is unclear what indicators will be checked, how they will be checked, and what acceptance criteria will be used. Chevron should attach standard operating procedures for all maintenance and QA/QC activities, which will become part of the publicly available QAPP, or else describe them more fully in the body of the document.
8. Page 18 of the QAPP states that bump tests and three-point calibrations will be performed with sealed cells capable of incorporating the atmospheric path, which is the approach the Air District prefers. However, Appendix D to the QAPP describes other maintenance, commissioning, and performance audit procedures involving optical fiber connections to gas cells. Please note that all calibrations and bump tests must be performed in the actual transmitted light path by using fixed or flow through cells containing a NIST traceable calibration gas standard. Additional optical fiber checks can be implemented as part of the QA/QC program, but do not fulfill the calibration and ongoing bump test requirements.
9. The AMP states that the Unisearch LasIR system has been selected to perform open path H₂S monitoring. However, Table 1-6 of the QAPP states that maintenance checks for the TDLAS open-path monitor may be modified or added pending instrument selection. Since the equipment has been selected, Chevron should remove this language from the plan and confirm Table 1-6 includes all maintenance activities necessary to ensure the proper operation of the chosen equipment. Should an alternative system be selected, at a later time, the AMP and QAPP will be re-opened and revised to incorporate the new system specifications. Minimum performance metrics must be consistent, and mirror those described in the October 6, 2021 letter, regardless of the system chosen.
10. The AMP states that Chevron has an existing open path H₂S monitoring system (the Boreal GasFinder 2.0) and that the plan is being revised to address installation of a new Unisearch LasIR system. However, the AMP is at times unclear about which system is being described. For example, page 17 of the AMP states that the H₂S detection limit for the open path monitor is over 50 ppb, while Table 4-4 on page 24 of the QAPP states that the MDL is less than 25 ppb; the AMP does not clearly indicate which systems these detection limits pertain to. In another instance, page 15 of the AMP states that the manufacturer of the open-path analyzers indicated that the current minimum detection limits for H₂S and other compounds should be achievable at the pathlengths installed. It could be inferred from

the surrounding text that this statement pertains to the Boreal equipment, but that is again not explicit and a similar statement is not made in the plan for the new Unisearch equipment. This lack of clarity with respect to the H₂S system is prevalent throughout the AMP. Because Chevron is revising the AMP to comply with H₂S monitoring requirements of Regulation 12, Rule 15 and the Air District has never approved use of the Boreal GasFinder equipment for that purpose, all references to and information about the Boreal equipment should be stricken from the plan. Chevron should also confirm that all information in the revised plan pertains to the Unisearch LasIR system.

11. The AMP states that the Unisearch LasIR system will be implemented by January 1, 2023. Please include a statement in the AMP that Chevron will notify the Air District of its status within seven days after the system is fully operational and put into production.
12. On multiple occasions, the AMP and QAPP state the requirements for data completeness as 75% completeness on an hourly basis and 75% completeness on a quarterly basis. However, according to the Air Monitoring Guidelines for Petroleum Refineries (April 2016) established pursuant to Regulation 12, Rule 15, instrumentation must meet a minimum of 75% completeness on an hourly basis, 90% of the time based on annual quarters. Chevron must revise the AMP and QAPP accordingly.
13. Table 3.3 (copied below for reference) provides information about the length and configuration of the UV-DOAS, TDL, and FTIR paths:

Table 3.3 – Fenceline Open-Path Lengths

Fenceline²	Path Designation	Open-Path Equipment	Approximate Path Length (meters)
North Richmond	D	UV-DOAS, TDL, FTIR	692
Atchison	E	UV-DOAS	790
Atchison (North)	E1	FTIR, TDL	420
Atchison (South)	E2	FTIR, TDL	380
Point Richmond	F	UV-DOAS, TDL, FTIR	897
Point Richmond (East)	F1	FTIR, TDL	510
Point Richmond (West)	F2	FTIR, TDL	405

The Air District has the following comments with respect to this table:

- a. Footnote 2 states that the FTIR and TDL instruments cover paths E and F via subpaths E1, E2, F1, and F2, respectively. Accordingly, the table identifies the FTIR and TDL instruments as equipment for paths E1 and E2 but not for path E as a whole. However, where path F is concerned, the table identifies the FTIR and TDL instruments as equipment for subpaths F1 and F2, and path F in its entirety. If this represents a difference in the configuration of the FTIR and TDL equipment among paths E and F, please explain that difference in the text of the plan. Otherwise, please use a consistent approach in the table for describing the configuration of the equipment along each path by striking references to the TDL and FTIR equipment in the line representing path F or by making other appropriate changes.

14. Table 1-1 (see below for reference) provides additional information about the geographic locations and coverage paths of the fenceline monitoring equipment:

Table 1-1. Fenceline monitor geographical locations and coverage paths.

