Quarterly Report on Air Quality Monitoring January 1 to September 30, 2025, at the Gregory – Portland Community Air Monitoring Stations

Prepared by

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Executive Summary

There are three continuous air quality monitoring stations operating in the Gregory-Portland area. The Gregory Fresnos Community Air Monitoring Station on Fresnos St. began continuous monitoring operations October 1, 2019. Two additional air-monitoring stations in Portland, TX, one near the intersection of Buddy Ganem Dr. and Wildcat Dr. on the campus of the Gregory-Portland High School and the other on Broadway Blvd. on the campus of the old East Cliff Elementary School, began operations on January 1, 2020. The U.S. Environmental Protection Agency (EPA) generally uses three years of data collection to assess attainment with the National Ambient Air Quality Standards (NAAQS). This project has now collected and validated data for more than five years at all three stations.

Since monitoring began, some measured pollutant concentrations have exceeded the concentration levels of NAAQS; however, these values have not been sustained long enough or measured frequently enough to violate a NAAQS. Furthermore, measured hydrocarbon concentrations have not exceeded the levels of concern published by the Texas Commission on Environmental Quality (TCEQ).

The public website developed as the community's source for information about the community air monitors continues to provide information about air quality and monitoring data from the three air monitoring stations (https://gpair.ceer.utexas.edu accessed October 2025).

UT Austin would be happy to answer any questions or conduct additional analysis at the community's or sponsors' requests. Contact Vincent Torres at vmtorres@mail.utexas.edu for information on the website or Dave Sullivan at sullivan231@mail.utexas.edu with questions about the monitoring data and analyses in this report.

1.0 Introduction

This report is jointly funded by Cheniere Energy and Gulf Coast Growth Ventures LLC (GCGV) as part of their separate Gregory-Portland community air-monitoring programs. This report includes reviews and analyses conducted by The University of Texas at Austin (UT) of the air monitoring data obtained at the three stations since their continuous monitoring operations began. UT established the Gregory Fresnos (GF) station for Cheniere Energy and has managed the station since continuous monitoring operations began on October 1, 2019. AECOM, an engineering company, established the Portland Buddy Ganem (PBG) and Portland Broadway (PBway) stations for GCGV on January 1, 2020, and managed the stations up through 2024. Recently, Orsat LLC, the company that operates auto-GC instruments for the TCEQ and operates the UT Gregory-Fresnos station, has taken over operations at the two GCGV stations.

The primary emphasis in this report is the examination of data collected and validated for the period July 1 to September 30, 2025, with some comparisons to earlier data.

2.0 Summary of Activities January 1 through September 30, 2025

The data completeness acceptable minimum for regulatory monitoring of criteria air pollutants is 75 percent. These three non-regulatory air monitoring stations have generally reported quality assured data at a greater than 75% data completeness.

As was noted in recent quarterly reports, the GCGV ethane-cracking and derivatives facility has been fully operational since January 2022. Operations at the GCGV facility and the Cheniere Energy facility do not appear to have affected the level of pollutants measured at project stations.

Dr. Sullivan provided a presentation on the air quality monitoring results on May 7, 2025, to the La Quinta Channel Community Advisory Panel in Portland, and then again to the Cheniere Community Advisory Panel at the Cheniere facility on June 24, 2025.

Commercial instruments to continuously measure and provide hourly average ambient concentrations of EtO have only been approved by the EPA and come on the market in the past few years. Since early 2024, the PBG station operator has been becoming familiar with the proper operation and maintenance of a new instrument (Aroma) to continuously measure EtO alongside the every sixth-day canister sample method currently used to measure EtO at the PBG station. While the new instrument has comparable accuracy to the canister method, it is not possible to make a direct comparison of the measurement of the two systems, i.e., a comparison of the sixth-day average to continuous hourly values. UT Austin data analysts have developed an approach to indirectly compare measurements from the two systems that will be used until the canister system is no longer needed.

In 2024, the United States Environmental Protection Agency (EPA) changed their annual average PM2.5 standard from its previous level of 12.0 micro-grams per cubic meter ($\mu g/m^3$) to 9.0 $\mu g/m^3$. Currently, the three-year average concentrations at all three stations have been lower than the 9.0 $\mu g/m^3$ level.

3.0 Air Monitoring Station Locations & Information

As noted earlier in this report, there are three air monitoring stations in the Gregory-Portland area in operation, one station operated by Orsat for UT in Gregory, TX and two operated by Orsat for GCGV in Portland, TX. The locations of the three stations and parameters measured are summarized in Table 1. The locations of the three stations are shown in satellite view in Figure 1[1]. Also shown in Figure 1 are the locations of the Cheniere liquefied natural gas facility and the GCGV ethane-cracking and derivatives facility.

Table 1. Gregory-Portland Community Air Monitoring Stations and Parameters Measured

Air Monitoring Station Name and Street Address	Volatile Organic Compounds (VOCs)[1]	Ethylene oxide (EtO)[1]	Nitrogen Oxides (NOx, NO, & NO_2)[1]	Sulfur Dioxide (SO_2)[1]	Particulate Matter (PM) Mass, particles < 2.5 micron diameter [1]	Wind Speed (WS), Wind Direction (WD), Ambient Temperature (T), Relative Humidity (RH), & Barometric Pressure (BP)[1]
Gregory Fresnos Stephen Austin Elementary 401 Fresnos St. Gregory, TX	Yes	No	Yes	Yes	Yes	Yes
Portland Buddy Ganem 307 Buddy Ganem St. GP High School Portland, TX	Yes	24-hr canister every 6 th day & a continuous analyzer	No	No	Yes	Yes + precipitation
Portland Broadway 175 Broadway Blvd. Old East Cliff Elementary School Portland, TX	Yes	24-hr canister every 6 th day	No	No	Yes	Only WS, WD

[1] All instruments operate continuously to provide hourly average measurements except as noted in the table.

[1] This image date is June 2023.

Figure 1. Location of Gregory-Fresnos Community Air Monitoring Station, and two Portland community stations on GPISD campuses on Buddy Ganem and on Broadway and the Cheniere Energy (green outline) and GCGV (red outline) industrial facilities

4.0 Summary of Measurement Data

As described in each report, the reader is reminded that pollutant concentrations are affected by several factors. One, of course, is the emission of a gas or smoke from an emission source or the availability of dust to become airborne. Another is the weather. Regarding weather, rain can reduce concentrations of several pollutants, especially particulate matter. The "mixing height" is the depth of the layer of the air near the earth's surface, wherein gases and particles mix vertically. Temperature inversions such as those experienced at night have low mixing heights and can lead to air pollutants emitted near the surface being trapped at lower altitudes, thus allowing concentrations to increase. The converse is midday periods when the mixing height of the lower atmosphere rises, and air pollutants are diluted in a larger volume of air. This is illustrated in Figure 2, showing the average propane concentration at the Gregory Fresnos station by hour of the day; this is referred to as the "diurnal pattern" for propane. The wind plays a significant role in moving air pollutants from an emission source to other locations. For this reason, a large majority of air monitoring stations operated by the TCEQ and all three Gregory-Portland stations measure wind speed and wind direction. Under high wind speeds, many gas pollutants are dispersed and diluted; however, under high-speed winds, dust on the surface can be picked up and transported, leading to higher particulate concentrations. Higher speed winds passing over the roof of a storage tank can lower the atmospheric pressure on that roof, leading

to vapors being drawn out of the tank and into the air. However, in general, low speed winds often lead to higher concentrations of pollutants. Figure 3 shows how higher concentrations of NO_2 and propane at the GF station are associated with low-speed winds, with lower concentrations under higher speed winds. Winds can be thought of as being local – near the surface – and regional – at higher altitudes. The local wind direction affects pollutant concentrations in terms of whether a pollution source is in the upwind direction, or along the local upwind path of the air if wind directions are changing. Similarly, but on a larger scale, the regional wind direction affects pollutant concentrations in terms of whether or not a source such as another major city, a large power plant, a forest fire, etc., is along the regional upwind path of the air. In the graphs that follow, some short-term concentration measurements are significantly higher than the balance of the data. In some cases, this is likely the combination of emission and meteorological (Met) factors, and in other cases, normal emissions can result in unusually high concentrations owing to a source being nearby under low wind speeds or air stagnation.

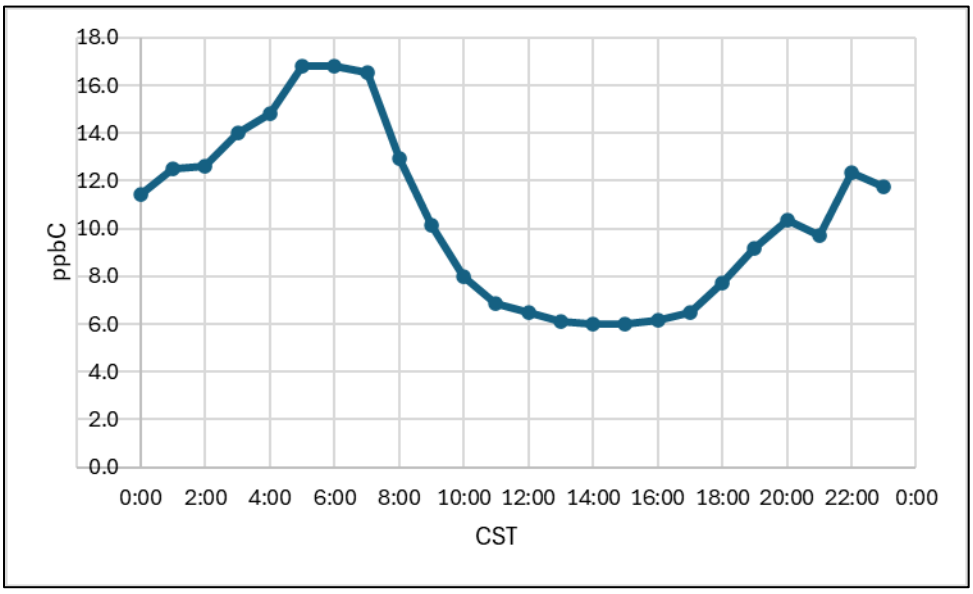

Figure 2. Average propane concentration Oct. 2019 – Aug. 2025 at GF by hour of the day

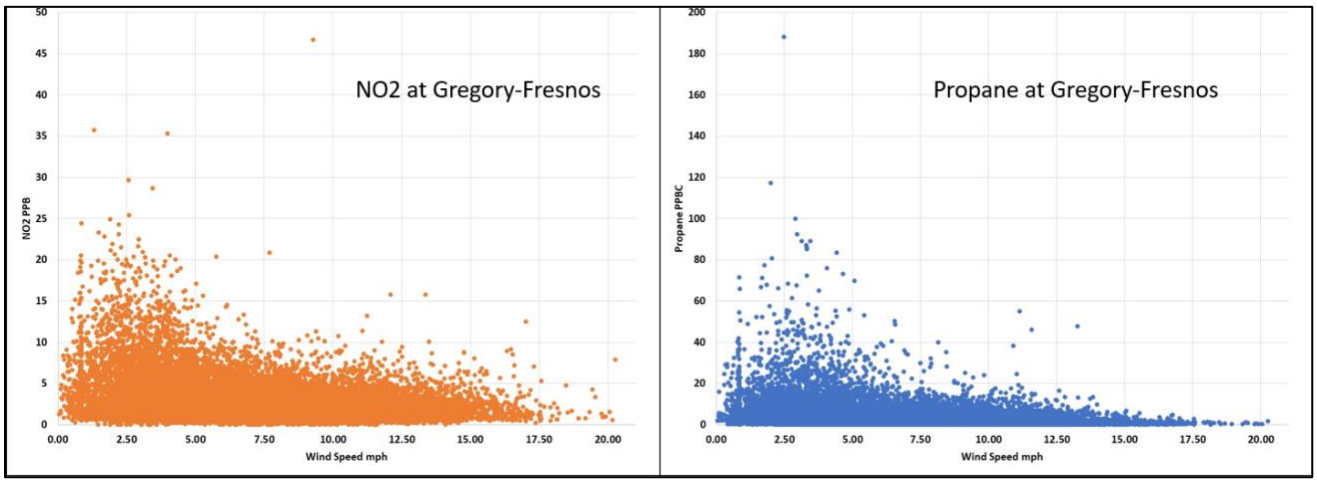

Figure 3. Effect of wind speed on primary pollutants

Please note that the measurement data in this report are quality assured station data made available at different submission frequencies:

- NOx, NO, & NO_2, SO_2, PM2.5 & Met measurements – weekly;
- Auto-GC VOC measurements – generally within 60 days of the measurement; and
- EtO canister data – generally within 60 days of the date the sample was collected.

