South Portland / Portland
24-Hour Volatile Organic Compounds Air Monitoring Results Analysis and Summary Report Update

Analysis and Summary Update for Sampling Period from November 2019 to November 2021

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Prepared by the Maine Center for Disease Control and Prevention

Contacts:

Andrew Smith, SM, ScD
State Toxicologist
Maine Center for Disease Control and Prevention
Tel: (207) 287-5189
Email: andy.e.smith@maine.gov

Breana Bennett, MS, MPA
Toxicologist
Maine Center for Disease Control and Prevention
Tel: (207) 287-3227
Email: breana.bennett@maine.gov

Background

This report provides a two-year update to the Maine CDC analysis of ambient air levels of volatile organic compounds (VOCs) measured at eight stations from November 2019 to November 2021. The Maine Department of Environmental Protection (DEP) started a stationary VOC monitoring project in South Portland and Portland in June 2019. Between June and November 2019 DEP installed and brought online five stationary monitoring stations in South Portland (Assessor's Office, Bug Light, Central Receiving, High School, and Red Bank stations) and two new stations in Portland (Ocean Gateway and West Commercial Street stations). In Portland, the DEP also collects 24-hour air samples from a long-term air monitoring station located at Deering Oaks Park. All eight monitoring stations take a 24-hour air sample every six days, which the DEP collects and analyzes for VOCs. Following the collection and analysis of over a year's worth of 24-hour sample VOC data at all monitoring stations, and in preparation for the scheduled demolition of the Central Receiving Building, on March 17, 2021 the DEP in consultation with the City of South Portland moved the station at Central Receiving to a new location on Mechanic Street in South Portland. The Mechanic Street station began collecting 24-hour samples on March 23, 2021. This report additionally provides an analysis of the new Mechanic Street station compared to the other stations for the first full year the Mechanic Street station has been online (March 23, 2021 through March 2022).

The analyses provided in the previous reports[1] and in this update are focused on comparing the 24-hour sample results for individual VOCs to short-term, acute, and long-term, chronic, health-based guidelines. For short-term health-based guideline comparisons, individual VOC levels from each 24-hour air sample at each station are compared to acute Minimal Risk Levels (acute MRLs) maintained by the federal Agency for Toxic Substances and Disease Registry (ATSDR). Only 15 of the 47 chemicals measured in the 24-hour air samples have corresponding MRLs. In the case of naphthalene, the Maine Intermediate Intervention Action Level (IIAL), which was derived to be used in assessing exposures in indoor buildings, is used for comparison to acute exposure levels as there is no acute MRL currently available from ATSDR. For long-term health-based guideline comparisons, the time-weighted cumulative average of all 24-hour samples for individual VOCs at each station is calculated and compared to the Maine Ambient Air Guideline (AAG) which are derived using the U.S. Environmental Protection Agency (EPA) Regional Screening Level calculator to be protective of human population (including sensitive subpopulations) exposures over a lifetime.

In addition to comparing VOC levels to the Maine AAGs, this report includes estimates of the increased risk of cancer from long-term exposure to those VOCs reported to have cancer health endpoints. To estimate the cumulative lifetime cancer risk for each monitoring station, we assumed that the cancer risk associated with each individual VOC are independent and additive. A cancer risk for long-term exposure to each chemical is estimated following standard risk assessment methods and these individual chemical estimates are summed together to result in a cumulative risk. This report presents both the cumulative cancer risk and the relative contribution of each chemical contributing to that risk for each of the monitoring locations with 2 years of data.

[1] Maine CDC reports and DEP air sampling data: https://www.maine.gov/dep/air/monitoring/spo-sampling-results.html

Summary of health risks

Summary of acute health risks

In the first two full years of the air monitoring project (November 2019 to November 2021), no 24-hour VOC sample result has exceeded a health-based guideline for short-term, acute exposures (Figure 1). Of the 16 chemicals with acute MRLs, or an IIAL in the case of naphthalene, only acrolein, benzene, and naphthalene have had single 24-hour samples less than 10-fold below the acute MRL or IIAL. Most of the individual 24-hour samples for acrolein, benzene, and naphthalene are more than 3-fold below the acute MRL or IIAL. The highest single 24-hour samples for acrolein, benzene and naphthalene were 1.5-fold, 3.1-fold, and 1.5-fold below the acute MRL or IIAL, respectively (Figure 1).

Summary of chronic health risks

For long-term exposure comparisons, in the first two full years of the air monitoring project (November 2019 to November 2021), the time-weighted cumulative average for two VOCs, naphthalene (Figure 2a) and acrolein (Figure 2b), continue to exceed the AAG. The cumulative averages for acrolein at all stations remain approximately 15 to 22-fold higher than the AAG (Figure 2b). Acrolein levels in the South Portland and Portland areas are similar to levels measured at other monitoring stations in the state. The cumulative averages for naphthalene are at or above the AAG at all stations. The Deering Oaks station in Portland and the Assessor's Office station in South Portland are both 1.1 times higher than the AAG for naphthalene. The cumulative average at Bug Light, Central Receiving, the High School, and Red Bank stations in South Portland are all 1.3 to 2.3 times higher than the AAG for naphthalene. The cumulative average at the Ocean Gateway and West Commercial Street stations in Portland are 3.5 to 4.5 times higher than the AAG (Figure 2a).

For long-term exposure comparisons, the time-weighted cumulative averages for most VOCs are more than 3-fold below their corresponding AAG (Figure 2a). Only 1,3-butadiene, benzene, and carbon tetrachloride have cumulative averages that are lower than, but within a 3-fold difference of the AAG at all South Portland and Portland monitoring stations. The cumulative average for 1,3-butadiene is more than 3-fold below the AAG at all stations except for Central Receiving (as of March 17, 2021, when the station as taken offline) and the West Commercial Street station, where the cumulative average is 2.8-fold below the AAG at both stations. For benzene, the cumulative averages range from 1.3-fold (Bug Light) to 2.5-fold (Red Bank) below the AAG (Figure 2a). Cumulative averages for carbon tetrachloride are consistently between 2.7- to 3-fold below the AAG. This has been consistent since these stations were brought online in 2019 and is consistent with carbon tetrachloride being a legacy pollutant.

Summary of cumulative cancer risks

In addition to comparing VOC levels to general chronic, long-term health risks, we estimated the cumulative increased risk of cancer based on the 2-year average ambient air concentration for VOCs with cancer health endpoints. To estimate the cumulative lifetime cancer risk for each monitoring station, we assumed that the cancer risks for each individual chemical are independent and additive.

Sixteen of the measured VOCs have cancer toxicity values in the U.S. EPA Regional Screening Levels calculator and contribute to the overall cancer risk. The cancer toxicity value for VOCs is the inhalation unit risk (IUR) and is defined as the upper-bound excess lifetime cancer risk estimated to result from continuous lifetime exposure to an agent at a concentration of 1 $\mu g/m^3$ in the air[2]. The IUR is a chemical-specific value and is expressed in units of $(\mu g/m^3)^{-1}$. The IUR can be multiplied by the long-term average concentration for each VOC to provide an estimate of the lifetime cancer risk (lifetime is typically modeled as a 70-year life). This risk can be expressed as an estimated number of excess cancer cases per number of exposed individuals. Figure 3 shows the number of estimated excess cancer cases per 1,000,000 people exposed for each VOC at each South Portland and Portland monitoring station.

Based on the average ambient air levels from two full years of the air monitoring project (November 2019 to November 2021), for all monitoring stations, the overall cumulative cancer risk ranged from 26.7 (Deering Oaks) to 62.3 (West Commercial Street) excess cases per 1,000,000 population over a 70-year exposure period (i.e., less than one excess cancer case per year assuming a 70-year lifetime. The Ocean Gateway and West Commercial Street stations in Portland both had lifetime cumulative cancer risks above 50 excess cases per 1,000,000. The South Portland stations at Bug Light, Central Receiving, High School, and Red Bank had cumulative cancer risks above 30 excess cases per 1,000,000. The Assessor's Office station in South Portland and the Deering Oaks station in Portland were the only stations to have cumulative cancer risks below 30 excess cases per 1,000,000.

At all stations naphthalene was the largest contributor to the cumulative cancer risk with the individual risk ranging from 10.9 (Deering Oaks) to 43.7 (West Commercial Street) excess lifetime cases per 1,000,000 (Figure 3). Benzene is the second largest contributor at all stations with the individual chemical risk ranging from 4.2 (Red Bank, Deering Oaks) to 7.6 (Bug Light) excess cases per 1,000,000. None of the remaining VOCs had individual risks higher than 4 excess cancer cases per 1,000,000.

Comparisons of Year 1 (Nov. 2019 – Nov. 2020) and Year 2 (Nov. 2020 – Nov. 2021) VOC monitoring data

Four of the South Portland stations (Assessor's Office, Bug Light, High School, and Red Bank) and the three Portland stations (Deering Oaks, West Commercial Street, and Portland Ocean Gateway) have two full years' worth of 24-hour VOC monitoring data as of November 2021. Additionally, the Central Receiving station in South Portland had nearly a year and a half of monitoring data when it was taken offline in March of 2021. Having two full years of monitoring data allows for some comparisons of the trends in the VOC monitoring data for acrolein, benzene, and naphthalene between the first and second full year of monitoring.

[2] https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

Acrolein

Acrolein levels at all South Portland and Portland VOC monitoring stations were slightly lower during the second year of monitoring (Figure 4). Table 1 shows the cumulative average 24-hour sampling results by year with a 95% confidence interval for each station, as well as the percentage change in the cumulative average concentration between the first and second year of monitoring.

Table 1. Average 24-hour sampling results by year with 95% confidence interval by station for Acrolein

	Assessor's Office	Bug Light	Central Receiving	High School	Red Bank	Deering Oaks	West Commercial St.	Portland Ocean Gateway
Year 1 Cumulative Average (± 95% CI), ppb-v	0.173 ± 0.022	0.154 ± 0.021	0.18 ± 0.045	0.195 ± 0.040	0.173 ± 0.034	0.169 ± 0.026	0.211 ± 0.046	0.227 ± 0.076
Year 2 Cumulative Average (± 95% CI), ppb-v	0.098 ± 0.011	0.126 ± 0.015	0.104 ± 0.025	0.129 ± 0.017	0.156 ± 0.027	0.11 ± 0.013	0.164 ± 0.023	0.146 ± 0.016
Percentage Change	-43%	-18%	-42%	-34%	-10%	-35%	-22%	-36%

The largest decreases in cumulative average acrolein levels were seen at the Assessor's Office (43% decrease), Central Receiving (42% decrease), and High School (43% decrease) stations in South Portland and the Deering Oaks (35% decrease) and Portland Ocean Gateway (36% decrease) stations in Portland (Table 1). There was more variability in the measured 24-hour acrolein levels in the first year of monitoring than in the second year for all stations, but most notably at the Central Receiving and High School stations in South Portland and the West Commercial Street and Ocean Gateway stations in Portland (Table 1, Figure 4). This can be seen in Figure 7 by higher and/or more frequent elevated 24-hour samples. At the Assessor's Office, Bug Light, and Red Bank stations in South Portland the variability in measured 24-hour acrolein levels was similar between the first and second year of monitoring. However, at the Red Bank station most of that variability in the second year of monitoring came during an extended period of elevated acrolein levels between July and September, whereas in the first year of monitoring there were more intermittent 24-hour peaks (Figure 7).

Benzene

Benzene levels at most monitoring stations in both South Portland and Portland were slightly higher in the second year of monitoring than they were in the first year (Figure 5). Table 2 shows the cumulative average 24-hour sampling results by year with a 95% confidence interval for each station, as well as the percentage change in the cumulative average concentration between the first and second year of monitoring.

