



NATTS Network Assessment and Technical Assistance Document Updates

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Outline

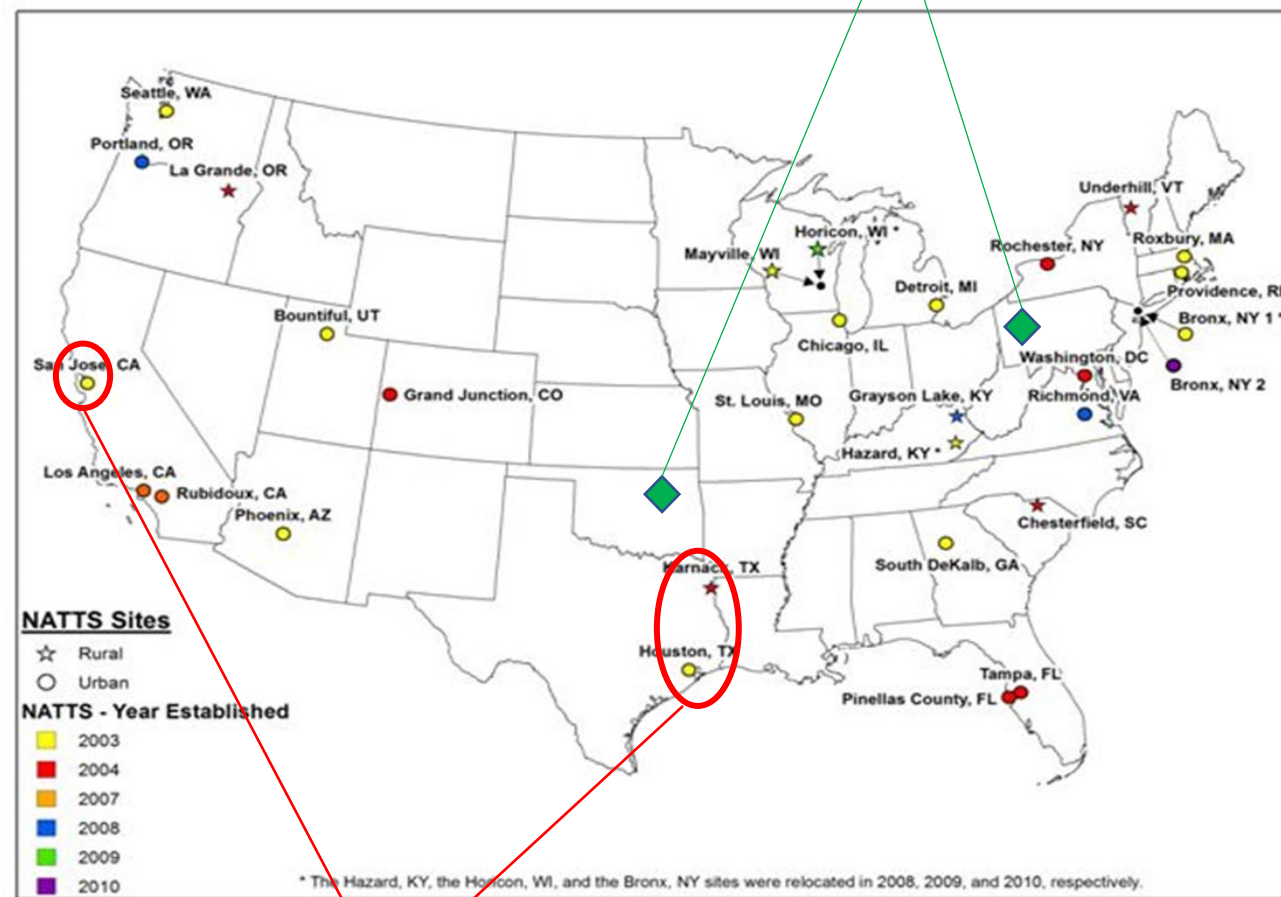
What we will cover:

- Third NATTS network assessment reports
- NATTS Technical Assistance Document (TAD) revision 4

NATTS Air Toxics Monitoring Network

❖ NATTS network updates:

- 26 sites active and operating
- 3 sites opted out in 2018
- 2 new sites added in 2020
 - Tulsa, OK
 - Pittsburgh, PA
- Redirect the funding for a third site to help NATTS labs as we roll out Ethylene Oxide monitoring



New sites added in 2020

Opted out in 2018

NATTS – Target Compounds

❖ NATTS “Tier 1” required target list includes:

- Volatile Organic Compounds (VOCs) via method TO-15/15A:
 - ✓ Acrolein, Benzene, 1,3-Butadiene, Carbon Tetrachloride, Chloroform, Ethylene Oxide (EtO)*, Perchloroethylene, Trichloroethylene, and Vinyl Chloride
 - ✓ *EtO added in 2019
- Polycyclic Aromatic Hydrocarbons (PAHs) via method TO-13A:
 - ✓ Benzo(a) pyrene and naphthalene
- Carbonyls via method TO-11A:
 - ✓ Acetaldehyde and Formaldehyde
- PM₁₀ Metal compounds via method IO 3.5:
 - ✓ Arsenic, Beryllium, Cadmium, Lead, Manganese, and Nickel
 - ✓ Hexavalent Chromium used to be required (different method) but was removed in 2013

NATTS Network Assessment

- ❖ Third NATTS network assessment completed in 2022
 - To include 2015-2018 new data to cover 2003-2018
 - To determine air toxics trends and data quality
 - Individual site evaluation and report
 - 27 NATTS site assessment reports:
<https://www.epa.gov/amtic/natts-network-assessment-reports>
 - Site calls with NATTS agencies—feedback on network improvement and challenges encountered

NATTS Network Assessment site reports

- ❖ What is included in a NATTS site assessment report?
 - Monitoring site information/history
 - Analytical laboratories supporting the site
 - Summary of air toxics measurements
 - NATTS Method Quality Objectives(MQOs) evaluations
 - Air toxics trends analysis
 - Monitoring site equipment inventory

NATTS Data Quality Evaluation

❖ NATTS Method Quality Objectives(MQOs) evaluations

- Completeness
- Method Detection Limits
- Analytical Bias—Proficiency Test
- Method precision
 - Overall Method Precision—Collocated/Duplicate samples
 - Analytical Method Precision— Replicate samples

Air Toxics National Trends—DQO & Data Rating

Rating (#points assigned)	MQO #1 Completeness (based on 1-in-6 day sampling)	MQO #2 Sensitivity (based on experimentally-determined MDLs)	MQO #3 Bias (based on PTs)	MQO #4 Precision (based on paired measurements \geq MDL)
A-Rated (4 pts. per MQO)	$\geq 85\%$	Avg. MDL to NATTS Target Ratio ≤ 1.00	$\pm 25\%$	$\leq 15\%$
B-Rated (3 pts. per MQO)	75% to 85%	Avg. MDL to NATTS Target MDL Ratio 1.00 to 2.00	$> 25\%$ to $\leq 35\%$ or $< -25\%$ to $\geq -35\%$	$> 15\%$ to $\leq 25\%$
Does not meet MQO (0 pts. per MQO)	$< 75\%$	Avg. MDL to NATTS Target Ratio > 2.00	$> 35\%$ or $< -35\%$	$> 25\%$
Not rated	Data were not rated	Data were not rated	Data were not rated	Data were not rated

- Most recent 3-year blocked averages

➤ 2013-2015 vs. 2016-2018

➤ Data Rating: A-rated and B-rated used for trends


Pollutant Group	A-rated		B-rated		Does Not Meet	
	#	%	#	%	#	%
VOCs	1,452	53%	737	27%	555	20%
Carbonyls	523	67%	193	25%	66	8%
PM ₁₀ Metals	1,418	61%	685	30%	213	9%
Chromium VI	159	74%	29	13%	27	13%
PAHs	410	74%	124	22%	18	3%
Total = 6,609	3,962	60%	1,768	27%	879	13%

