Tonawanda Community Air Quality Study –
December 2016 Data Analyses Update Graphs

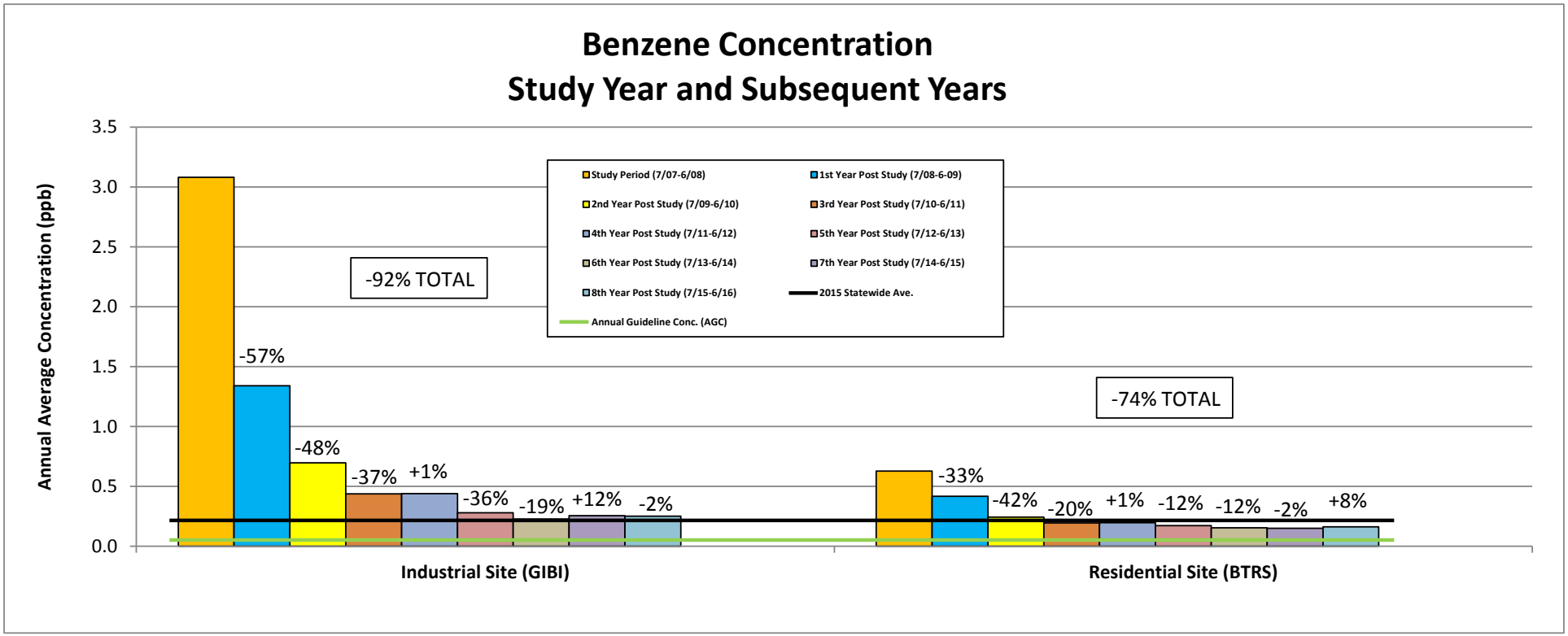
Data Analyses Updates for VOC and Carbonyl Data

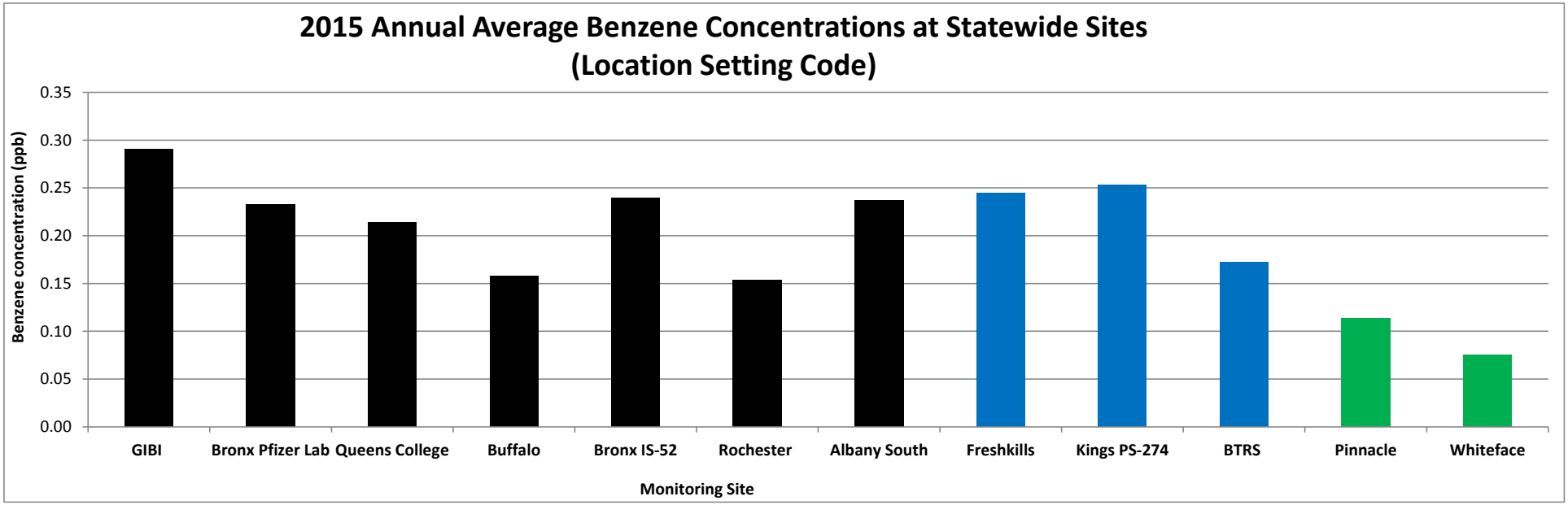
The following pages provide the updated data analyses for the Volatile Organic Compounds (VOCs) and carbonyls from the Study year (7/5/07 through 6/29/08) through the 8th year post-Study.

Five air contaminants with local emissions had measured average annual concentrations during the Study year above their respective New York State Department of Environmental Conservation (NYSDEC) Annual Guideline Concentrations (AGCs); three of the monitored VOCs (benzene, 1,3-butadiene, and acrolein) and two of the monitored carbonyls (formaldehyde and acetaldehyde). The updated VOC and carbonyl data analyses presented here include these five key contaminants. The ambient air concentrations and therefore exposure risks for these five contaminants all decreased from the Study year to the 8th year post-Study at the industrial (GIBI) monitor. However, only three of these five contaminants had ambient air concentrations that decreased from the Study year to the 8th year post-Study at the residential (BTRS) monitor (benzene, acrolein, and 1,3-butadiene). The other two contaminants (formaldehyde and acetaldehyde) had ambient air concentrations that increased from the Study year to the 8th year post-Study at the residential (BTRS) monitor. Field visits indicated a large increase in heavy duty diesel vehicle use in the area adjacent to the BTRS monitor as a result of the capping and closure of the Tonawanda Landfill and the construction of the North Youngmann Commerce Center. Analyses of local observed wind directions during this time period indicate that these construction activities, known to emit these two carbonyls (especially formaldehyde), are the source of the increased concentrations. The concentrations are expected to decrease with the cessation of construction activity in the area. The overall changes in both the ambient air concentrations and associated exposure risk estimates for all five of these contaminants at both monitoring locations are provided in the subsequent pages.