Although all these measurements, except EtO, are made in near-real time, the nature of the complexity in quality assuring the auto-GC target hydrocarbons among the thousands of different organic compounds that exist in the air leads to a lengthy delay in releasing the quality assured target species data. Air samples for EtO data are collected at the station and then sent to a laboratory where EtO concentrations are then derived upon analysis of the air samples. Hence, the data available at the time this report was written will not all have the same date ranges. For this report, auto-GC are available through July or August 2025, EtO data are available through August 31, 2025, and all other data were available through September 30, 2025.

4.1 Gregory Fresnos Station Hydrocarbon Data

Figure 4 shows the time series graph for hourly concentrations of benzene at the Gregory-Fresnos (GF) station in 2024 and 2025. The graph shows benzene hourly average concentrations for each hour from January 1, 2024, through August 31, 2025 (20 months). Benzene concentrations in the air can be of health concern but to date their concentrations have been much lower than TCEQ Air Monitoring Comparison Values (AMCV) of 1,080 ppbC for a single one-hour value or 8.4 ppbC for an annual hourly average concentration. Other AMCVs for auto-GC hydrocarbons can be found at https://www.tceq.texas.gov/cgi-bin/compliance/monops/agc_amcvs.pl (accessed October 2025). Note that a straight line or a gap in a time series graph represents missing data. Data may be missing owing to equipment failure, planned equipment or site maintenance, or external factors such as power loss or severe weather.

Table 2 lists all target hydrocarbon species measured and reported by the GF auto-GC, with the peak one-hour concentration, maximum 24-hour day concentration, and the average hourly concentration for each species from January 1 through August 2025. Note that the total sum of the target species (TNMTC) and the total sum of the hydrocarbons (target species plus non-target species and unknown species) (TNMHC) are included in the table. In addition, the TCEQ's Air Monitoring Comparison Values (AMCV) are shown in the table. From the TCEQ's Air Monitoring Comparison Values website[2]:

> "AMCVs are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. AMCVs are based on data concerning health effects, odor, and vegetation effects. They are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed the comparison level, adverse health or welfare effects would not be expected to result. If ambient levels of constituents in air exceed the comparison levels, it does not necessarily indicate a problem but rather triggers a more in-depth review. If you have any questions about the potential for health, odor, or vegetation effects from exposure to reported concentrations of any of these compounds, please contact the Toxicology Division by telephone at (512) 239-3900 or by email at tox@tceq.texas.gov."

Data completeness for auto-GCs is based on the planned collection of 22 hours per day – as two hours per day are reserved for quality assurance activities. The GF station has collected data on the individual hydrocarbon compounds with 78 to 88 percent data completeness of the planned collection hours for the first eight months of 2025.

[2] https://www.tceq.texas.gov/cgi-bin/compliance/monops/agc_amcvs.pl accessed October 2025.

Time series graphs of other hydrocarbon species are also available upon request, and any graphs can be made with timescale (x-axis) or concentration-scale (y-axis) adjustments. Also, concentrations can be averaged by day, month, or other time period upon request. A user can also make graphs of data on the project website at https://gpair.ceer.utexas.edu/custom-data-request.php (accessed October 2025). To make a request, contact Dr. Dave Sullivan at sullivan231@mail.utexas.edu or call 512-914-4710.

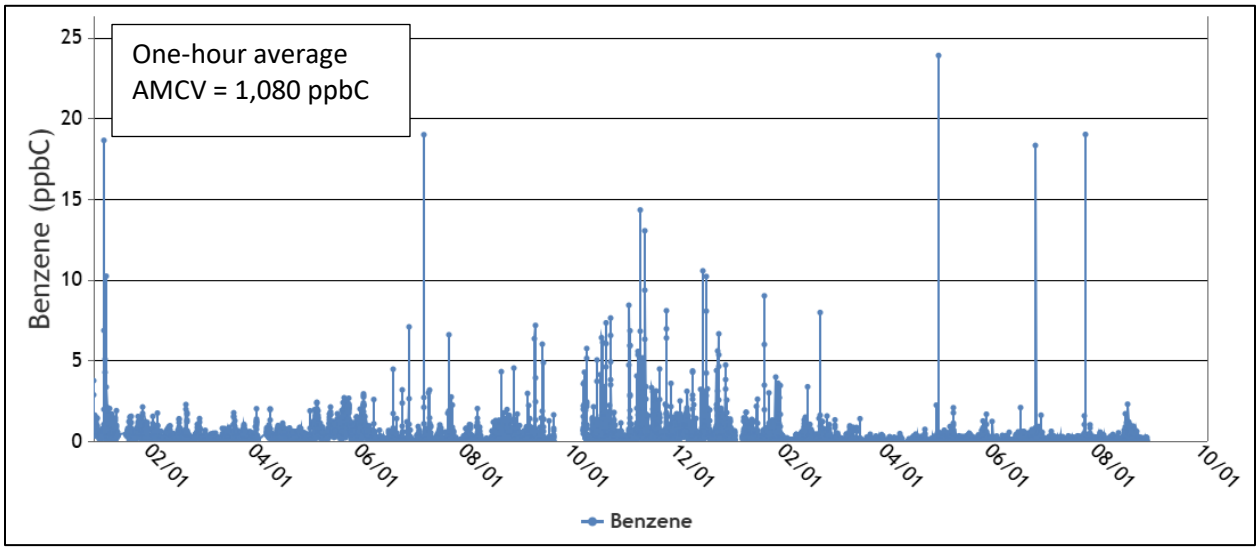

Figure 4. Hourly benzene concentrations at GF station, Jan. 1, 2024 – Aug. 31, 2025, ppbC units

Table 2. Gregory-Fresnos Auto-GC statistics for Jan. – Aug. 2025

Species	Num. Samples	Peak 1-hr ppbC	Peak 24-hr ppbC	Short-term AMCV	Mean ppbC	Long-term AMCV
TNMHC	4,705	3,607.57	431.17	N/A	49.92	N/A
TNMTC	4,705	3,509.17	377.02	N/A	45.09	N/A
Ethane	4,705	1,194.68	191.16	N/A	14.78	N/A
Ethylene	4,705	54.17	4.92	1,000,000	0.99	10,600
Propane	4,705	877.12	94.94	N/A	8.88	N/A
Propylene	4,705	8.50	2.72	N/A	0.89	N/A
Isobutane	4,705	519.18	49.71	132,000	3.07	40,000
n-Butane	4,705	413.68	47.07	368,000	5.15	40,000
Acetylene	4,673	4.99	0.98	50,000	0.37	5,000
trans-2-Butene	4,705	2.07	0.36	60,000	0.08	2,800
1-Butene	4,705	1.02	0.30	108,000	0.13	9,200
cis-2-Butene	4,705	72.92	5.33	60,000	0.08	2,800
Cyclopentane	4,705	6.47	2.29	29,500	0.18	2,950
Isopentane	4,705	183.17	18.93	340,000	2.41	40,500
n-Pentane	4,705	101.65	13.76	340,000	3.50	40,500
1,3-Butadiene	4,705	17.04	0.94	6,800	0.06	36
trans-2-Pentene	4,705	3.15	0.21	60,000	0.04	2,800
1-Pentene	4,705	3.93	0.40	60,000	0.05	2,800
cis-2-Pentene	4,705	1.45	0.13	60,000	0.02	2,800
2,2-Dimethylbutane	4,705	13.18	1.45	32,400	0.12	1,140
Isoprene	4,705	3.19	0.86	7,000	0.12	700
n-Hexane	4,705	42.61	4.80	32,400	0.60	1,140
Methylcyclopentane	4,705	24.08	2.44	4,500	0.34	450
2,4-Dimethylpentane	4,705	1.72	0.09	58,100	0.01	15,400
Benzene	4,705	23.92	1.26	1,080	0.16	8.4
Cyclohexane	4,705	30.24	3.68	6,000	0.38	600
2-Methylhexane	4,705	4.88	0.43	58,100	0.05	15,400
2,3-Dimethylpentane	4,705	5.23	0.58	58,100	0.04	15,400
3-Methylhexane	4,705	8.59	0.92	58,100	0.10	15,400
2,2,4-Trimethylpentane	4,705	5.89	0.83	32,800	0.12	3,040
n-Heptane	4,705	11.40	1.09	58,100	0.15	15,400
Methylcyclohexane	4,705	21.05	2.87	28,000	0.38	2,800
2,3,4-Trimethylpentane	4,705	1.26	0.25	32,800	0.02	3,040
Toluene	4,705	26.19	2.12	28,000	0.28	7,700
2-Methylheptane	4,705	2.92	0.31	32,800	0.04	3,040
3-Methylheptane	4,705	1.91	0.22	32,800	0.03	3,040
n-Octane	4,705	6.55	0.62	32,800	0.09	3,040
Ethyl Benzene	4,705	1.55	0.20	160,000	0.04	3,520
p-Xylene + m-Xylene	4,705	59.08	3.31	13,600	0.20	1,120
Styrene	4,644	0.66	0.06	41,600	0.01	880
o-Xylene	4,644	1.47	0.15	13,600	0.04	1,120
n-Nonane	4,644	10.09	0.54	27,000	0.04	2,520
Isopropyl Benzene -Cum.	4,644	0.71	0.13	4,590	0.01	459
n-Propylbenzene	4,644	67.95	3.51	4,590	0.05	459
1,3,5-Trimethylbenzene	4,162	4.20	0.21	27,000	0.01	333
1,2,4-Trimethylbenzene	4,162	161.17	8.52	27,000	0.31	333
n-Decane	4,162	21.33	1.06	10,000	0.07	1,900
1,2,3-Trimethylbenzene	4,162	4.58	0.62	27,000	0.07	333

4.2 Portland Buddy Ganem & Portland Broadway Stations Hydrocarbon Data

Figure 5 shows the time series graph for hourly concentrations of benzene at the Portland Buddy Ganem (PBG) station from January 1, 2024, through August 31, 2025. Figure 6 shows the time series graph for the hourly concentrations of benzene at the Portland Broadway (PBway) station from January 1, 2024, through July 31, 2025.

As was the case at the Gregory Fresnos station, hydrocarbon concentrations to date are much lower than the TCEQ AMCVs. Table 3 lists the target hydrocarbon species measured and reported by the Portland Buddy Ganem (PBG) auto-GC and Table 4 lists the target hydrocarbon species measured and reported by the Portland Broadway (PBway) auto-GC with the peak one-hour concentration, maximum 24-hour day concentration, and average hourly concentration for each species for 2025 data that have been validated. Also shown in the two tables are the TCEQ's AMCVs.

Based on the 22 hours per day planned ambient measurements, the PBG station has 91 percent data completeness for all compounds for the planned collection hours over 2025 to date, except for a lower 77 percent data completeness for Acetylene, and 85% for four of the heavier (nine and ten carbon) compounds. Acetylene is a particularly difficult compound to measure, but the 77% is an improvement over the 65% reported last quarter. The PBway station has from 76 to 86 percent data completeness for all compounds for the planned collection hours over 2025 to date, except for a lower 65% data completeness for Cis-2-pentene, which is an increase from its 49% in the last quarterly report.

Time series graphs of other hydrocarbon species are also available upon request, and any graphs can be made with timescale (x-axis) or concentration-scale (y-axis) adjustments. In addition, concentrations can be averaged by day, week, or month upon request. As mentioned earlier in the report, a user can also make graphs on the project website.

