



# EPA 325: The Why and How of Passive Fenceline Monitoring (SOR/2020-231)

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## Federal Regulation: SOR/2020-231



- WHY → Regulati
   Release of Volati
   T
   HOW → Passive F
   tubes- Carbopak
   N
  - WHY → Regulations Respecting Reduction in the Release of Volatile Organic Compounds

 HOW → Passive Fenceline Monitoring; passive TD tubes- Carbopak X media

• Public Access to data - Sarnia, ON facilities

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#### Proposed Canadian Regulations – Petroleum Sector: Fenceline Monitoring



- The proposed regulations will require facility operators to establish fenceline monitoring programs (sampling & analysis)
- Proposed requirements for quantity & location of sampling, sample collection frequency & laboratory analysis align with specific elements of U.S. EPA Methods 325A & 325B
- The proposed fenceline monitoring requirements came into force Dec. 2020 with the collection & analysis of samples required as of Jan 1, 2022
- <u>https://canadagazette.gc.ca/rp-pr/p2/2020/2020-11-11/html/sor-dors231-eng.html</u>



The objectives of the Canadian Regulations are to:

- reduce fugitive volatile organic compound (VOC) releases from equipment leaks at petroleum refineries and upgraders, and from petrochemical facilities that are operated in an integrated way with those facilities, in Canada;
- provide protection for human health by minimizing, to the greatest extent practicable, exposure to carcinogenic components contained in petroleum and refinery gases (PRGs);
- improve human health and environmental quality by reducing smog formation;
- promote a level playing field through nationally consistent VOC and PRG risk management measures;
- harmonize these measures, to the extent possible, with existing measures in other jurisdictions (e.g., provinces, municipalities, and the US); and
- provide regulatory certainty to the industry and other stakeholders, which will encourage them to plan and invest into the future with confidence (ECCC, Nov.2020).

### **Thermal Desorption Tube Sampling (USEPA TO-17)**





> passive sampling, a specific single-adsorbent TD tube & cap







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**Thermal Desorption (TD) Tubes program** 

- Passive sampling using single media Carbopak X TD tubes
- EPA 325 method allows for continuous sample collection
- up to 25 VOC compounds and is a cost effective technique that aids in LDAR (leak detection and repair) at petrochemical facilities
- Regulatory requirement for Canada: BTEX and 1,3-Butadiene, minimum 12 locations (+ blank and duplicates), 26 sampling events - year round



- Carbopack X is a hydrophobic granular graphitized carbon black (GCB) adsorbent with a large surface area of 240 m<sup>2</sup>/g that allows it to retain a broad range of VOCs
- Inner surface of SS tubes are inert coated to protect sample integrity over the relatively long sampling period
- Sorbents medium range is optimal for BTEX (C6-C8) & 1,3-butadiene (C4) sampling, as well as various other VOCs







#### How does Passive Sampling work?

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Compound	Carbopack X uptake rate (ml/min) <sup>a</sup>
1,3-Butadiene	0.61±0.11
1,1-Dichloroethene	0.57±0.14
3-Chloropropene	0.51±0.3
1,1-Dichloroethane	0.57±0.1
1,2-Dichloroethane	0.57±0.08
1,1,1-Trichloroethane	0.51±0.1
Benzene	0.66±0.06
Carbon tetrachloride	0.51±0.06
1,2-Dichloropropane	0.52±0.1
Trichloroethene	0.5±0.05
1,1,2-Trichloroethane	0.49±0.13
Toluene	0.52±0.14
Tetrachloroethene	0.48±0.05
Chlorobenzene	0.51±0.06
Ethylbenzene	0.46±0.07
m,p-Xylene	0.46±0.09
Styrene	0.5±0.14
o-Xylene	0.46±0.12
n-Dichlorohenzene	0.45+0.05

<sup>(</sup>a) McClenny, W.A., et. al., J. Environ. Monit. 7:248-256.

Monitoring points  $\rightarrow$  equal radial or linear approach

Radial: < 750 acres, samplers every 30 degrees based on a central emission source point (12 samples)

Linear: Boundary < than 24,000 feet, a minimum of 12 sampling locations evenly spaced ±10%.

26 two-week sampling events
→ creates a yearly rolling average
→this is compared to a specified action level.

### **Direct Reading Instruments - Useful/Integral pars of LDAR**



Device	Reliability
Tubes (colorimetric) & Pump	<ul> <li>-quick and easy- instant results</li> <li>-colourimetry can be prone to positive and negative interference</li> <li>- Requires knowledge of leak or plume location</li> </ul>
Handheld PID (photo-ionization detector)	<ul> <li>-PID provides a great starting point in determining if there is a problem</li> <li>-potential for interferences</li> <li>-requires knowledge of where the leak or the plume may be</li> </ul>
Weather Station with GC instrumentation	<ul> <li>accurate, but only situated in one location, plume must cross its sampling area to accurately measure VOCs</li> <li>Must be maintained and calibrated by qualified staff</li> </ul>





- Summary of some of the historical data from 2016-2018 for benzene from facilities monitoring in the Chemical Valley (Sarnia, ON).
- <a href="https://www.suncor.com/about-us/refining/sarnia-refinery">https://www.suncor.com/about-us/refining/sarnia-refinery</a>
- <u>https://www.shell.ca/en\_ca/about-us/projects-and-sites/sarnia-manufacturing-centre.html</u>
   <u>https://iolfencelinemonitoring.ca/en/Sarnia</u>
- <u>https://www.ineos-styrolution.com/portal/zh\_CN/environmental-compliance</u>





Thank You!

Questions?

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