Table 2. Average 24-hour sampling results by year with 95% confidence interval by station for Benzene

	Assessor's Office	Bug Light	Central Receiving	High School	Red Bank	Deering Oaks	West Commercial St.	Portland Ocean Gateway
Year 1 Cumulative Average (± 95% CI), ppb-v	0.201 ± 0.037	0.287 ± 0.062	0.179 ± 0.027	0.174 ± 0.027	0.171 ± 0.023	0.165 ± 0.028	0.195 ± 0.031	0.291 ± 0.032
Year 2 Cumulative Average (± 95% CI), ppb-v	0.252 ± 0.096	0.326 ± 0.084	0.204 ± 0.040	0.255 ± 0.066	0.163 ± 0.021	0.171 ± 0.023	0.210 ± 0.031	0.222 ± 0.027
Percentage Change	25%	14%	14%	47%	-5%	4%	8%	-24%

At the Bug Light, Central Receiving and Red Bank stations in South Portland and the Deering Oaks and West Commercial Street stations in Portland the benzene levels were generally similar between the first and second year of monitoring (Table 2, Figure 5). At the Assessor's Office and High School stations in South Portland, the cumulative average benzene concentration was slightly higher in the second year of monitoring than it was in the first, however this was largely due to a single very high 24-hour sample that occurred on September 9, 2021 (Figure 8). This peak was also observed at the Bug Light station, along with a second elevated 24-hour sample in early October; however, because benzene levels tend to be higher at Bug Light relative to other stations, these peaks had less of an impact on the cumulative average at the Bug Light station. Additionally, benzene levels appeared to be slightly higher during the winter months in the first year of monitoring, but this potential seasonal trend was less pronounced in the second year of monitoring (Figure 8).

Naphthalene

Naphthalene levels at the Assessor's Office and Bug Light stations in South Portland and the Deering Oaks station in Portland were largely unchanged between the first and second year of monitoring (Figure 6). Table 3 shows the cumulative average 24-hour sampling results by year with a 95% confidence interval for each station, as well as the percentage change in the cumulative average concentration between the first and second year of monitoring.

Table 3. Average 24-hour sampling results by year with 95% confidence interval by station for Naphthalene

	Assessor's Office	Bug Light	Central Receiving	High School	Red Bank	Deering Oaks	West Commercial St.	Portland Ocean Gateway
Year 1 Cumulative Average (± 95% CI), ppb-v	0.063 ± 0.01	0.076 ± 0.016	0.148 ± 0.048	0.106 ± 0.026	0.157 ± 0.031	0.058 ± 0.011	0.299 ± 0.111	0.240 ± 0.049
Year 2 Cumulative Average (± 95% CI), ppb-v	0.061 ± 0.008	0.071 ± 0.011	0.066 ± 0.017	0.080 ± 0.012	0.063 ± 0.007	0.064 ± 0.011	0.199 ± 0.046	0.144 ± 0.021
Percentage Change	-3%	-7%	-55%	-25%	-60%	10%	-33%	-40%

Naphthalene levels were notably lower at the Central Receiving (55% decrease), High School (25% decrease), and Red Bank (60% decrease) stations in South Portland and the West Commercial Street (33% decrease) and Ocean Gateway (40% decrease) stations in Portland in the second year of monitoring (Table 3). In the first year of monitoring there was a clear seasonal increase in naphthalene levels from July through September at the Central Receiving, High School, and Red Bank stations in South Portland that was not observed in the second year of monitoring (Figure 9). The seasonal increase in naphthalene levels from July through September was also observed at the West Commercial Street and Ocean Gateway stations in Portland in the first year of monitoring. In the second year of monitoring the West Commercial Street and Ocean Gateway stations there was still a season increase during the summer months, but to a lesser degree (Figure 9).

One Year Summary of Mechanic Street Station

On March 17, 2021 the Central Receiving station in South Portland was taken offline and on March 23, 2021 the Mechanic Street station began collecting 24-hour samples. In the first full year of monitoring at the Mechanic Street station the VOC trends for both benzene and naphthalene were notably different between Mechanic Street and the other South Portland monitoring stations (Figure 10a, Figure 11a). As noted above, benzene levels at the Assessor's Office, Bug Light, and High School stations in South Portland all had a notable peak on September 9, 2021. This peak was not observed at any other stations, including the Mechanic Street station (Figure 10a, Figure 10b). Overall, there is some suggestion that the Mechanic Street station may be more similar to the West Commercial Street and Ocean Gateway stations across the bay in Portland rather than the other South Portland monitoring stations.

As noted above, there was a seasonal increase in naphthalene levels observed at the West Commercial Street and Ocean Gateway stations from June through September in 2021 that was not observed at any of the original South Portland stations. At the Mechanic Street station naphthalene levels were

elevated from June through September in 2021 and declined through the fall and winter months (Figure 11a, 11b).

The elevated naphthalene levels at the Mechanic Street station are the largest contributor to overall cumulative cancer risk. Although it is preferable to have multiple years of data to estimate cumulative cancer risk, analyzing the first year of monitoring data at the Mechanic Station results in an estimated lifetime cancer risk of 49.7 excess cancer cases per 1,000,000. Of these estimated 49.7 excess cases of cancer, 32.8 can be attributed to naphthalene. This is more similar to the West Commercial Street and Ocean Gateway Stations in Portland rather than the other South Portland monitoring stations (Figure 3).

Summary of Major Findings

Overall, none of the monitoring stations in South Portland or Portland have had any 24-hour VOC sample results that have exceeded a health-based guideline for short-term, acute exposures. Two of the measured VOCs, acrolein and naphthalene, have cumulative average concentrations that exceed the AAG. For both acrolein and naphthalene, the cumulative average concentrations were lower in the second year of monitoring than in the first. With only two years of data, it is not yet clear whether there is an overall trend of decreasing acrolein and naphthalene concentrations in the South Portland and Portland area or rather just year to year variation. This finding underscores the importance of long-term monitoring. This is particularly important when considering cancer risk, as naphthalene is the largest contributor to the cumulative cancer risk for all the South Portland and Portland monitoring stations.

In reviewing the first year of monitoring data at the Mechanic Street station it appears that there are similarities between the Mechanic Street, West Commercial Street and Ocean Gateway stations in Portland. Most notably there was a seasonal pattern in naphthalene levels observed at the Mechanic Street, West Commercial Street, and Ocean Gateway stations from June through September 2021 that was not observed at any of the other South Portland stations.

Overall, Maine CDC's recommendations for the South Portland – Portland 24-hour VOC Air Monitoring Project is continued monitoring, particularly of those stations with elevated naphthalene levels. Continued monitoring of these stations will allow Maine CDC to better assess the long-term trends and annual variations, and their overall impact on potential health risk.

For further information regarding Maine CDC's current air monitoring analysis plan and explanation of the presented figures, readers are referred to the November 2019 - January 2020 report.[3] All air sampling data is available on the Maine DEP website.[4] The following pages include the analysis figures for acute and chronic exposure comparisons to health-based guideline values updated with air monitoring data from November 2019 through November 2021 for short-term and long-term exposure figures, and April 2021 through March 2022 for the Mechanic Street comparison figures.

[3] https://www.maine.gov/dep/air/monitoring/docs/S.Portland-Portland-24-hour-VOC-summary-report-03.19.20.pdf
[4] https://www.maine.gov/dep/air/monitoring/spo-sampling-results.html

Summary Figures

I. Summary figure for short-term exposures -

Acute MRL ratio figure

Acute MRL ratio figure

Figure 1. Individual 24-hour sample results-to-acute MRL ratios for chemicals with acute MRLs

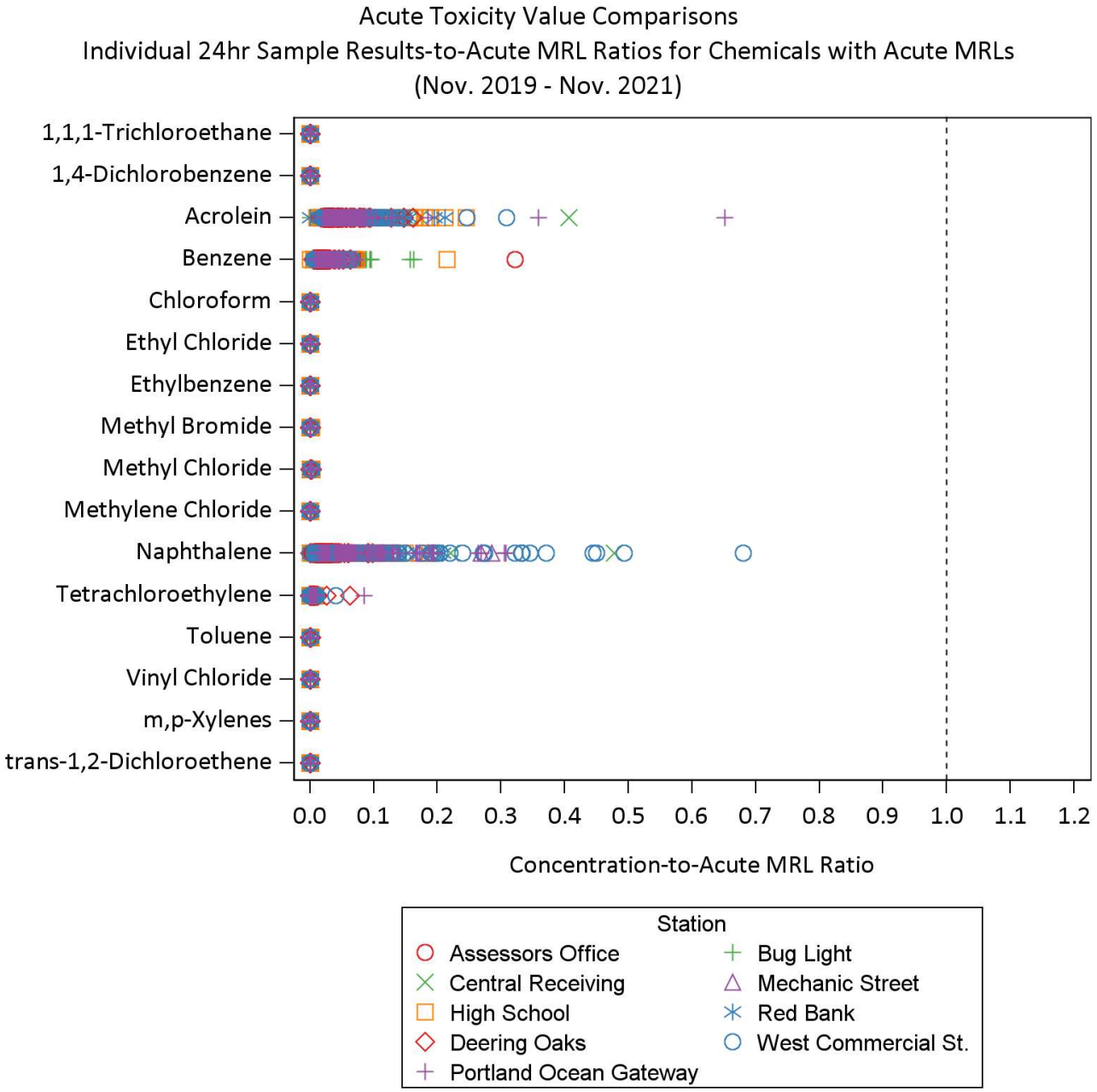

Figure 1 shows the ratio of individual 24-hour sample results collected at each sampling station to chemical-specific Agency for Toxic Substances and Disease Registry (ATSDR) acute Minimum Risk Levels (acute MRLs) for the first two years of the monitoring study (Nov. 2019 – Nov. 2021). Acute MRLs are developed for an exposure period of 1 to 14 days and are estimates of the amount of a chemical a person can be exposed to each day without a detectable risk to health. For naphthalene, the Maine Intermediate Intervention Action Level (IIAL) is used for comparison to acute exposure levels as there is no acute MRL for naphthalene currently available from ATSDR. Ratios greater than 1, the dashed grey reference line, indicate that an individual 24-hour sample result exceeded the chemical-specific acute MRL. To date, no VOC levels exceed an acute MRL (Central Receiving taken offline March 17, 2021; Mechanic Street brought online March 23, 2021). Sampling data obtained from Maine DEP.

