

ANNUAL AMBIENT MONITORING REPORT FOR PETROLEUM REFINING – INDUSTRY STANDARD

The air monitoring program assesses annual benzene concentrations along the Suncor refinery's perimeter using passive diffusive monitoring technology which has been approved by the MECP. Samples are taken continuously over a two-week period and the results are posted within 60 days of sample collection on our Suncor Sarnia Refinery website.

In 2021 our annual average from all 12 perimeter monitoring locations was 1.40 ug/m3. The statistical analysis with our three year benzene measurement baseline is included in this 2021 annual report. The full results from the 2021 monitoring program can be found below along with the map of the property line monitoring locations.

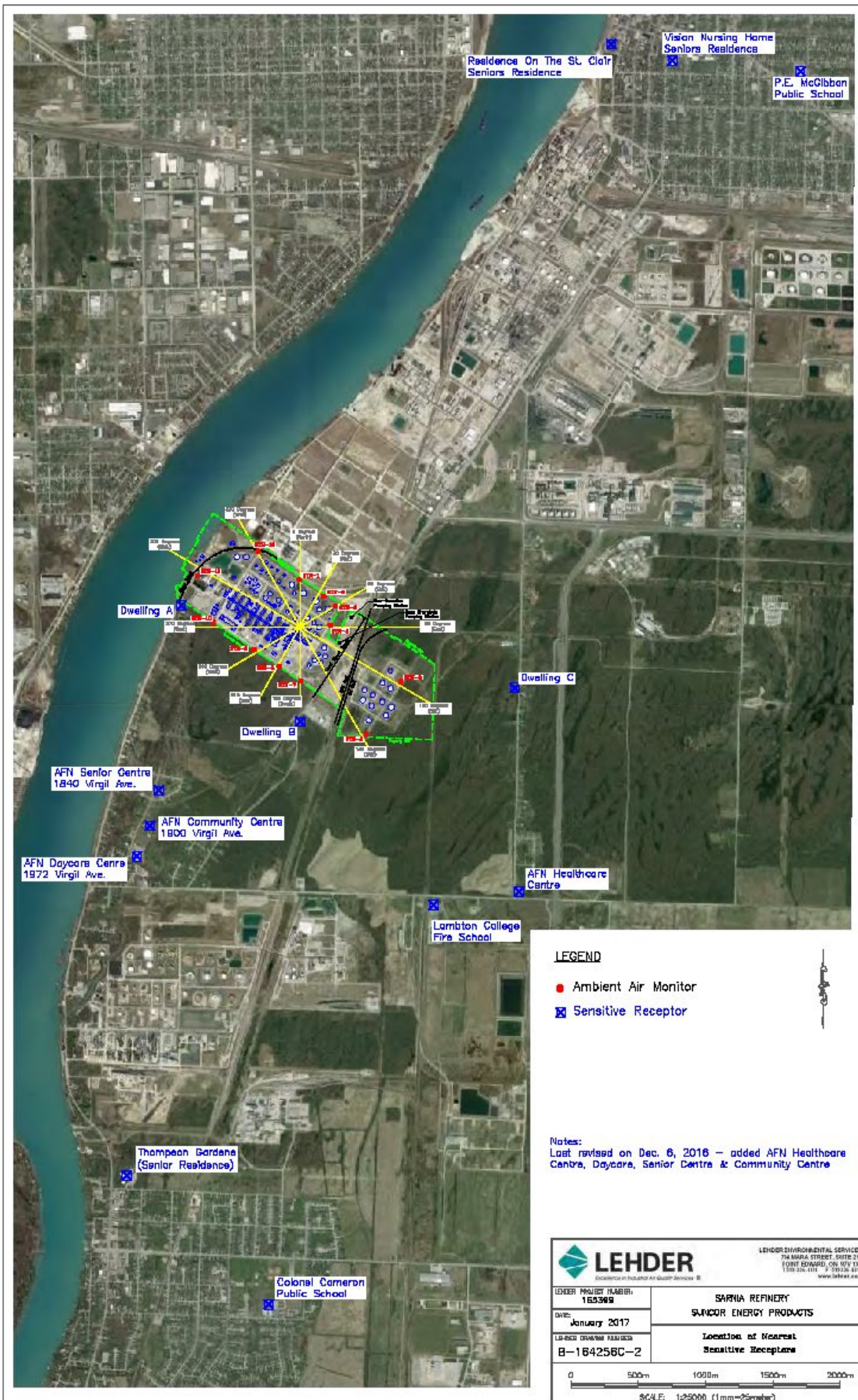
Annual Average for each station:

	2021
	Annual Average - Benzene (ug/m3)
STN-1	2.19
STN-2	2.21
STN-3	1.54
STN-4	1.81
STN-5	1.38
STN-6	1.23
STN-7	1.12
STN-8	1.03
STN-9	1.18
STN-10	1.01
STN-11	0.99
STN-12	1.25



Table 1: 2021 Suncor Sarnia Refinery Property Line Monitoring Results

	Station ID	STN-1	STN-2	STN-3	STN-4	STN-5	STN-6	STN-7	STN-8	STN-9	STN-10	STN-11	STN-12	
	UTM Coordinates	382737mE 4754383mN	382919mE 4754241mN	383006mE 4754172mN	382965mE 4754030mN	383490mE 4753619mN	383233mE 4753234mN	382748mE 4753824mN	382586mE 4753729mN	382400mE 4753853mN	382101mE 4754053mN	381980mE 4754394mN	382432mE 4754570mN	
Measured Benzene Concentration from 2-week monitoring period (ug/m3) Note: Duplicate values will be expressed in (brackets)	12/23/2020 - 1/7/2021	1.55	1.92	1.46	1.65	1.03 (0.97)	0.95	0.80	0.88	0.76	0.76	1.02	1.28	
	1/7/2021 - 1/21/2021	2.01	2.82	1.66	1.75	1.72	1.21 (1.20)	1.32	1.06	1.30	0.83	0.87	1.16	
	1/21/2021 - 2/4/2021	1.28	1.43	1.25	1.81	1.19	1.17 (1.13)	1.17	1.02	1.48	0.97	0.83	0.94	
	2/4/2021 - 2/18/2021	2.03	1.93	1.49	1.71	1.19	1.21	1.11	1.07 (1.05)	1.29	1.34	1.26	1.47	
	2/18/2021 - 3/4/2021	2.06	2.18	1.57	1.84	1.38	1.18	1.18	0.97	1.07 (1.08)	0.97	1.07	1.36	
	3/4/2021 - 3/18/2021	1.17	1.35	0.96	1.52	1.46	1.38	0.95	0.91	1.26	0.91 (1.02)	0.79	1.03	
	3/18/2021 - 4/1/2021	2.16	2.16	1.18	1.87	1.26	1.05	1.07	1.01	1.65	1.11	1.44 (1.46)	1.38	
	4/1/2021 - 4/15/2021	2.26	1.85	1.12	1.57	1.07	0.97	0.97	0.92	1.01	0.98	1.04	1.51 (1.56)	
	4/15/2021 - 4/29/2021	1.67 (1.74)	2.12	1.57	2.07	1.59	1.53	1.26	1.21	1.40	1.09	0.94	1.42	
	4/29/2021 - 5/13/2021	1.25	1.30 (1.35)	1.10	1.73	1.53	1.63	1.01	0.91	1.05	0.78	0.60	0.78	
	5/13/2021 - 5/27/2021	2.88	2.79	1.56 (1.54)	1.73	1.44	1.09	1.10	1.19	1.20	0.93	0.70	1.48	
	5/27/2021 - 6/10/2021	2.38	2.7	1.51	1.72 (1.68)	1.84	1.31	1.33	1.2	1.55	0.9	0.65	1.06	
	6/10/2021 - 6/24/2021	1.98	2.18	1.39	1.53	1.30 (1.29)	1.53	1.12	0.92	1.08	0.71	0.70	1.04	
	6/24/2021 - 7/8/2021	2.31	2.78	1.74	1.85	1.88	1.44 (1.39)	1.40	1.19	1.25	1.57	1.16	1.21	
	7/8/2021 - 7/22/2021	1.70	2.28	1.96	2.03	1.50	1.55	1.28 (1.23)	1.22	1.36	1.45	0.94	1.03	
	7/22/2021 - 8/5/2021	2.03	2.66	2.69	2.42	1.16	1.10	0.94	0.91 (0.88)	1.06	1.01	0.97	1.44	
	8/5/2021 - 8/19/2021	2.66	2.72	1.75	1.82	1.66	1.35	1.38	1.29	1.46 (1.47)	1.21	1.24	1.57	
	8/19/2021 - 9/2/2021	2.64	2.69	1.90	2.41	1.63	2.03	1.59	1.35	1.48	1.05 (1.07)	1.16	1.41	
	9/2/2021 - 9/16/2021	1.82	2.05	1.52	1.80	1.19	0.88	0.94	0.80	0.85	0.81	1.34 (1.17)	0.70	
	9/16/2021 - 9/30/2021	2.36	NA*	1.13	1.34	1.44	1.17	1.12	0.91	1.23	0.95	0.77	1.37 (1.27)	
	*Could not be analyzed, monitoring station with shelter was knocked down and tube was damaged due to storm													
		9/30/2021 - 10/15/2021	2.92 (3.07)	2.58	1.47	1.47	1.36	1.34	1.24	1.37	1.22	1.40	1.38	1.69
		10/15/2021 - 10/28/2021	2.02	2.33 (2.33)	1.97	2.50	1.39	1.27	1.30	1.05	1.32	1.04	0.80	1.22
		10/28/2021 - 11/12/2021	5.77	2.40	1.80 (1.54)	1.95	1.20	1.10	1.12	1.09	1.22	1.08	1.08	1.21
		11/12/2021 - 11/25/2021	2.31	2.49	1.63	1.73 (1.68)	0.93	0.66	0.66	0.73	0.65	0.56	0.80	1.26
		11/25/2021 - 12/9/2021	1.67	1.70	1.43	1.96	0.94 (0.96)	0.69	0.65	0.61	0.62	0.69	0.90	1.07
	12/9/2021 - 12/23/2021	2.46	2.27	1.49	1.62	1.37	1.12 (1.17)	0.98	0.93	0.99	0.99	1.13	1.41	
	12/23/2021 - 1/6/2022	1.68	1.6	1.2	1.37	1.5	1.15	1.11 (1.16)	1.07	1.16	0.97	1.09	1.24	