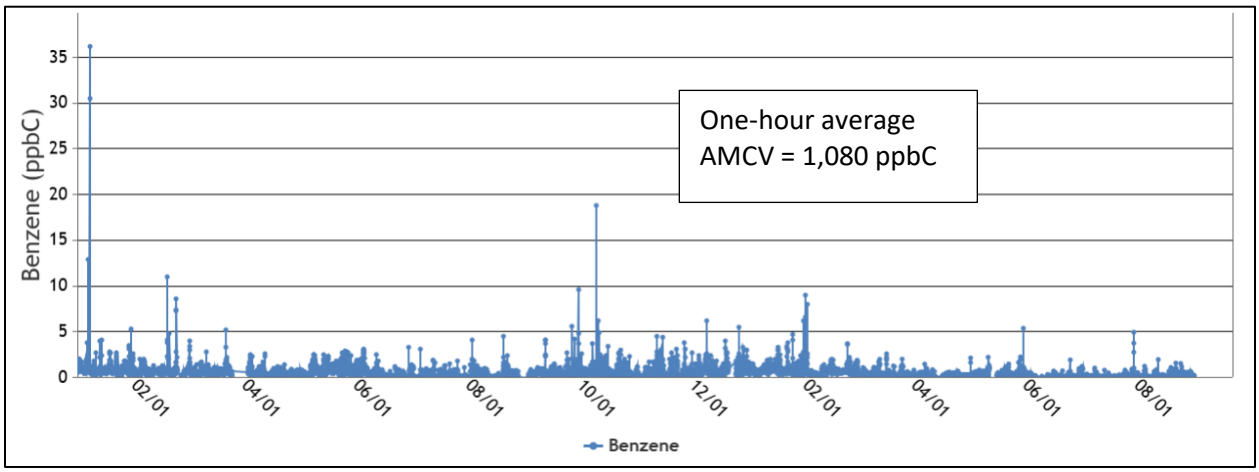

Figure 5. Hourly benzene concentrations at PBG station, Jan. 1, 2024 – Aug. 31, 2025, ppbC units

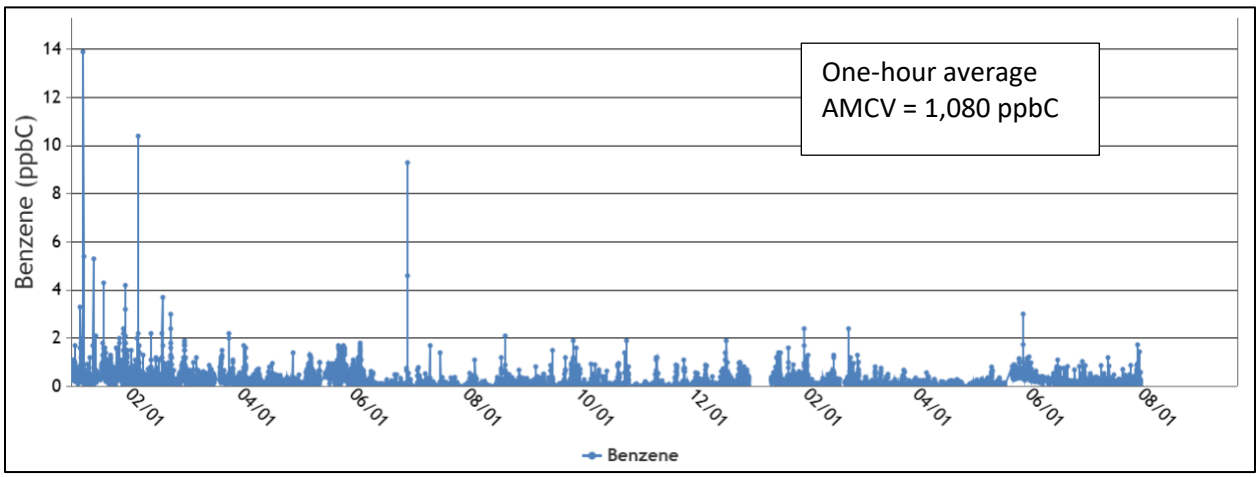

Figure 6. Hourly benzene concentrations at PBway station, Jan. 1, 2024 – July 31, 2025, ppbC units

Table 3. PBG Auto-GC statistics for Jan. – Aug. 2025

Species	Num. Samples	Peak 1-hr ppbC	Peak 24-hr ppbC	Short-term AMCV	Mean ppbC	Long-term AMCV
TNMHC	4,856	1,653.63	278.97	N/A	43.26	N/A
TNMTC	4,856	1,586.83	268.19	N/A	39.45	N/A
Ethane	4,856	1,286.00	174.05	N/A	14.41	N/A
Ethylene	4,856	75.93	6.41	1,000,000	0.89	10,600
Propane	4,856	452.00	69.04	N/A	7.60	N/A
Propylene	4,852	7.18	2.01	N/A	0.77	N/A
Isobutane	4,856	170.00	23.88	132,000	2.34	40,000
n-Butane	4,856	161.00	34.31	368,000	4.28	40,000
Acetylene	4,099	7.90	1.41	50,000	0.36	5,000
trans-2-Butene	4,856	6.00	0.42	60,000	0.11	2,800
1-Butene	4,856	17.38	0.97	108,000	0.14	9,200
cis-2-Butene	4,856	4.38	0.27	60,000	0.06	2,800
Cyclopentane	4,856	3.87	0.76	29,500	0.14	2,950
Isopentane	4,856	71.60	14.64	340,000	2.10	40,500
n-Pentane	4,856	49.40	12.66	340,000	1.77	40,500
1,3-Butadiene	4,856	146.93	7.12	6,800	0.07	36
trans-2-Pentene	4,856	0.90	0.12	60,000	0.02	2,800
1-Pentene	4,856	0.64	0.13	60,000	0.03	2,800
cis-2-Pentene	4,856	0.58	0.12	60,000	0.01	2,800
2,2-Dimethylbutane	4,856	3.59	0.46	32,400	0.05	1,140
Isoprene	4,856	2.15	0.85	7,000	0.26	700
n-Hexane	4,856	18.80	3.92	32,400	0.46	1,140
Methylcyclopentane	4,856	9.60	1.48	4,500	0.20	450
2,4-Dimethylpentane	4,856	1.40	0.07	58,100	0.00	15,400
Benzene	4,856	9.00	1.78	1,080	0.32	8.4
Cyclohexane	4,856	13.30	2.22	6,000	0.27	600
2-Methylhexane	4,856	3.93	0.83	58,100	0.09	15,400
2,3-Dimethylpentane	4,856	2.10	0.43	58,100	0.04	15,400
3-Methylhexane	4,856	4.20	1.02	58,100	0.14	15,400
2,2,4-Trimethylpentane	4,856	7.38	0.85	32,800	0.20	3,040
n-Heptane	4,856	8.40	1.69	58,100	0.20	15,400
Methylcyclohexane	4,856	12.80	2.47	28,000	0.30	2,800
2,3,4-Trimethylpentane	4,856	3.06	0.33	32,800	0.03	3,040
Toluene	4,856	15.20	2.35	28,000	0.47	7,700
2-Methylheptane	4,856	2.60	0.28	32,800	0.03	3,040
3-Methylheptane	4,856	2.33	0.29	32,800	0.03	3,040
n-Octane	4,856	5.60	0.78	32,800	0.12	3,040
Ethyl Benzene	4,856	15.25	1.85	160,000	0.08	3,520
p-Xylene + m-Xylene	4,856	12.31	1.70	13,600	0.22	1,120
Styrene	4,856	0.48	0.26	41,600	0.02	880
o-Xylene	4,856	10.47	1.22	13,600	0.06	1,120
n-Nonane	4,856	2.16	0.33	27,000	0.06	2,520
Isopropyl Benzene -	4,856	0.80	0.11	4,590	0.01	459
n-Propylbenzene	4,856	3.94	0.86	4,590	0.03	459
1,3,5-Trimethylbenzene	4,532	9.05	1.51	27,000	0.04	333
1,2,4-Trimethylbenzene	4,532	38.33	5.17	27,000	0.20	333
n-Decane	4,532	1.83	0.56	10,000	0.18	1,900
1,2,3-Trimethylbenzene	4,532	10.62	1.34	27,000	0.10	333

Table 4. PBway Auto-GC statistics for Jan. – July 2025

Species	Num. Samples	Peak 1-hr ppbC	Peak 24-hr ppbC	Short-term AMCV	Mean ppbC	Long-term AMCV
TNMHC	3,932	759.03	369.52	N/A	34.77	N/A
TNMTC	3,932	729.28	360.34	N/A	31.96	N/A
Ethane	3,994	365.00	241.00	N/A	11.64	N/A
Ethylene	3,994	15.60	4.21	1,000,000	0.51	10,600
Propane	3,994	193.00	60.48	N/A	6.05	N/A
Propylene	3,994	7.20	3.96	N/A	1.35	N/A
Isobutane	3,994	79.60	19.50	132,000	1.94	40,000
n-Butane	3,994	129.00	36.85	368,000	3.75	40,000
Acetylene	3,802	7.46	1.18	50,000	0.29	5,000
trans-2-Butene	3,991	3.17	0.45	60,000	0.09	2,800
1-Butene	3,994	6.65	3.99	108,000	0.18	9,200
cis-2-Butene	3,994	0.74	0.16	60,000	0.05	2,800
Cyclopentane	3,994	3.50	0.79	29,500	0.12	2,950
Isopentane	3,994	48.60	16.46	340,000	1.81	40,500
n-Pentane	3,994	50.90	12.61	340,000	1.38	40,500
1,3-Butadiene	3,994	1.20	0.15	6,800	0.03	36
trans-2-Pentene	3,994	1.34	0.09	60,000	0.01	2,800
1-Pentene	3,994	1.80	0.14	60,000	0.02	2,800
cis-2-Pentene	3,016	0.86	0.09	60,000	0.00	2,800
2,2-Dimethylbutane	3,994	3.09	0.32	32,400	0.05	1,140
Isoprene	3,994	4.08	1.81	7,000	0.39	700
n-Hexane	3,932	12.40	3.35	32,400	0.31	1,140
Methylcyclopentane	3,932	8.00	1.60	4,500	0.12	450
2,4-Dimethylpentane	3,932	1.47	0.09	58,100	0.01	15,400
Benzene	3,932	3.01	0.78	1,080	0.15	8.4
Cyclohexane	3,932	7.70	3.35	6,000	0.19	600
2-Methylhexane	3,932	1.50	0.29	58,100	0.03	15,400
2,3-Dimethylpentane	3,932	2.10	0.29	58,100	0.02	15,400
3-Methylhexane	3,932	3.50	0.70	58,100	0.06	15,400
2,2,4-Trimethylpentane	3,932	5.43	1.15	32,800	0.11	3,040
n-Heptane	3,932	4.30	1.00	58,100	0.07	15,400
Methylcyclohexane	3,932	8.30	2.35	28,000	0.19	2,800
2,3,4-Trimethylpentane	3,932	1.72	0.15	32,800	0.02	3,040
Toluene	3,932	25.89	1.89	28,000	0.20	7,700
2-Methylheptane	3,932	1.89	0.11	32,800	0.01	3,040
3-Methylheptane	3,932	2.16	0.12	32,800	0.01	3,040
n-Octane	3,932	4.57	0.39	32,800	0.03	3,040
Ethyl Benzene	3,932	0.59	0.08	160,000	0.01	3,520
p-Xylene + m-Xylene	3,932	4.30	0.50	13,600	0.10	1,120
Styrene	3,932	0.95	0.19	41,600	0.02	880
o-Xylene	3,932	2.14	0.21	13,600	0.02	1,120
n-Nonane	3,932	7.76	0.76	27,000	0.04	2,520
Isopropyl Benzene -	3,932	2.06	0.15	4,590	0.01	459
n-Propylbenzene	3,932	12.38	1.28	4,590	0.02	459
1,3,5-Trimethylbenzene	3,587	26.86	2.76	27,000	0.04	333
1,2,4-Trimethylbenzene	3,564	79.38	8.34	27,000	0.19	333
n-Decane	3,587	10.47	1.07	10,000	0.03	1,900
1,2,3-Trimethylbenzene	3,587	22.91	2.34	27,000	0.04	333

4.3 Ethylene Oxide Measurements

As shown in Figure 7 through Figure 10, the levels of EtO measured at the two GCGV stations have remained low. Note that values of 0.0 ppbC were recorded from the laboratory reports for non-detects. The TCEQ effects screening level (ESL) and Air Monitoring Comparative Value (AMCV) for chronic exposure to EtO is 2.4 ppbV or 4.8 ppbC. The terms AMCV and ESL are defined in Appendix A.2. (https://www.tceq.texas.gov/downloads/toxicology/dsd/final/eto.pdf, accessed October 2025). It is notable that there has been little change in concentrations over the past three years while the GCGV industrial facility has been in operation. In fact, there has been an increased frequency of non-detects over time.

