June 4, 2026
File No. 01204123.21 Task 22

**MEMORANDUM**

**TO:** Stephen Dutz, SCAQMD

**FROM:** Stipe Markotic, Quincy Laris, Ray Huff

**SUBJECT:** **Chiquita Canyon Landfill Air Monitoring – Elevated Acrolein Reading Analysis**

**SCS Engineers (SCS)** has prepared this memorandum to provide the South Coast Air Quality Management District (SCAQMD) a review and analysis of 51 reported acrolein readings above the Office of Environmental Health Hazard Assessment (OEHHA) acute reference exposure level (1.09 ppb) within the Enhance Air Monitoring Program (EAMP) at the Chiquita Canyon Landfill (Landfill), from March 2025 through March 2026. As part of the ongoing quality assurance and control (QA/QC) procedures for data review under the EAMP, analysis of acrolein elevated readings was conducted by both Tricorn Tech (TCT) and SCS to determine the validity of each reading. A summary of each elevated reading event is provided in **Attachment A.**

## INITIAL QA/QC REVIEW

### TCT Review

As a part of our QA/QC process, TCT reviews all readings above an OEHHA reference exposure level (REL). The results of their review for each such reading are included in **Attachment A**. In summary, TCT recommended invalidation of 49 out of the total 51 readings above the OEHHA acute REL for acrolein. TCT uses an invalidation comment code for the invalidation criteria. A summary of this code and count of samples that met the code criteria is presented as **Table 1**, below.

Comment Codes 1 and 2 are associated with the initial installation of the acrolein sensors at nine out of 10 of the stations. These issues were corrected by the replacement of faulty sensors (Comment Code 1) and re-calibration/replacement of reference gas cylinders (Comment Code 2).

As shown in **Table 1,** the most prevalent Comment Code was 3 – "Peak overlap with unknown compound," which accounted for 22 of the 49 invalidation conclusions. An example chromatogram associated with this issue is provided in **Attachment B.**

Table 1. TCT Comment Codes and Reading Count

| TCT Comment Code | Comment | Count of Readings |
|---|---|---|
| 1 | Initial readings after new sensor module installation and review calibration signals | 6 |
| 2 | Invalid reading due to faulty sensor module | 11 |
| 3 | Peak overlap with unknown compound | 22 |
| 4 | Residual carry over signals observed post calibration | 5 |
| 5 | Retention time shift due to low Nitrogen pressure - Nitrogen cylinder empty | 1 |
| 6 | Algorithm error due to software issue | 1 |
| 7 | Abnormal baseline reading (Acrolein) | 3 |
| **TOTAL** | | **49** |

Invalid data conclusions identified by Comment Codes 4 and 5 can be mitigated through updates in our Standard Operating Procedure (SOP) for acrolein sensor maintenance and calibration, which have been implemented and submitted to SCAQMD in our most recent SOP.

For Comment Codes 6 and 7, although these appear to be anomalous, a copy of the chromatograms associated with these issues are also presented in **Attachment B**.

Based on TCT analysis and SCS review, we are recommending the invalidation of 49 of the 51 REL exceedances between March 2025 and March 2026. This leaves 2 valid readings: one at MS-01 on January 22, 2026 and one at MS-02 on January 18, 2026, as shown in **Attachment A.**

## SCS Review

A broader evaluation of wind direction was also performed for all 51 readings. This analysis assumes that the acrolein readings were valid, although based on TCT's review, 49 out of 51 of them were not.