Air Toxics National Trends

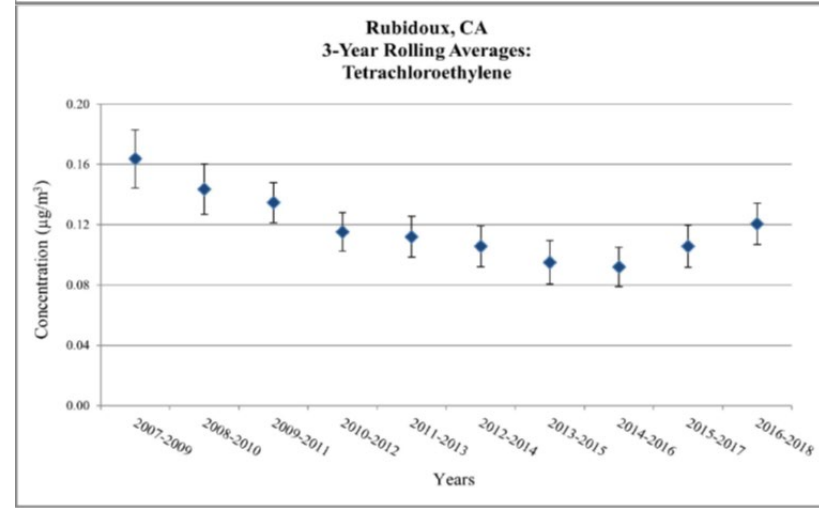
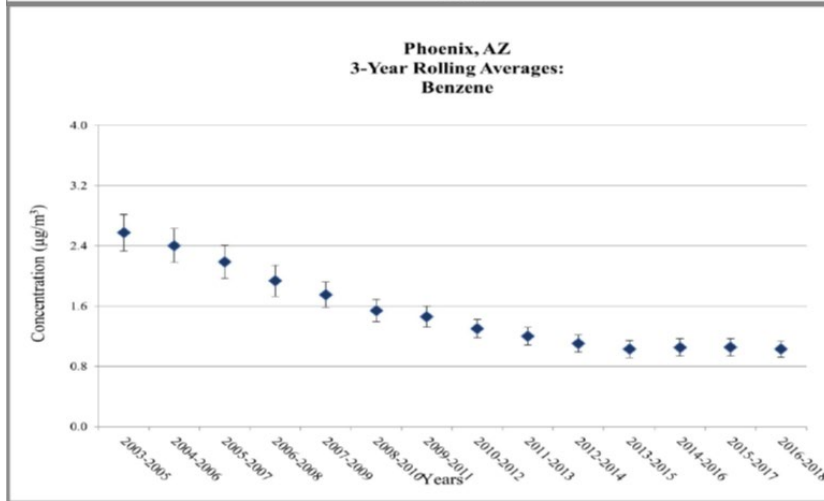
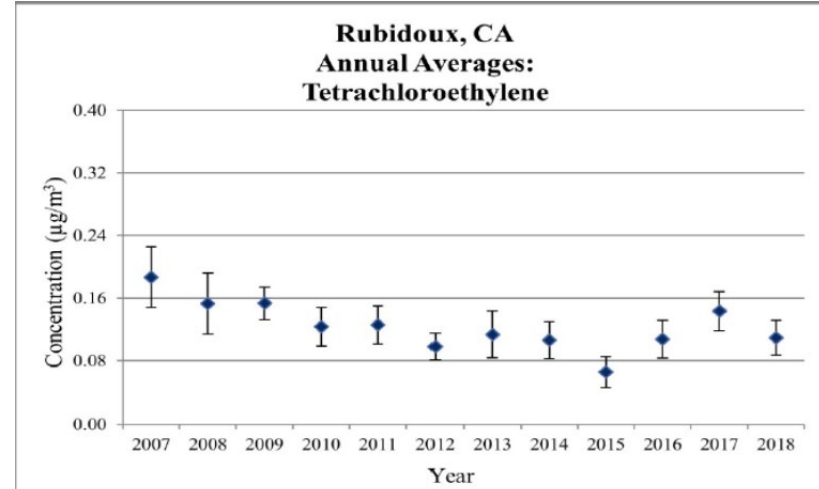
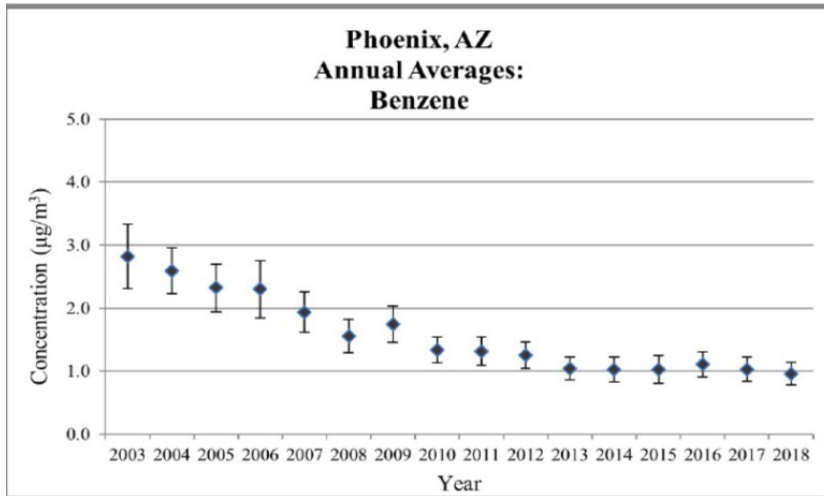
Pollutant	Units	# Sites	Block 1	Block 2	% Difference
Acetaldehyde	µg/m ³	19	1.51	1.39	-7.7%
Arsenic (PM ₁₀)	ng/m ³	21	0.71	0.68	-3.2%
Benzene	µg/m ³	19	0.65	0.59	-10.2%
Benzo(a)pyrene	ng/m ³	21	0.113	0.087	-23.2%
Beryllium (PM ₁₀)	ng/m ³	20	0.012	0.009	-26.4%
Butadiene, 1,3-	µg/m ³	19	0.071	0.063	-10.9%
Cadmium (PM ₁₀)	ng/m ³	21	0.170	0.097	-43.0%
Carbon Tetrachloride	µg/m ³	15	0.59	0.56	-4.7%
Chloroform	µg/m ³	20	0.256	0.255	-0.4%
Chromium VI	ng/m ³	18	0.029	0.026	-7.7%
Formaldehyde	µg/m ³	19	2.77	2.68	-3.3%
Lead (PM ₁₀)	ng/m ³	21	3.08	2.81	-8.9%
Manganese (PM ₁₀)	ng/m ³	20	8.06	7.93	-1.6%
Naphthalene	ng/m ³	20	66.70	51.08	-23.4%
Nickel (PM ₁₀)	ng/m ³	19	1.28	1.05	-18.0%
Tetrachloroethylene	µg/m ³	19	0.149	0.174	17.2%
Trichloroethylene	µg/m ³	19	0.020	0.022	10.7%
Vinyl Chloride	µg/m ³	17	0.0051	0.0048	-5.5%