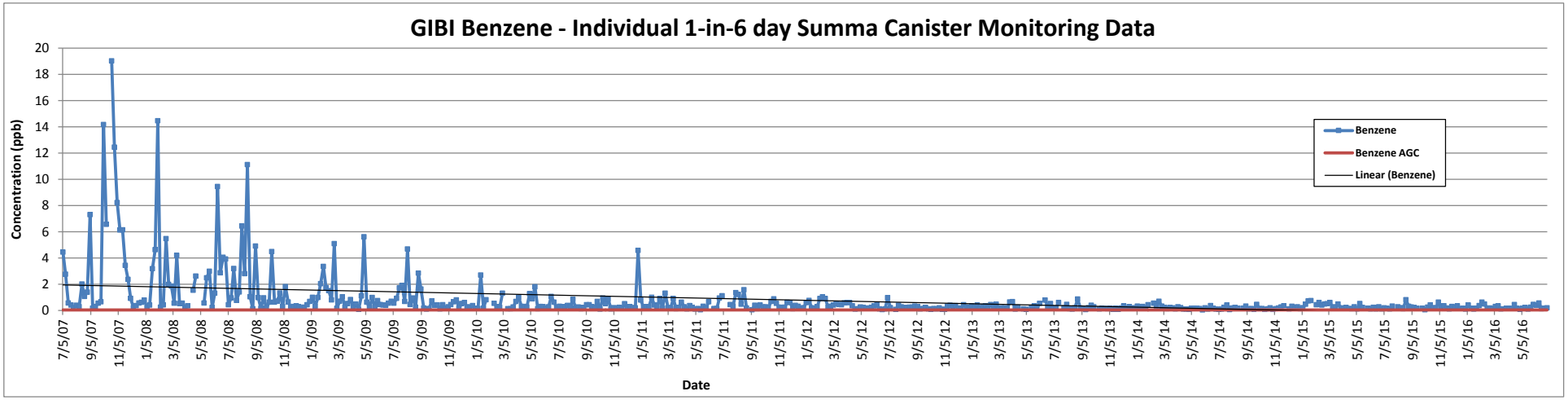
Observed reductions in the measured ambient air concentrations for many of these contaminants (benzene especially) were the result, in part, of operational modifications made by the Tonawanda Coke Corporation (TCC) in response to the NYSDEC's and the U.S. Environmental Protection Agency's (USEPA's) inspections of the facility and subsequent federal and state enforcement actions against TCC.

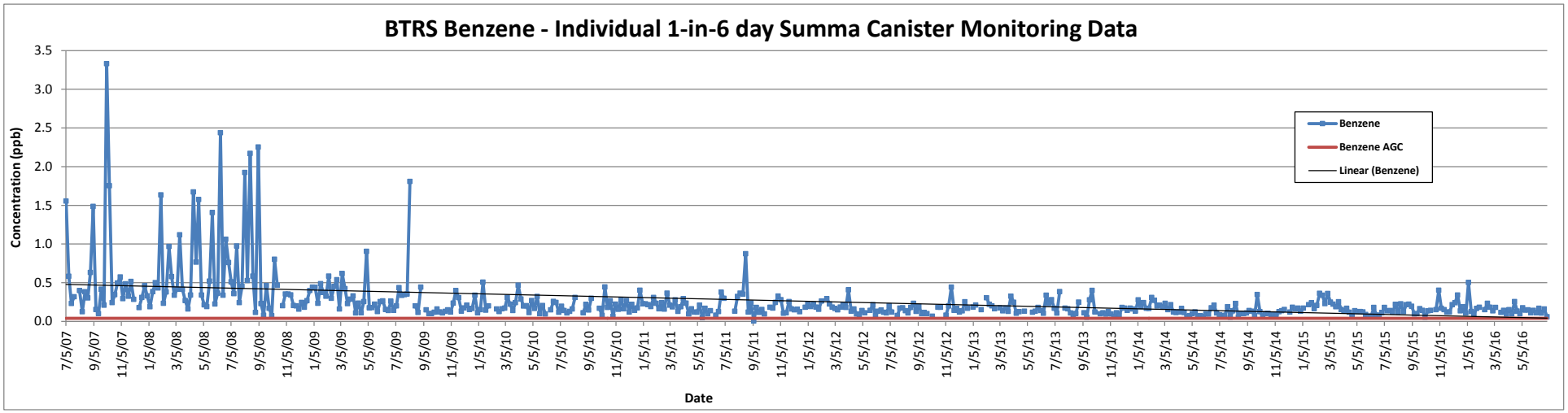
Volatile Organic Carbons (VOCs) Data Analyses Updates