Summary Figures

II. Summary figures for long-term exposures -

A. Cumulative average to AAG ratio figures

B. Cumulative average cancer risk figures

C. Year 1 vs. Year 2 cumulative average uncertainty figures

D. Comparisons of Year 1 and Year 2 24-hour sampling results

A. Cumulative average to AAG ratio figures

Figure 2a. Cumulative average-to-AAG ratios for individual chemicals with AAGs

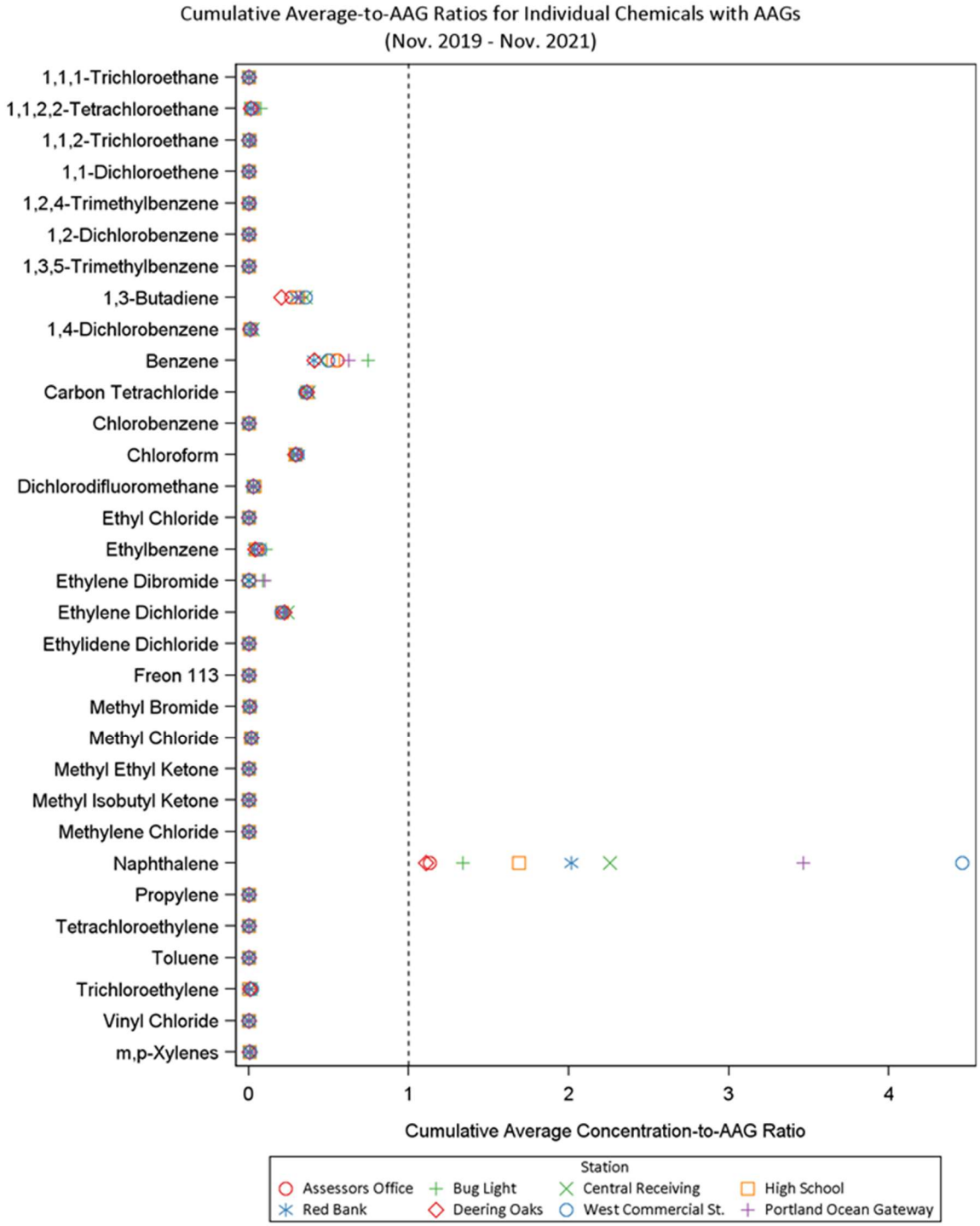

Figure 2a shows the ratio of the time-weighted cumulative average, i.e., the average of all individual 24-hour samples collected for an individual chemical by station, to the Maine Ambient Air Guideline (AAG) for all chemicals with an AAG for the first two years of the monitoring study (Nov. 2019 – Nov. 2021). An AAG is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Ratios that are greater than 1, the dashed grey reference line, indicate that the current 24-hour sample cumulative average exceeds the chemical-specific AAG. Only stations with at least one full year of monitoring data as of November 2021 included in AAG comparisons. As of November 2021, only the chemicals naphthalene (above) and acrolein (Figure 2b) are trending with cumulative averages above an AAG. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Figure 2b. Cumulative average-to-AAG ratios for acrolein

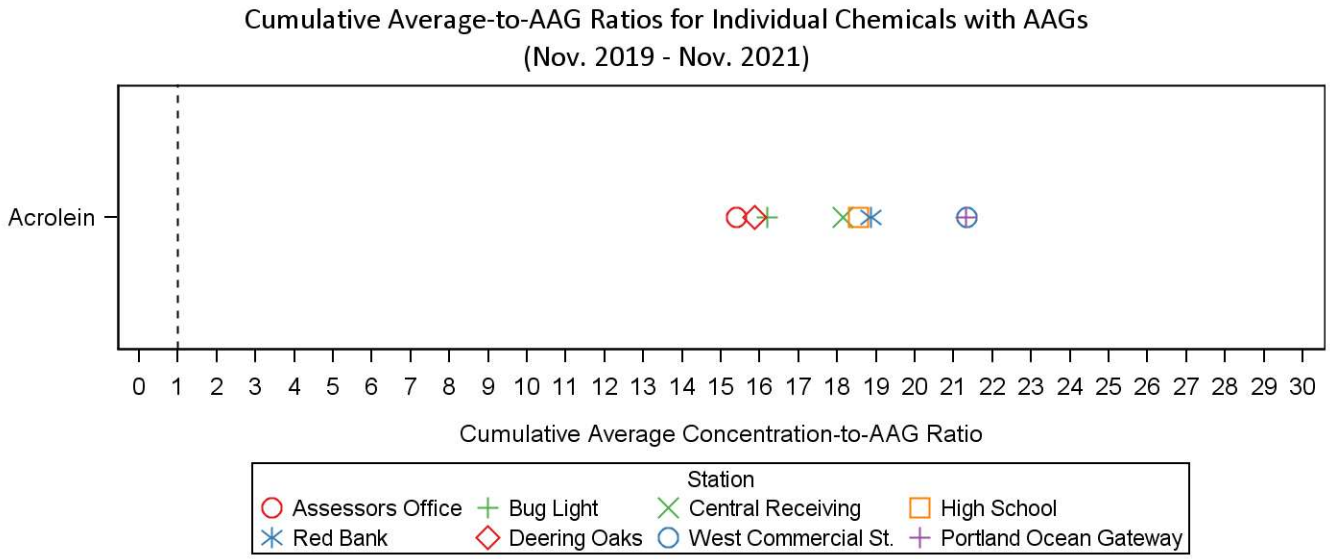

Figure 2b shows the ratio of the time-weighted cumulative average to the Maine Ambient Air Guideline (AAG) for acrolein for the first two years of the monitoring study (Nov. 2019 – Nov. 2021). All cumulative averages for individual stations exceed the acrolein AAG; this is also the case for all sampling locations across the State of Maine. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