- Block 1—2013-2015 averages
- Block 2—2016-2018 averages

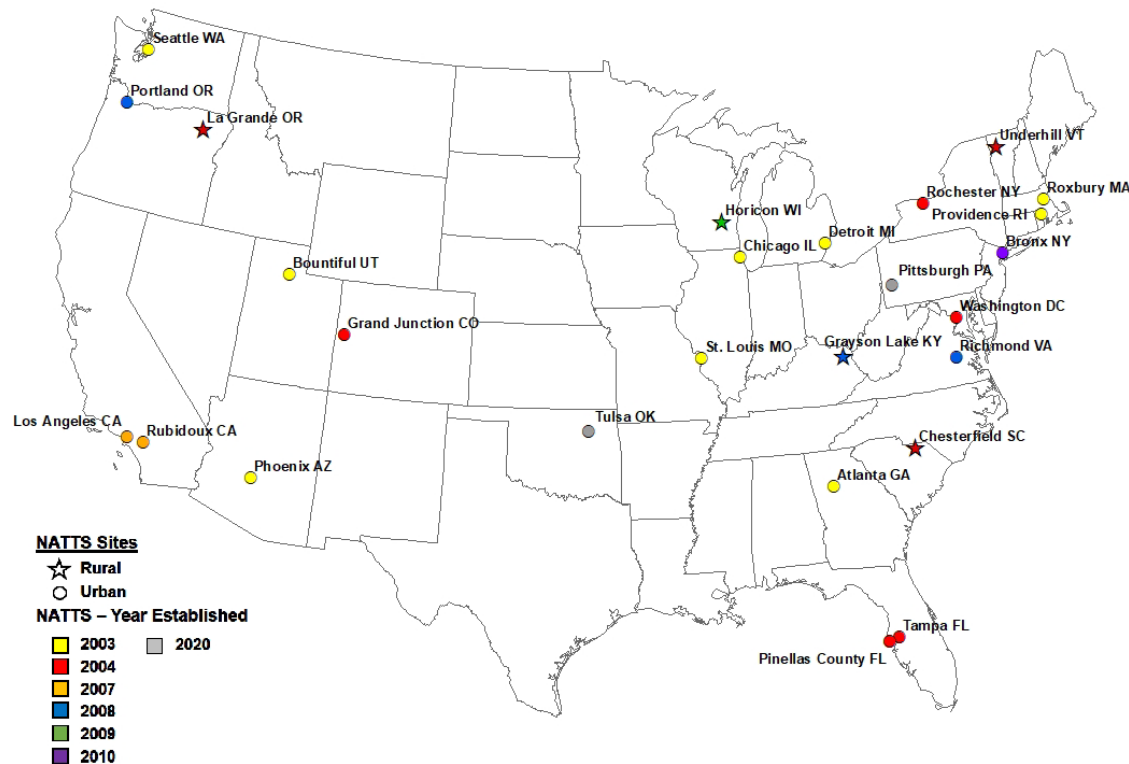
• 5 analytes trending 

• 1 analyte trending 

NATTS Site Annual and 3-yr Rolling Averages



Active NATTS sites and Quality Control Guidance



- ❖ 26 active NATTS sites (21 urban & 5 rural)
- ❖ NATTS workplan template
 - QAPP
 - MDL MQO
 - NATTS Technical Assistance Document
 - Proficiency Testing
 - Technical Systems Audit

NATTS TAD

➤ Purpose:

- Presents best practices and sets forth requirements for the collection and reporting of NATTS network air toxics measurement data
- And is intended as an aid to the agencies responsible for implementing the NATTS Program

➤ Provide information/guidance on:

- Implementation and maintenance of the necessary quality system
- Collection and analysis of air samples
- Data handling and validation
- Reporting of results to EPA's Air Quality System (AQS) database

NATTS TAD revision 4

- ❖ NATTS TAD Revision 3 dated 2016
- ❖ Updated NATTS revision 4 completed in July and released in August 2022
- ❖ Comments table with responses
 - Links to NATTS TAD revision 4 and comments table with responses
 - ✓ <https://www.epa.gov/amtic/natts-technical-assistance-document>
 - Webinars to walk through NATTS TAD revision 4
 - ✓ August 10th on VOCs
 - ✓ August 16th on carbonyls, PM₁₀ metals, and PAHs, and data handling aspects and others

Updating the NATTS TAD

Steps taken:

Solicitation of comments and feedback on NATTS TAD revision 3 from SLT agencies

Known list of changes such as TO-15A components

Compilation of a comment table with responses

Review panel including OAQPS, EPA regions, SLT monitoring staff

Incorporate changes to NATTS TAD revision 4



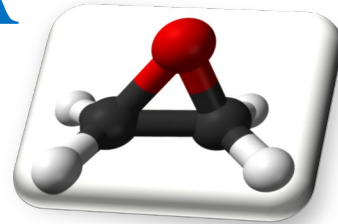
Critical Changes and Updates in the NATTS TAD Revision 4

- Programmatic changes
- Advancements in technology and refinements to measurement methods(e.g., TO-15A)
- Ambiguities and inconsistencies
- Updated measurement and data handling guidance and requirements

EPA Compendium Method TO-15A

- ❖ TO-15A released in 2019 and mostly incorporated in NATTS TAD revision 4 under VOC section
- ❖ Major updated in TO-15A included in Revision 4:
 - Canister Cleanliness Criteria – reflect need to measure lower concentrations due to decreasing concentrations of VOCs
 - Canister and Instrument Qualification
 - Humidity Guidance
 - Modern Preconcentration and Measurement Instrument Components
 - Calibration Standard Range and Regression Modeling
 - Quality Control Criteria
 - Qualitative Identification Criteria
 - Method Detection Limits (MDLs)

