



***Bay Area Air Quality Management District
(BAAQMD) Odor Attribution Study for
Three Facility Sources (RFP# 1029-004)***

South Bay Stakeholders Meeting
July 15, 2021



MONTROSE
ENVIRONMENTAL

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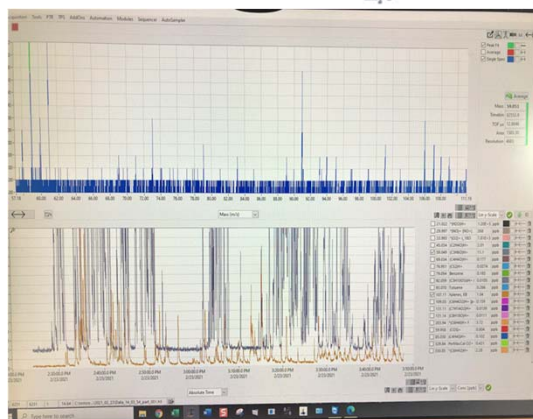
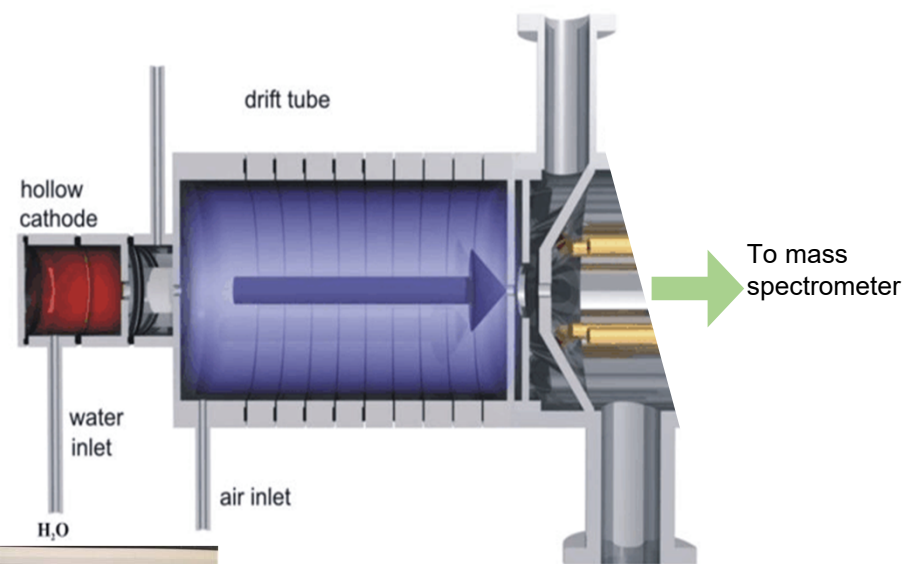


Proton Transfer Reaction Time of Flight Mass Spectrometry for Odor Analysis



Proton Transfer Reaction Time of Flight Mass Spectrometry Mobile Platform (PTR-TOF MS)

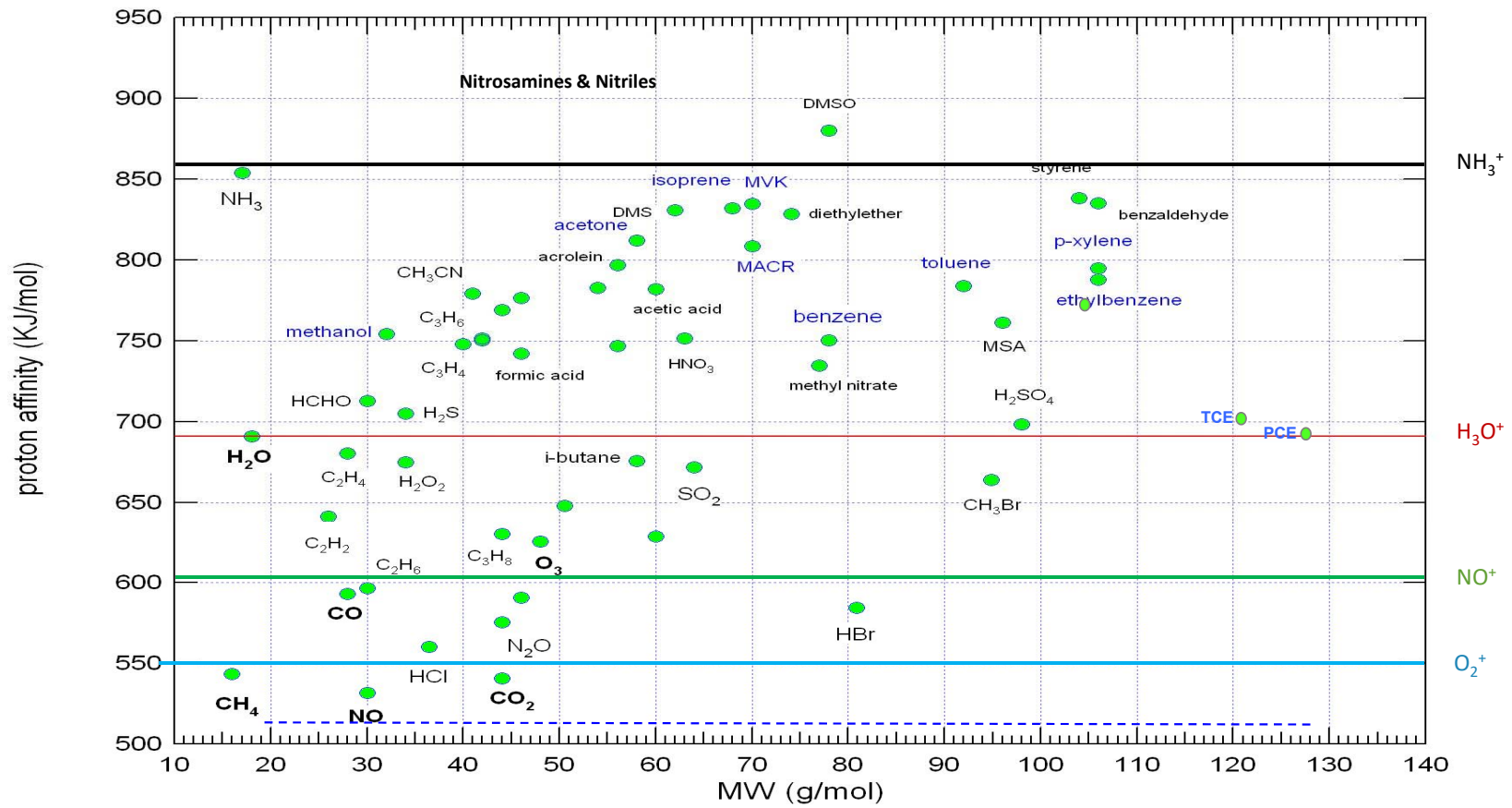
- Proton Transfer Reaction Mass Spectrometry for Real Time VOCs and Inorganics
- Weather Station & GPS
- Real Time 3-D Concentration vs Location Profiling



Typical Reagent Gases:



Speciation with Selective Ionization Reagents



Anything above the green line with NO^+

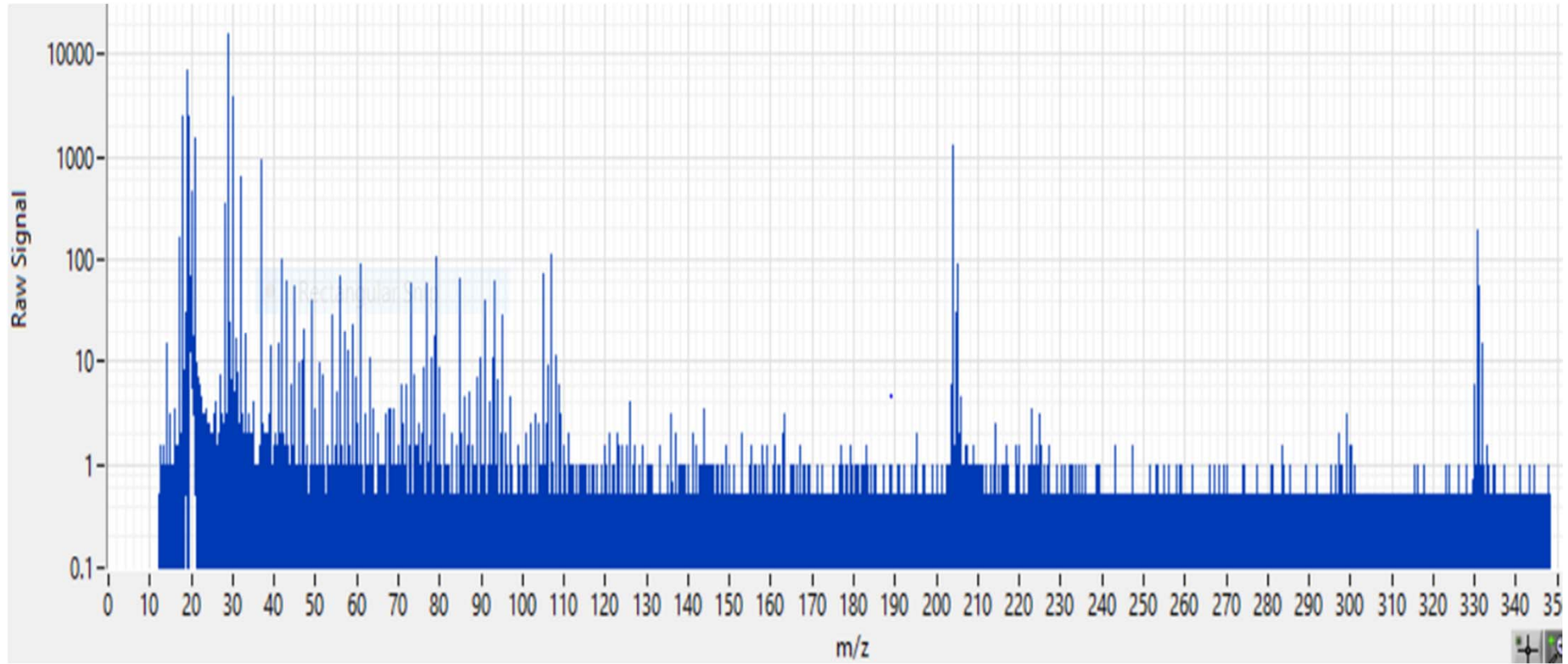
Anything above the red line with H_3O^+

Anything above the blue line with O_2^+

Anything above the black line with NH_3^+



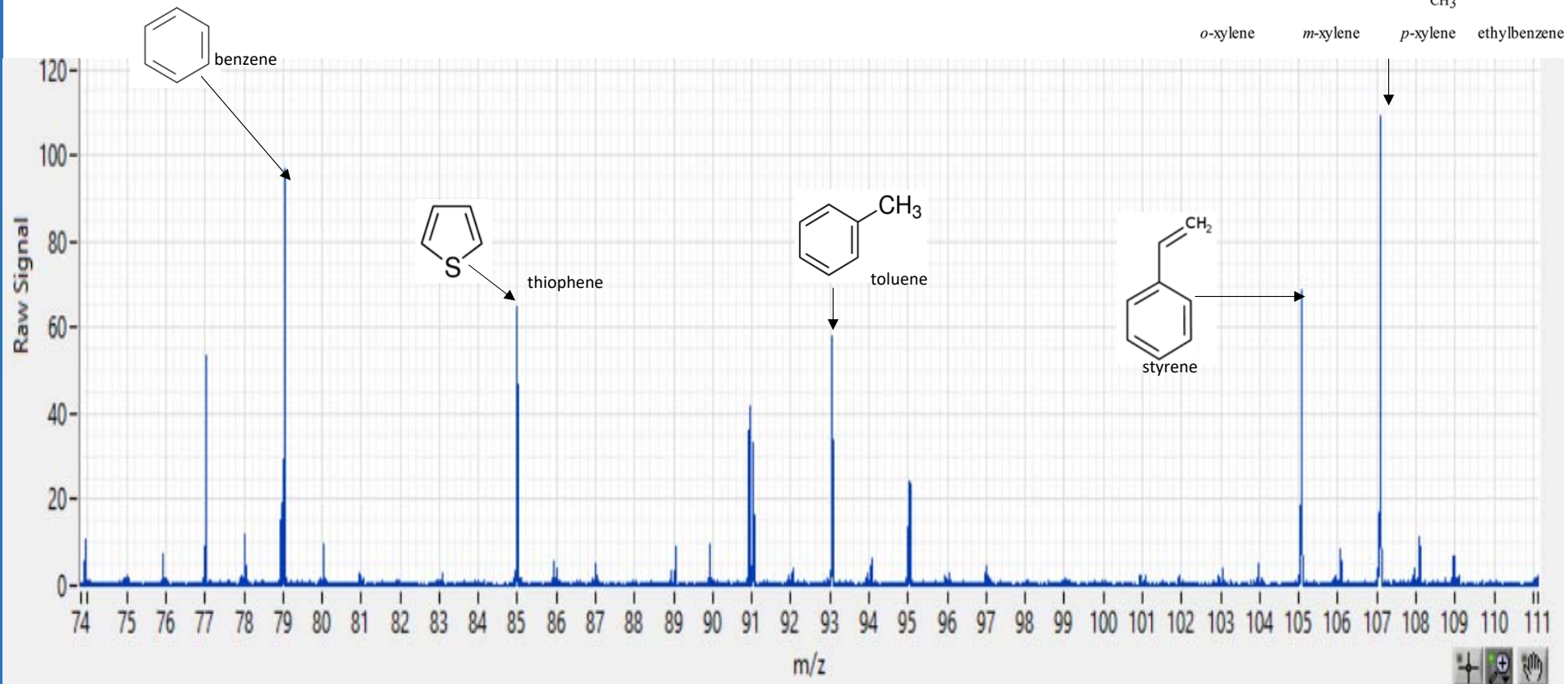
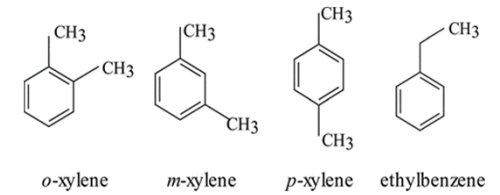
PTR-TOF-MS Instrument Detection Output



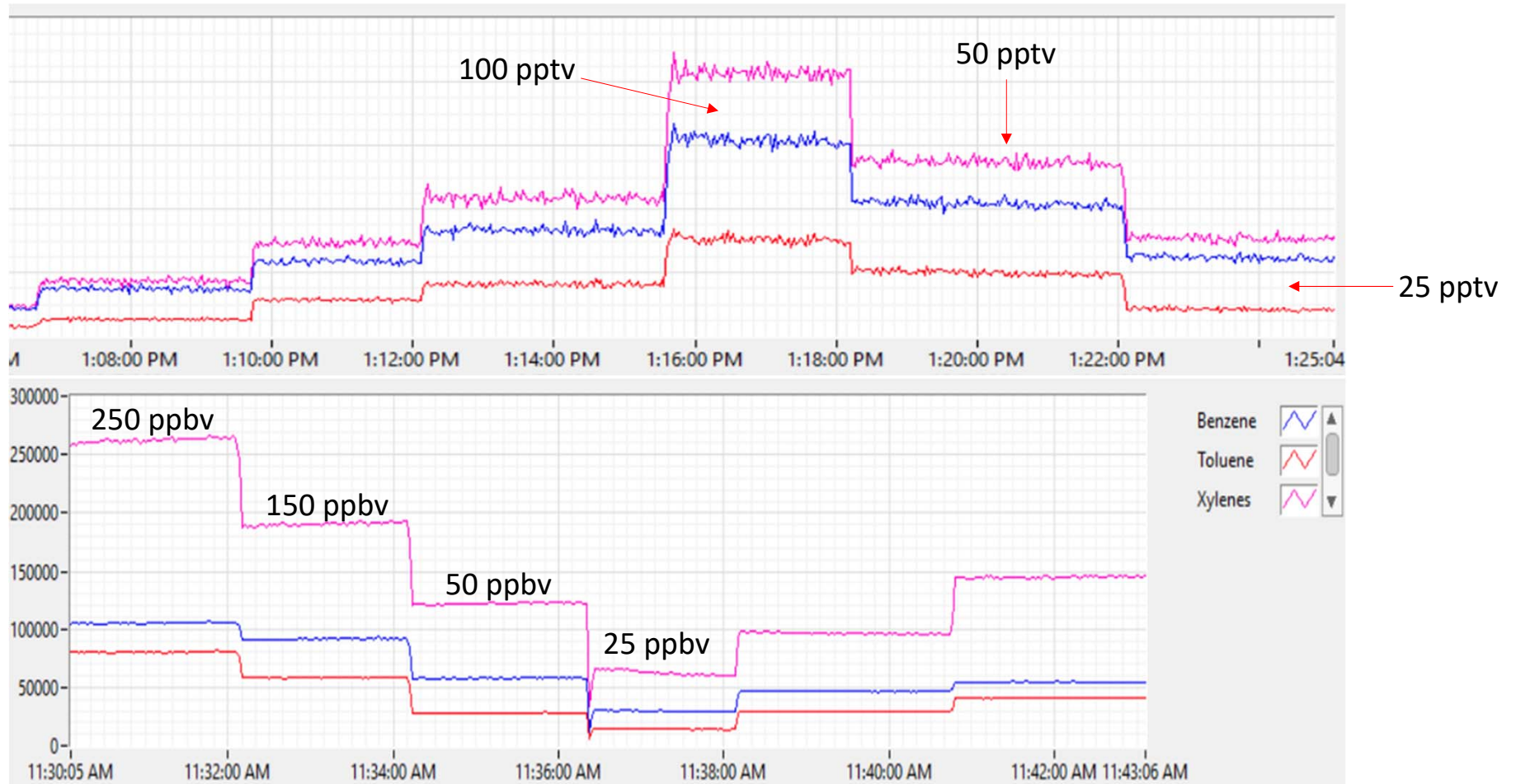
Natural Log of the mass to charge ratios detected in the Time of Flight Detector