LEGEND

- Ambient Air Monitor
- Sensitive Receptor



Notes:
 Last revised on Dec. 6, 2016 – added AFN Healthcare Centre, Daycare, Senior Centre & Community Centre

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LEHDER PROJECT NUMBER: 163368	SARNIA REFINERY SUNCOR ENERGY PRODUCTS
DATE: January 2017	Location of nearest Sensitive Receptors
LEADER DRAWING NUMBER: B-164256C-2	
<p>0 500m 1000m 1500m 2000m</p> <p>SCALE: 1:25000 (1mm=25metre)</p>	

Following three full calendar years (2018-2020) of monitoring, a three-year benzene measurement baseline was determined for each monitoring location. This baseline will be updated annually based on the measurements from the previous three calendar years. The updated baseline from the monitoring period (2019-2021) can be found below.

For the monitoring period from 2019-2021 the results are as follows:

	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12
Sum	0.48	0.22	0.23	0.11	0.17	0.29	0.22	0.17	0.30	0.27	0.27	0.21
Std. Dev Squared	0.019	0.009	0.009	0.004	0.007	0.012	0.009	0.007	0.012	0.011	0.011	0.009

These results are based on the MECP formula in paragraph 4 of section 61 of the Technical Standards to Manage Air Pollution – Petroleum Refining.

$$S^2 = \frac{1}{m-1} \sum (x_i - X)^2$$

Where,

S is the standard deviation;

m is the number of two-week average concentrations recorded in paragraph 1;

x_i is each value translated in paragraph 2; and

X is the value calculated in paragraph 3.

A statistical comparison to the baseline was performed for each monitor based on measurements from the previous calendar year. If there is any location with a statistically significant increase from the baseline, further analysis will be conducted to assess for potential actions to prevent, minimize or reduce the risk of future statistically significant increases in annual benzene concentrations.

The statistical comparison to the baseline for the 2021 PLM results showed there was no statistical significant increase.

	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11	Station 12
Calculated T - Value	-0.127	0.784	0.238	0.524	-0.872	-0.208	-0.421	-1.062	-0.853	0.254	0.039	0.172
Degree of freedom corresponding T value for comparison	3.551	3.551	3.551	3.551	3.46	3.551	3.551	3.551	3.551	3.551	3.551	3.551

Based on 2021 monitored data, all calculated T-Value's for each station were lower than the corresponding T-value in Table 6-62 of the technical standard

These results are based on the MECP formula in section 62 of the Technical Standards to Manage Air Pollution – Petroleum Refining.