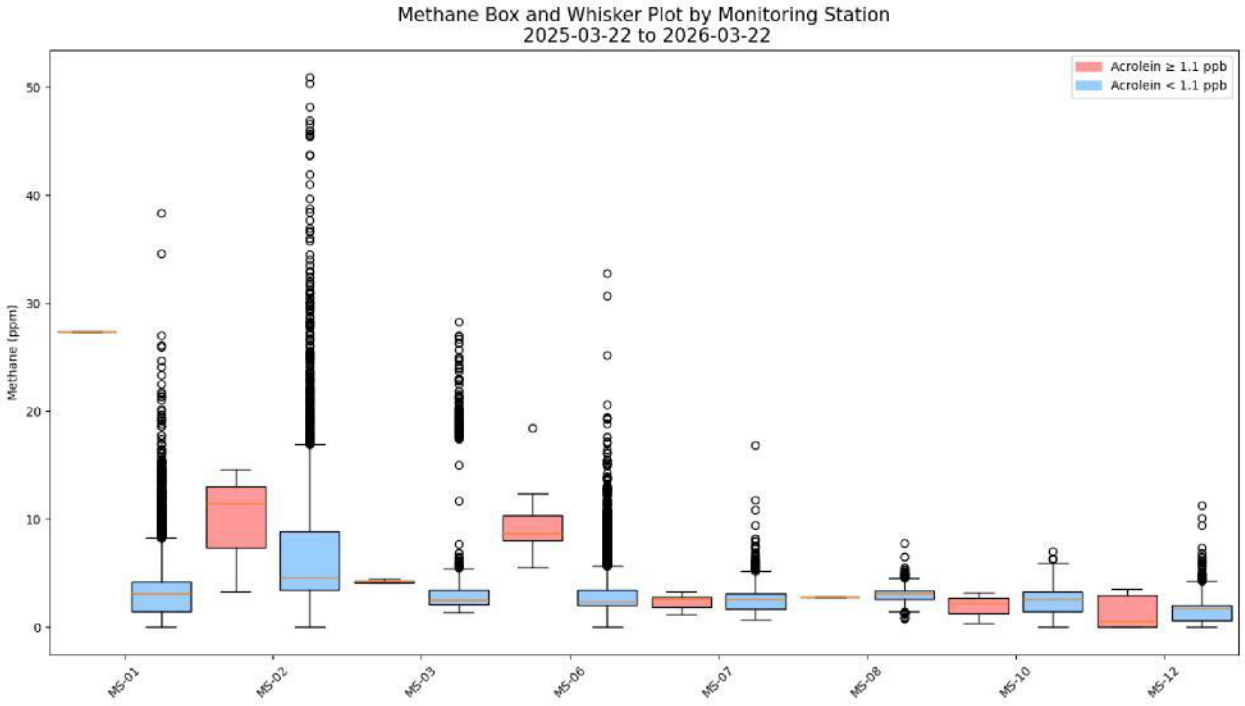
This analysis used the central landfill meteorological (MET) station as a surrogate for site-wide wind patterns rather than relying on local AQM MET data because past air movement studies have shown that the regional wind conditions, as represented by the central MET station, are the key determinant of how constituents may move offsite, not localized wind conditions at AQM locations. The objective was to assess whether observed wind patterns support the Landfill as a plausible source of the erroneous acrolein readings.

For each reading, 5-minute average wind direction data were evaluated for both the hour of the measurement and the preceding hour. These wind directions were then compared to the bearing between the center of the landfill and the monitoring station where the measurement occurred. If any recorded wind direction during the 2-hour evaluation period fell within 50 degrees of that bearing, the landfill was considered a plausible source.

Based on this analysis, the Landfill was considered a plausible source in 27 of the 51 events. Given the relatively broad temporal wind and angular tolerance used in this analysis, a 53 percent

correspondence rate is low and does not provide strong support for the Landfill as the primary source of the observed acrolein concentrations.

In addition to wind data, methane was evaluated as a surrogate for landfill gas (LFG) to assess whether acrolein exceedances were associated with elevated LFG concentrations. It should be noted that methane does not serve well as surrogate for reaction gas, however methane is being used in this instance to represent movement of general LFG. The figure below presents box-and-whisker plots comparing average methane concentrations during periods with elevated acrolein readings to the rest of the methane data observed during periods without such readings.




It should be noted that the portions of the figure representing methane concentrations during elevated acrolein readings are based on relatively few data points, which can exaggerate the apparent interquartile range shown in red. The limited sample size also increases the influence of random variability and reduces the statistical strength of the comparison. For example, at MS-01, the single corresponding methane data point is elevated; however, a single observation does not provide sufficient statistical support to conclude that methane concentrations were elevated during these events.