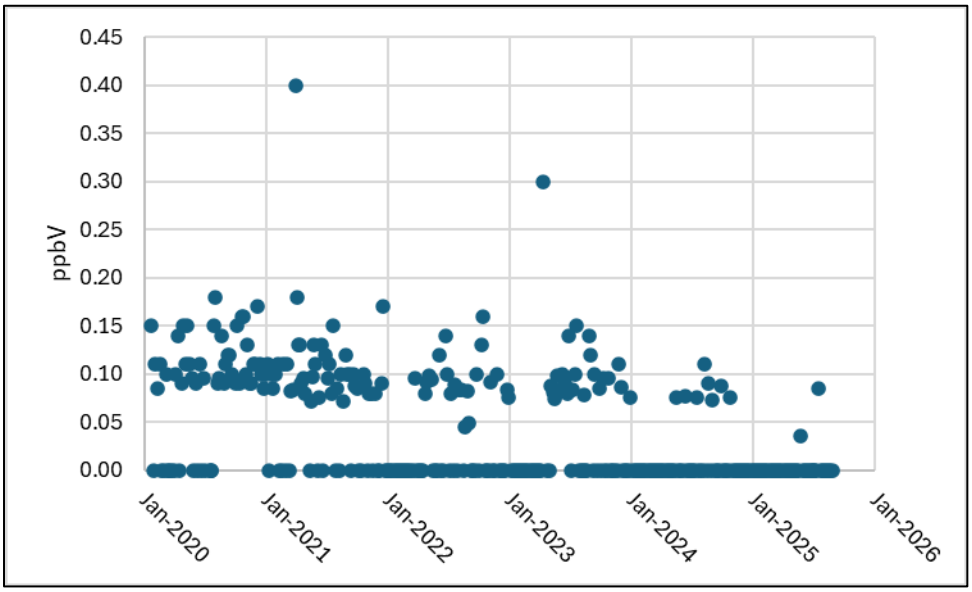

Figure 7 PBG EtO concentrations, every 6th day samples Jan. 2020 through Aug. 2025

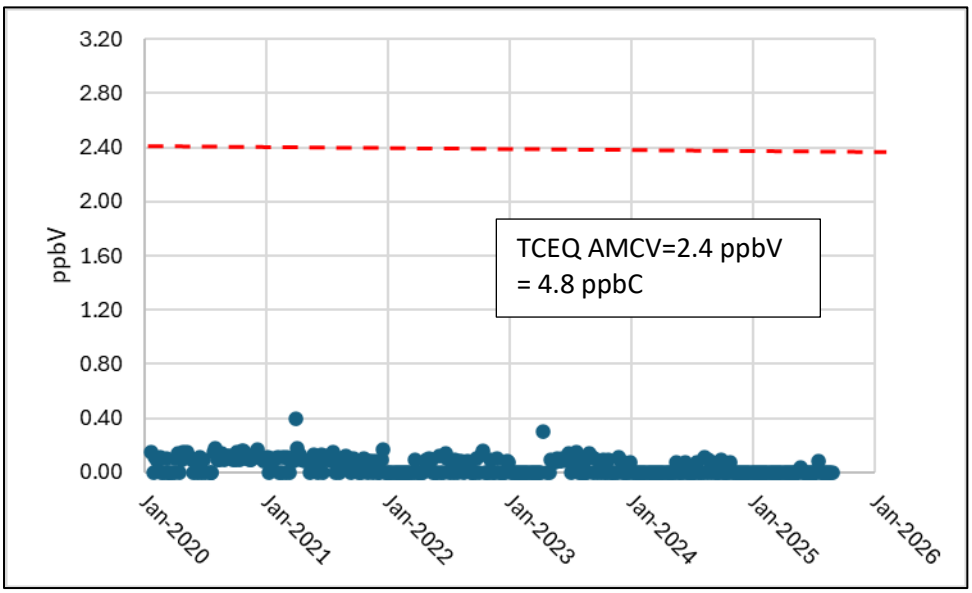

Figure 8. PBG EtO concentrations, every 6th day samples Jan. 2020 through Aug. 2025, in comparison to TCEQ Air Monitoring Comparison Value

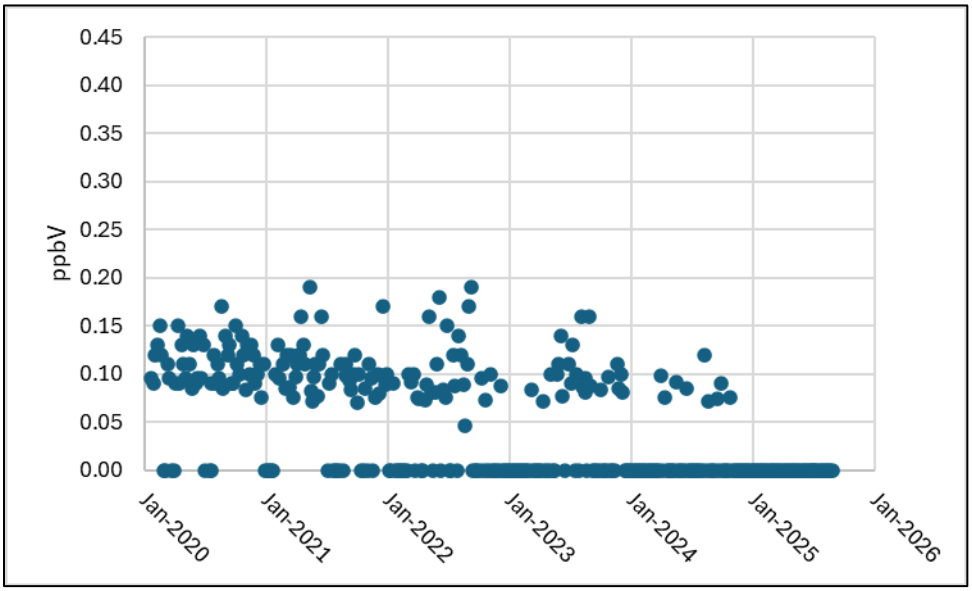

Figure 9. PBway EtO concentrations, every 6th day samples Jan. 2020 through Aug. 2025

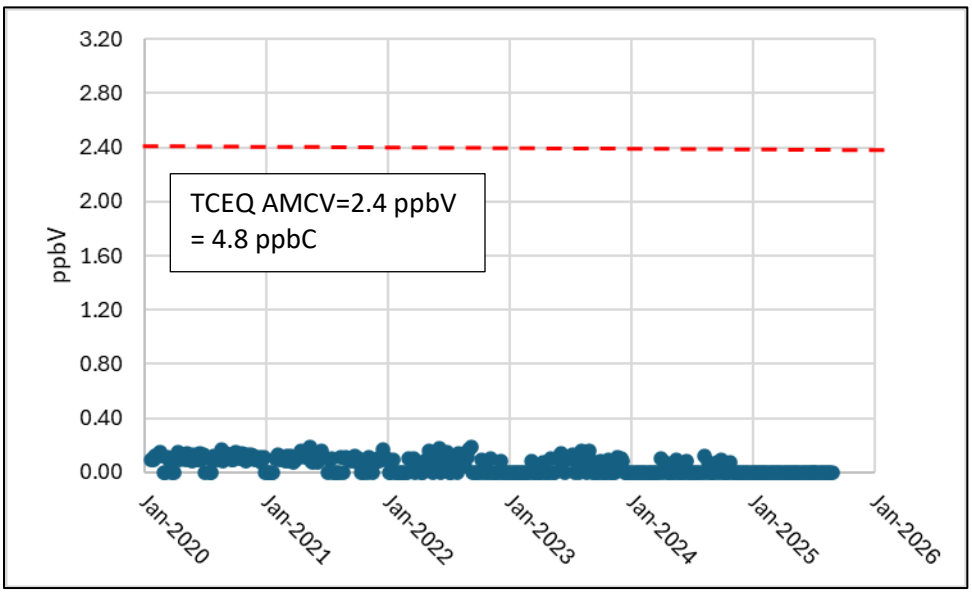

Figure 10. PBway EtO concentrations, every 6th day samples Jan. 2020 through Aug. 2025, in comparison to TCEQ Air Monitoring Comparison Value

As was noted earlier in this report, a continuous EtO analyzer (company name Aroma) has been operating at the PBG station since February of 2024. The continuous analyzer measurements for EtO are made in parts per billion "volume" (ppbV), which is a count of molecules of the compound to molecules in the air, as opposed to a count of carbon atoms in the molecule in ppbC. So ppbV units are used in this section of the report. The continuous EtO analyzer has a method detection limit of 0.010 ppbV. This instrument has higher sensitivity at lower concentrations than the canister sampling method. On two occasions, the instrument recorded one-hour concentrations greater than 2.4 ppbV, but still well below the odor threshold or health thresholds noted by U.S. EPA[3].

To provide a comparison of the continuous analyzer measurements to the canister sample measurements, the continuous analyzer measurements must be averaged into 24-hour periods and then the 24-hour averages compared. Graphs of the Aroma instrument concentrations data averaged for 24-hour periods appear in Figure 11 and Figure 12. In comparing the canister sampler averages in Figure 8 to the continuous analyzer averages Figure 10, the analyzer averages are all below 0.05 ppbV with only two exceptions, while the canister detections averages tend to range between 0.05 to 0.20 ppbV, a higher range than the continuous analyzer.

[3] https://www.epa.gov/sites/default/files/2016-09/documents/ethylene-oxide.pdf accessed October 2025

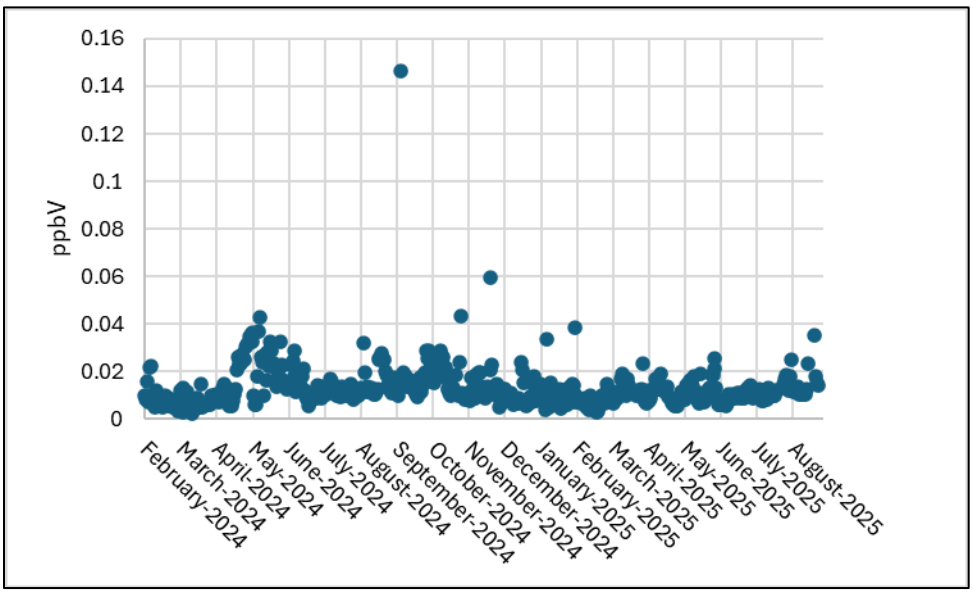

Figure 11. PBG AROMA EtO continuous analyzer 24-hour averages, Feb. 1, 2024 – Aug. 31, 2025

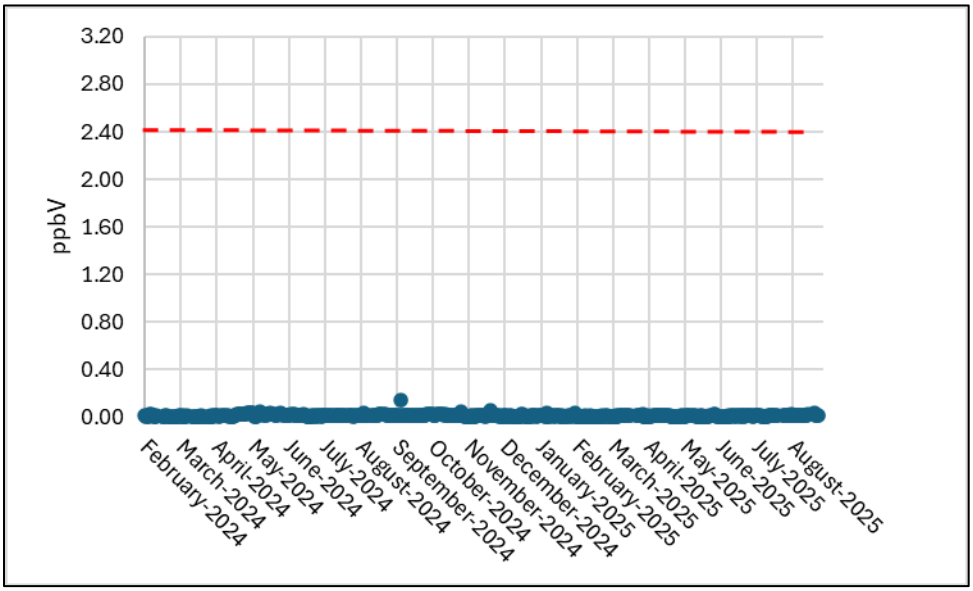

Figure 12. PBG AROMA EtO continuous analyzer 24-hour averages, Feb. 1, 2024 – Aug. 31, 2025, with TCEQ AMCV at 2.4 ppbV (red dashed line)

4.4 Comparing Hydrocarbon Data between Stations

Figure 13 shows a bar graph comparison between the average concentrations for 2025 through August 31 for GF and PBG, and through July 31 for PBway for the hydrocarbons measured by auto-GC, including TNMTC and TNMHC, at the three stations. The graph shows relatively close correlation among the three stations.