B. Cumulative average cancer risk figures

Figure 3. Cumulative average cancer risk per million by station

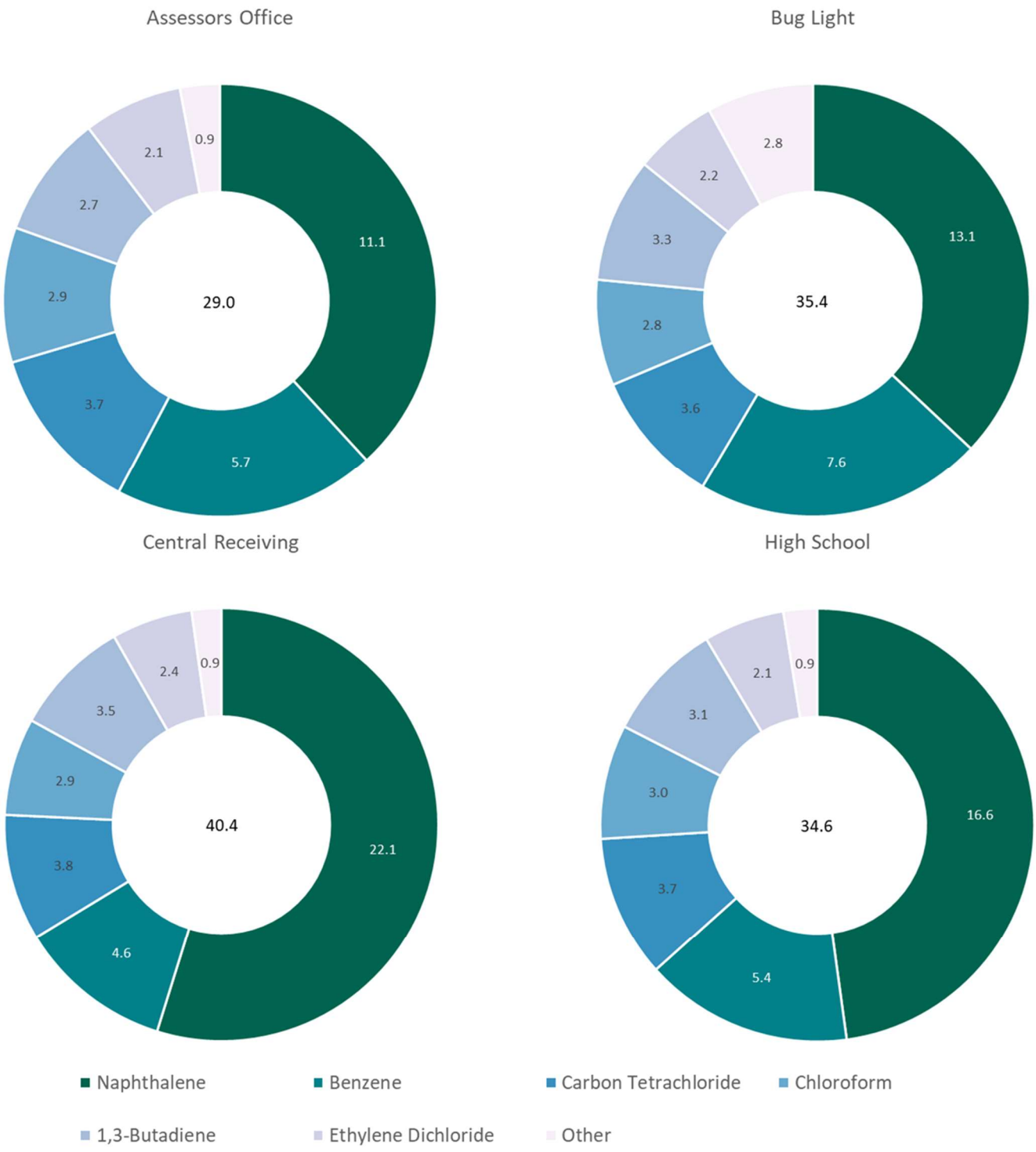

Figure 3 cont. Cumulative average cancer risk per million by station

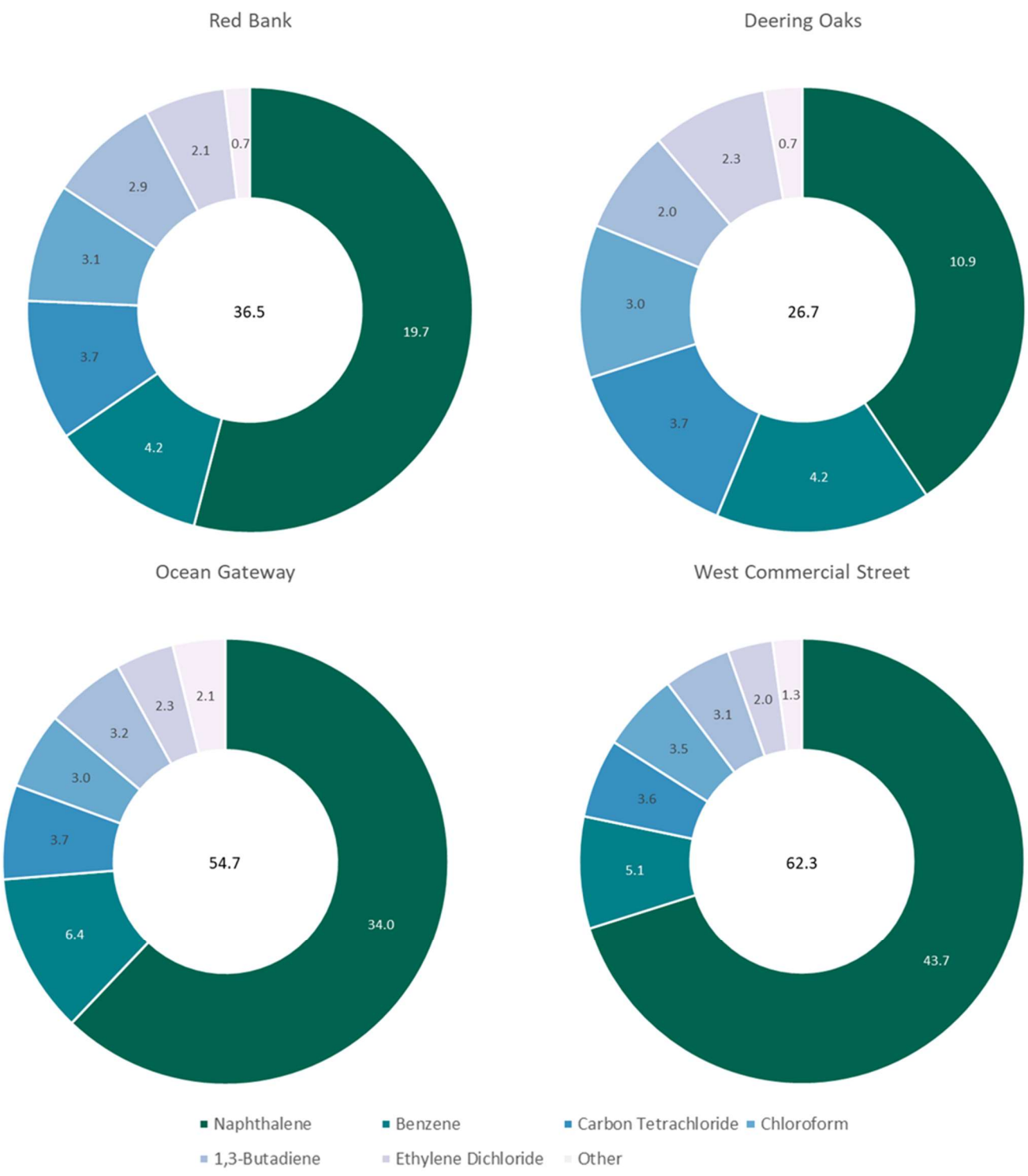

Figure 3 shows the cumulative average cancer risk for all individual 24-hour samples collected by station for the first two years of the monitoring study (Nov. 2019 – Nov. 2021). 24-hour air samples are collected every 6 days. Sixteen of the measured VOCs have cancer toxicity values in the U.S. EPA Regional Screening Levels calculator and contribute to the overall cancer risk. The number in the center of the donut is the total incremental cancer risk or the number of estimated excess cancer cases per 1,000,000 exposed. Each segment of the donut is the incremental cancer risk contribution from each individual VOC. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

C. Year 1 vs. Year 2 cumulative average uncertainty figures

Figure 4. Average 24-hour sampling results by year with 95% confidence interval by station for acrolein

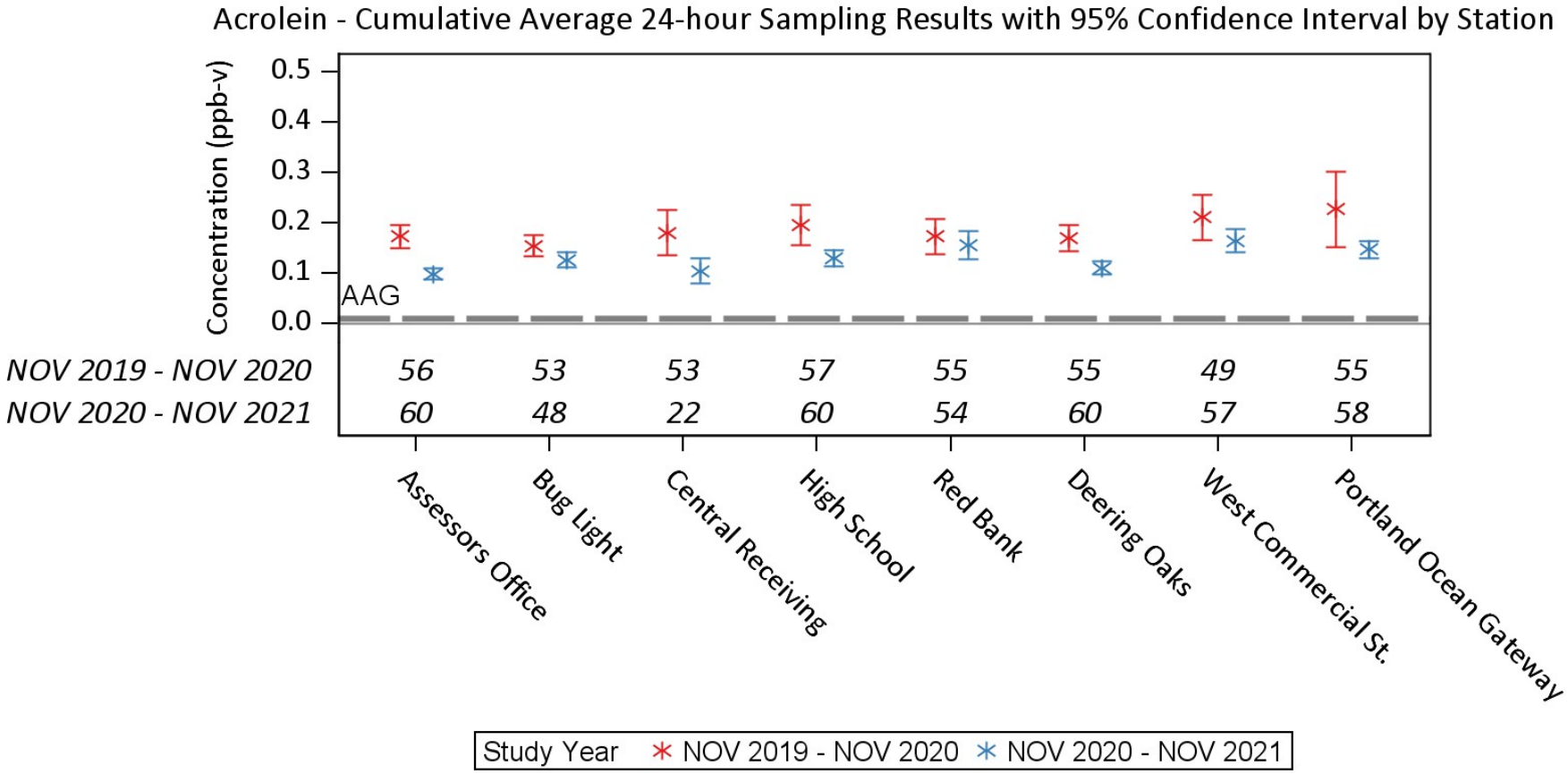

Figure 4 shows the average acrolein level as a marker (asterisk) with 95% confidence interval for the average (vertical lines) for all individual 24-hour samples collected by station for the original 8 stations in the first full year of monitoring (red, Nov. 2019 – Nov. 2020) and in the second full year of monitoring (blue, Nov. 2020 – Nov. 2021). 24-hour air samples are collected every 6 days. The number of samples collected by station is shown for each sampling year. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Average acrolein levels exceed the AAG at all sampling locations in both sampling years. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Figure 5. Average 24-hour sampling results by year with 95% confidence interval by station for benzene

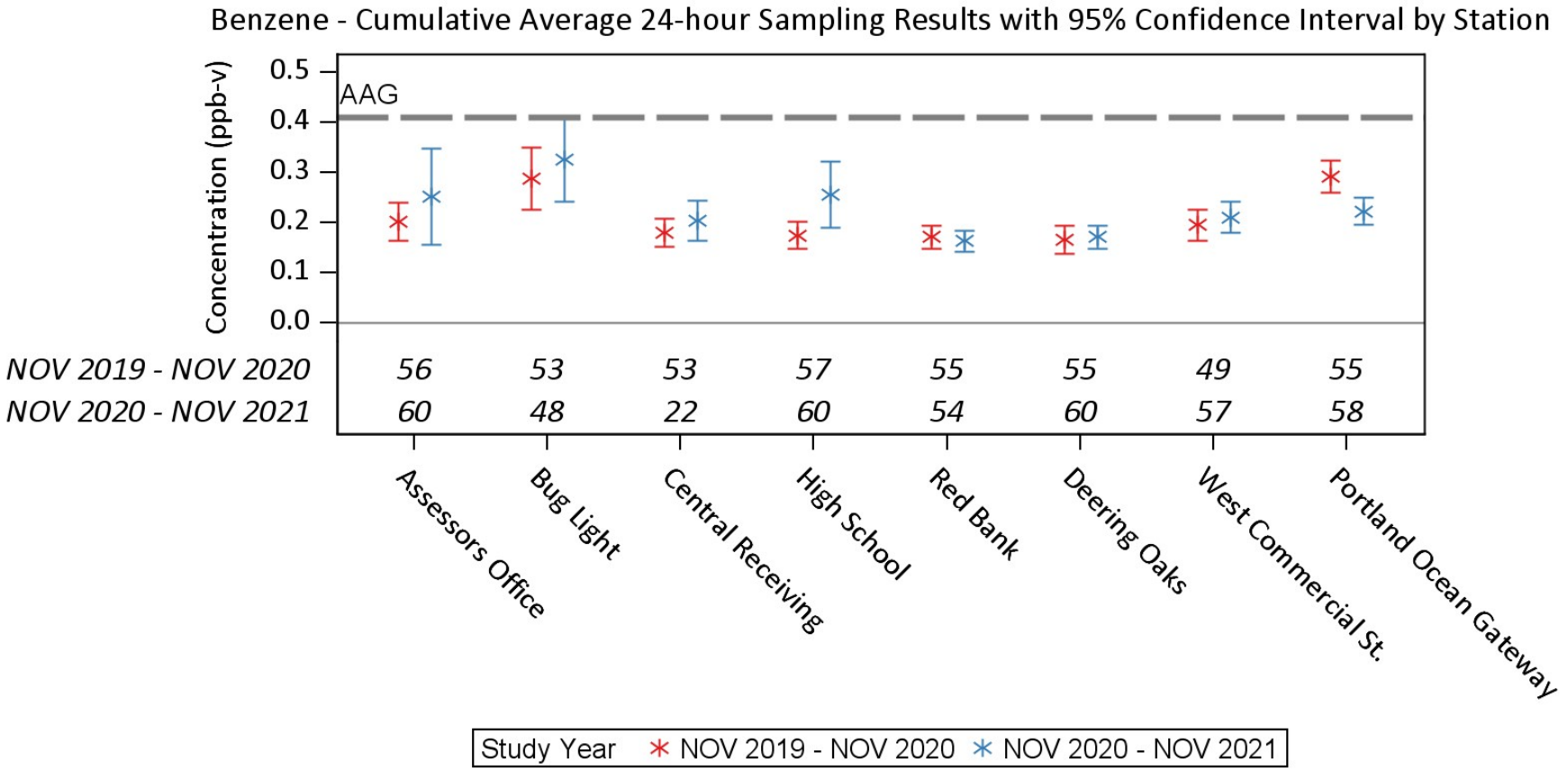

Figure 5 shows the average benzene level as a marker (asterisk) with 95% confidence interval for the average (vertical lines) for all individual 24-hour samples collected by station for the original 8 stations in the first full year of monitoring (red, Nov. 2019 – Nov. 2020) and in the second full year of monitoring (blue, Nov. 2020 – Nov. 2021). 24-hour air samples are collected every 6 days. The number of samples collected by station is shown for each sampling year. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Average benzene levels are below the AAG at all sampling locations for both years with the 95% confidence interval approaching the AAG at the Bug Light location in the second year of monitoring. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Figure 6. Average 24-hour sampling results with 95% confidence interval by station for naphthalene