What are we really looking at ????



BTEX Part Per Billion/Trillion Concentration Direct Calibration

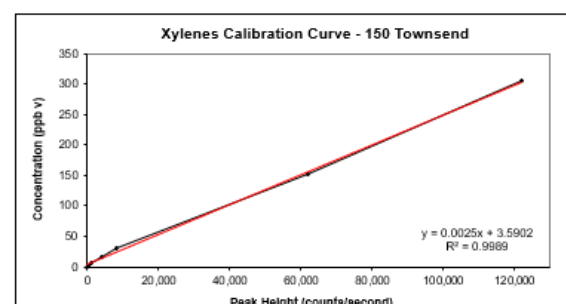
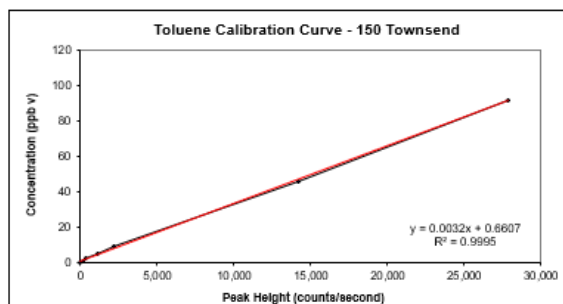
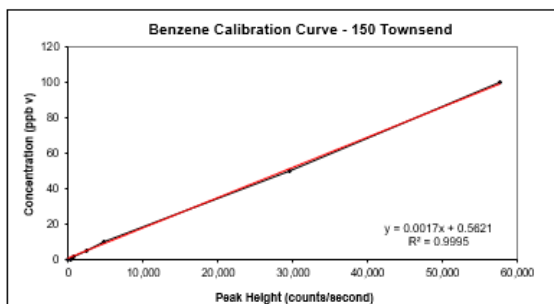
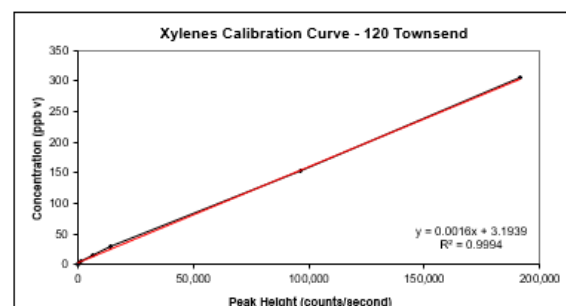
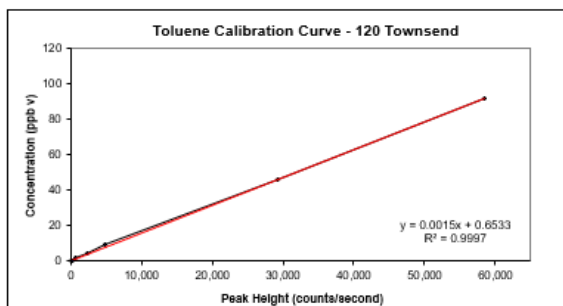
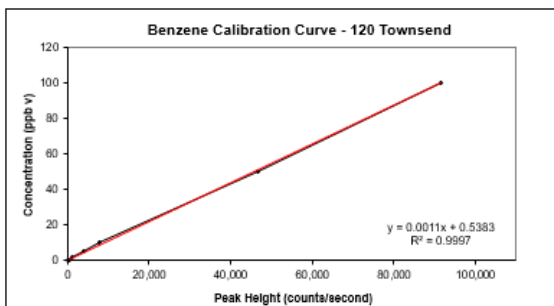
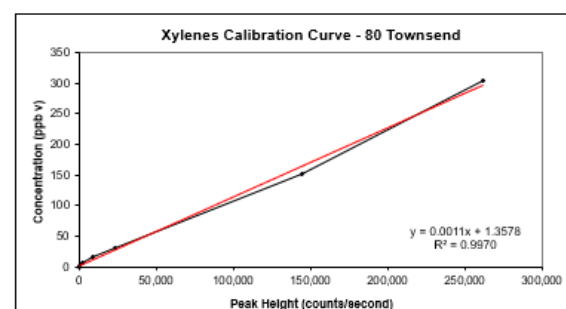
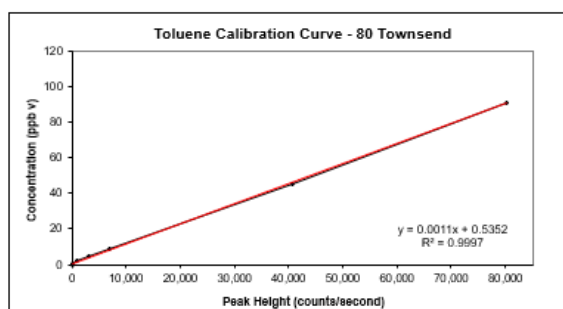
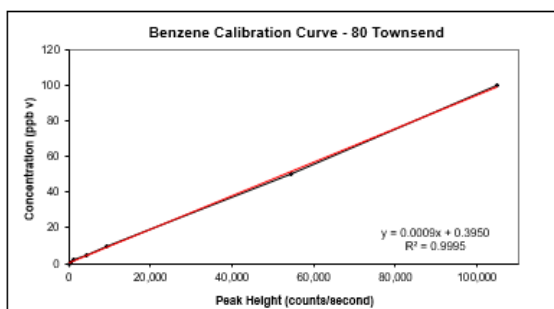


Direct Calibration Curves for Ambient Analysis

PTR Calibration Coefficient Determination Curves - Ambient Sampling

PTR Calibration Coefficient Determination Curves - Ambient Sampling

PTR Calibration Coefficient Determination Curves - Ambient Sampling



Okay, so how do we get there?



What are we looking for.....