Ethylene Oxide Measurements by TO-15A



- ❖ EtO added as a Tier I required NATTS analyte in 2019
- ❖ Challenges to EtO measurement by method TO-15A, primarily due to:
 - Stock gas standards stability
 - EtO formation and growth within the typical holding time in some cleaned canisters
 - Potential coelutions that interfere with resolution, identification, and chromatographic peak integration

Resources for EtO Measurements

- Technical note on NATTS network's primary and secondary source EtO standards procurement (August 2019)
 - ✓ https://www.epa.gov/sites/production/files/2021-04/documents/eto_stability_memo_082219.pdf
- Ethylene Oxide Technical Webinar(April 2021)
 - ✓ <https://www.epa.gov/sites/default/files/2021-05/documents/eto-technical-webinar-041521-w-qandas.pdf>
- Technical note and memo on EtO canister effect (May 2021)
 - ✓ <https://www.epa.gov/sites/default/files/2021-05/documents/technical-note-on-eto-canister-effect-052521.pdf>
 - ✓ <https://www.epa.gov/sites/default/files/2021-05/documents/ord-eto-canister-background-memo-05072021.pdf>

Data Validation Tables— Category of Importance

Critical

Criteria must be met for reported results to be valid.

Samples for which these criteria are not met are invalidated.

MQO

Required NATTS Measurement Quality Objective which must be attained.

Failure to meet these criteria does not necessarily invalidate data, but may compromise data and result in exclusion from trends analysis.

Operational

Failure to meet criteria does not invalidate reported results; the results are compromised and on a case-by-case basis may require qualification.

Practical

Failure to meet criteria does not invalidate reported results; results may be compromised but do not require qualification.

Data Validation Tables--Examples

Parameter	Description and Required Frequency	Acceptance Criteria	Reference	Category	Data Reporting Impact
Continuing Calibration Verification (CCV)	Analysis of a known standard in the lower 1/3 of the calibration range to verify ongoing instrument calibration Analyze each day of analysis prior to analyzing QC or field samples. Recommended after every 10 field samples and concluding the analytical sequence.	Recovery for each target VOC within 69.9-130.1% of the theoretical nominal (linear or quadratic models) or the RRF < ±30% of the mean ICAL RRF	Section 4.2.8.6.2	Critical for Tier I VOCs Operational for non-Tier I VOCs	Invalidate Tier I VOCs as EC Qualify non-Tier I VOCs as LJ, LL (low bias), or LK (high bias) as appropriate
Parameter	Description and Required Frequency	Acceptance Criteria	Reference	Category	Data Reporting Impact
<i>Laboratory Readiness and Proficiency</i>					
Method Detection Limit	Determined initially and verified minimally every 13 months thereafter for each target VOC. When method changes are made that alter instrument sensitivity, initial MDL must be redetermined.	MDL determined via 4.1 must be ≤ those listed in Table 4.1-1. These MDL MQOs current as of April 2022. Refer to current workplan template for up-to-date MQOs.	Sections 4.1 and 4.2.9	MQO	NA
Canister Zero Check	Introduction of a humidified HCF zero into the canister to verify that the canister does not contribute to positive bias (i.e., exhibit growth) of target VOCs over an approximate 30-day period Prior to initial use, every three years thereafter, and following major maintenance such as valve replacement. Recommended annually.	At initial and later (e.g., 30-days) timepoints target VOCs ≤ 3x MDL or 0.030 ppbv, whichever is lower, corrected to standard barometric pressure (760 mmHg) Tier I VOCs must also be ≤ MDL MQO	Section 4.2.4.1.2	Operational until concentration exceeds 5xMDL, then critical	Qualify affected analytes as CF and LK (high bias) Invalidate affected analytes as EC when concentration exceed 5xMDL

