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Bay Area Air District:

August 25, 2022

VIA ELECTRONIC MAIL

Bud Ghosh
Senior Environmental Consultant
Phillips 66
San Francisco Refinery
1380 San Pablo Avenue
Rodeo, CA 94572

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

Dear Mr. Ghosh:

Thank you for submitting a revised Fenceline Air Monitoring Plan (AMP) and Quality Assurance Project Plan (QAPP) on July 14, 2022 pursuant to Section 403 of Bay Area Air Quality Management District (Air District) Regulation 12, Rule 15. Phillips 66 revised the AMP to accommodate installation of a new open-path H_2S 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, Phillips 66 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

ENCLOSURE

Air District Comments on Phillips 66's Revised Fenceline Air Monitoring Plan and Quality Assurance Project Plan, Submitted July 14, 2022

1. In a letter dated October 6, 2021, the Air District outlined the minimum requirements that any open-path H_2S monitoring system must have. Among the requirements is the need for the system to be operational by January 1, 2023. While Phillips 66's July 14, 2022 cover letter states the AMP and QAPP have been updated to reflect the new Unisearch H_2S fenceline monitoring system to be installed at the refinery, neither the AMP nor the QAPP state that the system will be operational and that the associated data will be posted on the public website by the required date. Such a commitment must be added to the AMP. In addition, please include a statement in the AMP that Phillips 66 will notify the Air District of the system status within seven days after it is fully operational and put into production.

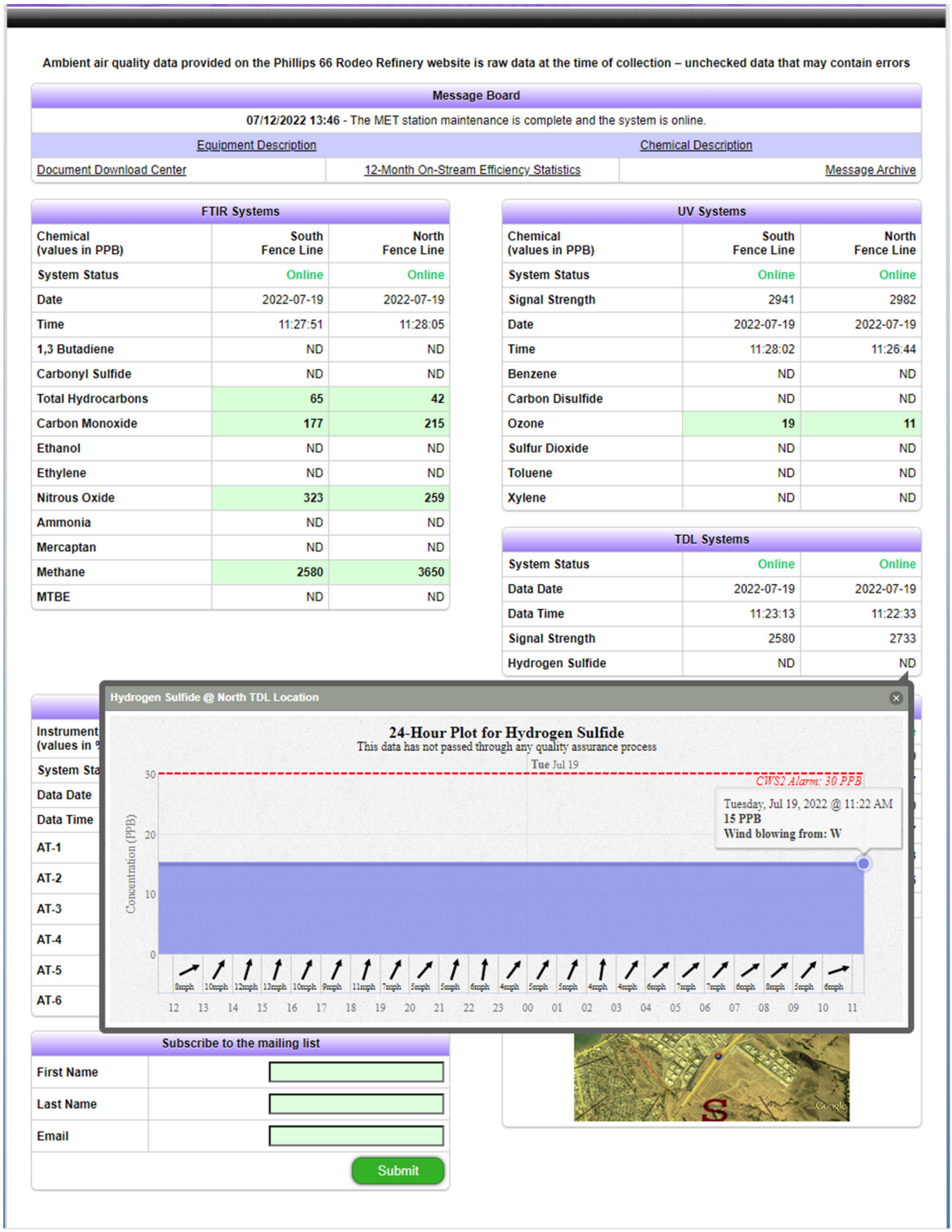
2. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S monitoring system included a requirement for the confirmed minimum detection limit (MDL) to be between 3 ppb and 25 ppb H_2S depending on environmental and operational conditions. The Air District has the following comments regarding this requirement:
    a. While Table 1 of the AMP (p. 14) states that the required MDL is 25 ppb, the QAPP should discuss whether and under what conditions MDLs at the lower end of the specified range can be achieved and demonstrated.

3. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S 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.

4. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S monitoring system specified that it should have a measurement range of 3 ppb to 5,000 ppb with 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. Also, in the event the upper detection limit (UDL) is greater than 5,000 ppb H_2S based on the design and configuration of the system, please specify the path-specific UDL.

5. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S 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 11 of the QAPP includes the detection limit in a bulleted list of performance criteria that will be assessed, 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. Phillips 66 must update the AMP and QAPP to include this information.
    b. Neither the AMP nor the QAPP state that the MDL will be reported in near real time on the refinery fenceline monitoring website; this requirement must be added to both documents.
    c. With regard to data displayed on the public website, page 15 of the AMP states: "Detection limits for the data generated by the equipment are normally set to be at least two times the

manufacturer's MDL. This is done to minimize the occurrence of false detections being reported to the real-time public website." Please elaborate on what this means and how it affects the data that are presented to the public; in your response, please include an explanation of the image below, in which the main page of the refinery website reports ND for H_2S at 11:22 AM on July 19, 2022 while the 24-hour plot shows a concentration of 15 ppb with the same time stamp.



Ambient air quality data provided on the Phillips 66 Rodeo Refinery website is raw data at the time of collection – unchecked data that may contain errors

Message Board

07/12/2022 13:46 - The MET station maintenance is complete and the system is online.

Equipment Description | Chemical Description

Document Download Center | 12-Month On-Stream Efficiency Statistics | Message Archive

FTIR Systems

Chemical (values in PPB)	South Fence Line	North Fence Line
System Status	Online	Online
Date	2022-07-19	2022-07-19
Time	11:27:51	11:28:05
1,3 Butadiene	ND	ND
Carbonyl Sulfide	ND	ND
Total Hydrocarbons	65	42
Carbon Monoxide	177	215
Ethanol	ND	ND
Ethylene	ND	ND
Nitrous Oxide	323	259
Ammonia	ND	ND
Mercaptan	ND	ND
Methane	2580	3650
MTBE	ND	ND

UV Systems

Chemical (values in PPB)	South Fence Line	North Fence Line
System Status	Online	Online
Signal Strength	2941	2982
Date	2022-07-19	2022-07-19
Time	11:28:02	11:26:44
Benzene	ND	ND
Carbon Disulfide	ND	ND
Ozone	19	11
Sulfur Dioxide	ND	ND
Toluene	ND	ND
Xylene	ND	ND

TDL Systems

System Status	Online	Online
Data Date	2022-07-19	2022-07-19
Data Time	11:23:13	11:22:33
Signal Strength	2580	2733
Hydrogen Sulfide	ND	ND

Hydrogen Sulfide @ North TDL Location

24-Hour Plot for Hydrogen Sulfide

This data has not passed through any quality assurance process

Tue Jul 19

CWS2 Alarm: 30 PPB

Tuesday, Jul 19, 2022 @ 11:22 AM
15 PPB
Wind blowing from: W

Concentration (PPB)

Instrument (values in %
System Sta
Data Date
Data Time
AT-1
AT-2
AT-3
AT-4
AT-5
AT-6

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d. Page 19 of the AMP and page 16 of the QAPP state that final data sets are compiled quarterly and provided to the Air District. However, neither document states 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.

6. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S 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. Table 3 of the QAPP states the signal levels will be checked on a monthly basis; Phillips 66 may check the signal levels on a monthly basis but it must also do so continuously as required by our October 6, 2021 letter. Phillips 66 must add this requirement to the QAPP. Also, please explain any difference between the monthly signal checks and the continuous monitoring.

    b. Please explain the significance of 0.4 as the acceptance criterion for signal intensity.

    c. Page 19 of the AMP and page 16 of the QAPP state that final data sets are compiled quarterly and provided to the Air District. However, neither document 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.

7. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S 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 of the QAPP (p. 13) indicates that instrument QA/QC checks will include H_2O 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 H_2O is an appropriate measurement parameter for ongoing data validation.

8. Section 3.4.9 of the QAPP (pp. 11-13) identifies the maintenance activities and QA/QC checks that will be performed on the open-path H_2S system. 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 3 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.
    - Section 3.4.9 provides a list of system performance criteria and states the frequency as "Continuous to Quarterly."
    - The QAPP states that the processes for using sealed gas cells for bump checks and 3-point calibration checks are still in development, it does not discuss performance of these tests using sealed cells capable of incorporating the atmospheric path, and it does not reflect the requirement that bump tests will be performed with a unique concentration that differs from the calibration checks.