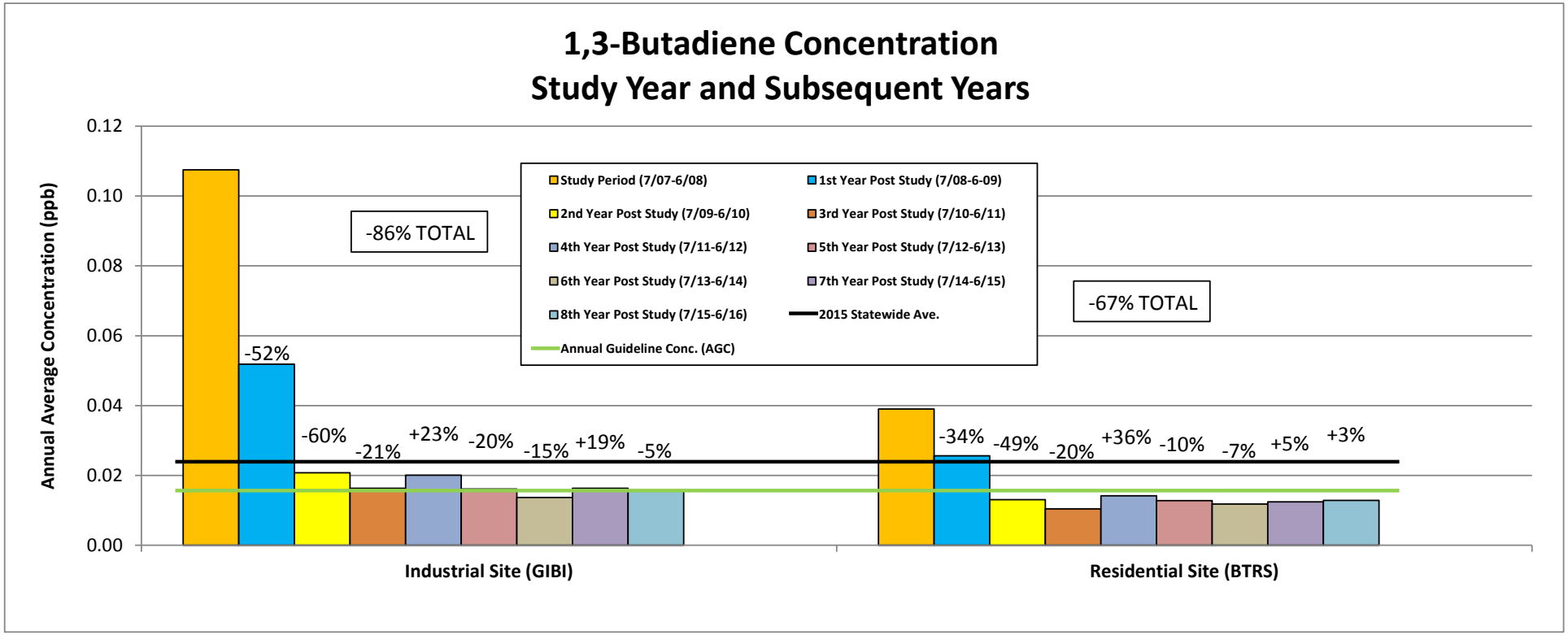


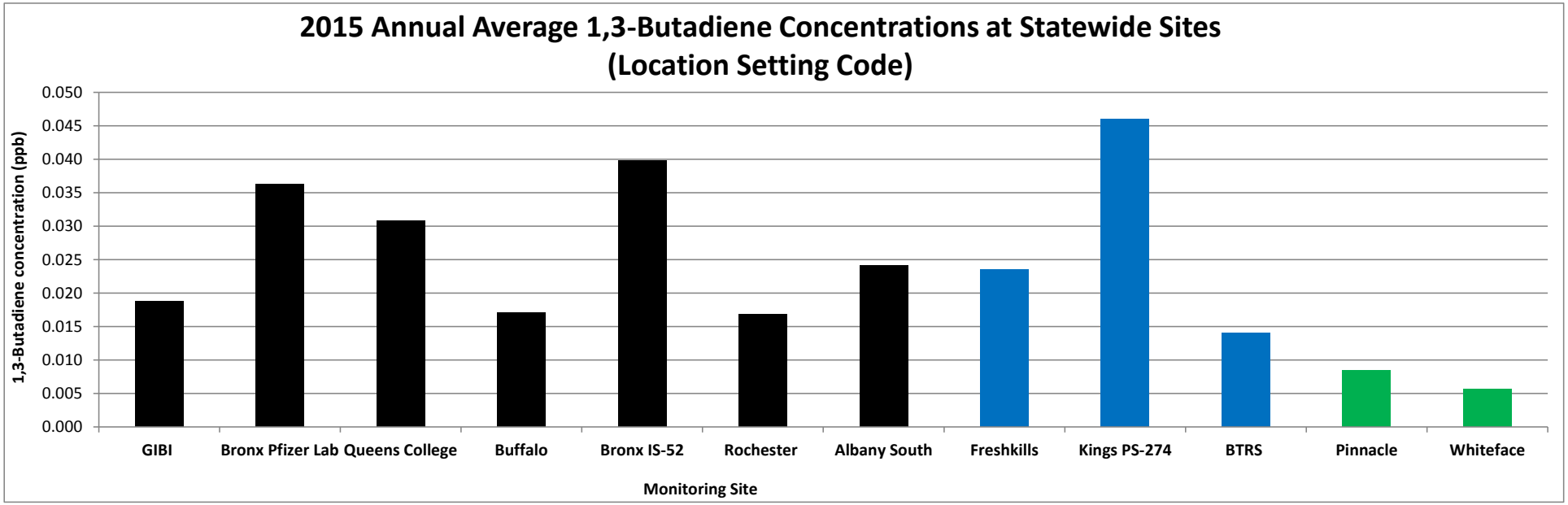
Note: The NYS monitoring sites are organized according to their location setting codes with the various colors representing the following: BLACK = URBAN, BLUE = SUBURBAN, and GREEN = RURAL.



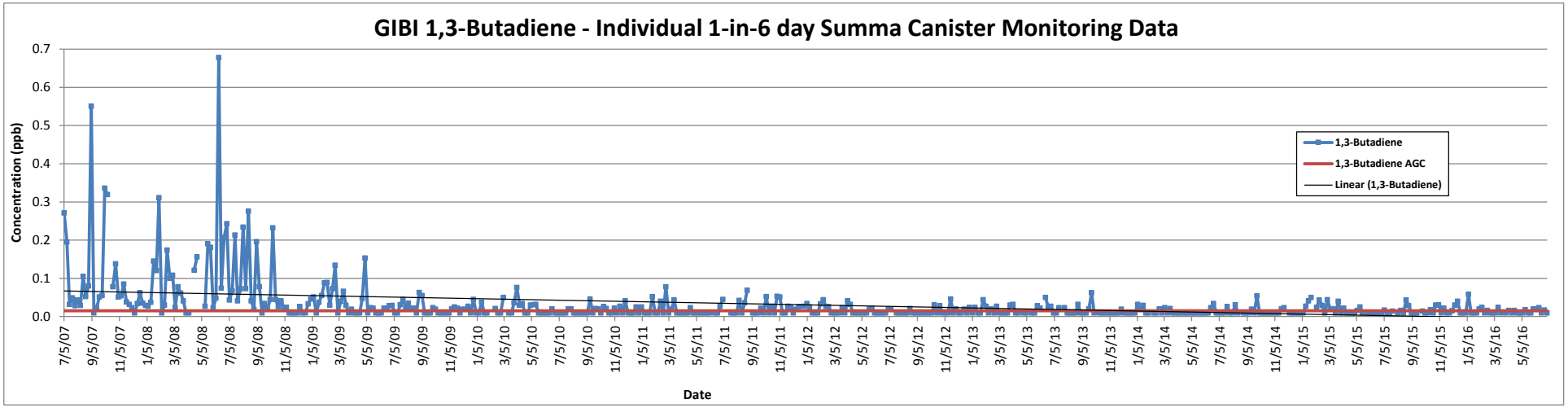


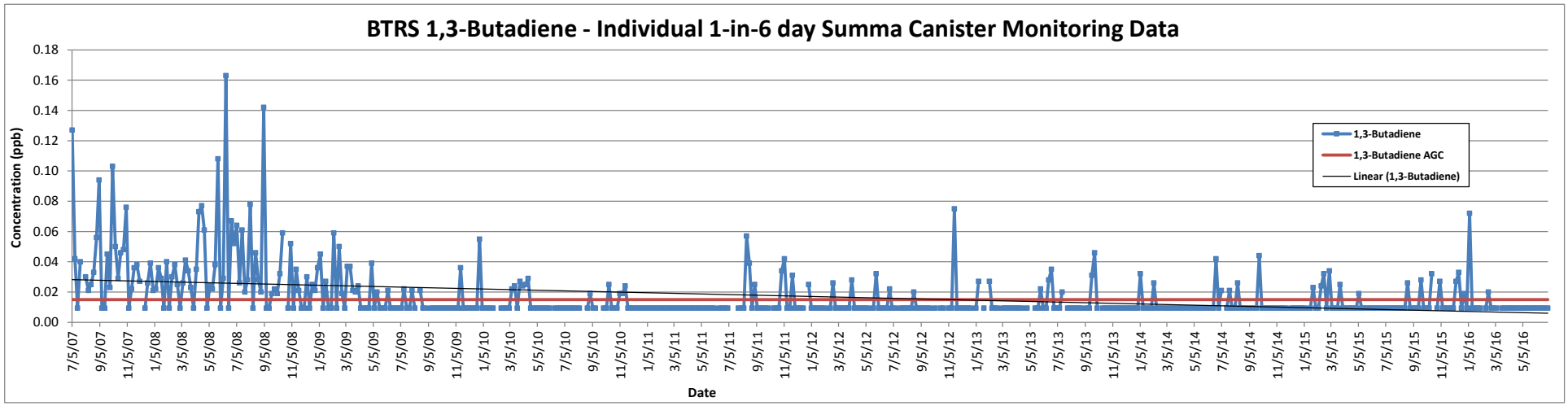
Note: The black lines are the overall average linear trendlines. AGC = Annual Guideline Concentration.