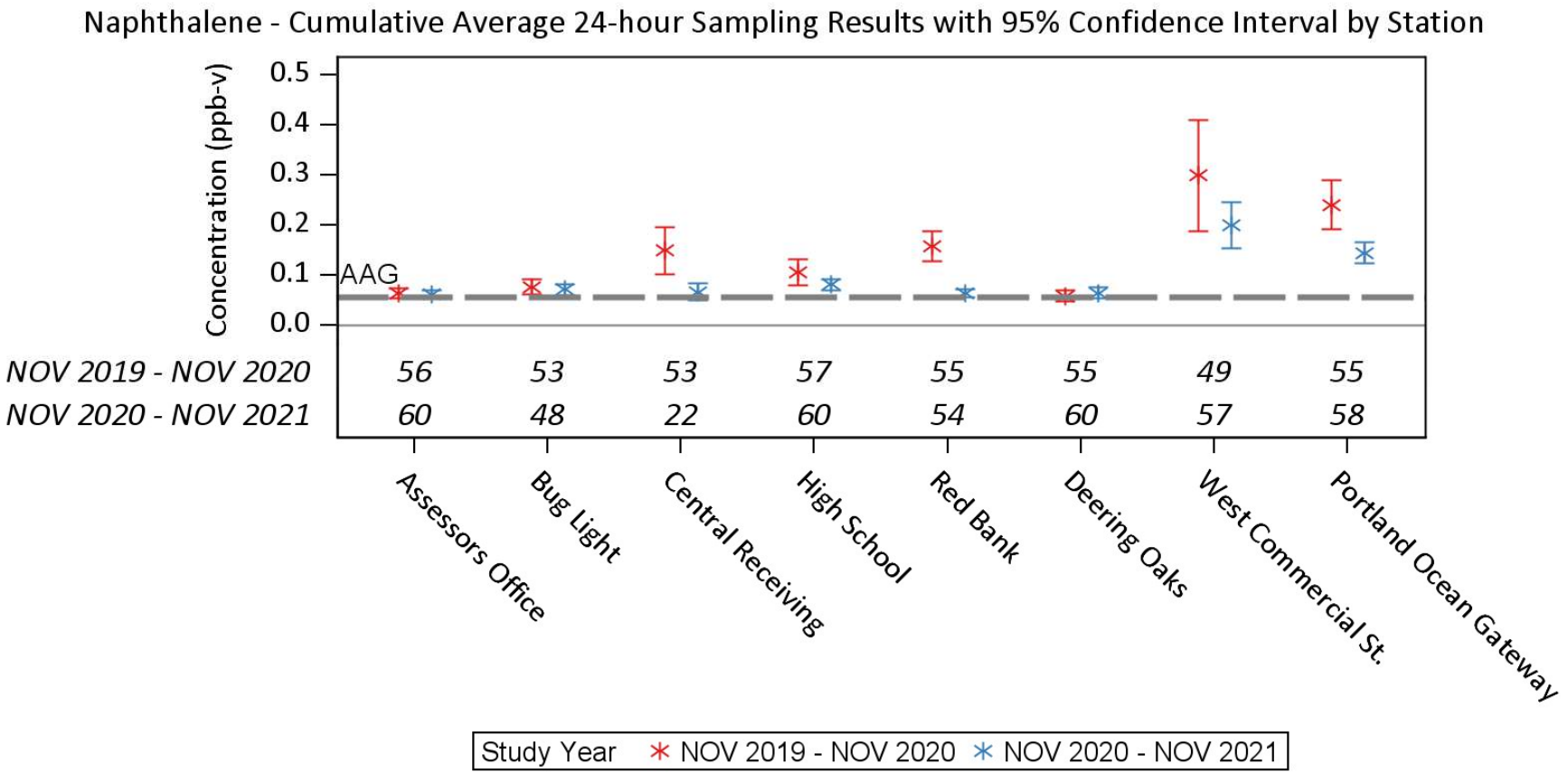

Figure 6 shows the average naphthalene level as a marker (asterisk) with 95% confidence interval for the average (vertical lines) for all individual 24-hour samples collected by station for the original 8 stations in the first full year of monitoring (red, Nov. 2019 – Nov. 2020) and in the second full year of monitoring (blue, Nov. 2020 – Nov. 2021). 24-hour air samples are collected every 6 days. The number of samples collected by station is shown for each sampling year. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. In the first year of monitoring five stations had average naphthalene levels above the AAG and three stations had levels at or near the AAG. In the second year of monitoring two stations had average naphthalene levels above the AAG and six stations had average naphthalene levels at or slightly above the AAG. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