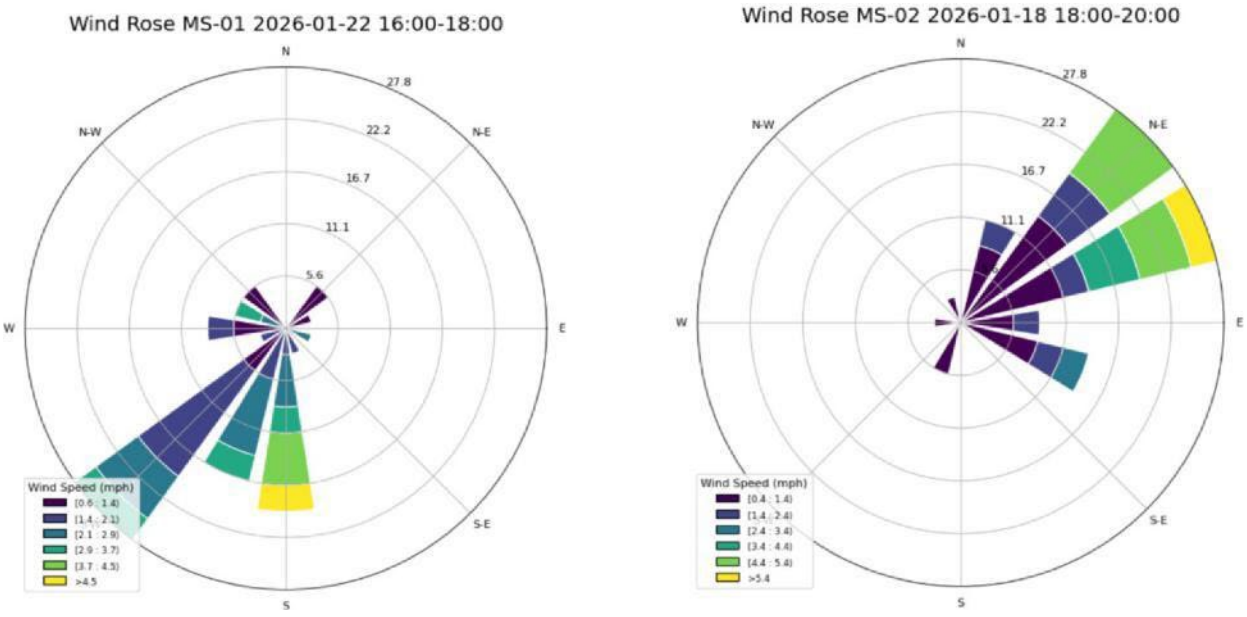
At most monitoring locations, no clear relationship was observed between the elevated acrolein readings and elevated methane concentrations. MS-06 showed a possible increase in methane during such events, but this pattern was not consistently observed across the entire monitoring network. When evaluated collectively, average methane concentrations during the elevated acrolein readings were slightly higher than during non-elevated periods; a statistical test was performed to determine whether this increase was significant or attributable to random variation. Given the limited number of data points, the available data does not support a strong conclusion regarding a consistent relationship between elevated acrolein readings and elevated methane concentrations.

## SUPPLEMENTARY QA/QC REVIEW

In addition to the TCT analysis, SCS performed a QA/QC review of the valid elevated acrolein readings at MS-01 and MS-02. As part of this review, wind direction and wind speed were analyzed in addition to methane concentration during the time of each elevated acrolein reading to look for any correlation or trends within the data.

Wind speed and wind direction on an average of 5-minute increments were analyzed as part of the QA/QC data review. **Figure 1**, below are the wind roses for the two valid elevated acrolein readings.

Figure 1. Wind Roses for MS-01 and MS-02 Acrolein Exceedances




Review of the wind roses above indicate that during both occurrences the monitoring stations were predominantly downwind from the Landfill. Please note, due to the micro-environment that these air monitoring stations are located in, wind direction alone may not always be sufficient to determine the presence of location of an emission source.

During both events, multiple additional compounds were elevated. Based on previous flux studies conducted at the landfill, acrolein is not considered an expected emission compound from the Landfill. It is possible that these events represented an exception to prior observations, or alternatively, that the acrolein originated from another emission source. Given the limited available information, it is difficult to draw strong conclusions regarding the source of the acrolein.

## CONCLUSION

The supplemental wind and methane analysis for the associated REL exceedances do not establish any correlation or trends to indicate an alternative source or explanation for the acrolein readings.

Due to the nature of the false readings that were identified following TCT QA/QC review including co-elution of unknown compounds and instrumentation deficiencies, SCS concurs with the initial

findings regarding the elevated acrolein readings recorded between March 22, 2025 to March 22, 2026. As a majority of the elevated acrolein readings (roughly 96%) were determined to be invalid/false detections, there is some concern on the viability of continued acrolein monitoring under the EAMP.