1,3-Butadiene Concentration
Study Year and Subsequent Years
Annual Average Concentration (ppb)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Study Period (7/07-6/08)
1st Year Post Study (7/08-6-09)
2nd Year Post Study (7/09-6/10)
3rd Year Post Study (7/10-6/11)
4th Year Post Study (7/11-6/12)
5th Year Post Study (7/12-6/13)
6th Year Post Study (7/13-6/14)
7th Year Post Study (7/14-6/15)
8th Year Post Study (7/15-6/16)
2015 Statewide Ave.
Annual Guideline Conc. (AGC)
-86% TOTAL
-67% TOTAL
-52%
-60%
-21%
+23%
-20%
-15%
+19%
-5%
-34%
-49%
-20%
+36%
-10%
-7%
+5%
+3%
Industrial Site (GIBI)
Residential Site (BTRS)

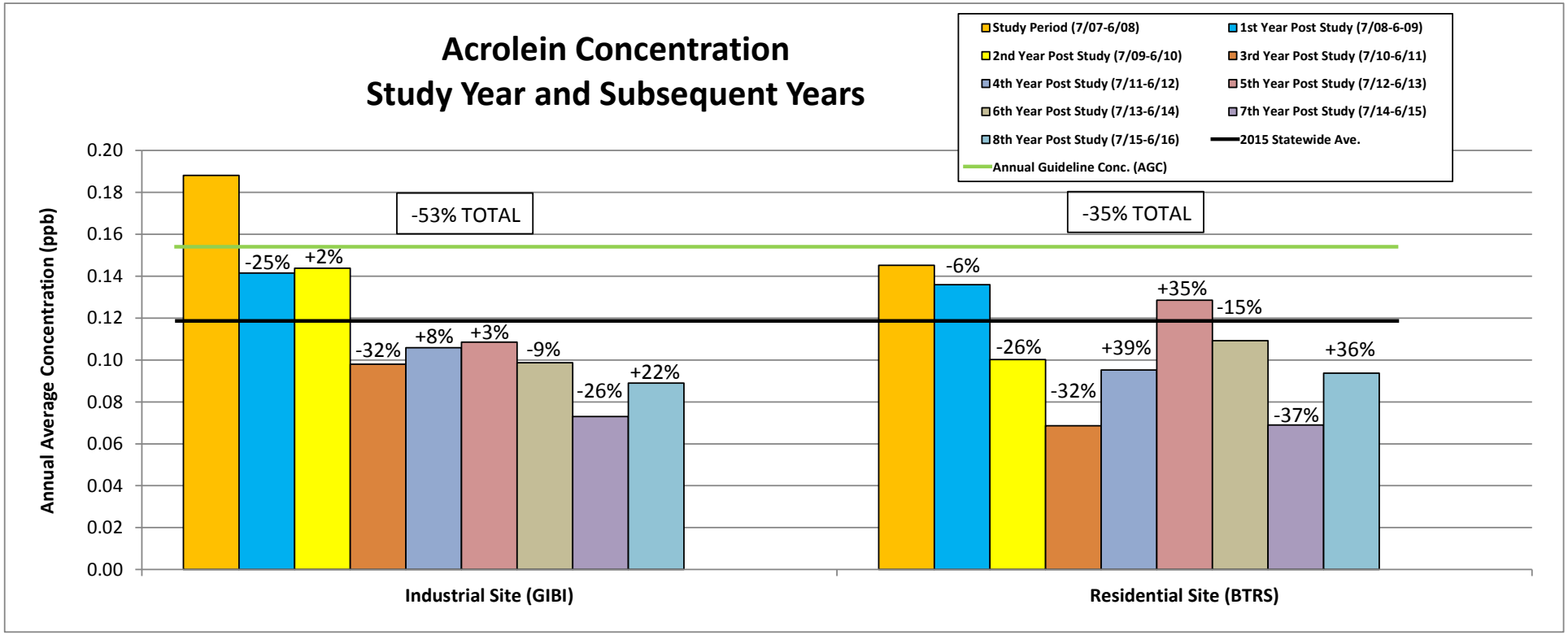


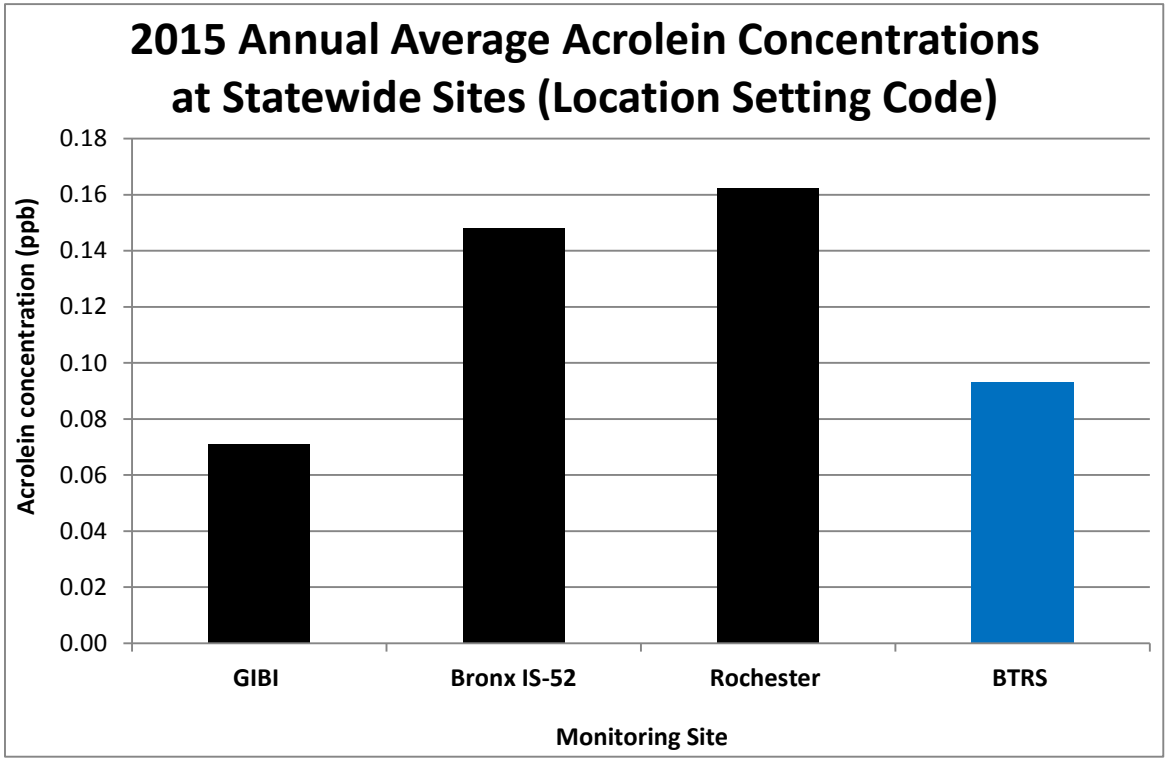
Note: The NYS monitoring sites are organized according to their location setting codes with the various colors representing the following: BLACK = URBAN, BLUE = SUBURBAN, and GREEN = RURAL.