D. Comparisons of Year 1 (Nov. 2019 – Nov. 2020) and Year 2 (Nov. 2020 – Nov. 2021) 24-hour sampling results

Figure 7. Individual 24-hour sampling results by year for acrolein

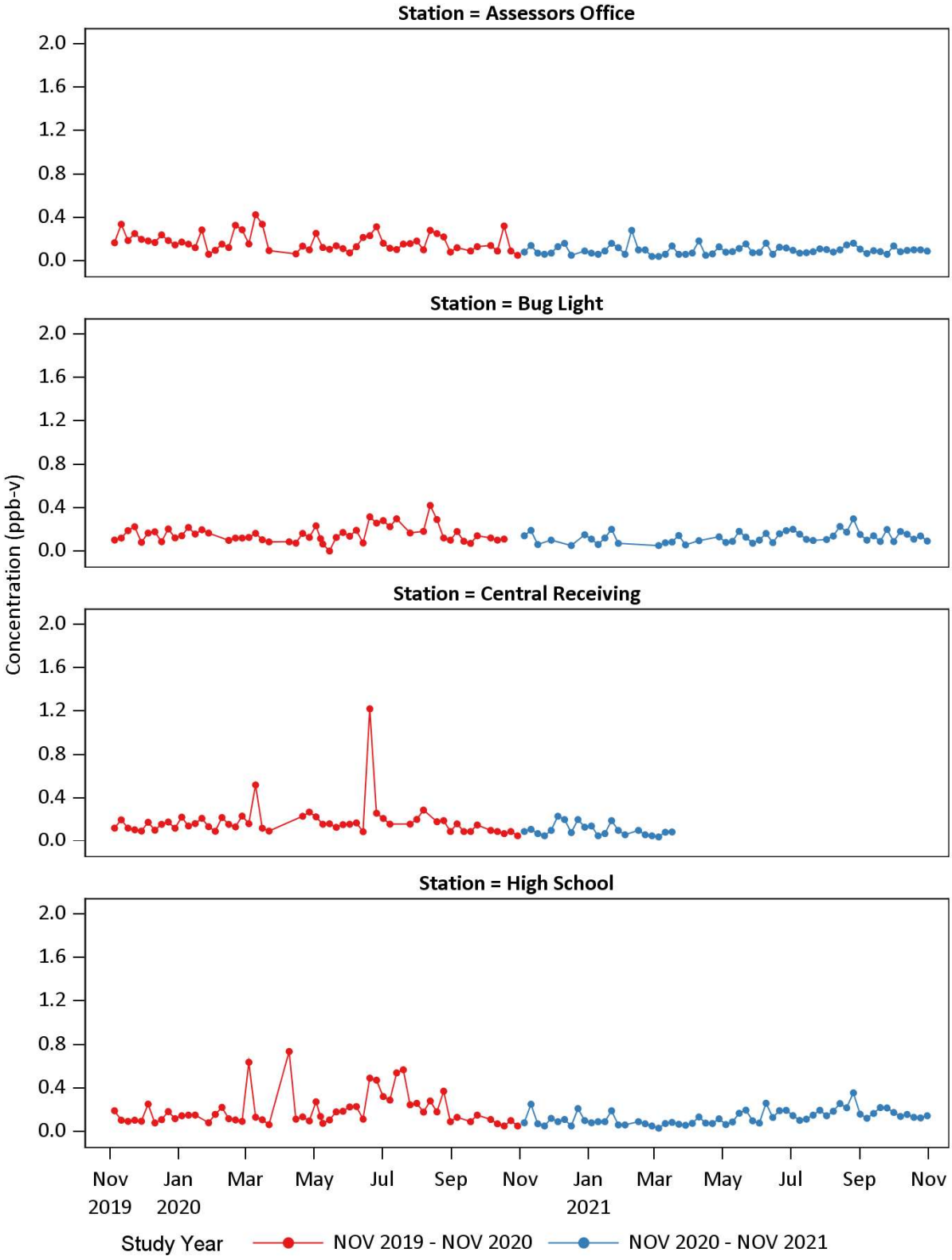

Figure 7 cont. Individual 24-hour sampling results by year for acrolein

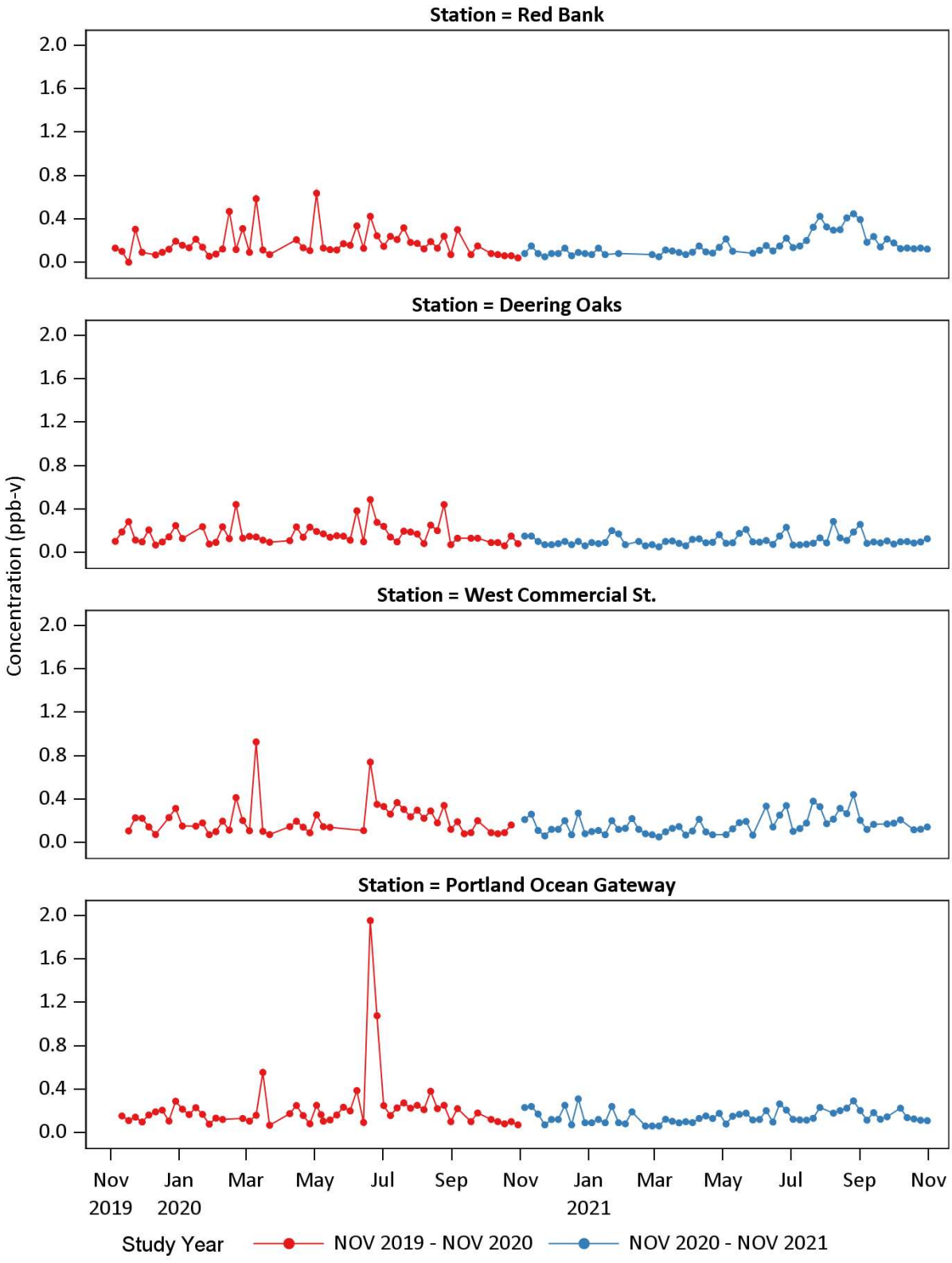

Figure 7 shows the individual 24-hour sample results in the first (red) and second (blue) full year of monitoring for acrolein for each of the original 8 stations. 24-hour air samples are collected every 6 days. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Figure 8. Individual 24-hour sampling results by year for benzene

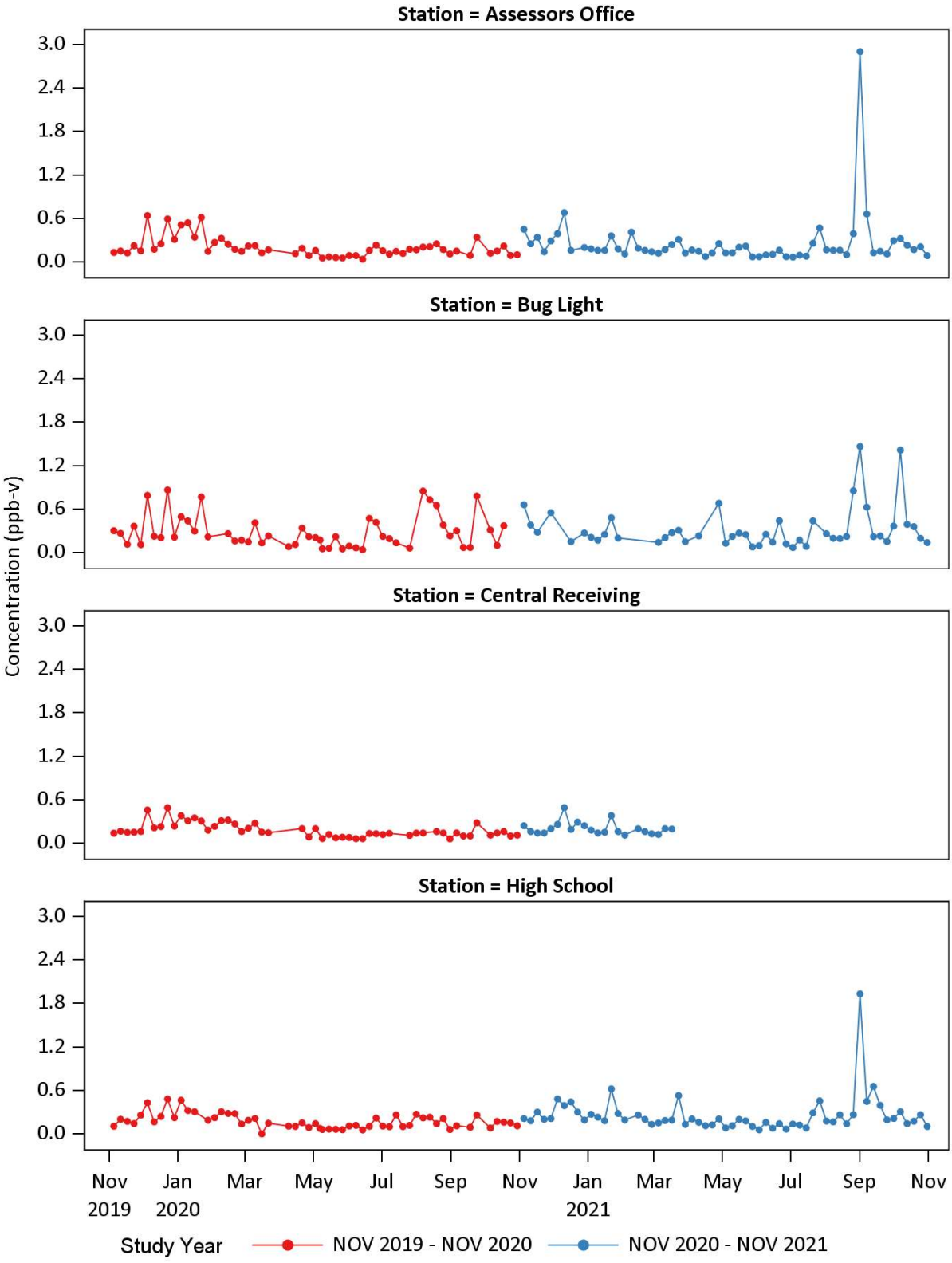

Figure 8 cont. Individual 24-hour sampling results by year for benzene

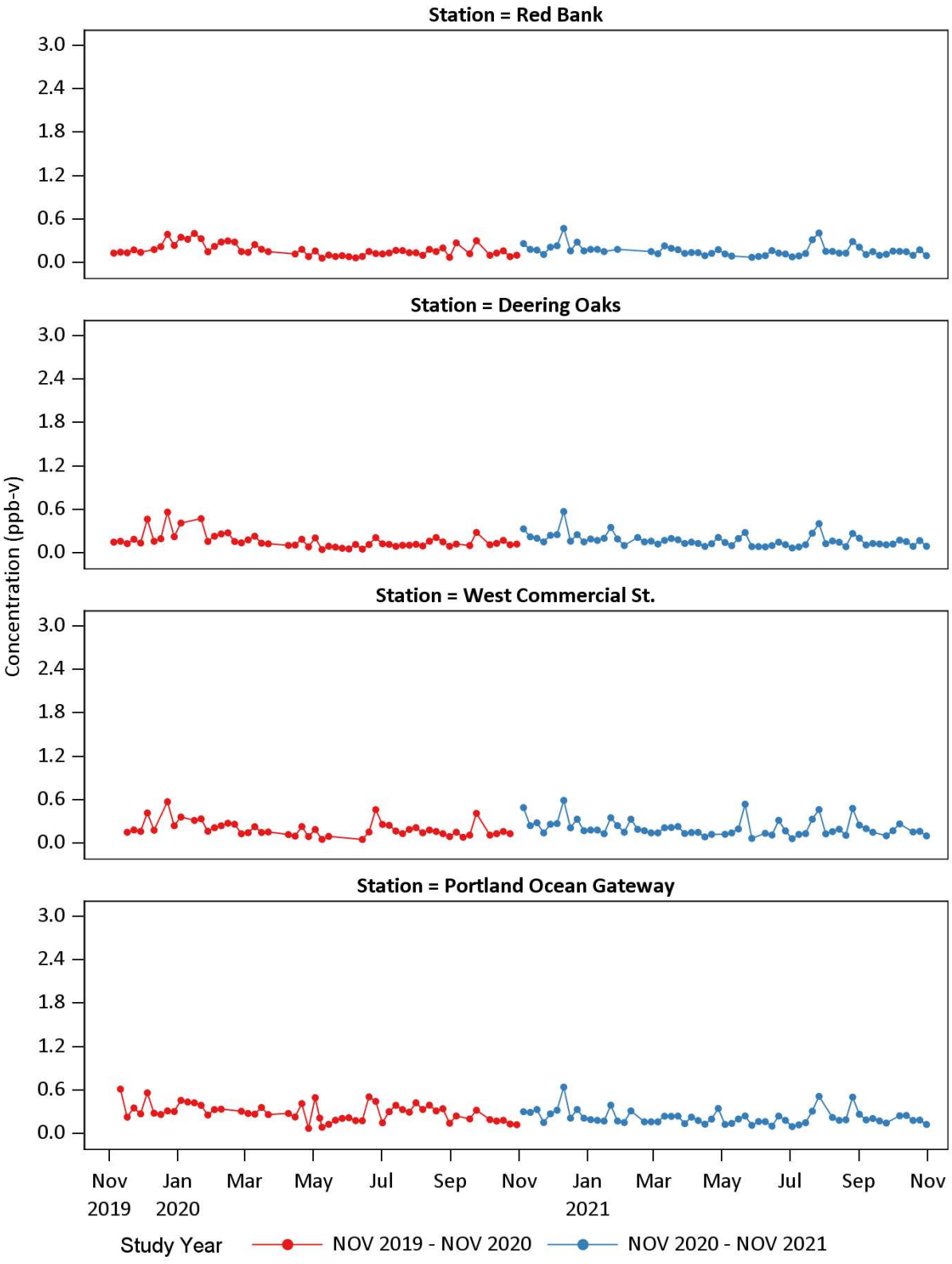

Figure 8 shows the individual 24-hour sample results in the first (red) and second (blue) full year of monitoring for benzene for each of the original 8 stations. 24-hour air samples are collected every 6 days. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Figure 9. Individual 24-hour sampling results by year for naphthalene