ATTACHMENT A

ACROLEIN EXCEEDANCE DATA TABLE

| Date/Time | Monitoring Station | Measured Value (ppb) | Response | Comment Code |
|---|---|---|---|---|
| 3/22/25 0:00 | MS-06 | 2.43 | Invalid | 1 |
| 3/22/25 1:00 | MS-06 | 1.51 | Invalid | 1 |
| 3/22/25 2:00 | MS-06 | 2.03 | Invalid | 1 |
| 3/22/25 23:00 | MS-06 | 1.37 | Invalid | 1 |
| 3/23/25 0:00 | MS-06 | 1.75 | Invalid | 1 |
| 3/23/25 1:00 | MS-06 | 1.79 | Invalid | 1 |
| 4/6/25 20:00 | MS-06 | 1.16 | Invalid | 2 |
| 5/9/25 3:00 | MS-10 | 1.15 | Invalid | 2 |
| 6/10/25 16:00 | MS-12 | 1.17 | Invalid | 2 |
| 6/14/25 14:00 | MS-12 | 1.16 | Invalid | 2 |
| 6/15/25 12:00 | MS-12 | 1.15 | Invalid | 2 |
| 6/15/25 13:00 | MS-12 | 1.25 | Invalid | 2 |
| 6/15/25 14:00 | MS-12 | 1.41 | Invalid | 2 |
| 6/15/25 18:00 | MS-12 | 1.28 | Invalid | 2 |
| 6/16/25 15:00 | MS-12 | 1.32 | Invalid | 2 |
| 6/16/25 16:00 | MS-12 | 1.31 | Invalid | 2 |
| 6/16/25 17:00 | MS-12 | 1.1 | Invalid | 2 |
| 7/24/25 3:00 | MS-10 | 1.5 | Invalid | 3 |
| 8/7/25 23:00 | MS-12 | 4.26 | Invalid | 3 |
| 8/8/25 0:00 | MS-12 | 4.7 | Invalid | 3 |
| 8/8/25 2:00 | MS-03 | 1.56 | Invalid | 3 |
| 8/8/25 3:00 | MS-03 | 1.44 | Invalid | 3 |
| 8/8/25 4:00 | MS-03 | 2.59 | Invalid | 3 |
| 8/8/25 4:00 | MS-12 | 7.73 | Invalid | 3 |
| 8/8/25 5:00 | MS-12 | 8.51 | Invalid | 3 |
| 8/8/25 6:00 | MS-03 | 3.89 | Invalid | 3 |
| 8/8/25 6:00 | MS-12 | 7.23 | Invalid | 3 |
| 8/8/25 7:00 | MS-03 | 2.84 | Invalid | 3 |
| 8/8/25 8:00 | MS-12 | 4.48 | Invalid | 3 |
| 8/9/25 1:00 | MS-08 | 1.23 | Invalid | 3 |
| 12/22/25 22:00 | MS-06 | 1.41 | Invalid | 3 |
| 12/22/25 23:00 | MS-06 | 2.44 | Invalid | 3 |
| 12/23/25 0:00 | MS-06 | 1.25 | Invalid | 3 |
| 1/24/26 17:00 | MS-10 | 1.34 | Invalid | 3 |
| 2/26/26 12:00 | MS-02 | 7.00 | Invalid | 3 |
| 3/6/26 11:00 | MS-04 | 1.35 | Invalid | 3 |
| 3/22/26 20:00 | MS-07 | 1.31 | Invalid | 3 |
| 3/22/26 21:00 | MS-07 | 1.43 | Invalid | 3 |
| 3/22/26 22:00 | MS-07 | 1.47 | Invalid | 3 |