Figure 14 is a similar graph excluding TNMTC and TNMHC. This second graph allows for a better comparison of the similarity among the stations. The most common nonmethane hydrocarbons in the atmosphere in urban areas are ethane and propane, followed by other alkane species such as butanes and pentanes. These species have low chemical reactivities and thus can persist in the air longer than more reactive species. Some ethane and propane are likely transported into the region from nearby oil and gas extraction fields.

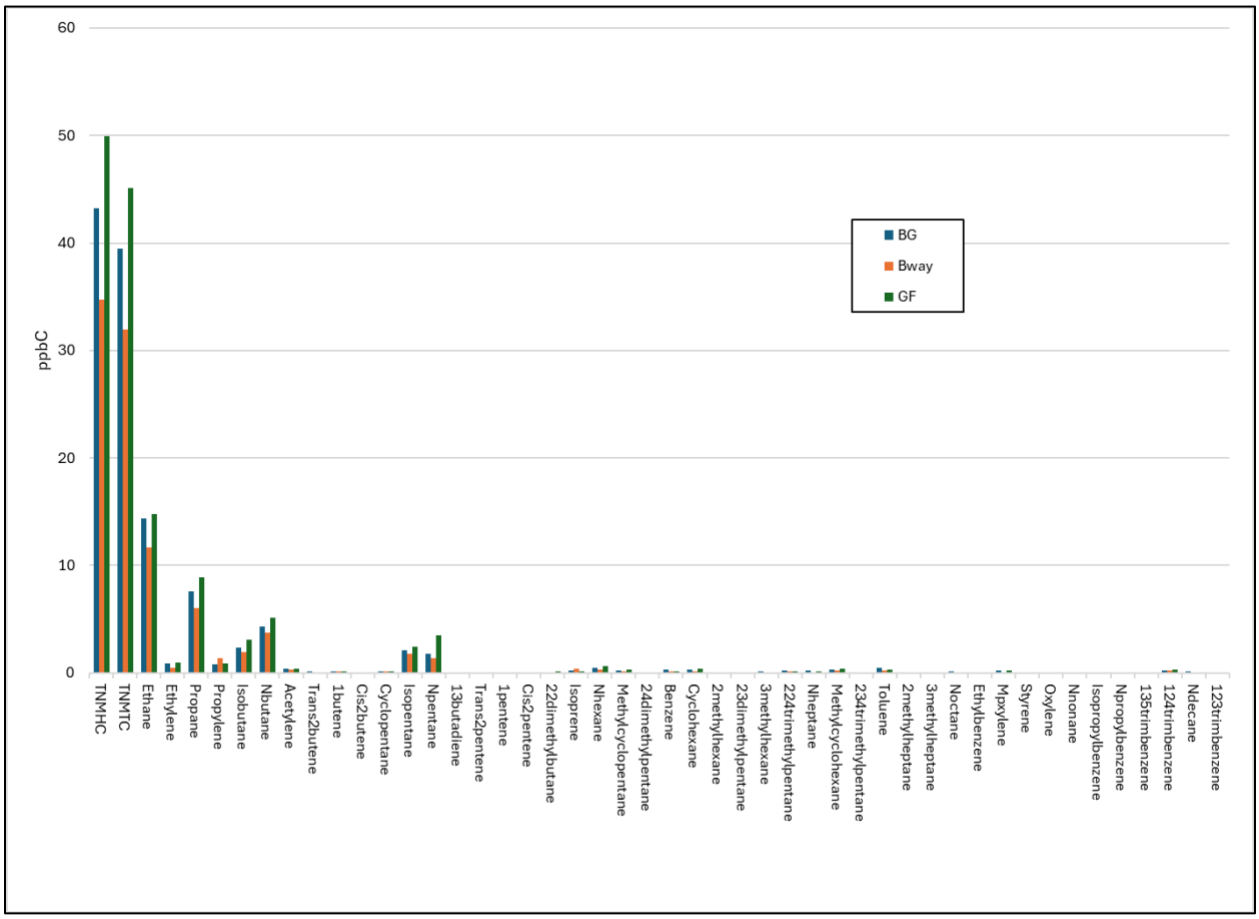

Figure 13. January 1 through August 31, 2025 (July 31 for PBway), mean concentrations of TNMTC, TNMHC, and hydrocarbon species at three stations.

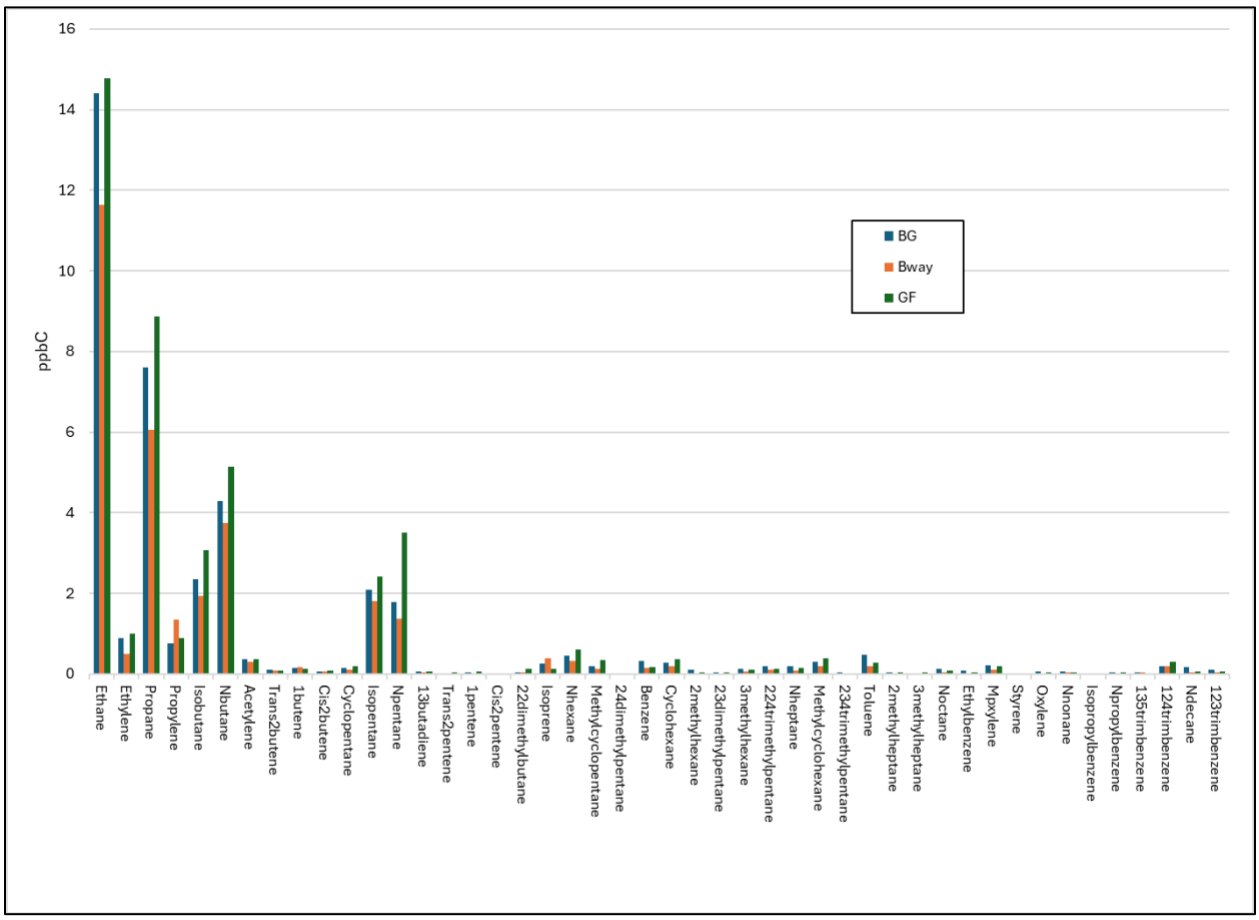

Figure 14. January 1 through August 31, 2025 (July 31 for PBway), mean concentrations of individual hydrocarbon species at three air monitoring stations.

4.5 Gregory Fresnos Station Criteria Pollutant Data

Sulfur dioxide (SO_2), fine particulate matter (PM2.5), and nitrogen dioxide (NO_2) are three pollutants measured at the GF site that are regulated by the U.S. Environmental Protection Agency (EPA). These pollutants, along with ozone, lead, combined coarse and fine particulate matter (PM10), and carbon monoxide are referred to as "criteria pollutants" and are governed by National Ambient Air Quality Standards (NAAQS). Some NAAQS are based on annual average concentrations, and some are based on the frequency with which very high concentrations are measured. The rationale is that different pollutants affect human health in different ways.

- PM2.5 has both an annual average NAAQS and 24-hour NAAQS. For the PM2.5 24-hour NAAQS, the three-year average of the 98th percentile 24-hour (midnight to midnight, using standard time) concentration each year must be less than 35 micrograms per cubic meter ($\mu g/m^3$). The annual average, averaged over three years, is calculated by first averaging 24-hour averages by quarter and then averaging the four quarters must be less than 9 $\mu g/m^3$.
- The NAAQS for NO_2 is for the one-hour values to average less than 53 ppb in a calendar year and for the three-year average of the 98th percentile daily maximum values to be less than 100 ppb.
- SO_2 has a 1-hour NAAQS, based on ranking the daily maximum one-hour values for

each day in a year, selecting the 99th percentile daily maximum values, and then calculating a three-year average, which must be less than 75 ppb.

No concentrations at levels that violate the NAAQS have been seen at the GF station. Several recorded PM2.5 one-hour values exceeded the level of the 24-hour NAAQS (35 µg/m^3), but as noted above, the NAAQS is not violated unless the 98th percentile of 24-hour averaged concentrations in a year, averaged over three years exceeds the 24-hour NAAQS (35 µg/m^3) level, or unless the overall annual average, averaged over three years, exceeds the level of the annual NAAQS (9µg/m^3).

Figure 15 shows the 24-hour average daily PM2.5 concentrations since the start of monitoring in October 2019. This graph is provided to illustrate the roughly seasonal pattern of PM2.5, with higher concentrations in the summers associated with transported dust from Northern Africa. The average concentration for 2024 was 8.4 µg/m^3. Table 5 lists the annual mean PM2.5 concentration from each of the past five years and the most recent three-year average for the GF station. Also shown are the statistics for Jan. – Sept. 2025.