Endpoint	Coordinate (Decimal Degrees)	UV-DOAS	FTIR and open- path H₂S
North end of North Richmond fenceline monitor	37.953652, -122.37962	Path D, 694 m	Path D, 694 m
South end of North Richmond fenceline monitor	37.948341, -122.375476		
North end of Atchison fenceline monitor	37.941008, -122.381301	Path E, 793 m	Path E1, 420 m
Middle of Atchison Fenceline Monitor	37.937730, -122.383568		Path E2, 380 m
South end of Atchison fenceline monitor	37.934758, -122.385561		
North end of Point Richmond fenceline monitor	37.934215, -122.385938	Path F, 897 m	Path F1, 497 m
Middle of Point Richmond fenceline Monitor	37.933824, -122.391536		Path F2, 401 m
South end of Point Richmond fenceline monitor	37.933230, -122.396043		

The Air District has the following comments with respect to this table:

- a. It is unclear if the coordinates for the middle of the Atchison fenceline monitor represent the location of the analyzer and reflector for subpaths E1 and E2 or if the coordinates represent the true middle of path E (i.e., the point of equal distance between the end points). The same is true with respect to path F. If the coordinates represent the locations of the analyzers and reflectors for the respective subpaths, please clarify this in the table. If the coordinates represent the point of equal distance along the paths, please add the coordinates for the analyzers and reflectors for the subpaths to the table.
- b. Tables 1-1 and 3.3 (see Comment 1 above) suggest that subpaths E1 and E2 together make up path E in its entirety and that subpaths F1 and F2 make up path F in its entirety. However, there are several discrepancies in these tables and in other parts of the plan. For example, Table 1-1 states that path E1 is 420 m in length and path E2 is 380 m (together equaling 800 m) but that path E as a whole is only 793 m long. Similarly, the table states that subpath F1 is 497 m and subpath F2 is 401 (together equaling 898 m) but that path F as a whole is 897 m. At the same time, Table 3.3, Figure 3.4, and the site map in Appendix A of the plan show the length of subpath F1 as 510 m rather than 497 m. Please explain these apparent discrepancies or resolve them throughout the plan.

15. Table 4-4 of the QAPP contains an unlabeled column. Please explain what this column represents.

Table 4-4. Approximate minimum detection limits (MDLs) and upper detection limits (UDLs) by compound and path.

	Path Length			North Richmond (D)		Atchison (E)		Atchison (E1)		Atchison (E2)		Point Richmond (F)		Point Richmond (F1)		Point Richmond (F2)	
		N/A	N/A	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)
		MDL (ppmm)	UDL (ppmm)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)	MDL (ppb)	UDL (ppb)
FTIR	Methane	7	4200	5.1	3000	-	-	8.4	5000	9.2	5500	-	-	7.1	4200	8.8	5200
	Ethane	3.2	1100	2.3	810	-	-	3.8	1300	4.2	1500	-	-	3.2	1100	4	1400
	Propane	3.8	1100	2.7	810	-	-	4.5	1300	5	1500	-	-	3.8	1100	4.7	1400
	Butane	4.2	1100	3	810	-	-	5	1300	5.5	1500	-	-	4.2	1100	5.2	1400
	Pentane	1.6	1100	1.2	810	-	-	1.9	1300	2.1	1500	-	-	1.6	1100	2	1400
TDLAS	Hydrogen Sulfide	<25	7,500	<25	5,400	-	-	<25	8,900	<25	9,900	-	-	<25	7,500	<25	9,300
UV-DOAS	Benzene	0.27	16000	0.19	23000	0.17	20000	-	-	-	-	0.15	18000	-	-	-	-
	Toluene	0.84	22000	0.61	32000	0.53	28000	-	-	-	-	0.47	25000	-	-	-	-
	Ethylbenzene	0.3	11000	0.22	16000	0.19	14000	-	-	-	-	0.17	12000	-	-	-	-
	o-xylene	3.8	2100	2.7	3100	2.4	2700	-	-	-	-	2.1	2400	-	-	-	-
	m-xylene	0.35	920	0.25	1300	0.22	1200	-	-	-	-	0.2	1000	-	-	-	-
	p-xylene	0.24	360	0.17	510	0.15	450	-	-	-	-	0.13	400	-	-	-	-
	Sulfur Dioxide	0.68	21000	0.49	30000	0.43	26000	-	-	-	-	0.38	23000	-	-	-	-

16. Please specify the units of measure for the path lengths in Table 4-4 of the QAPP.

17. Please include a table in the AMP and QAPP documenting the version history of each document. The table should include the version or revision number, the corresponding date, and a brief description of the revisions.

18. All procedures and metrics for exclusion, or invalidation, of data must be fully described and documented in the QAPP and on the publicly facing facility fenceline data website, including environmental conditions, system maintenance, or system failure. Any data exclusion, or invalidation, must be reported to the Air District and verifiable through review and audit of logged operational data. Data exclusion, or invalidation, that cannot be verified will not be accepted and will be counted against the systems operational uptime requirements.