| Date/Time | Monitoring Station | Measured Value (ppb) | Response | Comment Code |
|---|---|---|---|---|
| 7/27/25 4:00 | MS-07 | 1.47 | Invalid | 4 |
| 7/30/25 4:00 | MS-07 | 1.9 | Invalid | 4 |
| 8/3/25 4:00 | MS-07 | 1.5 | Invalid | 4 |
| 8/6/25 4:00 | MS-07 | 1.6 | Invalid | 4 |
| 9/17/25 4:00 | MS-07 | 8.99 | Invalid | 4 |
| 11/10/25 19:00 | MS-06 | 1.13 | Invalid | 5 |
| 1/7/26 13:00 | MS-07 | 170.12 | Invalid | 6 |
| 2/24/26 23:00 | MS-02 | 1.36 | Invalid | 7 |
| 2/25/26 7:00 | MS-02 | 2.26 | Invalid | 7 |
| 2/25/26 11:00 | MS-02 | 3.61 | Invalid | 7 |
| 1/18/26 19:00 | MS-02 | 1.37 | Valid | - |
| 1/22/26 17:00 | MS-01 | 1.49 | Valid | - |
| 1/24/26 17:00 | MS-10 | 1.34 | Invalid | 3 |
| 2/24/26 23:00 | MS-02 | 1.36 | Invalid | 7 |
| 2/25/26 07:00 | MS-02 | 2.26 | Invalid | 7 |
| 2/25/26 11:00 | MS-02 | 3.61 | Invalid | 7 |
| 2/26/26 12:00 | MS-02 | 7.00 | Invalid | 3 |
| 3/6/26 11:00 | MS-04 | 1.35 | Invalid | 3 |
| 3/22/26 20:00 | MS-07 | 1.31 | Invalid | 3 |
| 3/22/26 21:00 | MS-07 | 1.43 | Invalid | 3 |
| 3/22/26 22:00 | MS-07 | 1.47 | Invalid | 3 |

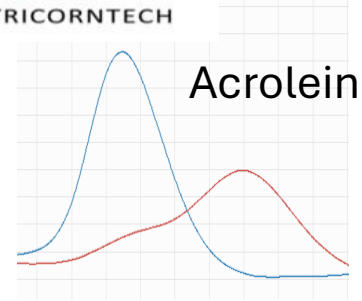
Comment Codes:

1 – Initial readings after new sensor module installation and review calibration signals
2 – Invalid reading due to faulty sensor module
3 – Peak overlap with unknown compound
4 – Residual carry over signals observed post calibration
5 – Retention time shift due to low Nitrogen pressure - Nitrogen cylinder empty
6 – Algorithm error due to software issue
7 – Abnormal baseline reading (Acrolein)

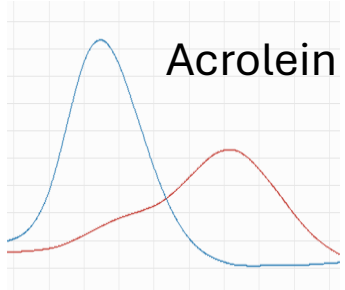
# ATTACHMENT B

# MICRO-GC GAS CHROMATOGRAMS

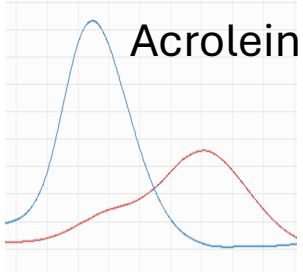
# Comment Code 3 - Peak Overlap with Unknown Compound
# MS-12 (8/8/25)