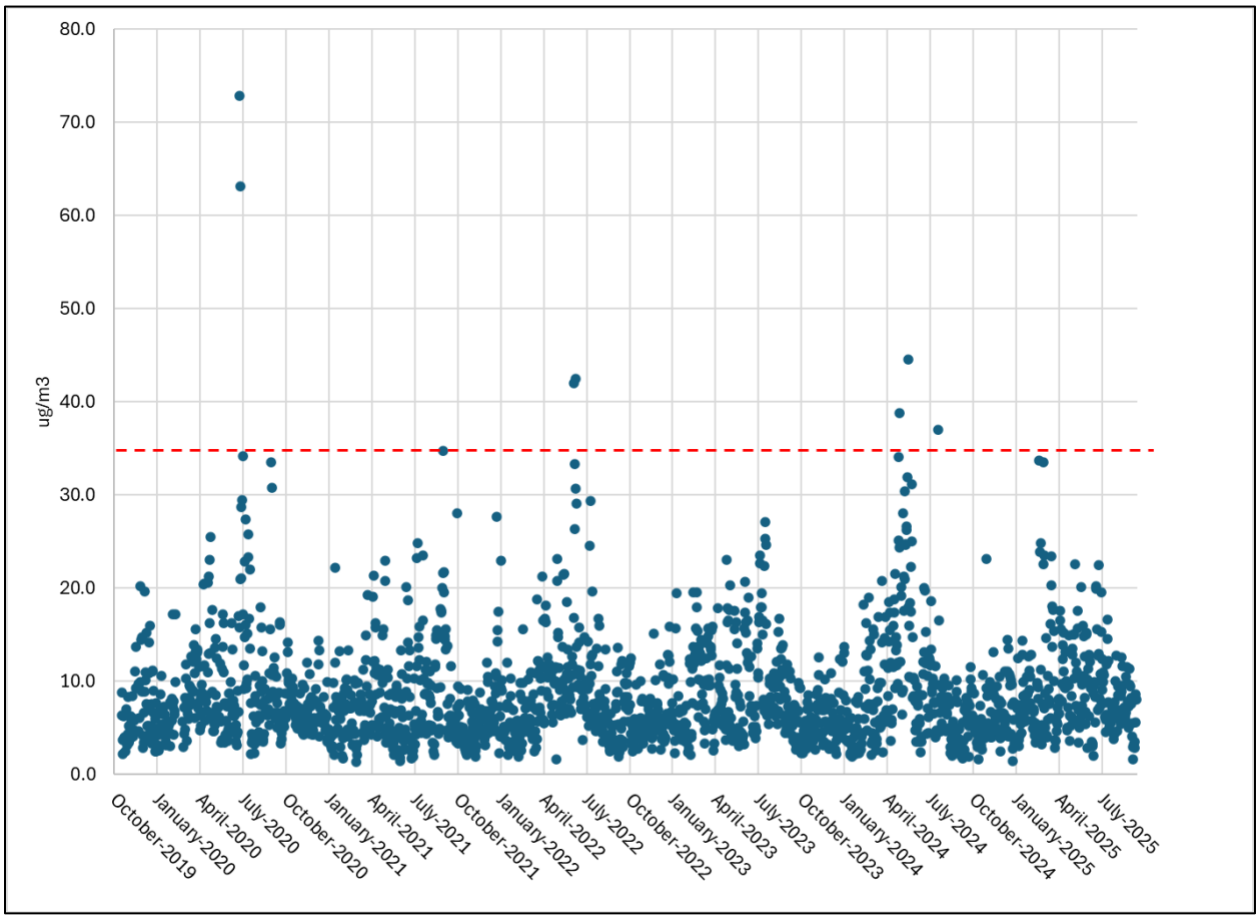

Figure 15. Averaged 24-Hour PM2.5 at GF, Oct. 1, 2019 – Sept. 30, 2025, with EPA NAAQS Value 35 µg/m^3 (red dashed line)

Table 5. GF PM2.5 annual means and three-year averages showing NAAQS compliance.

Year	Annual Mean, µg/m^3	NAAQS 3-Year Annual Average Value, µg/m^3	Annual 98th Percentile Value, µg/m^3	NAAQS 3-Year 98th Percentile Average Value, µg/m^3
2020	8.9		27.4	
2021	7.7		21.7	
2022	8.2		24.3	
2023	8.4		20.9	
2024	8.7		28.0	
2025 partial	9.1		23.2	
2022-2024 3-year average	8.4	9.0	24.4	35.0

Figure 16 shows the hourly average time series graph for daily maximum NO_2 at the Gregory Fresnos station from October 1, 2019, through September 30, 2025. The figure also shows the 24-hour 98th p-tile 100 ppb NAAQS level. The figure shows measured concentrations have been well below the level of the NAAQS. In addition, one can see the periodicity of concentrations, which tend to be higher during winter months owing to longer nights with lower mixing heights and less overall air movement. Table 6 lists for the past five years the NO_2 annual 98th percentile and the annual averages showing NAAQS compliance with these standards by large margins. Also shown are the statistics for Jan. – Sept. 2025.

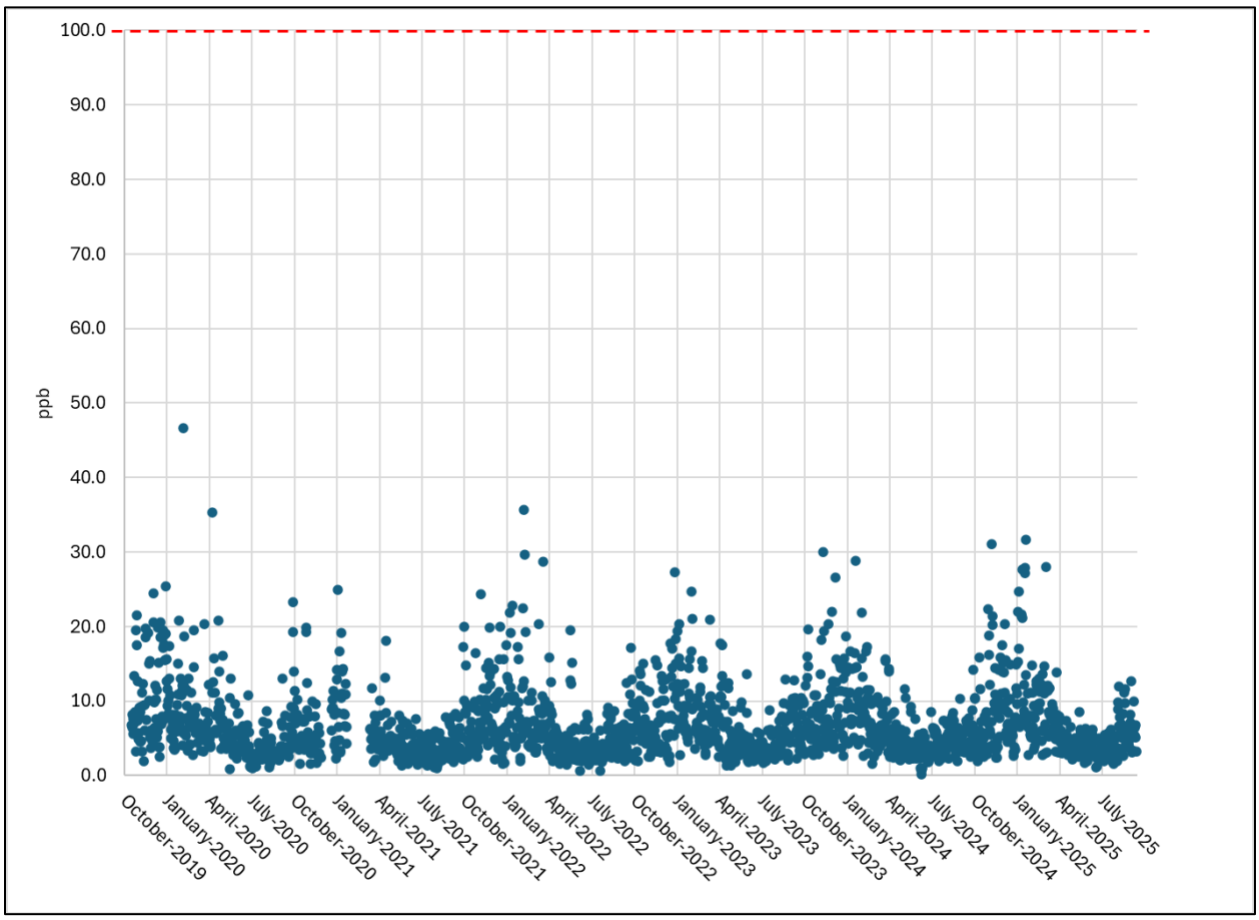

Figure 16. Daily maximum NO_2 at GF, ppb units, Oct. 1, 2019 – Sept. 30, 2025, with EPA NAAQS Value 100 ppb (red dashed line)

Table 6. GF NO_2 annual 98th p-tile values, three-year mean showing NAAQS compliance.

Year	Annual Average Values, ppb	NAAQS Annual Average Value, ppb	Annual 98th percentile ppb	NAAQS 3-Year 98th Percentile Average Value, ppb
2020	2.7	53	19.4	
2021	2.4		18.5	
2022	2.7		19.7	
2023	3.0		20.6	
2024	2.8		18.8	
2025 partial	2.9		23.7	
3-year Average for **2022-2024** Period	2.83		19.7	100

SO_2 is rarely found in ambient air, and the SO_2 instruments are calibrated to accurately measure high concentrations that are a risk to public health. As a result, the large majority of SO_2 concentrations measurements are close to 0.0. Many instruments measuring low concentrations will produce time series with much scatter near 0.0 owing to the nature of carrying out the chemical or electrical reaction that is associated with the measurement and converting that to a number representing the concentration. When an instrument has been calibrated to accurately measure high concentrations to safeguard public health, generally at low concentrations near zero there can be high relative error. The time series graph for SO_2 since Oct. 2019 at the GF station is shown in Figure 17. The graph is scaled to illustrate how low the concentrations have been compared to the 75-ppb level of the NAAQS.

Table 7 lists the annual 99th percentile values of daily maximum SO_2 for the past five complete years, again showing compliance between the level of the NAAQS and measured concentrations by more than 70 ppb. Also shown are the statistics for Jan. – Sept. 2025.

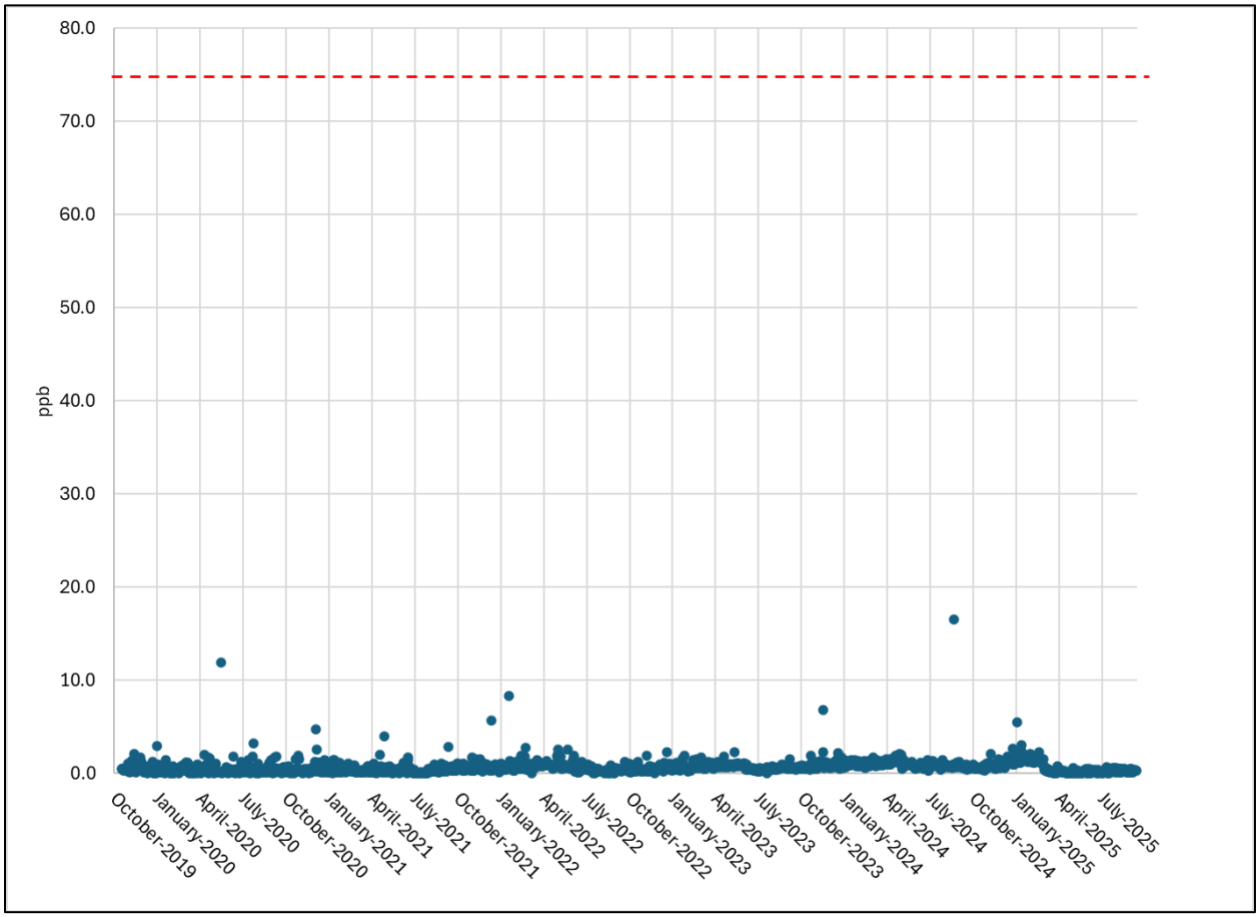

Figure 17. Daily maximum SO_2 at GF, Oct. 1, 2019 – Sept. 30, 2025, with EPA NAAQS Value 75 ppb (red dashed line)

Table 7. GF SO_2 annual 99th percentile values of daily maximums three-year average showing NAAQS compliance.