M-2A WWTP East Primaries	
5/18/2021	
Collected at 08:50	
Top 50 Concentration List for BAAQMD Report	
Compound	
m18.035540 ((H3N)H+ [Ammonia]) (Conc)	
m46.036850 (Ethylene oxide) (Conc)	
m94.989430 (Acetic acid, chloro-) (Conc)	
m94.998370 (Disulfide, dimethyl) (Conc)	
m95.049140 (Phenol) (Conc)	
m95.060370 (2-Pyridinamine) (Conc)	
m95.050790 (Diethyl sulphide) (Conc)	
m95.049100 ((C6H6O)H+ [Phenol]) (Conc)	
m89.059700 (Ethyl Acetate) (Conc)	
m46.065100 ((C2H7N)H+ [Dimethylamine]) (Conc)	
m89.059710 (Ethyl acetate) (Conc)	
m89.059710 (Formic acid, 1-methylethyl ester) (Conc)	
m89.059710 (Formic acid, propyl ester) (Conc)	
m89.059710 (Propanoic acid, methyl ester) (Conc)	
m89.070940 (Urea, N,N-dimethyl-) (Conc)	
m96.063730 (2-Pyridinamine) (Conc)	
m89.041900 ((C4H8S)H+ [Allylmethyl sulphide]) (Conc)	
m89.096100 ((C5H12O)H+ [Pentanol]) (Conc)	
m96.052500 (1-Propyne, 3,3-oxybis-) (Conc)	
m96.052500 (Phenol) (Conc)	
m330.846880 (PerMasCal) (Conc)	
m96.088880 (2-Norbornene) (Conc)	
m48.990790 (Thioformaldehyde) (Conc)	
m43.054230 (Cyclopropane) (Conc)	
m43.054230 (Propene) (Conc)	
m81.069880 (1,3-Cyclohexadiene) (Conc)	
m49.010700 ((CH4S)H+ [Methanethiol]) (Conc)	
m81.044720 (Pyridazine) (Conc)	
m34.995500 ((H2S)H+ [Hydrogen sulfide]) (Conc)	
m59.085530 (Isobutane) (Conc)	
m59.049140 (Propanal) (Conc)	
m59.049140 (Propylene oxide) (Conc)	
m59.060370 ((E)-Dimethyldiazene) (Conc)	
m81.044700 ((C4H4N2)H+ [Pyrazine]) (Conc)	
m81.069900 ((C6H8)H+ [Monoterpene frag.]) (Conc)	
m203.943050 (Permascal Frag.) (Conc)	
m59.057880 ((C3H6O)H+ [Acetone]) (Conc)	
m137.132480 (1,5,5-Trimethyl-3-methylenecyclohexene) (Conc)	
m137.132480 (Limonene) (Conc)	
m137.107320 (1,4-Benzenediamine, N,N-dimethyl-) (Conc)	
m137.107320 (1-Azabicyclo[2.2.2]octane-4-carbonitrile) (Conc)	
m371.101990 ((C10H30O5S)H+ [D5 siloxane]) (Conc)	
m63.026300 (Dimethyl sulfide) (Conc)	
m63.026300 (Ethaneithiol) (Conc)	
m93.069880 (2,5-Norbornadiene) (Conc)	
m93.069880 (Toluene) (Conc)	
m93.057300 (Anilino radical) (Conc)	
m63.006440 (Thiirane) (Conc)	
m41.038580 (1,2-Propadiene) (Conc)	
m61.010650 (Thiirane) (Conc)	
m63.026300 ((C2H6S)H+ [DMS]) (Conc)	
m31.017800 ((CH2O)H+ [Formaldehyde]) (Conc)	

M-1B ZWED Interior Bag	
5/17/2021	
Collected 14:42 pm	
Top 50 Concentration List for BAAQMD Report	
Compound	
m18.035540 ((H3N)H+ [Ammonia]) (Conc)	
m59.049140 (Propanal) (Conc)	
m59.049140 (Propylene oxide) (Conc)	
m59.060370 ((E)-Dimethyldiazene) (Conc)	
m59.085530 (Isobutane) (Conc)	
m59.057880 ((C3H6O)H+ [Acetone]) (Conc)	
m61.010650 (Thiirane) (Conc)	
m45.033490 (Ethylene oxide_2) (Conc)	
m43.054230 (Cyclopropane) (Conc)	
m43.054230 (Propene) (Conc)	
m61.028410 (Acetic acid) (Conc)	
m61.028410 (Methyl formate) (Conc)	
m61.020160 (Phosphirane) (Conc)	
m61.064790 (1-Propanol) (Conc)	
m61.064790 (Isopropyl alcohol) (Conc)	
m43.091000 (Propylene[C3H6]H+) (Conc)	
m33.015500 (Silane) (Conc)	
m61.064800 ((C3H8O)H+ [IPA]) (Conc)	
m33.032920 ((CH4O)H+ [Methanol]) (Conc)	
m73.064790 (2-Butanone) (Conc)	
m73.064790 (Butanal) (Conc)	
m73.064790 (Furan, tetrahydro-) (Conc)	
m73.064790 (Propanal, 2-methyl-) (Conc)	
m45.033500 ((C2H4O)H+ [Acetaldehyde]) (Conc)	
m73.028400 ((C3H4O2)H+ [Acrylic acid]) (Conc)	
m81.069880 (1,3-Cyclohexadiene) (Conc)	
m81.069880 (1,4-Cyclohexadiene) (Conc)	
m81.069880 (1-Methyl-3-methylenecyclobutene) (Conc)	
m81.044720 (1,3-Diazine) (Conc)	
m81.044700 ((C4H4N2)H+ [Pyrazine]) (Conc)	
m81.069900 ((C6H8)H+ [Monoterpene frag.]) (Conc)	
m41.038580 (1,2-Propadiene) (Conc)	
m41.038580 (Cyclopropene) (Conc)	
m41.038580 (Propyne) (Conc)	
m137.107320 (1,4-Benzenediamine, N,N-dimethyl-) (Conc)	
m137.107320 (1-Azabicyclo[2.2.2]octane-4-carbonitril	
m137.132480 (1,5,5-Trimethyl-3-methylenecyclohexen	
m137.132480 (Limonene) (Conc)	
m61.076000 ((C2H8N2)H+ [Dimethylhydrazine]) (Conc)	
m89.059700 (Ethyl Acetate) (Conc)	
m46.994770 (HSiOH) (Conc)	
m46.995000 (Thioformaldehyde) (Conc)	
m75.026300 (Methyl vinyl sulfide) (Conc)	
m75.026300 (Thietane) (Conc)	
m75.026300 (Thiirane, methyl-) (Conc)	
m47.049140 (Dimethyl ether) (Conc)	
m39.022930 (Cyclopropenylidene) (Conc)	
m75.044060 (Acetic acid, methyl ester_2) (Conc)	
m75.044060 (Formic acid, ethyl ester_2) (Conc)	
m75.044060 (Propanoic acid) (Conc)	
m47.012800 ((CH2O2)H+ [Formic acid]) (Conc)	

M-3B Newby Island Landfill Working Face	
5/19/2021	
Collected at 13:47	
Top 50 Concentration List for BAAQMD Report	
Compound	
m18.035540 ((H3N)H+ [Ammonia]) (Conc)	
m46.065100 ((C2H7N)H+ [Dimethylamine]) (Conc)	
m94.989430 (Acetic acid, chloro-) (Conc)	
m59.049140 (Propanal) (Conc)	
m59.049140 (Propylene oxide) (Conc)	
m43.054230 (Cyclopropane) (Conc)	
m43.054230 (Propene) (Conc)	
m59.057880 ((C3H6O)H+ [Acetone]) (Conc)	
m89.059700 (Ethyl Acetate) (Conc)	
m43.016900 ((C2H2O)H+ f [EA frag., AA frag., Ketene]) (Conc)	
m43.030000 ((C3H6)H+ f [IPA frag., Propene]) (Conc)	
m94.998370 (Disulfide, dimethyl) (Conc)	
m61.010650 (Thiirane) (Conc)	
m89.059710 (1,3-Dioxane) (Conc)	
m89.059710 (Ethyl acetate) (Conc)	
m89.059710 (Formic acid, propyl ester) (Conc)	
m89.059710 (Propanoic acid, methyl ester) (Conc)	
m61.028410 (Acetic acid) (Conc)	
m61.028410 (Methyl formate) (Conc)	
m61.064790 (1-Propanol) (Conc)	
m61.064790 (Isopropyl alcohol) (Conc)	
m89.070940 (Urea, N,N-dimethyl-) (Conc)	
m89.041900 ((C4H8S)H+ [Allylmethyl sulphide]) (Conc)	
m95.050790 (Diethyl sulphide) (Conc)	
m95.060370 (2-Pyridinamine) (Conc)	
m96.088880 (2-Norbornene) (Conc)	
m89.096100 ((C5H12O)H+ [Pentanol]) (Conc)	
m45.033490 (Ethylene oxide_2) (Conc)	
m45.008300 ((N2O)H+) (Conc)	
m44.997100 ((CO2)H+) (Conc)	
m61.064800 ((C3H8O)H+ [IPA]) (Conc)	
m95.085530 (2-Norbornene) (Conc)	
m95.049100 ((C6H6O)H+ [Phenol]) (Conc)	
m33.015500 (Silane) (Conc)	
m33.032920 ((CH4O)H+ [Methanol]) (Conc)	
m45.033500 ((C2H4O)H+ [Acetaldehyde]) (Conc)	
m330.846880 (PerMasCal) (Conc)	
m81.044720 (1,3-Diazine) (Conc)	
m81.044720 (Pyrazine) (Conc)	
m81.044720 (Pyridazine) (Conc)	
m81.069880 (1,3-Cyclohexadiene) (Conc)	
m81.069880 (1,2-Propadiene) (Conc)	
m41.038580 (Cyclopropene) (Conc)	
m41.038580 (Propyne) (Conc)	
m46.994770 (HSiOH) (Conc)	
m46.995000 (Thioformaldehyde) (Conc)	
m81.069900 ((C6H8)H+ [Monoterpene frag.]) (Conc)	
m137.107320 (1,4-Benzenediamine, N,N-dimethyl-) (Conc)	
m137.132480 (Limonene) (Conc)	
m203.943050 (Permascal Frag.) (Conc)	
m47.049140 (Dimethyl ether) (Conc)	
m90.063060 (Propanoic acid, methyl ester) (Conc)	
m90.074290 (Urea, N,N-dimethyl-) (Conc)	