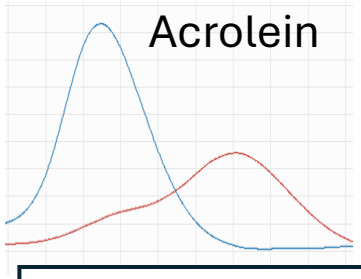

12:00am



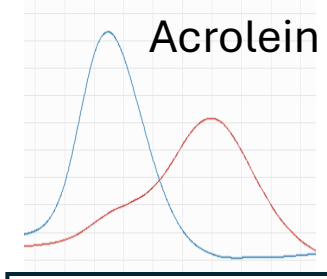

4:00am



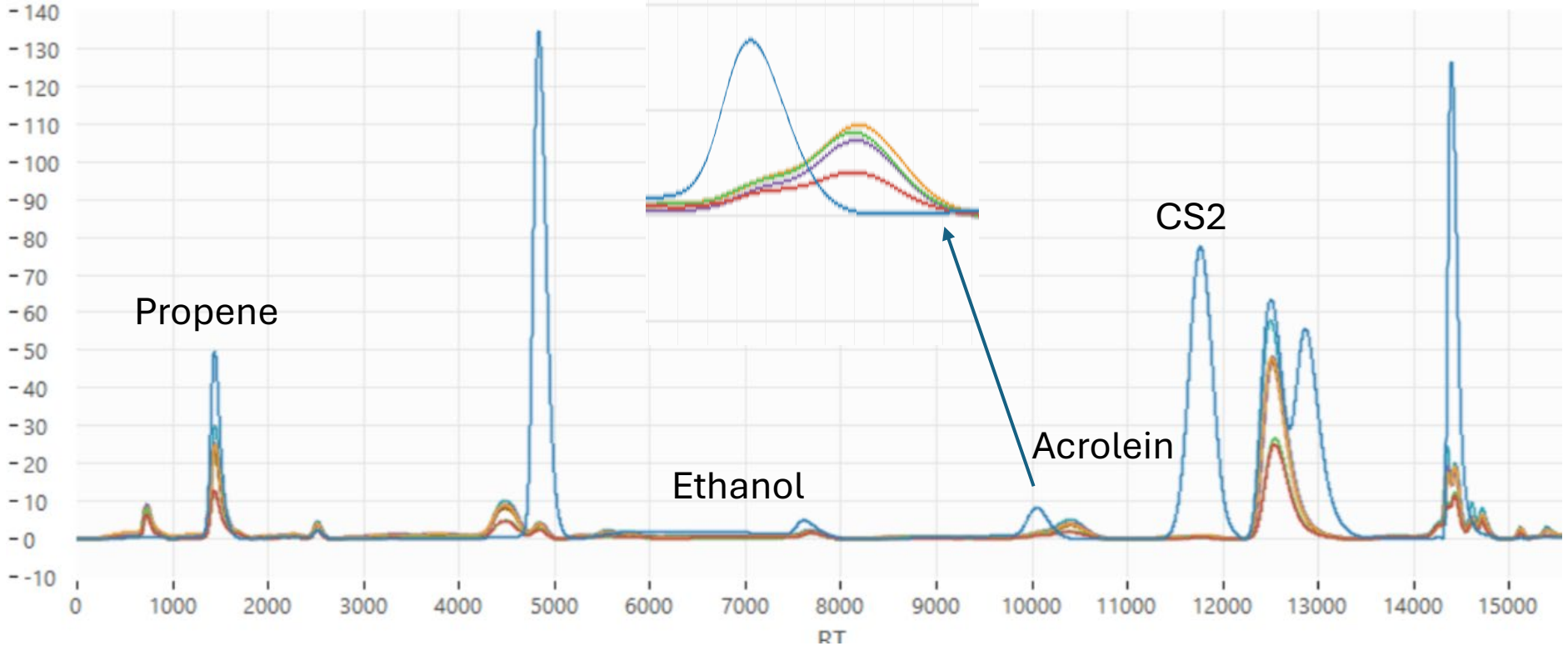

5:00am




6:00am




7:00am



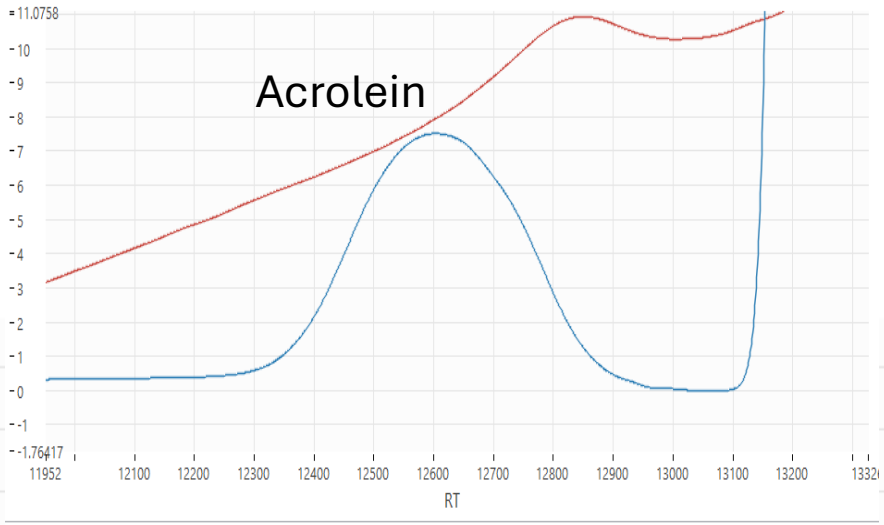

| MS12 | |
|---|---|
| StartTime | Acrolein |
| 8/8/2025 0:00 | 4.7 |
| 8/8/2025 4:00 | 7.7 |
| 8/8/2025 5:00 | 8.5 |
| 8/8/2025 6:00 | 7.2 |
| 8/8/2025 7:00 | 10 |
| 8/8/2025 8:00 | 4.5 |