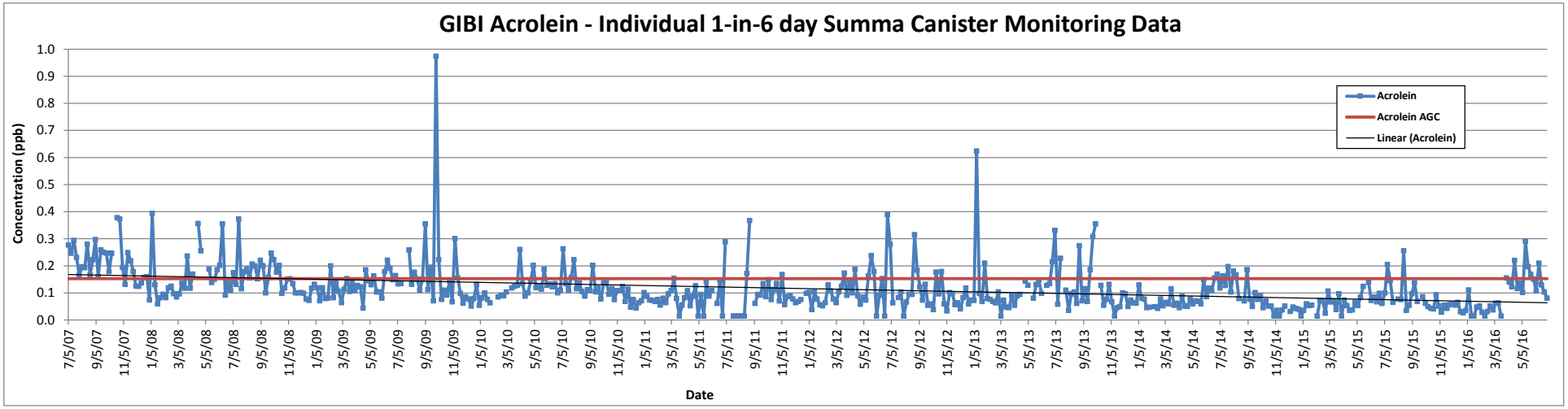


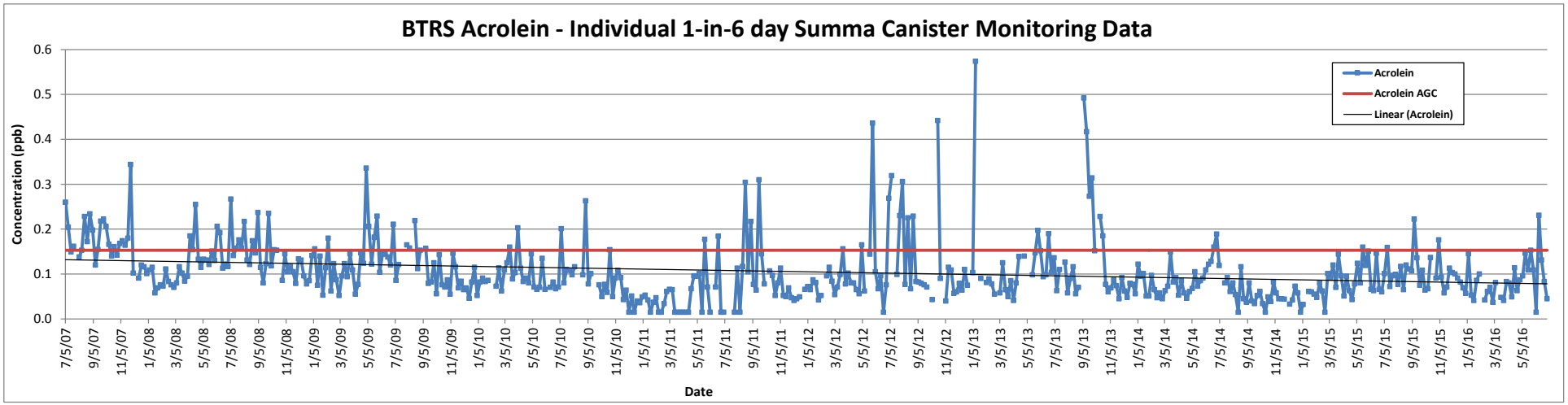
Note: The black lines are the overall average linear trendlines. AGC = Annual Guideline Concentration.


Acrolein Concentration
Study Year and Subsequent Years
Study Period (7/07-6/08)
1st Year Post Study (7/08-6-09)
2nd Year Post Study (7/09-6/10)
3rd Year Post Study (7/10-6/11)
4th Year Post Study (7/11-6/12)
5th Year Post Study (7/12-6/13)
6th Year Post Study (7/13-6/14)
7th Year Post Study (7/14-6/15)
8th Year Post Study (7/15-6/16)
2015 Statewide Ave.
Annual Guideline Conc. (AGC)
Annual Average Concentration (ppb)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
-53% TOTAL
-25%
+2%
-32%
+8%
+3%
-9%
-26%
+22%
-35% TOTAL
-6%
-26%
-32%
+39%
+35%
-15%
-37%
+36%
Industrial Site (GIBI)
Residential Site (BTRS)



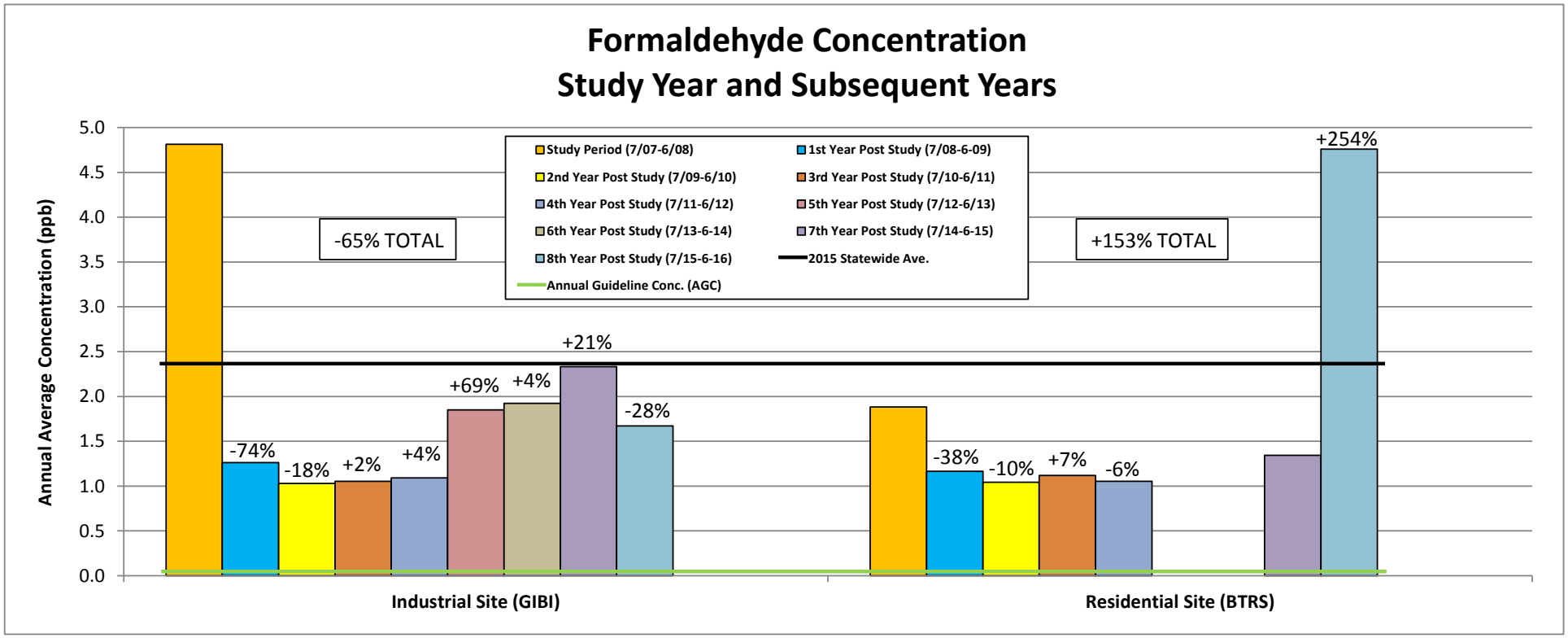
Note: The NYS monitoring sites are organized according to their location setting codes with the various colors representing the following: BLACK = URBAN and BLUE = SUBURBAN.