M-3A Newby Island Compost Pile	
5/19/2021	
Collected at 10:35	
Top 50 Concentration List for BAAQMD Report	
Compound	
m59.049140 (Propanal) (Conc)	
m59.049140 (Propylene oxide) (Conc)	
m33.032920 ((CH4O)H+ [Methanol]) (Conc)	
m59.060370 ((E)-Dimethyldiazene) (Conc)	
m59.057880 ((C3H6O)H+ [Acetone]) (Conc)	
m59.085530 (Isobutane) (Conc)	
m18.035540 ((H3N)H+ [Ammonia]) (Conc)	
m73.064790 (2-Butanone) (Conc)	
m73.064790 (Butanal) (Conc)	
m73.064790 (Furan, tetrahydro-) (Conc)	
m73.064790 (Propanal, 2-methyl-) (Conc)	
m73.028400 ((C3H4O2)H+ [Acrylic acid]) (Conc)	
m81.069880 (1,4-Cyclohexadiene) (Conc)	
m81.069880 (1-Methyl-3-methylenecyclobutene) (Conc)	
m94.989430 (Acetic acid, chloro-) (Conc)	
m81.044700 ((C4H4N2)H+ [Pyrazine]) (Conc)	
m81.069900 ((C6H8)H+ [Monoterpene frag.]) (Conc)	
m94.998370 (Disulfide, dimethyl) (Conc)	
m95.030300 (CFH2COCHF2) (Conc)	
m95.050790 (Diethyl sulphide) (Conc)	
m95.060370 (2-Pyridinamine) (Conc)	
m75.026300 (Thietane) (Conc)	
m75.026300 (Thiirane, methyl-) (Conc)	
m75.044060 (Acetic acid, methyl ester_2) (Conc)	
m75.044060 (Formic acid, ethyl ester_2) (Conc)	
m75.044060 (Propanoic acid) (Conc)	
m137.107320 (1,4-Benzenediamine, N,N-dimethyl-) (Conc)	
m43.054230 (Cyclopropane) (Conc)	
m43.054230 (Propene) (Conc)	
m137.132480 (1,5,5-Trimethyl-3-methylenecyclohexene) (Conc)	
m137.132480 (Limonene) (Conc)	
m95.085530 (2-Norbornene) (Conc)	
m96.063730 (2-Pyridinamine) (Conc)	
m95.049100 ((C6H6O)H+ [Phenol]) (Conc)	
m43.016900 ((C2H2O)H+ f [EA frag., AA frag., Ketene]) (Conc)	
m43.030000 ((C3H6)H+ f [IPA frag., Propene]) (Conc)	
m96.052500 (1-Propyne, 3,3-oxybis-) (Conc)	
m41.038580 (1,2-Propadiene) (Conc)	
m41.038580 (Cyclopropene) (Conc)	
m41.038580 (Propyne) (Conc)	
m45.033490 (Ethylene oxide_2) (Conc)	
m61.010650 (Thiirane) (Conc)	
m61.028410 (Acetic acid) (Conc)	
m61.028410 (Methyl formate) (Conc)	
m138.110680 (1,4-Benzenediamine, N,N-dimethyl-) (Conc)	
m61.064790 (1-Propanol) (Conc)	
m61.064790 (Isopropyl alcohol) (Conc)	
m89.059700 (Ethyl Acetate) (Conc)	
m330.846880 (PerMasCal) (Conc)	
m75.080400 ((C4H10O)H+ [Butanol]) (Conc)	

Plus an additional 470 compounds.....

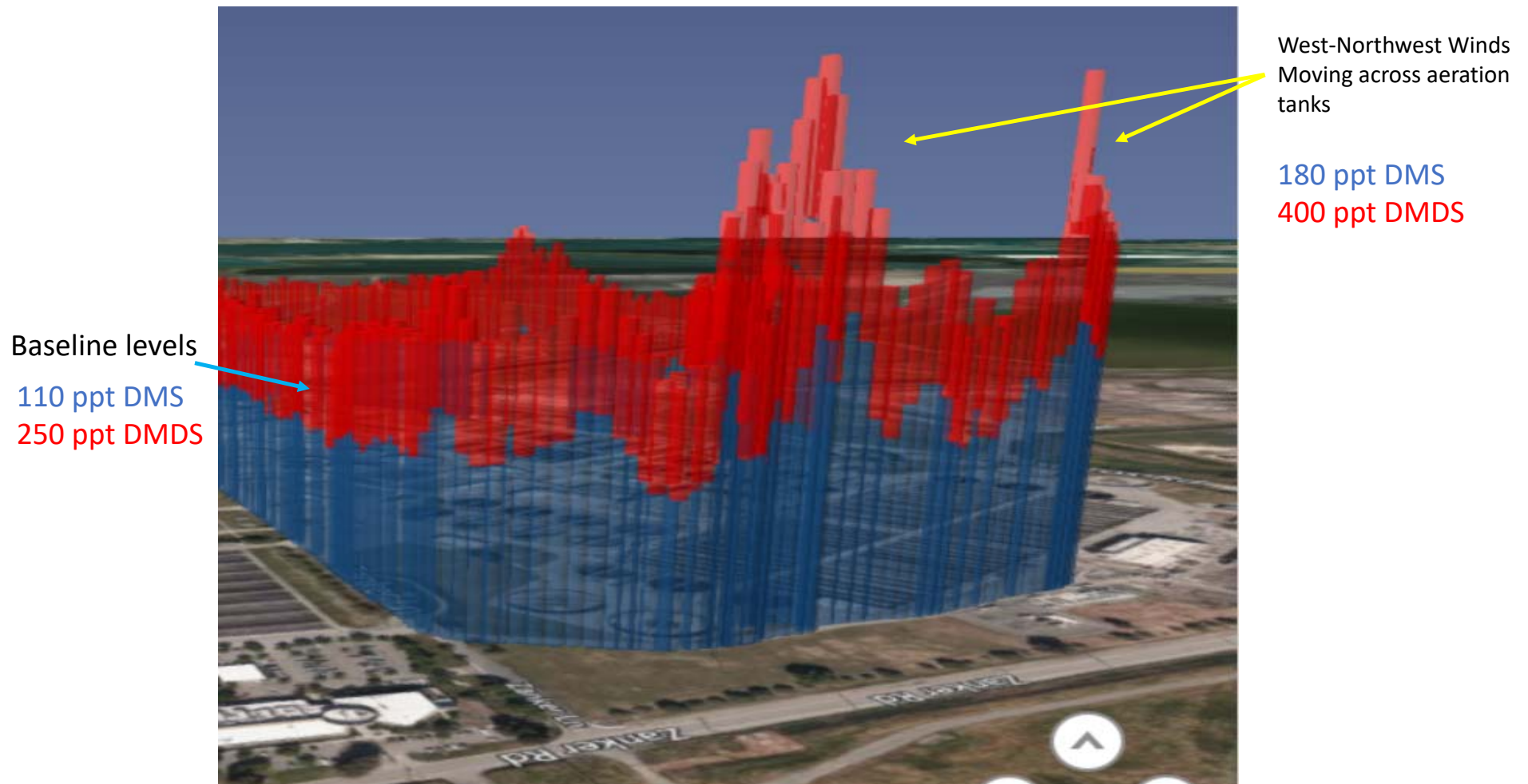
5/14/2021 11:29 AM

Regional Wastewater Facility



- Dimethyl disulfide
- Dimethyl sulfide (l

Increased Dimethyl Sulfide and Dimethyl Disulfide levels Downwind from Aeration area