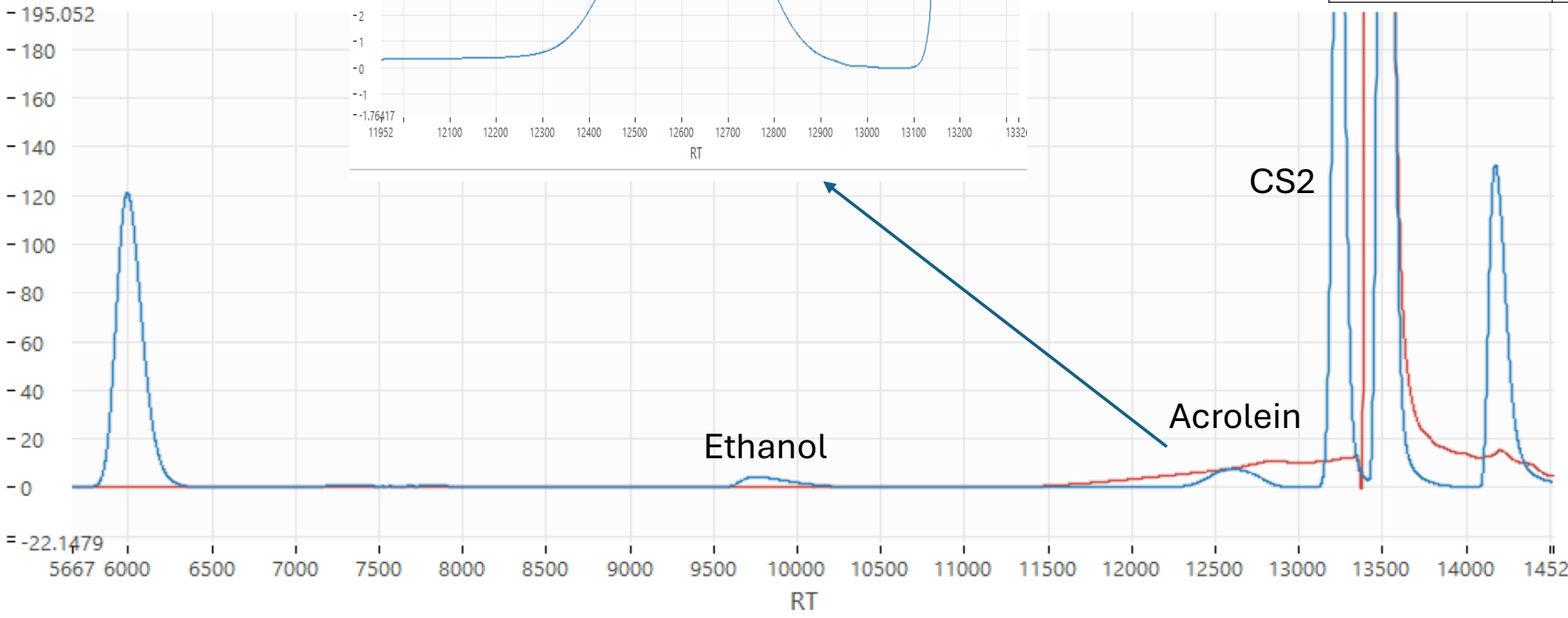
# Comment Code 6 - Algorithm Error - MS-07 (01/07/26)