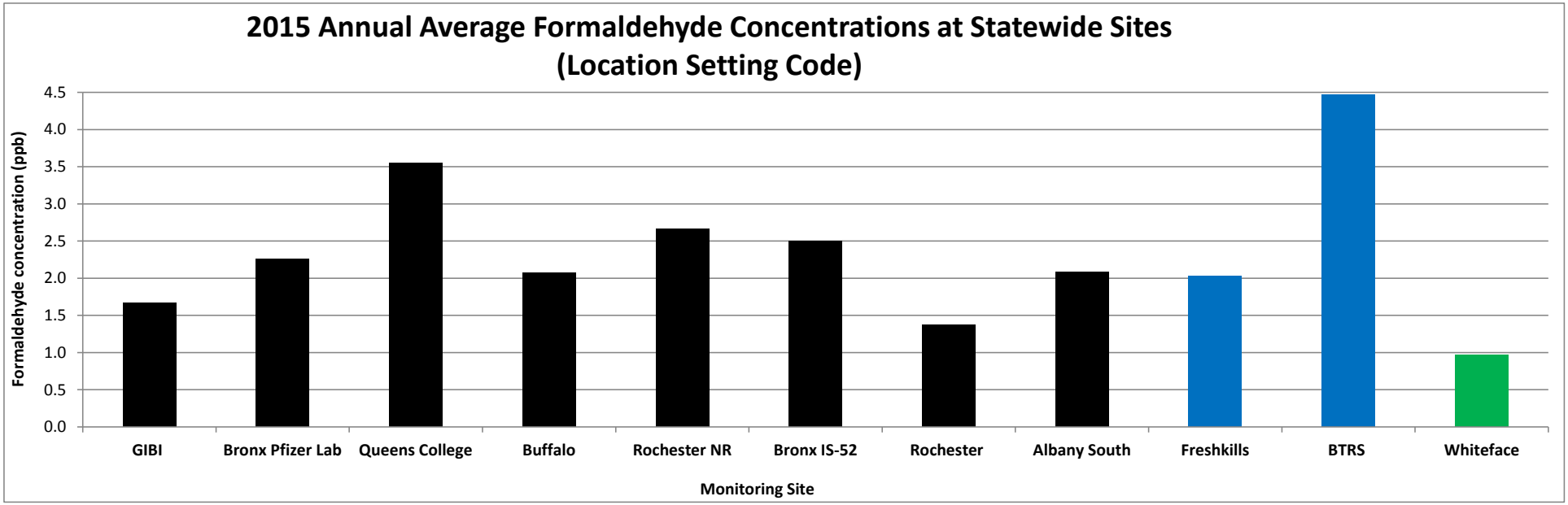


Note: The black lines are the overall average linear trendlines. AGC = Annual Guideline Concentration.