5/18/2021 3:00 PM



5/18/2021



Ambient Concentrations:

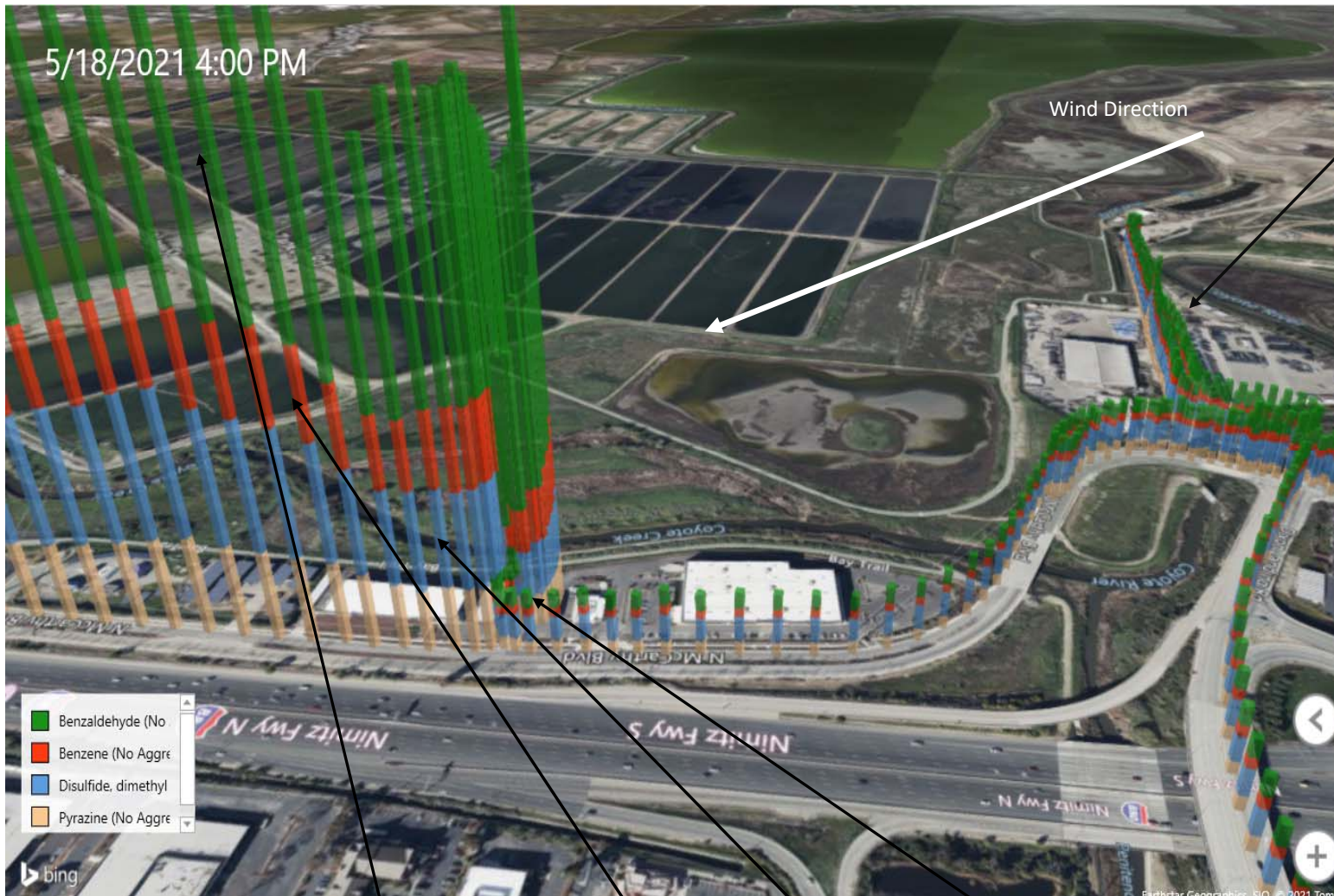
Benzaldehyde 75 ppt

Benzene 60 ppt

DMDS 102 ppt

Pyrazine 87 ppt

North of sources – very low background readings

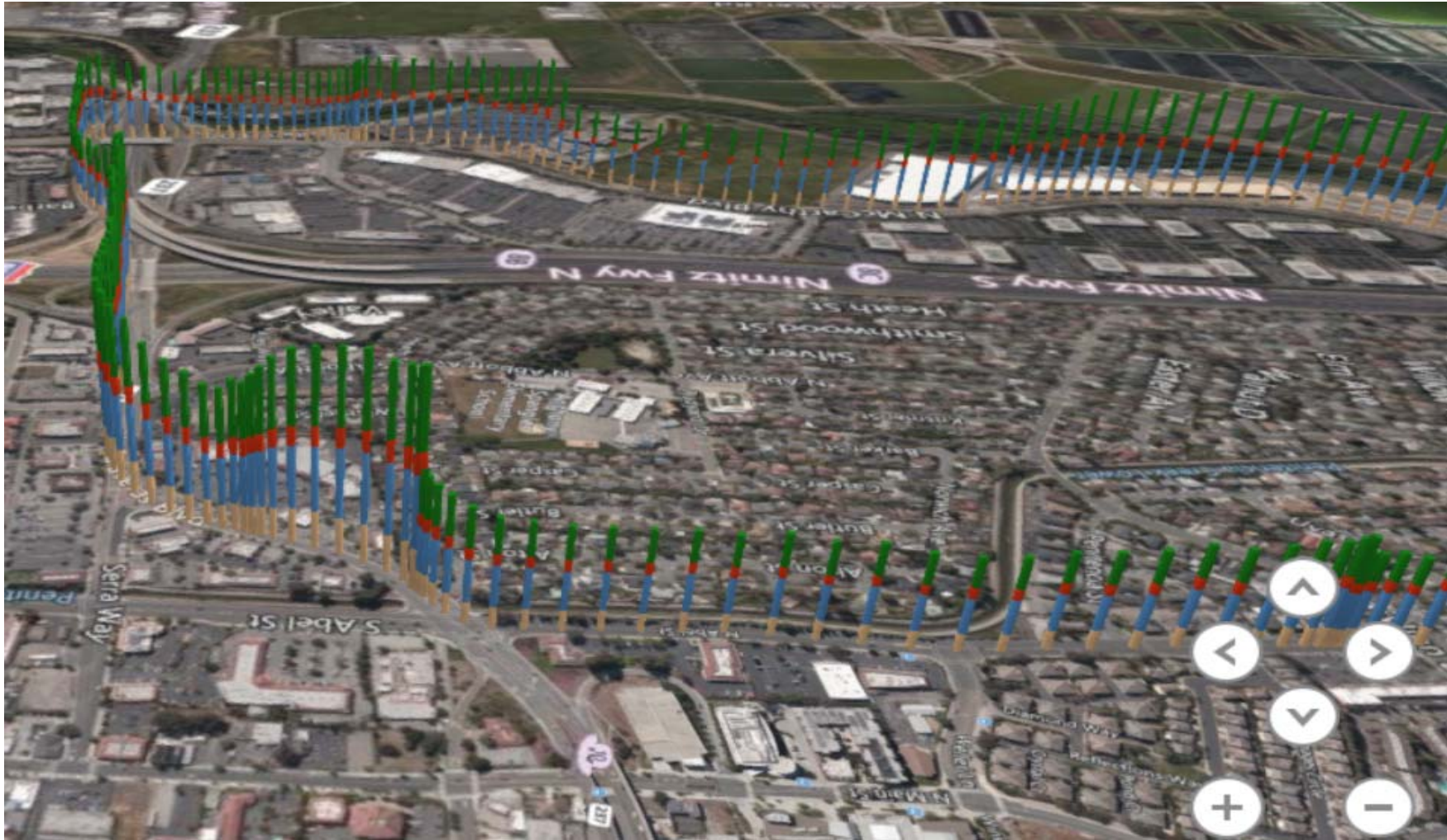


Upwind Concentrations:

Benzaldehyde 106 ppt
 Benzene 62 ppt
 DMDS 151 ppt
 Pyrazine 116 ppt

Downwind Concentrations: Benzaldehyde 1750 ppt Benzene 480 ppt DMDS 816 ppt Pyrazine 589 ppt

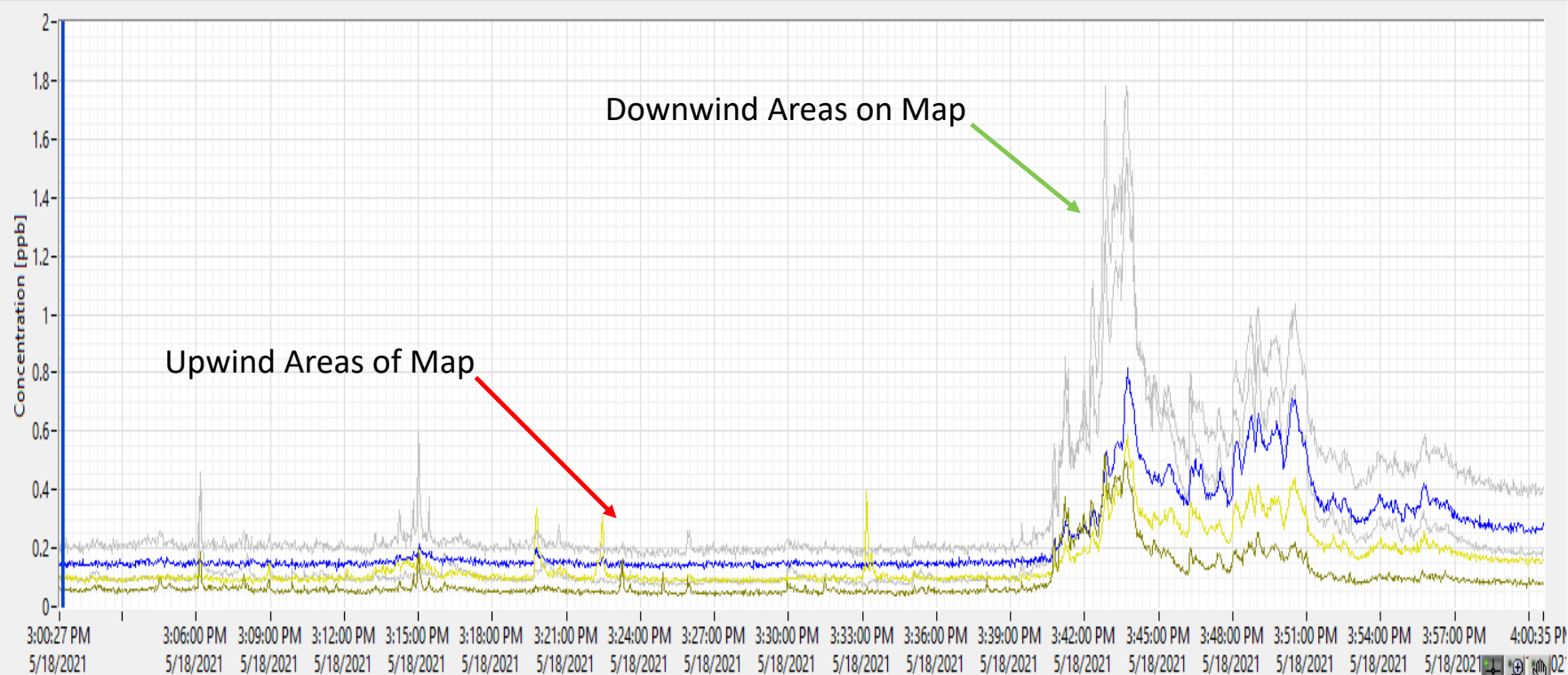




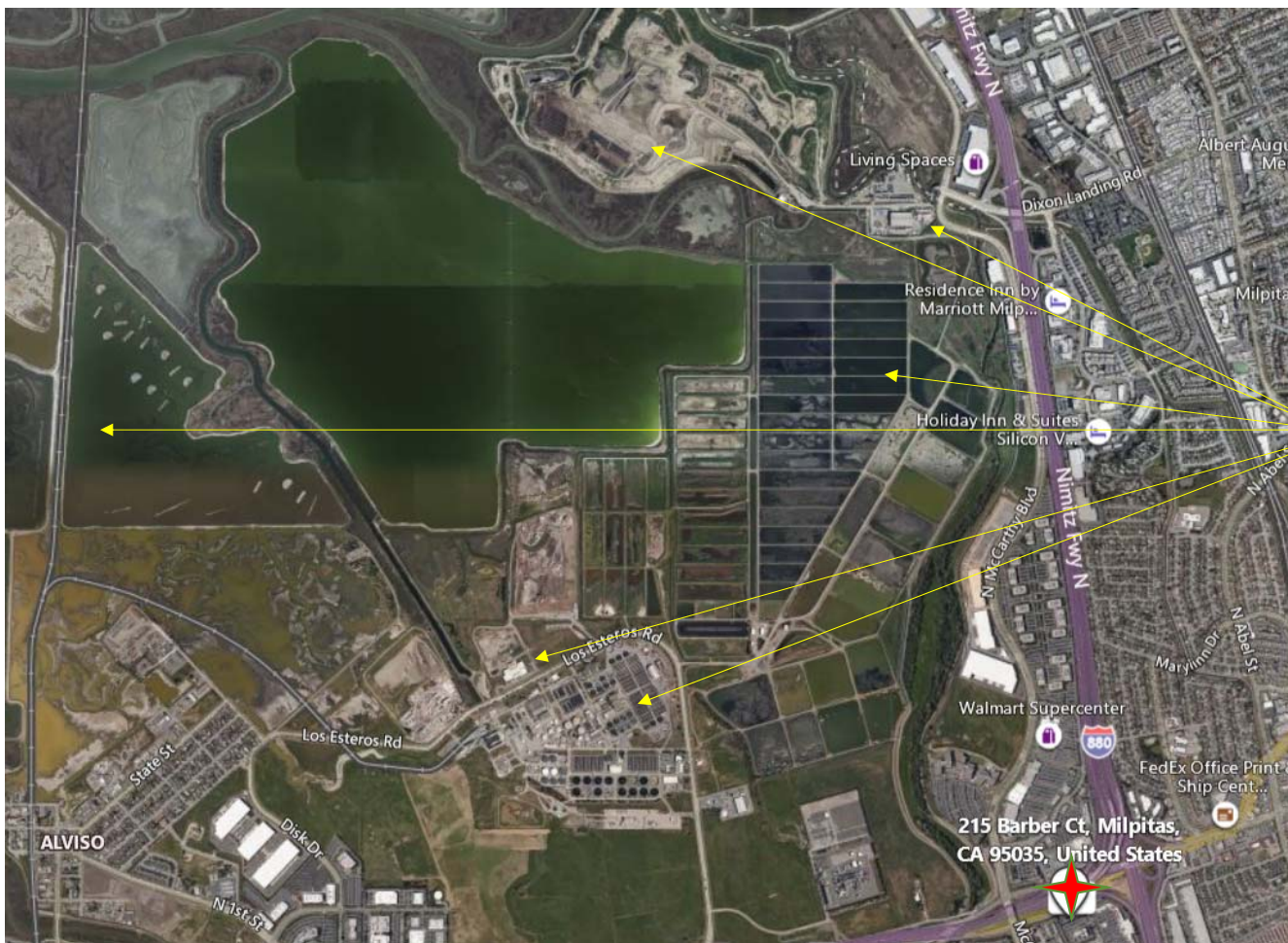
West Calaveras Blvd 1.3 miles downwind



Graphical Representation of GPS Map Concentrations – Dixon Landing Park Area



Underlying Elements of Odors - Combinations of Multiple Chemical Species

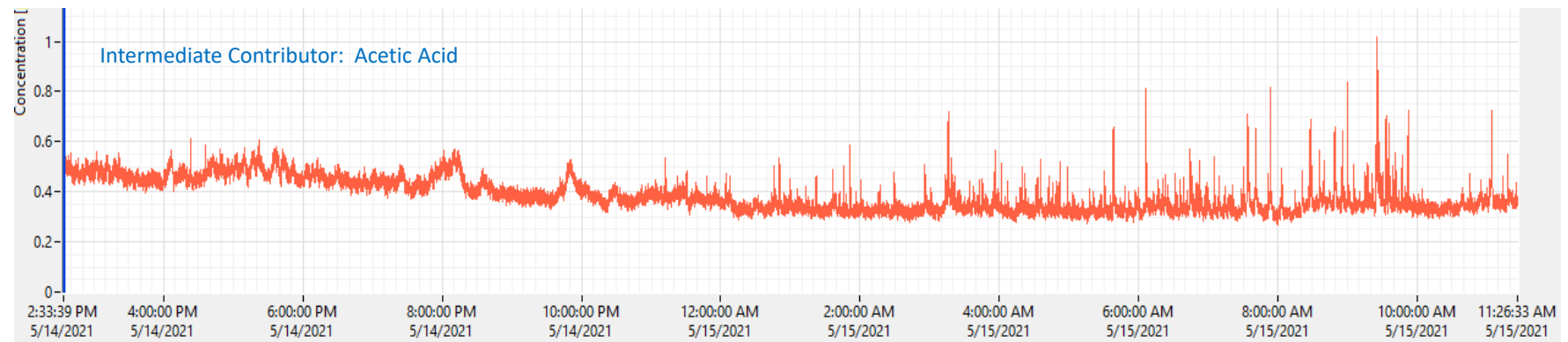
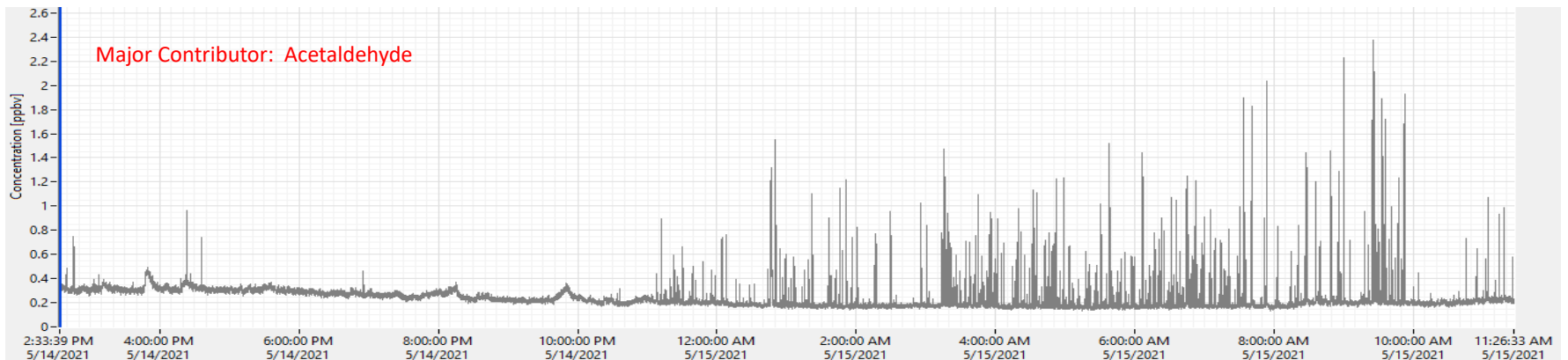


Hampton Inn
Overnight Plume Monitoring

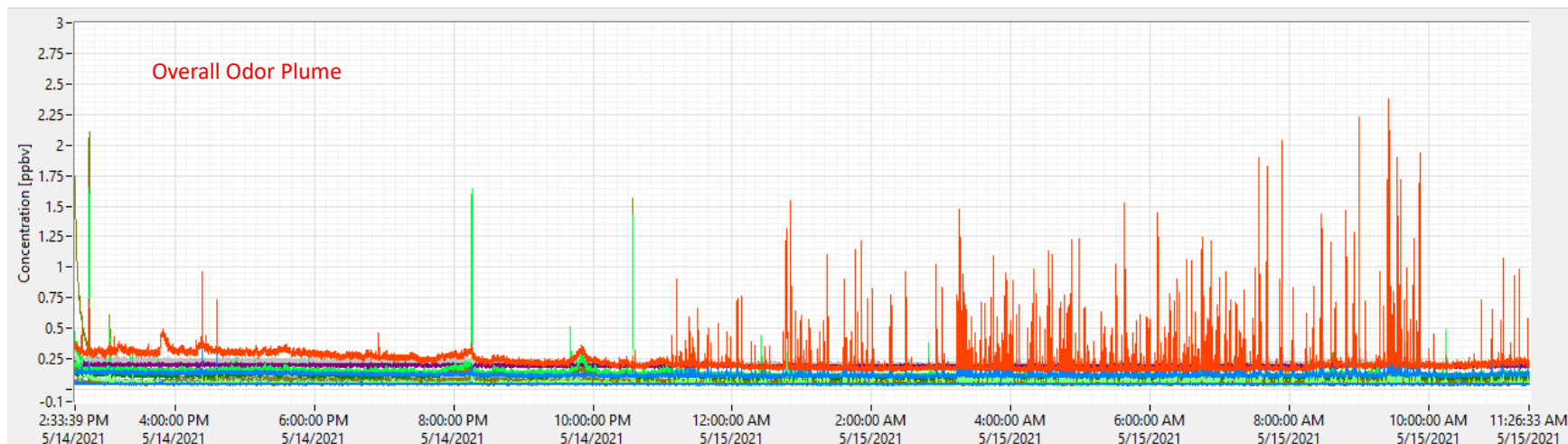