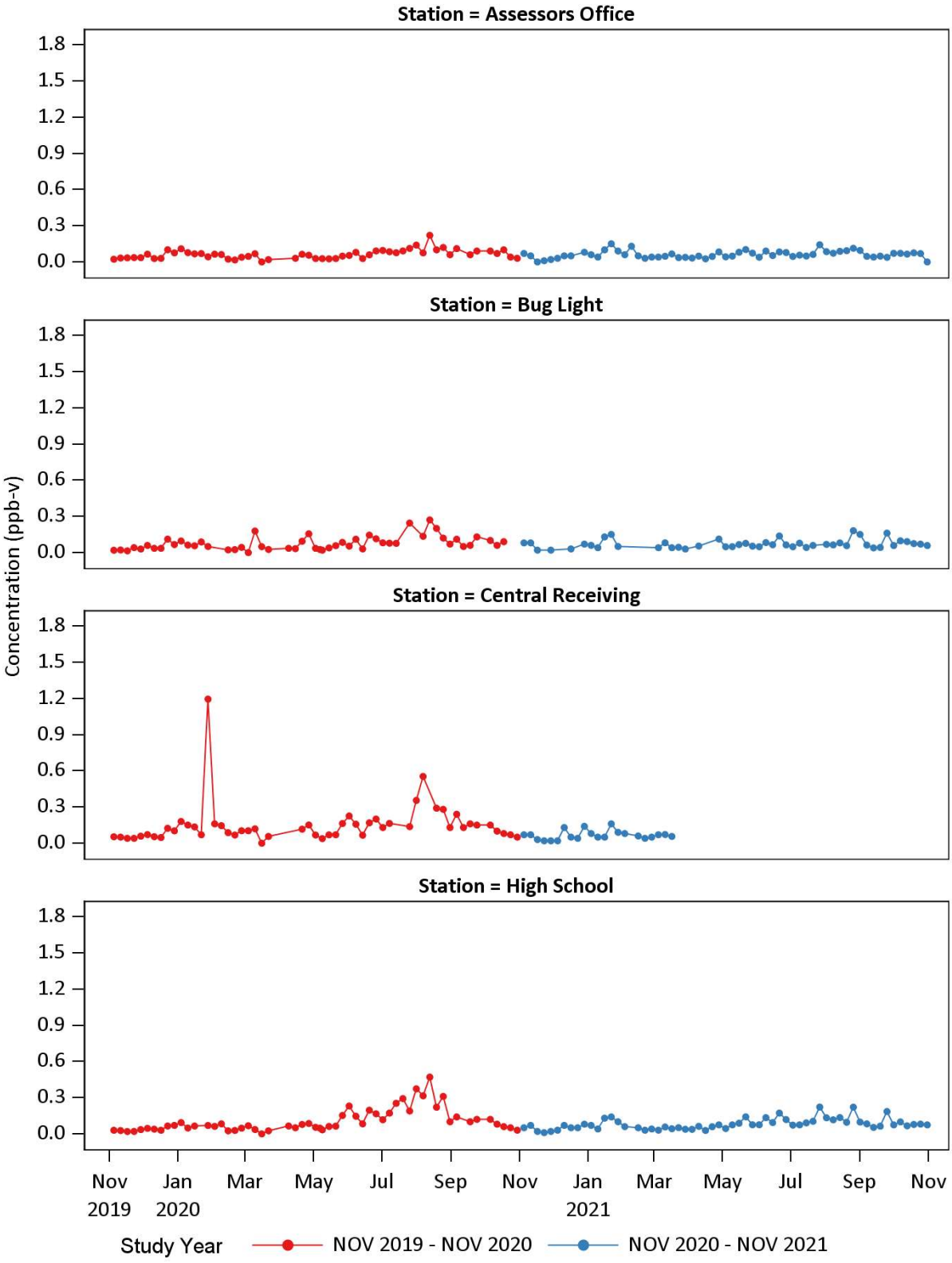

Figure 9 cont. Individual 24-hour sampling results by year for naphthalene

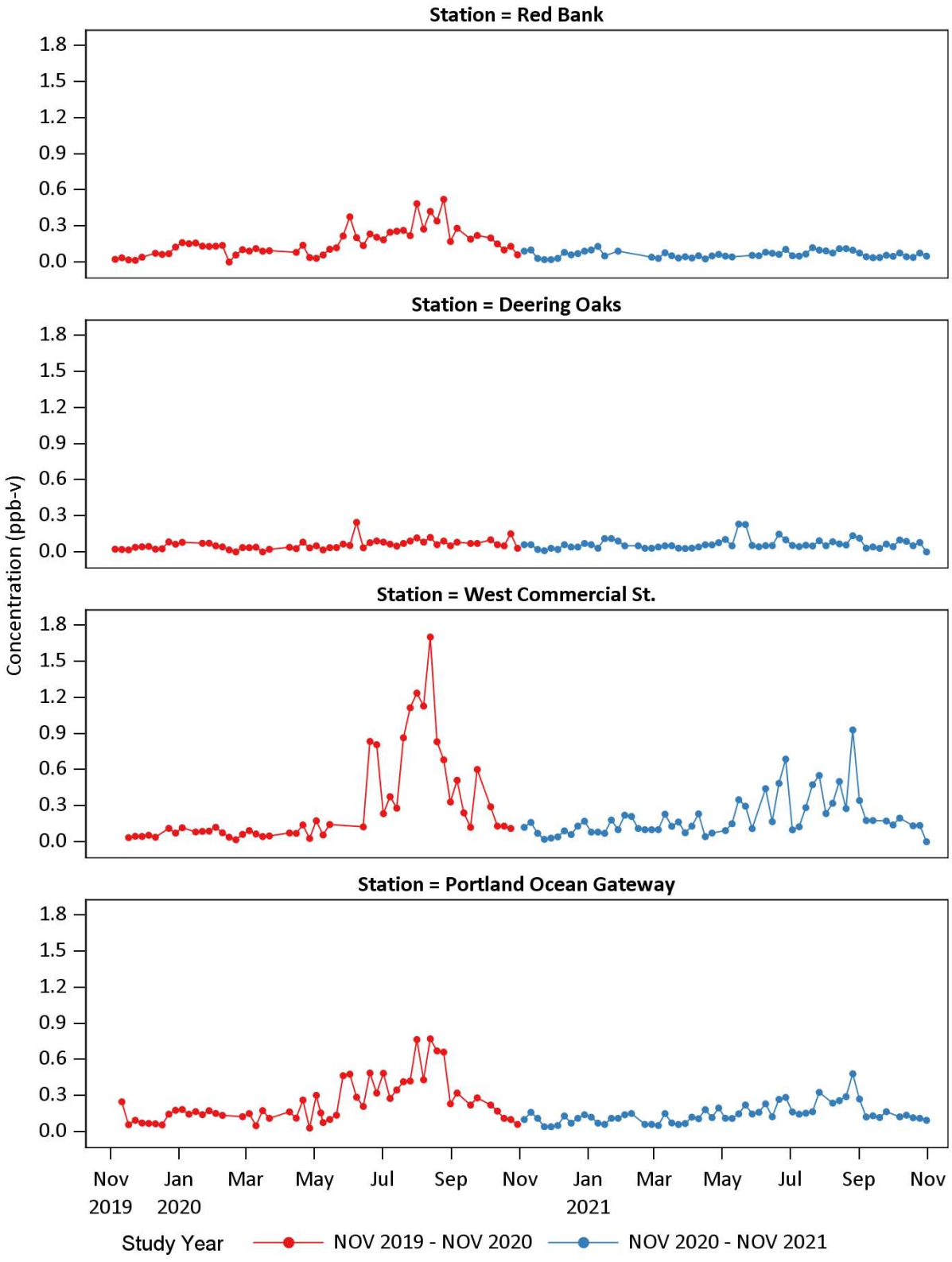

Figure 9 shows the individual 24-hour sample results in the first (red) and second (blue) full year of monitoring for naphthalene for each of the original 8 stations. 24-hour air samples are collected every 6 days. Sampling data obtained from Maine DEP. Central Receiving taken offline March 17, 2021; Mechanic Street (not included) brought online March 23, 2021.

Summary Figures

III. Summary figures for Mechanic Street station

Individual 24-hour sampling results with cumulative average trends

One year summary of Mechanic Street Station Sampling Results

Figure 10a. Individual 24-hour sampling results with cumulative average time trends for benzene, South Portland stations

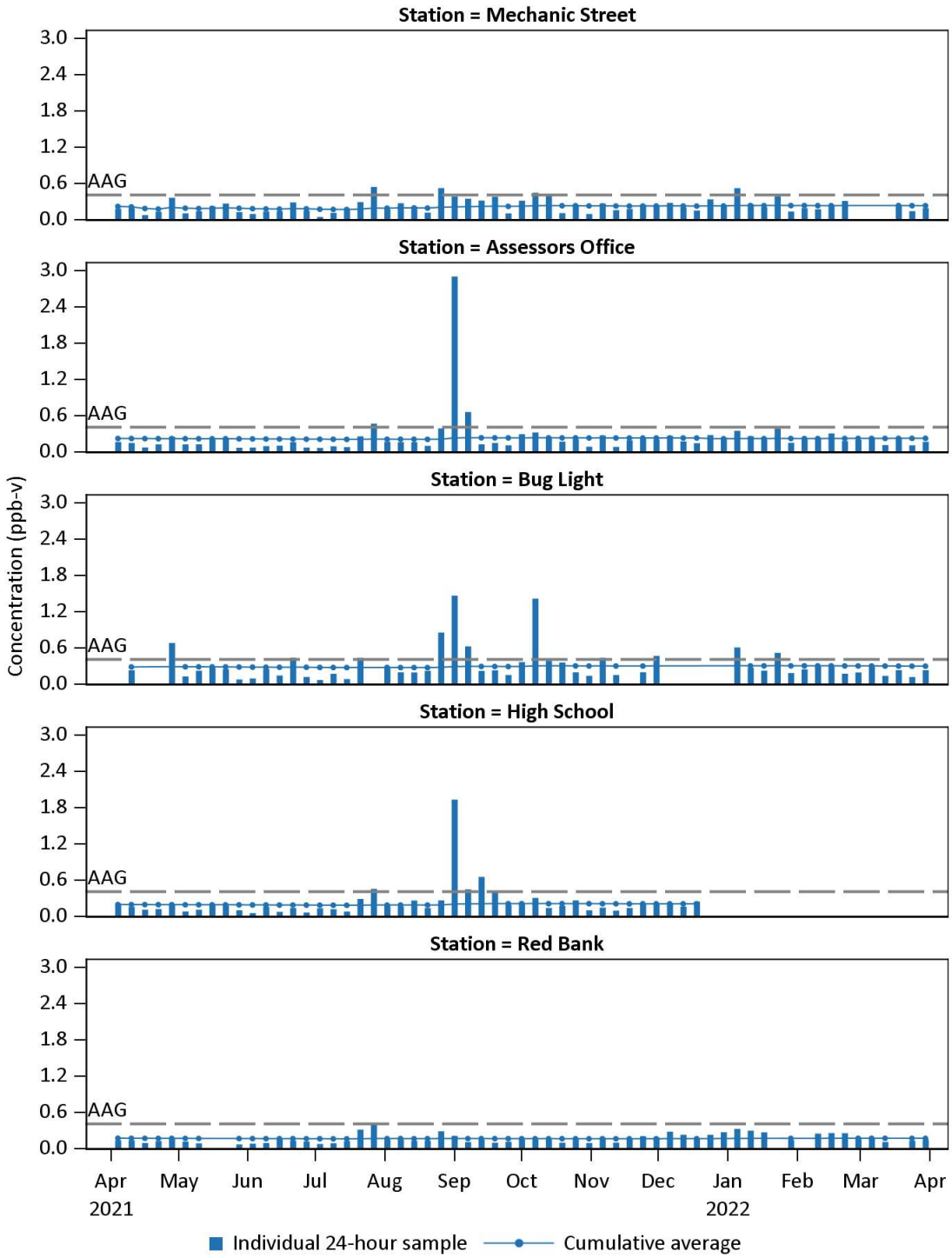

Figure 10a shows the individual 24-hour benzene results by date for the South Portland monitoring stations compared to Mechanic Street displayed as bars with the cumulative average displayed as a line with markers showing the average trend over time for the first year Mechanic Street station has been online (March 23, 2021 – March 30, 2022). 24-hour air samples are collected every 6 days. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Sampling data obtained from Maine DEP. Due to a leak in the sampler at the High School station in South Portland, data from December 24, 2021 onward was voided.