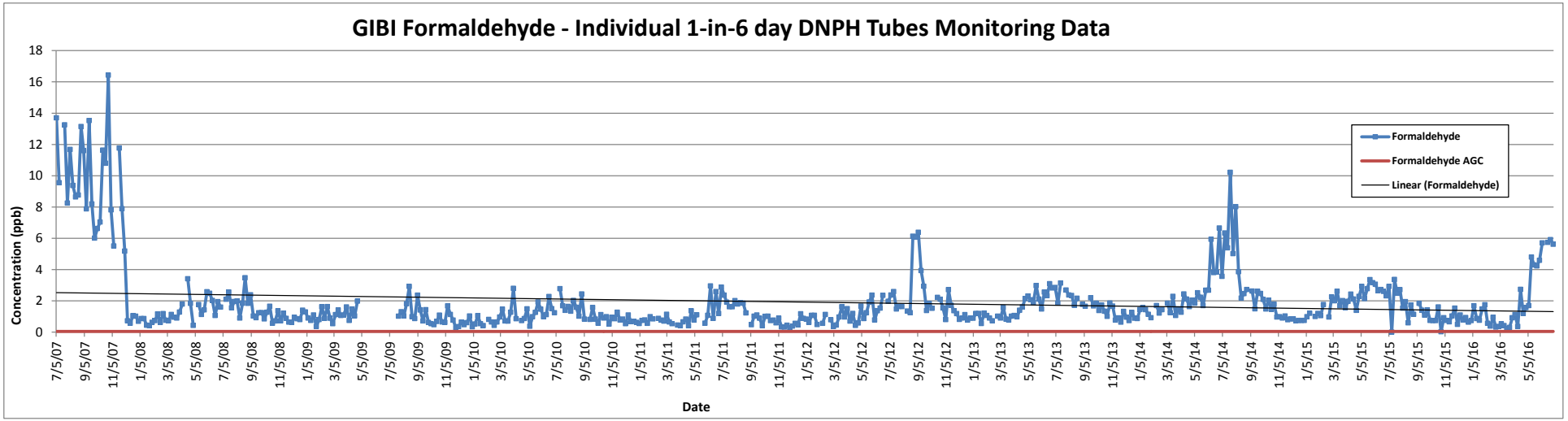
Carbonyls Data Analyses Updates

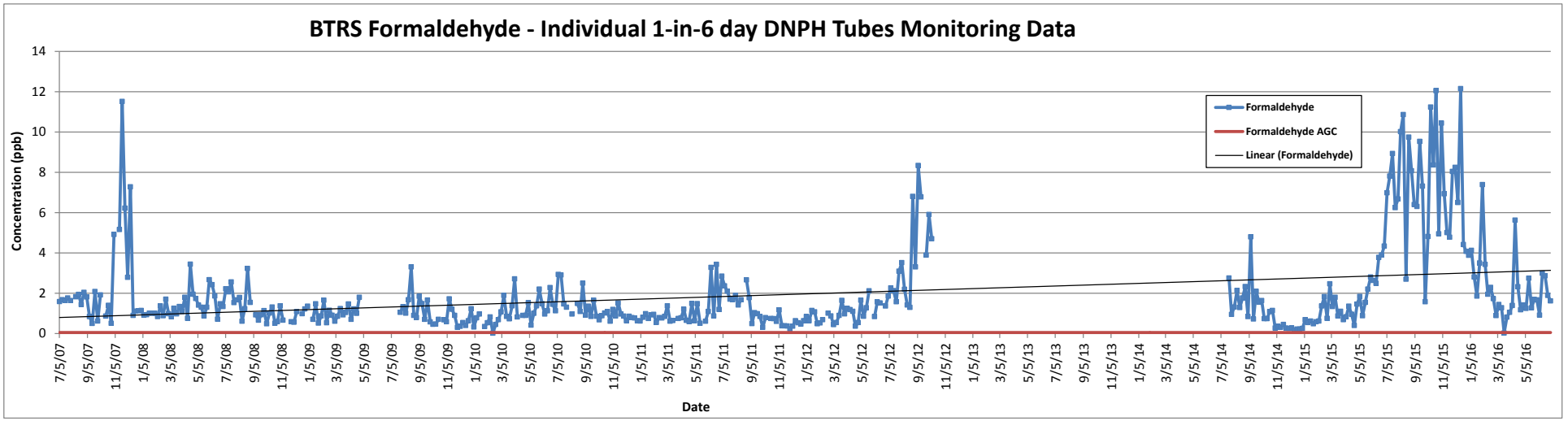


Note: The measurement gap at BTRS is due to those data being invalidated.

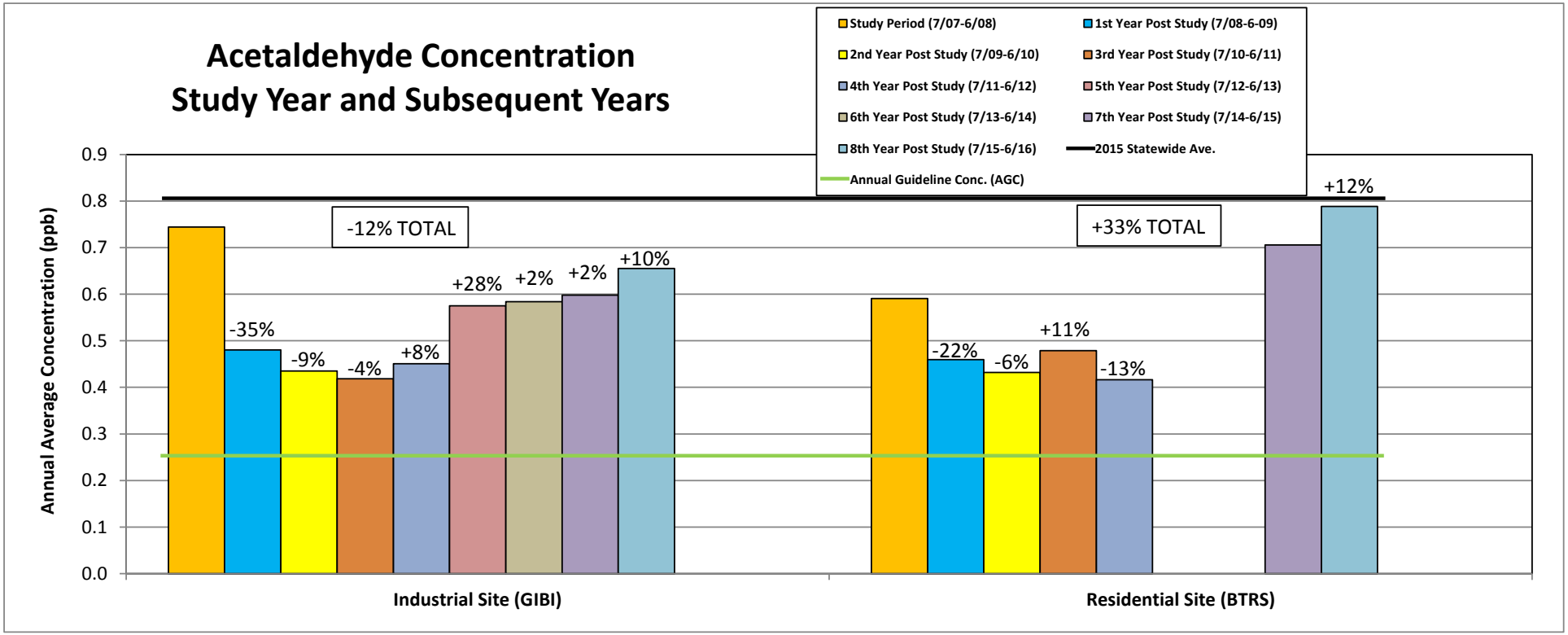


Note: The NYS monitoring sites are organized according to their location setting codes with the various colors representing the following: BLACK = URBAN, BLUE = SUBURBAN, and GREEN = RURAL.