Year	Annual 99th percentile ppb	NAAQS 99th Percentile Average Value, ppb
2020	2.5	
2021	2.0	
2022	2.3	
2023	1.9	
2024	2.0	
2025 partial	2.4	
3-year Avg. **2022 - 2024**	2.1	75

4.6 Portland Buddy Ganem & Portland Broadway Stations Criteria Pollutant Data

Fine particulate matter (PM2.5) is the only NAAQS-regulated pollutant measured at the PBG and PBway stations. Figure 18 shows the 24-hour average concentrations at the PBG site from Jan. 2020 through June 2025, and Figure 19 shows the same time series for the PBway site. The 3-year average concentration PBG is 8.1 $\mu g/m^3$ and is also 8.1 $\mu g/m^3$ at PBway. Table 8 and Table 9 summarize the average annual PM2.5 concentrations for the PBG and PBway stations and the three-year average annual concentrations. The year 2024 was the first year a station – PBG – averaged over 9 $\mu g/m^3$ in one year, but the 3-year value is what matters. It is also the case that the Clean Air Act (Section 179b) specifically calls for excluding pollutant concentrations coming from outside the United States boundaries in assessing NAAQS compliance, and research at The University of Texas at Austin has shown that up to a half a micro-gram per cubic meter of annual PM2.5 averages in East Texas may be caused by a combination of North African dust transported across the Atlantic Ocean, and agricultural smoke from foliage and crop burning in Central America and Southern Mexico. As an example of the out of the U.S. transport of PM2.5, all three stations exceeded the 35 $\mu g/m^3$ 24-hour NAAQS on the same two dates, June 12, 2022, and June 16, 2022, owing to the transported North African dust. Across the State of Texas, with 66 regulatory PM2.5 monitors, 22 stations had elevated PM2.5 on June 12, 2022, and 48 stations had elevated PM2.5 on June 16, 2022. Among TCEQ regions, all parts of the state had some elevated concentrations between June 12 and June 16, 2022.

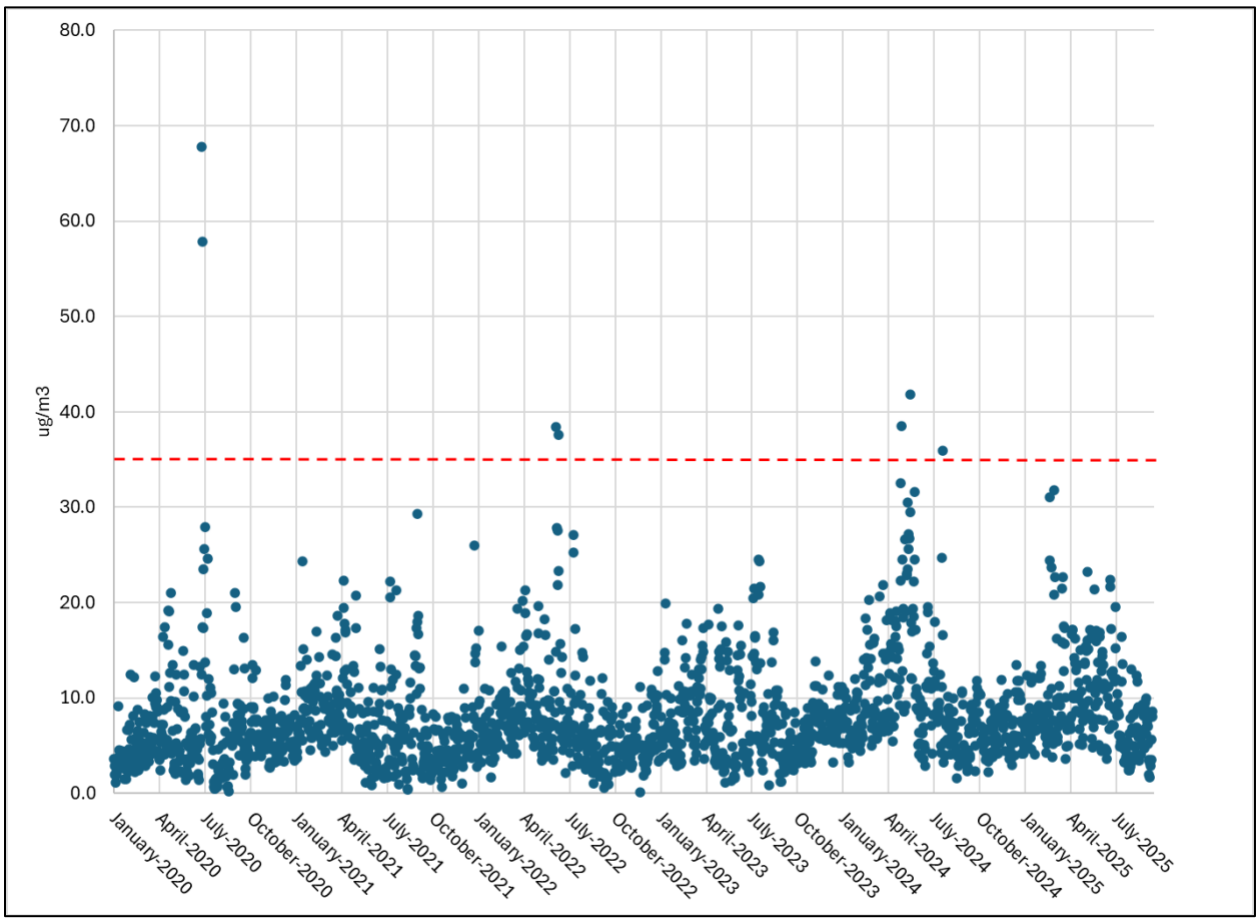

Figure 18. Mean 24-Hour PM2.5 at PBG, Jan. 1, 2020 – Sept. 30, 2025, with NAAQS scale 35µg/m^3 (red dashed line)

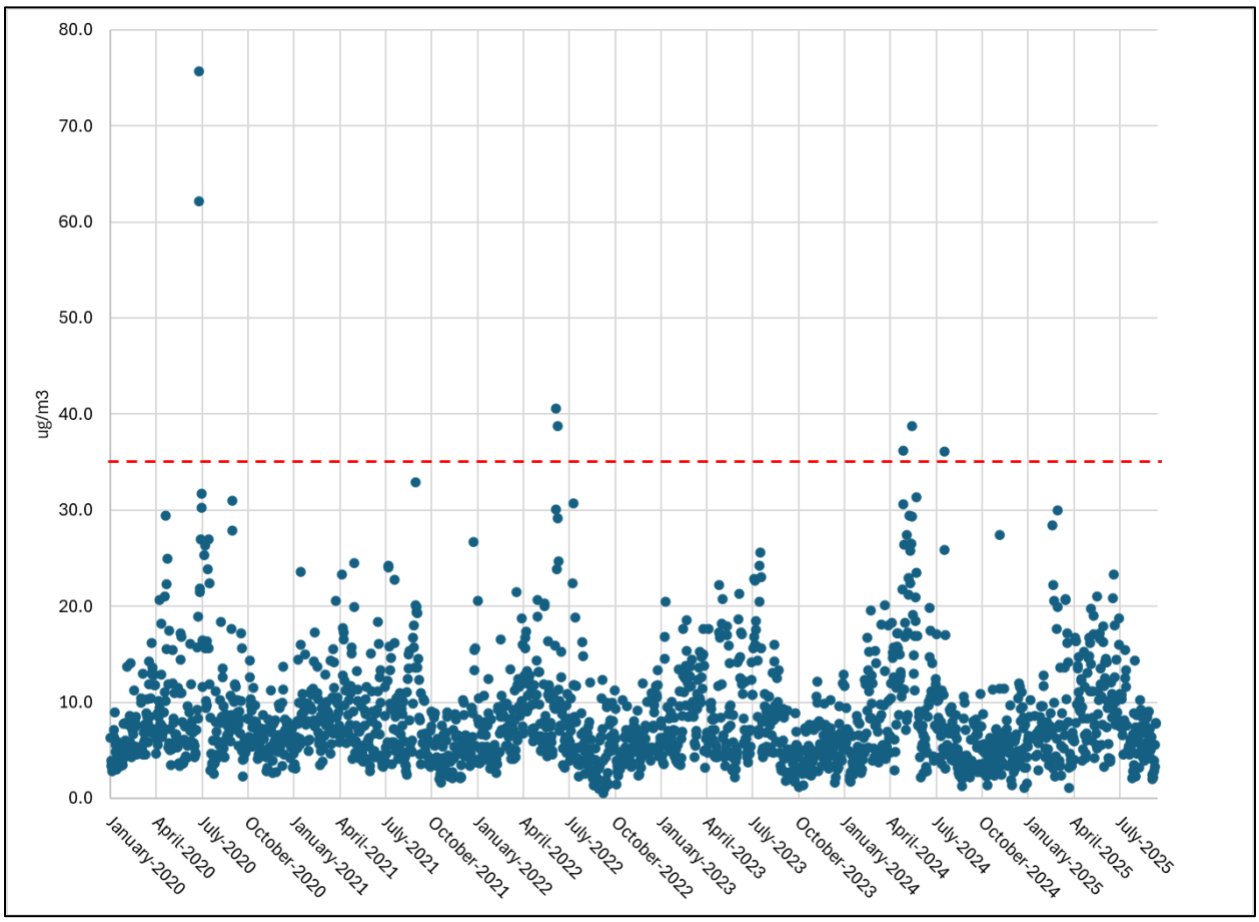

Figure 19. Mean 24-Hr PM2.5 at PBway, Jan. 1, 2020 – Sept. 30, 2025, with NAAQS value 35µg/m^3 (red dashed line)

Table 8. PBG PM2.5 annual means and 3-year averages showing NAAQS compliance.

Year	Annual Mean, µg/m^3	NAAQS 3-Year Annual Average Value, µg/m^3	Annual 98th Percentile Value, µg/m^3	NAAQS 3-Year 98th Percentile Average Value, µg/m^3
2020	6.6		20.8	
2021	7.2		20.5	
2022	7.4		21.3	
2023	7.6		19.3	
2024	9.5		27.4	
2025 partial	9.3		22.7	
3-year Avg. **2022-2024**	8.2	9.0	22.7	35.0

Table 9. PBway PM2.5 annual means and 3-year averages showing NAAQS compliance.

Year	Annual Mean, µg/m^3	NAAQS 3-Year Annual Average Value, µg/cm^3	Annual 98th Percentile Value, µg/m^3	NAAQS 3-Year 98th Percentile Average Value, µg/m^3
2020	8.7		26.9	
2021	8.2		20.5	
2022	7.8		22.5	
2023	8.1		20.7	
2024	8.3		27.4	
2025 partial	8.6		20.8	
3-year Avg. **2022-2024**	8.1	9.0	23.5	35.0

5.0 Data Analysis

Note on PM2.5

As was noted earlier in this report, the Clean Air Act Section 179B specifically allows states to exclude pollution measurements that come from outside the United States in determining compliance with the National Ambient Air Quality Standards. The EPA Website states: "Air agencies responsible for a nonattainment area that would be able to attain and maintain, or would have attained, the relevant National Ambient Air Quality Standard but for emissions emanating from outside the United States should consult section 179B of the Clean Air Act for information on developing and submitting to EPA a request demonstrating the impact."

The Texas state agency that handles most environmental monitoring and compliance is the Texas Commission on Environmental Quality (TCEQ). The Monitoring Division has a staff of meteorologists who look at forecasts to help estimate the coming days pollution levels for regional pollutants such as ozone and particulate matter. A review of daily emails from the TCEQ allows persons to know when, say, dust from the deserts in North Africa is traveling across the Atlantic Ocean and on its way toward the Texas coast. Similarly, they may forecast the smoke from agricultural burning in Mexico or Central America is headed toward Texas. Also, on some occasions, smoke from fires in Canada have penetrated into Texas.