Phillips 66 must attach standard operating procedures for all maintenance and QA/QC activities, which will become part of the publicly available QAPP, or else fully describe the standard procedures in the body of the QAPP.

9. While Table 3 of the QAPP (p. 12) states that bump tests will be performed on a monthly basis, the document contains a footnote that says the tests may be performed less frequently in the future. Although the footnote goes on to say that any request for a reduction in bump test frequency will require approval from the Air District, this footnote should be stricken from the plan as the requirement established by the Air District is to perform bump tests on a monthly basis.

10. The Air District's October 6, 2021 letter regarding the minimum requirements for the open-path H_2S monitoring system specified that raw spectral data files must be saved as single files and made available to the Air District upon request. This requirement could not be found in the AMP or QAPP and must be added.

11. 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. While the AMP and QAPP reflect this requirement, they lack an adequate level of detail regarding how compliance with this requirement is demonstrated. For example, the QAPP should contain information such as:

    - codes used to flag data as valid, invalid, or under review;
    - operational codes used to explain why measurements are invalid (e.g., instrument malfunction, planned maintenance, poor visibility, etc.); and
    - formulas used to determine the completeness of the data and other related statistics.

    Phillips 66 should add more detail to the QAPP in this regard.

12. As stated above, the Air Monitoring Guidelines for Petroleum Refineries (April 2016) established pursuant to Regulation 12, Rule 15 require instrumentation to meet a minimum of 75% completeness on an hourly basis, 90% of the time based on annual quarters. The guidelines go on to say atmospheric conditions that affect accurate measurements and that are beyond the control of the refinery shall not be counted against data completeness requirements as long as appropriate meteorological measurements document time periods when these conditions exist. With regard to these requirements, the AMP states the following (p. 18, emphasis added):

    > "Atmospheric conditions beyond the control of the Refinery that affect accurate measurements are typically rain and fog. When these occur, the open-path measurement of light signal will drop below a level where data can be reliably quantified. The reason for this is the light beams produced by the open- path air monitoring systems are scattered as they interact with the water vapor in the air. Once scattered, the light can no longer be received and used by the instruments. **When an instrument's signal drops below a predetermined level, the signal strength of the other open path instruments is evaluated during the same time period. If another instrument shows a pattern of signal drop, the data will be identified and flagged as meeting the criteria of atmospheric conditions beyond the control of the Refinery.** This method should provide information that is more accurate than a separate visibility monitor as the signal reading is directly tied to the instrument's quantification abilities, and information is gathered directly from at least two instruments used in the fence line program, as opposed to a single measurement from a separate analyzer."

A similar statement is also included in the QAPP (p. 7). While the signal strength of multiple instruments is informative for determining whether adverse atmospheric conditions exist, those measurements alone are not sufficient to justify the exclusion of data. As stated in the April 2016 guidelines, such exclusion must be supported by meteorological measurements. Phillips 66 must revise the AMP and QAPP to include the use of meteorological measurements for substantiating the exclusion of data associated with adverse atmospheric conditions when determining compliance with the data completeness requirement.

13. The Air District supports Phillips 66's practice to include a document control table in the QAPP and recommends that a similar table be included in the AMP.

14. 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.

15. The Air Monitoring Guidelines for Petroleum Refineries (April 2016) established pursuant to Regulation 12, Rule 15 state that air monitoring plans must include the location and elevation of equipment among other information. The Air District has the following comments with respect to these requirements:
    a. While the AMP and QAPP each include a map of the monitoring path (AMP, p. 7; QAPP, p. 5), it is not clear in either map which end of the path includes the light source and which end includes the reflector. Please clarify this in both maps.
    b. In addition to the height above ground level, please include the height above mean sea level for the equipment in Table 1 of the QAPP.

16. With regard to meeting measurement quality objectives, page 15 of the QAPP states the following (emphasis added):

> "Phillips 66 will investigate any portion of the fence line system that fails to meet the above measurement quality objectives, or on-stream efficiency requirements under Rule 12-15. The investigation team will include members of the fence line management team and appropriate equipment vendors to assess the problem and to initiate corrective action. In addition, improvement opportunities identified will be considered as possible further action to minimize the chance for similar problems in the future.
>
> **Phillips 66 is allowed to upgrade the system, without prior consultation of other parties, with substantially equivalent equipment** or software (i.e., equipment that does not diminish the sensitivity of the equipment or the fence line system) as necessary to maintain system operability. Changes to equipment described in this QAPP may trigger a change in the Quality Assurance/Quality Control requirements associated with the updated equipment."

Section 403 of Regulation 12, Rule 15 requires the owner or operator of a refinery to obtain and maintain Air District approval of a plan for establishing and operating a fenceline monitoring system. This plan must include detailed information describing the equipment to be used to monitor, record, and report air pollutant levels; the siting, operation, and maintenance of the equipment; and procedures for implementing data quality assurance and quality control. In the event Phillips 66 modifies any of its equipment, it is likely that revisions to the AMP and QAPP will be necessary unless

identical equipment is put in its place. As a result, we recommend that Phillips 66 consult with us prior to making any modifications to the fenceline monitoring systems.