Jan 7th Calibration peak

Environment peak at 1:00 pm

| CS2 ppb | Acrolein ppb |
|---|---|
| 11.68 | 170.12 |

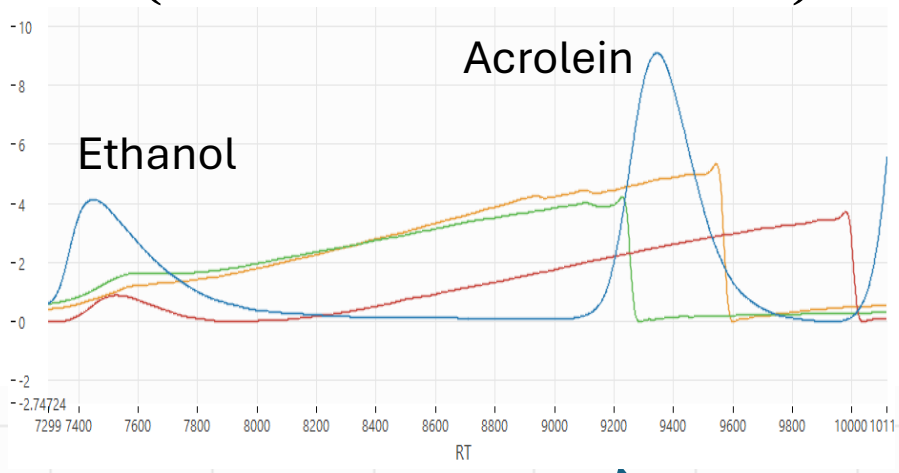



Sensor 3

# Comment Code 7 - Abnormal Baseline
# MS-02 (02/24/26 & 02/25/26)

| | 11:00 PM | 7:00 AM | 11:00 AM |
|---|---|---|---|
| Ethanol | 0 ppb | 0 ppb | 0.61 ppb |
| Acrolein | 1.36 ppb | 2.26 ppb | 3.61 ppb |

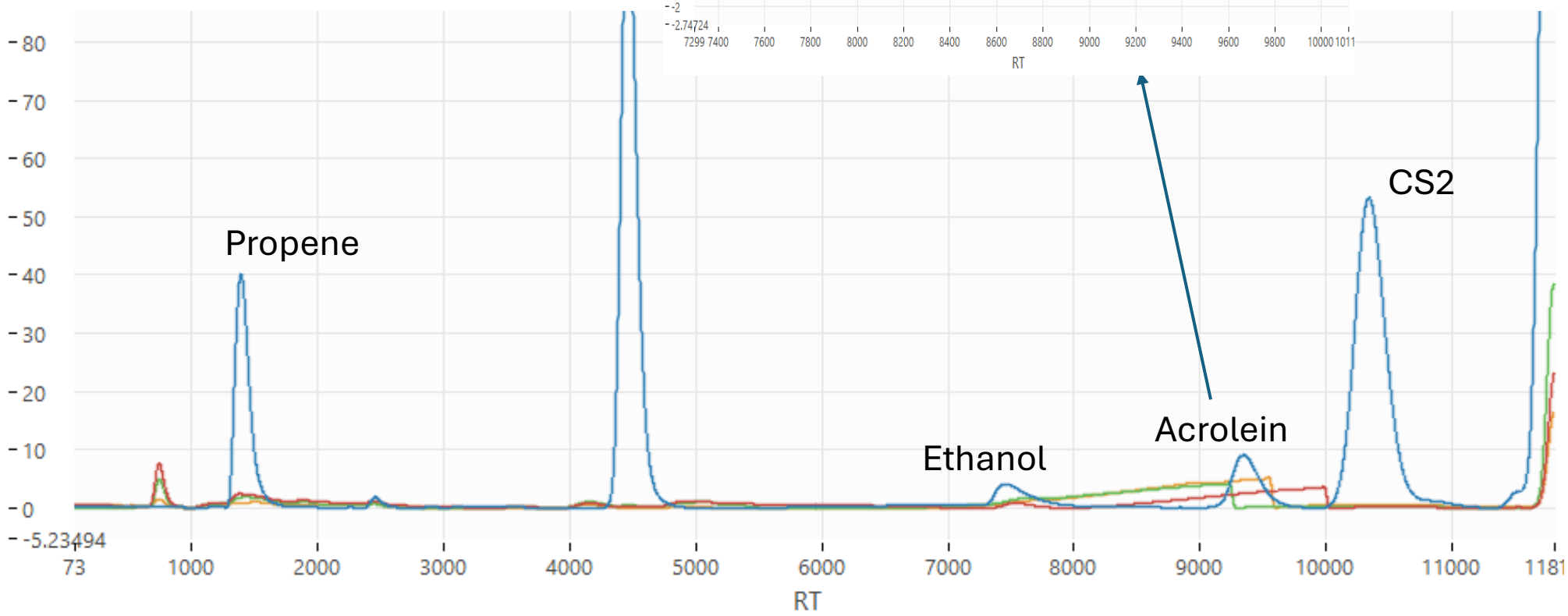



Feb 24th Calibration peak

Environment peak at 11:00 pm

Environment peak at 7:00 am

Environment peak at 11:00 am




Sensor 3

# Valid Acrolein Reading - MS-01 (01/22/26)