One can examine Figure 15, Figure 18, and Figure 19 showing time series for 24-hour average PM2.5 at the three stations in San Patricio County and note the same days with values greater than 35 µg/m^3. In the last quarterly report, we showed that the annual averages listed in earlier PM2.5 tables will be modified by removing days that were influenced by out-of-country pollution. Thus, in comparing calculated PM2.5 averages to the NAAQS, one must be careful in drawing conclusions until the out-of-country effect has been removed.

Comparing Total Hydrocarbons across Texas

Data for hourly total nonmethane hydrocarbon concentrations measured by auto-GCs for calendar year 2024 were downloaded from the TCEQ, and the average concentrations were calculated for each monitoring station, and similarly data from the three San Patricio monitoring

stations were downloaded and had their average 2024 concentration calculated. The results appear in Table 10. As UT has often noted, the air in San Patricio County tends to be among the cleanest in the state owing to a strong sea breeze that provides ventilation and disperses pollution emissions. With three San Patricio stations and 36 TCEQ auto-GCs generally within Texas urban areas and having greater than 80% data return in 2024, the three San Patricio stations are close to the bottom of the list for mean TNMHC. At the top of the list are locations within oil and gas extraction areas, where natural gas leaks into the air, thus raising the TNMHC totals. Counties with large populations and associated industries are next, while stations with less traffic and industry or with good ventilation are at the bottom. The Site nomenclature in Table 10 are the labels used by EPA that combine the national coding for state ("48" for TX), then county ("201" for Harris County), and a unique number ("0083" for the Corpus Christi Palm station). Sites can be looked up at the TCEQ's website: https://www.tceq.texas.gov/airquality/monops/sites/air-mon-sites accessed October 2025.

Table 10 Average TNMHC for CY 2024 at Texas Auto-GCs

Rank	County	Site	ppbC
1	Midland	_483291095	437.1
2	Ector	_481351092	393.9
3	Ector	_481351093	352.6
4	Karnes	_482551070	266.3
5	Harris	_482010057	241.8
6	Harris	_482010036	209.5
7	Harris	_482010307	194.6
8	Harris	_482016000	162.4
9	Harris	_482011049	161.6
10	Harris	_482010803	159.9
11	Jefferson	_482451035	143.8
12	Harris	_482010069	128.7
13	Denton	_481211013	120.3
14	Jefferson	_482450009	115.3
15	Harris	_482011035	109.0
16	Wilson	_484931038	107.4
17	El Paso	_481410044	105.1
18	Tarrant	_484391002	103.6
19	Tarrant	_484391018	101.5
20	Harris	_482010026	101.3
21	Wise	_484970088	92.5
22	Wise	_484971064	90.5
23	Tarrant	_484390075	88.4
24	Johnson	_482511501	88.3
25	Harris	_482011039	86.7
26	Dallas	_481131505	86.3
27	Tarrant	_484391065	74.2
28	Tarrant	_484391503	74.0
29	Tarrant	_484391062	71.9
30	Tarrant	_484391009	71.5
31	Harris	_482010617	71.2
32	San Patricio	**GF**	64.8
33	Dallas	_481130069	64.5
34	Nueces	_483550083	63.3
35	San Patricio	**PBG**	58.6
36	Johnson	_482511063	55.1
37	Denton	_481211007	53.4
38	Bexar	_480290052	46.6
39	San Patricio	**PBway**	44.5

6.0 Conclusions

The air monitoring to date has been very successful. Although some concentrations have occasionally exceeded the concentration levels of the NAAQS, to date, the NAAQS have not been violated. Furthermore, measured hydrocarbon concentrations have not exceeded TCEQ long- or short-term AMCVs. To date, operations at the GCGV facility and the Cheniere Energy facility do not appear to have affected the level of pollutants measured at project stations. UT Austin would be happy to answer any questions or conduct additional analysis at the community's or sponsors' requests.

Appendices

A.1 Air Monitoring Station Locations & Information

Table A-1. Gregory-Portland Community Air Monitoring Stations and Parameters Measured

Air Monitoring Station Name and Street Address	Volatile Organic Compounds (VOCs)[1]	Ethylene oxide (EtO)[1]	Nitrogen Oxides (NOx, NO, & NO2)[1]	Sulfur Dioxide (SO_2)[1]	Particulate Matter (PM) Mass, particles < 2.5 micron diameter[1]	Wind Speed (WS), Wind Direction (WD), Ambient Temperature (T), Relative Humidity (RH), & Barometric Pressure (BP)[1]
Gregory Fresnos Stephen Austin Elementary 401 Fresnos St. Gregory, TX	Yes	No	Yes	Yes	Yes	Yes
Portland Buddy Ganem 307 Buddy Ganem St. GP High School Portland, TX	Yes	24-hr canister every 6 th day & a continuous analyzer	No	No	Yes	Yes + precipitation
Portland Broadway 175 Broadway Blvd. Old East Cliff Elementary School Portland, TX	Yes	24-hr canister every 6 th day	No	No	Yes	Only WS, WD

[1] All instruments operate continuously to provide hourly average measurements except as noted in the table.

Figure 20. Location of Gregory-Fresnos Community Air Monitoring Station (GF, pin G), and two Portland community stations on GPISD campuses on Buddy Ganem (PBG, pin 1) and on Broadway (PBway, pin 2) and the Cheniere Energy and GCGV industrial facilities

A.2 Glossary of Terms and Terminology

Pollutant concentrations – Concentrations of most gaseous pollutants are expressed in units denoting their "mixing ratio" in air, i.e., the ratio of the number molecules of the pollutant to the total number of molecules per unit volume of air. Because concentrations for all gases other than molecular oxygen, nitrogen, and argon are very low, the mixing ratios are usually scaled to express a concentration in terms of "parts per million" (ppm) or "parts per billion" (ppb).

Sometimes the units are explicitly expressed as ppm-volume (ppmV) or ppb-volume (ppbV) where 1 ppmV indicates that one molecule in one million molecules of ambient air is the compound of interest and 1 ppbV indicates that one molecule in one billion molecules of ambient air is the compound of interest. In general, air pollution standards and health effects screening levels are expressed in ppmV or ppbV units. Because hydrocarbon species may have a chemical reactivity related to the number of carbon atoms in the molecule, mixing ratios for these species are often expressed in ppb-carbon (ppbV times the number of carbon atoms in the molecule), to reflect the ratio of carbon atoms in that species to the total number of molecules in the volume. This is relevant to our measurement of auto-GC species and TNMHC, which are reported in ppbC units. For the purpose of relating hydrocarbons to health effects, this report notes hydrocarbon concentrations in converted ppbV units. However, because TNMHC is a composite of all species with different numbers of carbons, it cannot be converted to ppbV. Pollutant concentration measurements are time-stamped based on the start time of the sample, in Central Standard Time (CST), with sample duration noted.

Auto-GC – The automated gas chromatograph collects a sample for 40 minutes, and then automatically analyzes the sample for a target list of 46 hydrocarbon species. These include benzene and 1,3-butadiene, which are air toxics, various species that have relatively low odor thresholds, and a range of gasoline and vehicle exhaust components.

Total non-methane hydrocarbons (TNMHC) – TNMHC represent a large fraction of the total volatile organic compounds released into the air by human and natural processes. TNMHC is an unspeciated total of all hydrocarbons, and individual species must be resolved by other means, such as with canisters or auto-GCs.

Canister – Electro-polished stainless-steel canisters are filled with 24-hour air samples on a regular every sixth-day schedule, or when an independent sensor detects that *elevated* (see below) levels of hydrocarbons (TNMHC or a specific chemical species) are present. Event-triggered samples are taken for a set time period to capture the chemical make-up of the air.

Air Monitoring Comparison Values (AMCV) – The TCEQ uses AMCVs in assessing ambient data. A TCEQ Website that explain AMCVs is at https://www.tceq.texas.gov/toxicology/amcv/about (accessed October 2025). The following text is an excerpt from the Website:

> **AMCVs** and **ESLs** are screening levels for ambient air set to protect human health and welfare.
>
> **AMCVs** are screening levels used in TCEQ's evaluation of ambient air monitoring data to assess the potential for measured concentrations of specific chemicals to cause health

or welfare effects. Health-based AMCVs are safe levels at which exposure is unlikely to result in adverse health effects. Long-term AMCVs are similar to the USEPA's inhalation reference concentrations.

ESLs are screening levels used in the TCEQ's air permitting process to establish maximum emission rates that are written into enforceable air permits. Health-based ESLs are set 70 percent lower than the safe level, or AMCV. This additional buffer allows TCEQ to take into account exposure to chemicals from multiple sources in air permit reviews. A more detailed discussion of the differences can be found in Attachment C of the **Uses of ESLs and AMCVs Document**, or the **Fact Sheet** (which discusses the health-based values used to review air permits and air monitoring data)..

Rationale for Differences between ESLs and AMCVs – A very specific difference between the permitting program and monitoring program is that permits are applied to one company or facility at a time, whereas monitors may collect data on emissions from several companies or facilities or other source types (e.g., motor vehicles). Thus, the protective ESL for permitting is set lower than the AMCV in anticipation that more than one permitted emission source may contribute to monitored concentrations.

National Ambient Air Quality Standards (NAAQS) – U.S. Environmental Protection Agency (EPA) has established a set of standards for several air pollutions described in the Federal Clean Air Act. NAAQS are defined in terms of *levels* of concentrations and particular *forms*. For example, the NAAQS for particulate matter with size at or less than microns (PM2.5) has a *level* of 12 micrograms per cubic meter averaged over 24- hours, and a *form* of the annual average based on four quarterly averages, averaged over three years. Individual concentrations measured above the level of the NAAQS are called *exceedances*. The number calculated from a monitoring site's data to compare to the level of the standard is called the site's *design value*, and the highest design value in the area for a year is the regional design value used to assess overall NAAQS compliance. A monitor or a region that does not comply with a NAAQS is said to be *noncompliant*. At some point after a monitor or region has been in noncompliance, the U.S. EPA may choose to label the region as *nonattainment*. A nonattainment designation triggers requirements under the Federal Clean Air Act for the development of a plan to bring the region back into compliance. A more detailed description of NAAQS can be found on the EPA's Website at https://www.epa.gov/criteria-air-pollutants#self (accessed October 2025)

One species measured by this project and regulated by a NAAQS is sulfur dioxide (SO_2). EPA set the SO_2 NAAQS to include a level of 75 ppb averaged over one hour, with a form of the three-year average of the annual 99th percentiles of the daily maximum one- hour averages. If measurements are taken for a full year at a monitor, then the 99th percentile would be the fourth highest daily one hour maximum. There is also a secondary SO_2 standard of 500 ppb over three hours, not to be exceeded more than once in any one year.

Elevated Concentrations – In the event that measured pollutant concentrations are above a set threshold they are referred to as "elevated concentrations." The values for these thresholds are summarized by pollutant below. As a precursor to reviewing the data, the reader should understand the term "*statistical significance*." In the event that a concentration is higher than one would typically measure over, say, the course of a week, then one might conclude that a specific

transient assignable cause may have been a single upwind pollution source, because experience shows the probability of such a measurement occurring under normal operating conditions is small. Such an event may be labeled "statistically significant" at level 0.01, meaning the observed event is rare enough that it is not expected to happen more often than once in 100 trials. This does not necessarily imply the failure to meet a health-based standard. A discussion of "elevated concentrations" and "statistical significance" by pollutant type follows:

- For SO_2, any measured concentration greater than the level of the NAAQS, which is 75 ppb over one hour, is considered "elevated." Note that the concentrations of SO2 need not persist long enough to constitute an exceedance of the standard to be regarded as elevated. In addition, any closely spaced values that are statistically significantly (at 0.01 level) greater than the long-run average concentration for a period of one hour or more will be considered "elevated" because of their unusual appearance, as opposed to possible health consequence. The rationale for doing so is that unusually high concentrations at a monitor may suggest the existence of unmonitored concentrations closer to the source area that are potentially above the state's standards.
- For TNMHC, any measured concentration greater than the threshold of 2000 ppbC is considered "elevated."
- For benzene and other air toxics in canister samples or auto-GC measurements, any concentration above the AMCV is considered "elevated." Note that 40-minute auto-GC measurements are compared with the short-term AMCV.
- Some hydrocarbon species measured by the auto-GC generally appear in the air in very low concentrations close to the method detection level. Similar to the case above with SO_2, any values that are statistically significant (at 0.01 level) greater than the long-run average concentration at a given time or annual quarter will be considered "elevated" because of their unusual appearance, as opposed to possible health consequence. The rationale for doing so is that unusually high concentrations at a monitor may suggest an unusual emission event in the area upwind of the monitoring site.