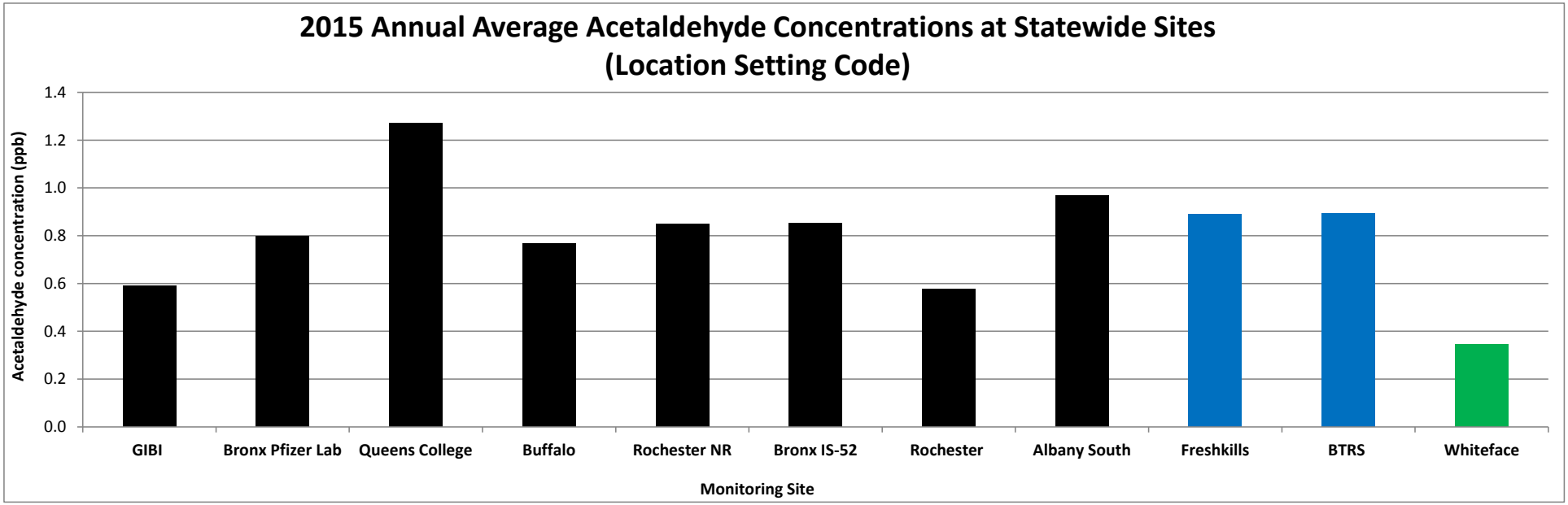




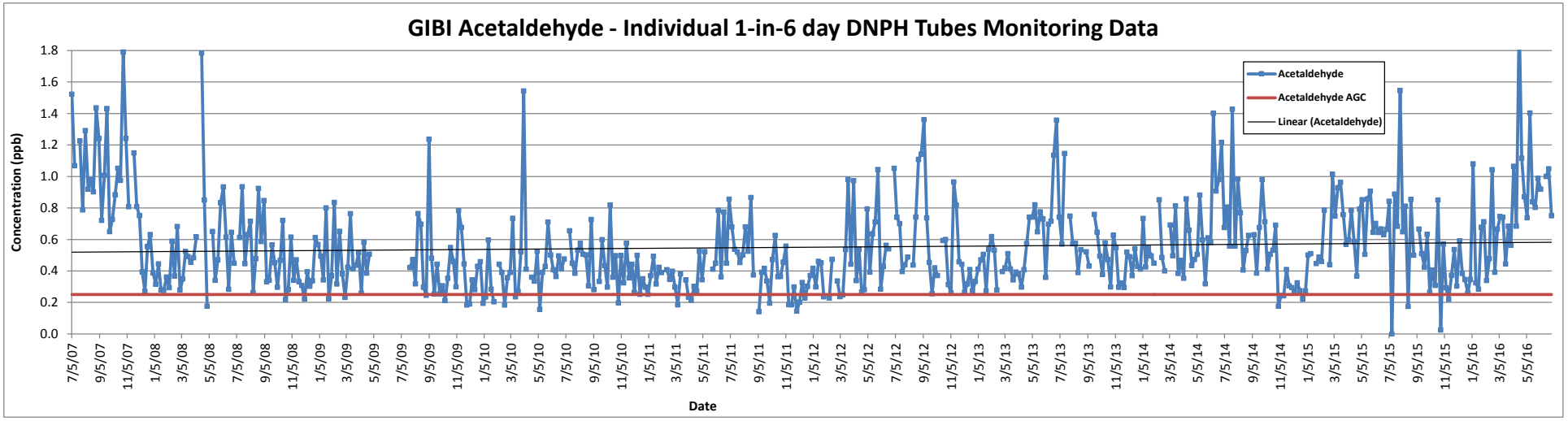
Note: The black lines are the overall average linear trendlines. AGC = Annual Guideline Concentration. The measurement gap at BTRS is due to those data being invalidated.

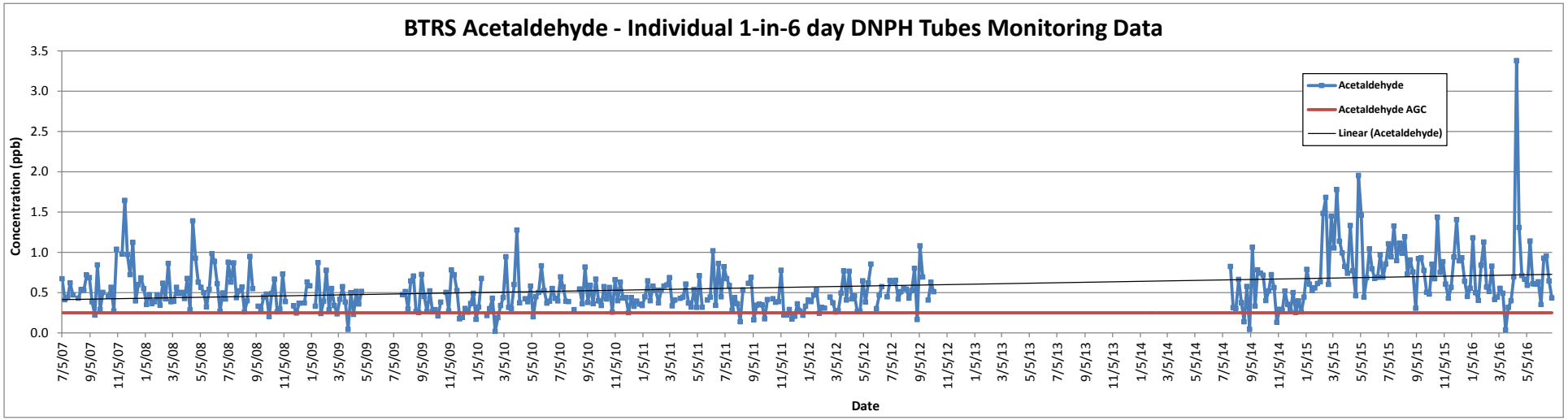


Note: The measurement gap at BTRS is due to those data being invalidated.



Note: The NYS monitoring sites are organized according to their location setting codes with the various colors representing the following: BLACK = URBAN, BLUE = SUBURBAN, and GREEN = RURAL.





Note: The black lines are the overall average linear trendlines. AGC = Annual Guideline Concentration. The measurement gap at BTRS is due to those data being invalidated.

Risk Reductions from the Study Year (7/5/07-6/29/08) to the 8TH Year Post-Study (7/2/11-6/26/12)

- **Cancer**
  - Benzene
    - GIBI (Industrial Site): from 75 to 6.3 in a million
    - BTRS (Residential Site): from 15 to 4.1 in a million
  - Formaldehyde
    - GIBI (Industrial Site): from 98 to 33 in a million
    - BTRS (Residential Site): from 38 to 95 in a million
  - Acetaldehyde
    - GIBI (Industrial Site): from 2.9 to 2.6 in a million
    - BTRS (Residential Site): from 2.4 to 3.2 in a million
  - 1,3-Butadiene
    - GIBI (Industrial Site): from 7.3 to 1.0 in a million
    - BTRS (Residential Site): from 2.7 to 0.9 in a million

- **Non-Cancer**
  - Acrolein
    - GIBI (Industrial Site): Hazard Quotient from 1.2 to 0.6
    - BTRS (Residential Site): Hazard Quotient from 0.9 to 0.6

Note: The Annual Guideline Concentration (AGC) for acrolein has been revised since the original Study. The new AGC was used herein to estimate the non-cancer acrolein exposure risk both for the most recent 8th year post-Study and for the Study year (which originally was reported after using the previous AGC value to calculate the risk). Therefore, the original exposure risk reported for acrolein for the Study year was a different value. The formaldehyde and acetaldehyde ambient air concentration increases at the residential (BTRS) monitor were likely due to increased use of heavy duty diesel vehicle use in the area adjacent to the BTRS monitor as a result of the capping and closure of the Tonawanda Landfill and the construction of the North Youngmann Commerce Center.

Hazard Quotient - The ratio of the potential exposure to the substance and the level at which no adverse effects are expected. If the HQ is calculated to be equal to or less than 1, then no adverse health effects are expected as a result of exposure. If the HQ is greater than 1, then adverse health effects are possible. The HQ cannot be translated to a probability that adverse health effects will occur and it is unlikely to be proportional to risk. It is especially important to note that an HQ exceeding 1 does not necessarily mean that adverse effects will occur.