Figure 10b. Individual 24-hour sampling results with cumulative average time trends for benzene, Portland Stations

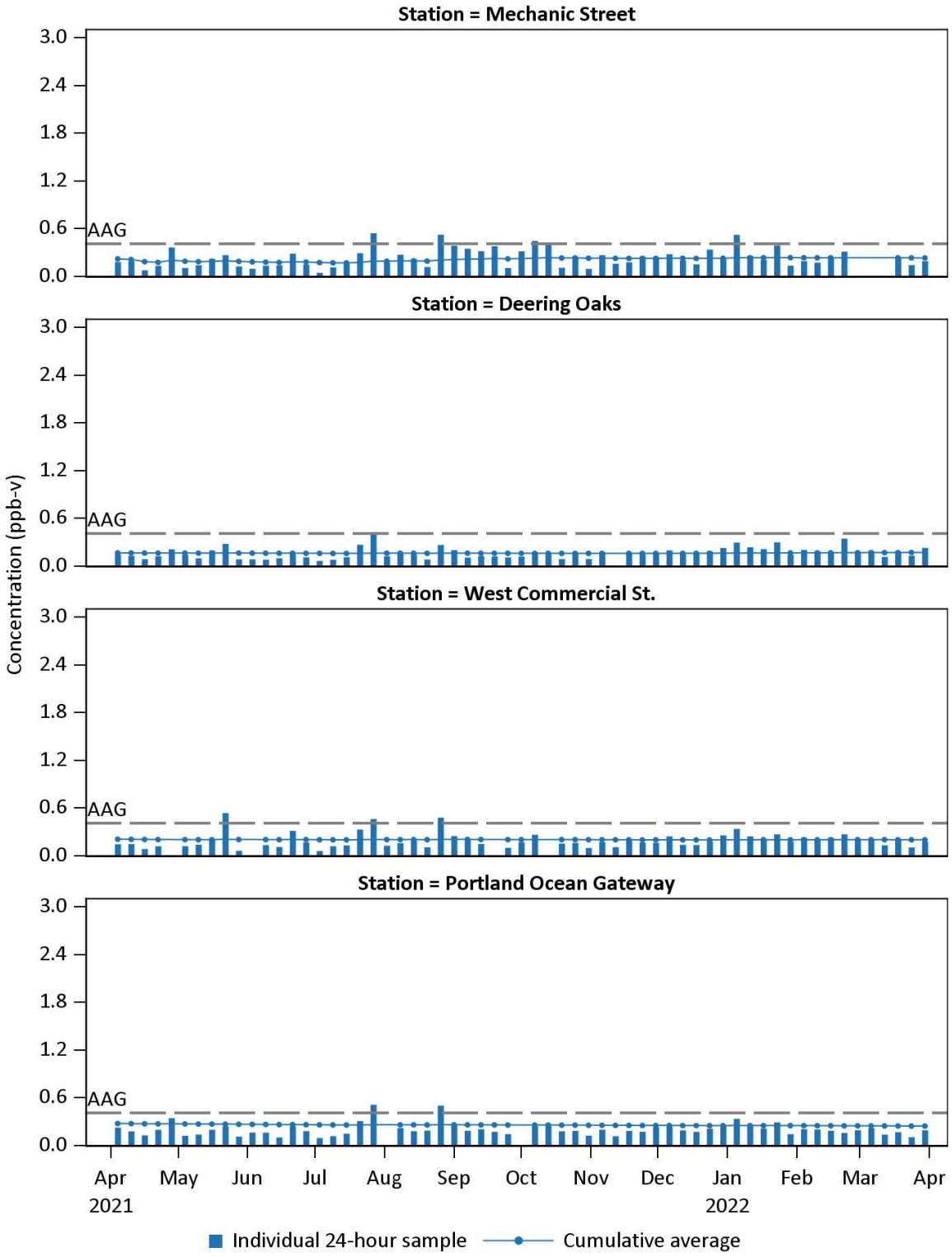

Figure 10b shows the individual 24-hour benzene results by date for the Portland monitoring stations compared to Mechanic Street displayed as bars with the cumulative average displayed as a line with markers showing the average trend over time for the first year Mechanic Street station has been online (March 23, 2021 – March 30, 2022). 24-hour air samples are collected every 6 days. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Sampling data obtained from Maine DEP.

Figure 11a. Individual 24-hour sampling results with cumulative average time trends for naphthalene, South Portland stations

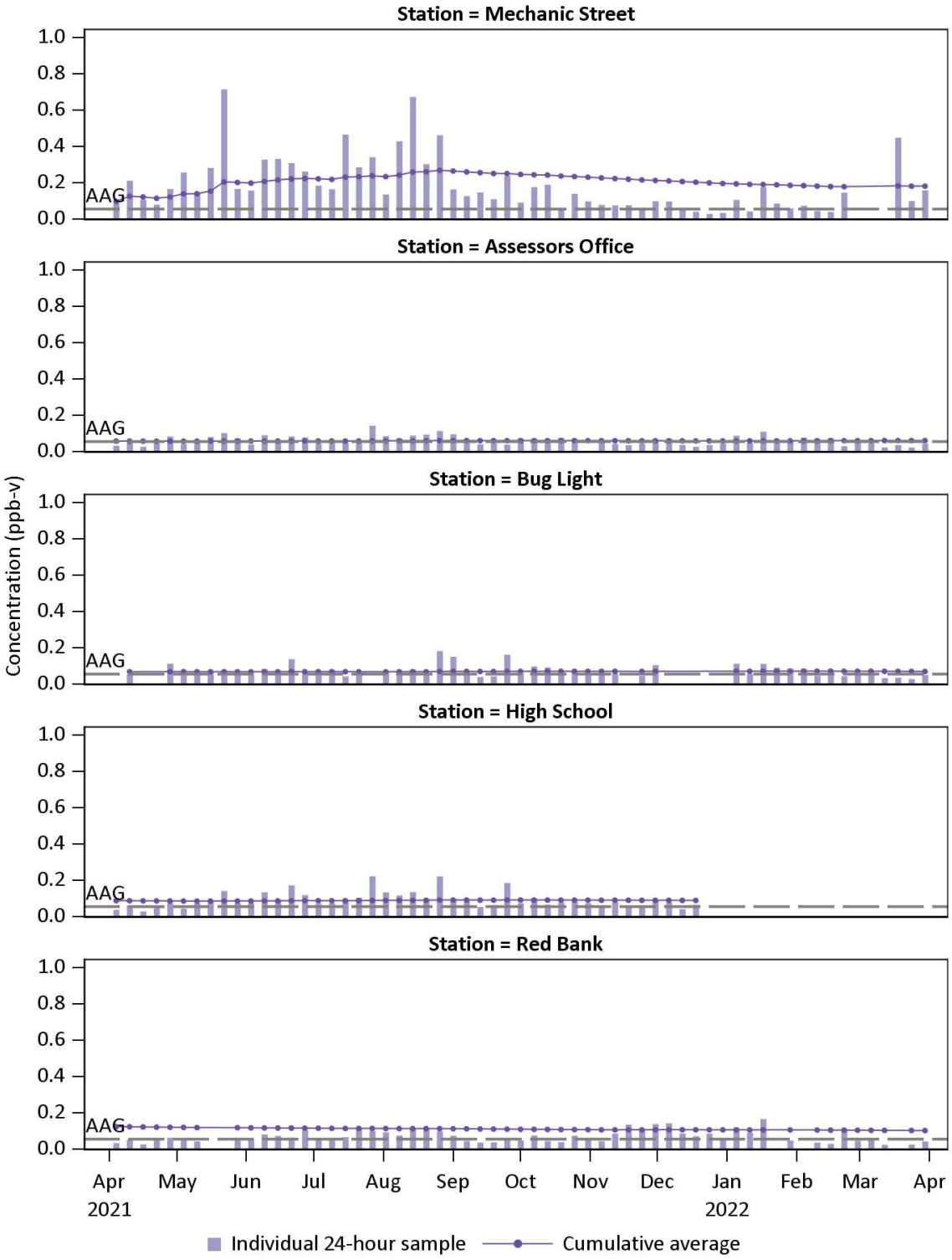

Figure 11a shows the individual 24-hour naphthalene results by date for the South Portland monitoring stations compared to Mechanic Street displayed as bars with the cumulative average displayed as a line with markers showing the average trend over time for the first year Mechanic Street station has been online (March 23, 2021 – March 30, 2022). 24-hour air samples are collected every 6 days. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Sampling data obtained from Maine DEP. Due to a leak in the sampler at the High School station in South Portland, data from December 24, 2021 onward was voided.

Figure 11b. Individual 24-hour sampling results with cumulative average time trends for naphthalene, Portland Stations

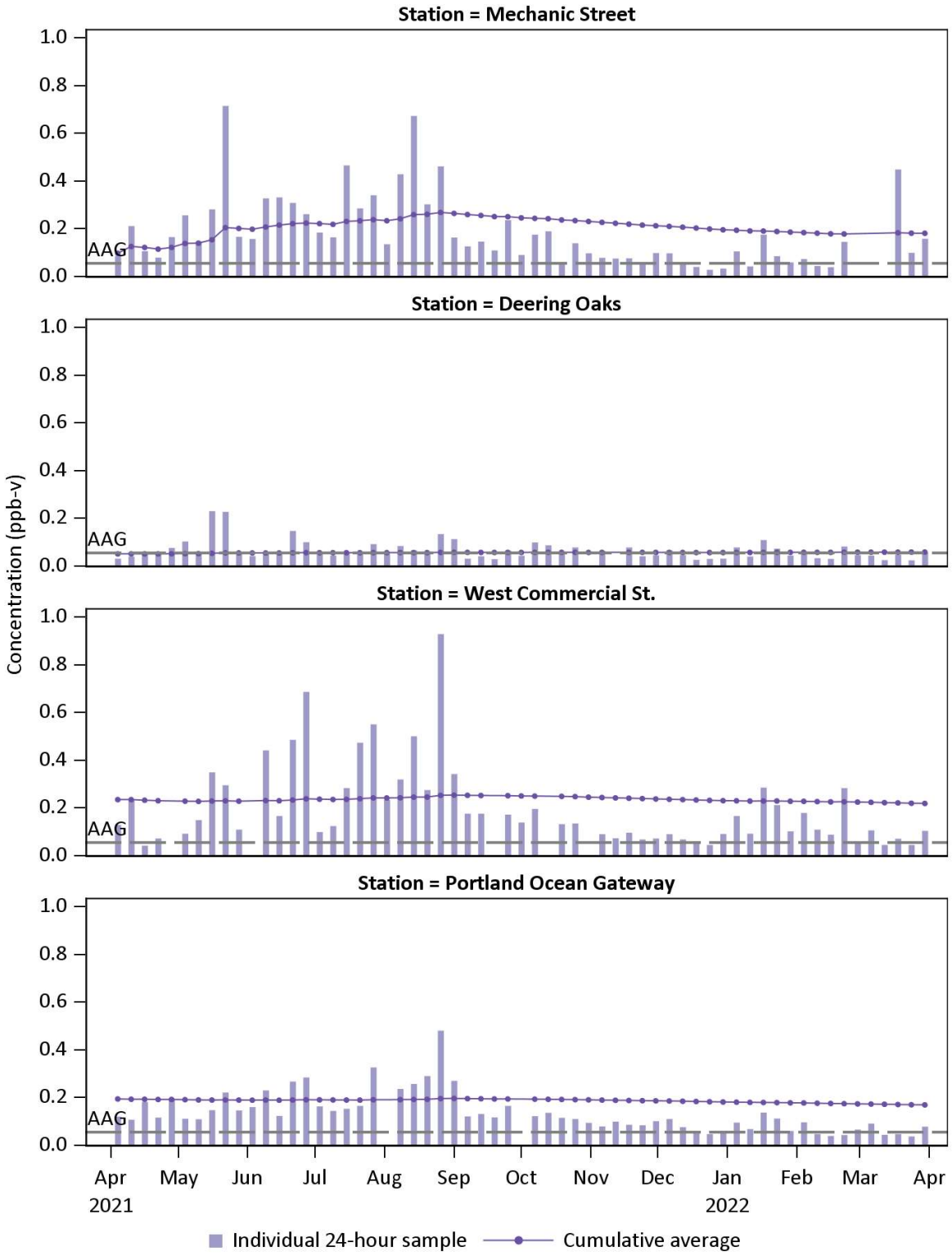

Figure 11b shows the individual 24-hour naphthalene results by date for the Portland monitoring stations compared to Mechanic Street displayed as bars with the cumulative average displayed as a line with markers showing the average trend over time for the first year Mechanic Street station has been online (March 23, 2021 – March 30, 2022). 24-hour air samples are collected every 6 days. AAG = State of Maine Ambient Air Guideline, which is an exposure level believed to be associated with a minimal risk of an adverse health effect from life-time exposure, even for sensitive members of the population. Sampling data obtained from Maine DEP.