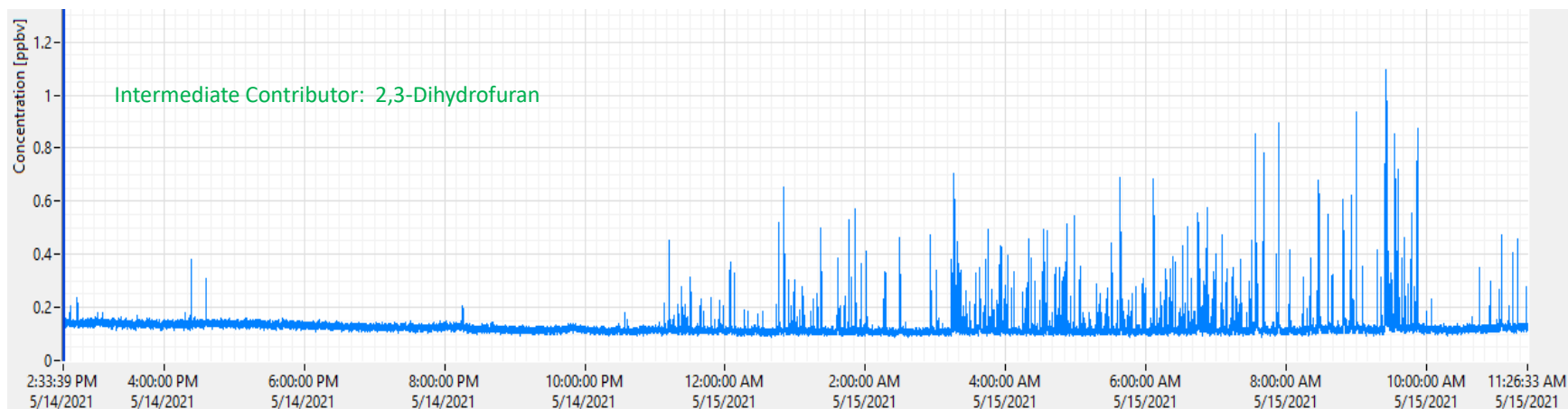
Possible Odor Sources



Underlying Elements of Odors - Combinations of Multiple Chemical Species



Underlying Elements of Odors - Combinations of Multiple Chemical Species (cont.)



5/17/2021 12:06 PM



5/17/2021 12:43 PM

Acetaldehyde 2.25 ppb

Acetaldehyde 0.52 ppb

Benzene 0.711 ppb

Benzene 0.058 ppb

- Acetaldehyde (
- Benzene (No A
- 9H-Purine (No



Questions?



PTR at Landfill Working Face

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pzemek@montrose-env.com



Location of unknown Odor Source Outfall Pipe



PTR Van Plume Sampling From Milpitas CA Hotel