NATTS Data Reporting

❖ Flow Rate Verification and Audit Data Reporting

❖ Updated AQS QA Qualifiers

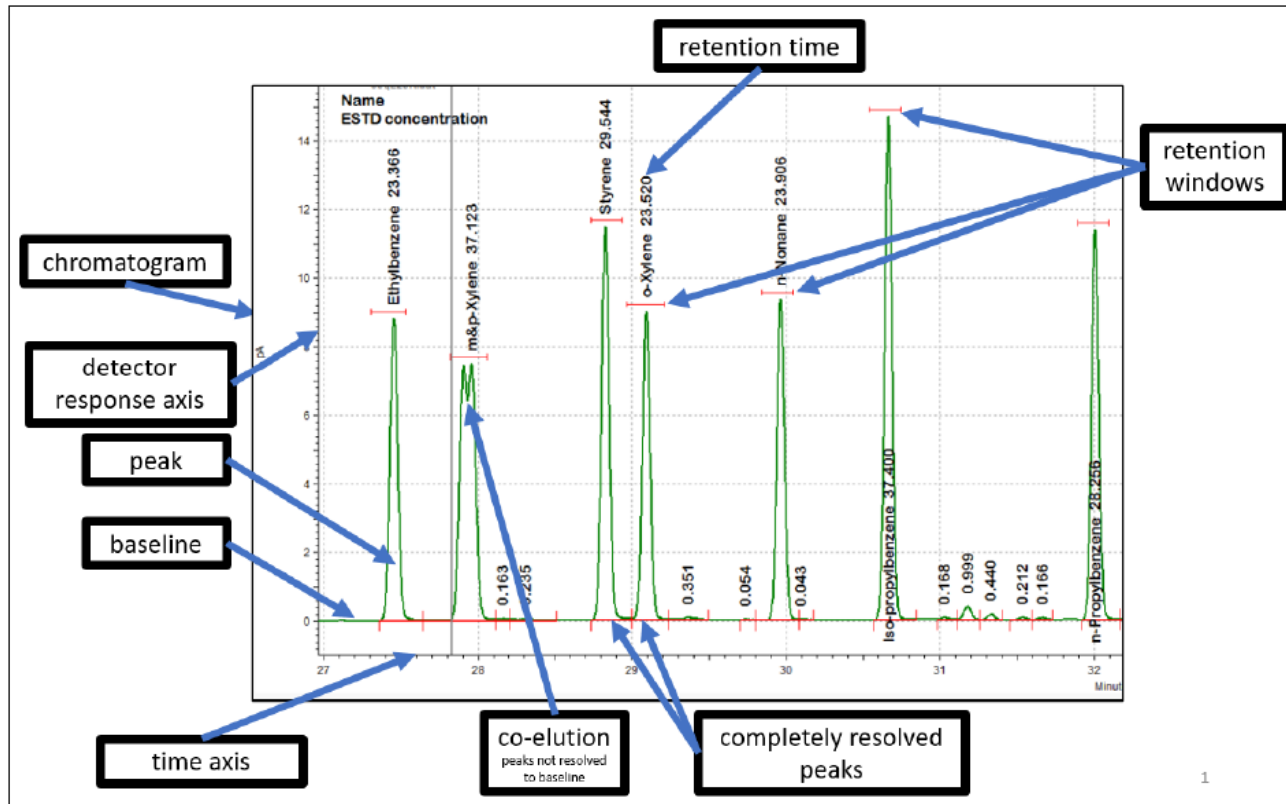
- 1V – data reviewed and validated
- CF – (VOCs only) canister bias failure for this pollutant
- DN – (carbonyls only) DNPH peak < NATTS TAD requirement – estimated
- SB – (VOCs and carbonyls) sampler bias failure for this pollutant
- SP – spike recovery out of limits
- Y – elapsed time out of specification

Other Resources Included

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Basics of Chromatography



- Basics chromatography terminology
- Basic chromatogram components
- Chromatographic peak integration

Implementation of NATTS TAD Revision 4

❖ Timelines

- NATTS TAD revision 4 completed in July 2022
- Webinars to walk through changes incorporated in August 2022
- Transition time to implement and incorporate revision 4
 - ~ one year from August 2022
- Feedback

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Questions?