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 2022 our annual average from all 12 perimeter monitoring locations was 1.53 ug/m3. The statistical analysis with our three year benzene measurement baseline is included in this 2022 annual report. The full results from the 2022 monitoring program can be found below along with the map of the property line monitoring locations.

Annual Average for each station:

|	2022 Annual Average - Benzene (ug/m3)
STN-1	2.44
STN-2	2.41
STN-3	1.64
STN-4	2.04
STN-5	1.56
STN-6	1.31
STN-7	1.19
STN-8	1.19
STN-9	1.26
STN-10	1.01
STN-11	0.95
STN-12	1.30

Table 1: 2022 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 4754363mN	382919mE 4754241mN	383006mE 4754172mN	382965mE 4754030mN	383490mE 4753619mN	383233mE 4753234mN	382748mE 4753824mN	382586mE 4753729mN	382400mE 4753863mN	382101mE 4754053mN	381980mE 4754394mN	382432mE 4754670mN
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
1/6/2022 - 1/21/2022	1.65	1.88	1.46	2.04	1.23	1.04	1.01	0.97 (1.01)	1.22	1.03	1.00	1.29
1/21/2022 - 2/3/2022	2.2	2.03	1.34	1.41	1.21	1.09	1.04	1.1	1.09 (1.13)	0.98	1.04	1.34
2/3/2022 - 2/17/2022	2.77	2.79	2.1	2.4	1.65	1.58	1.95	1.36	1.77	1.32 (1.29)	1.38	1.51
2/17/2022 - 3/3/2022	2.38	2.32	1.78	2.1	1.81	1.56	1.36	1.36	1.29	1.33	1.30 (1.22)	1.18
3/3/2022 - 3/17/2022	2.16	4.28	1.62	2.01	1.6	1.16	1.33	2.29	1.6	1.19	1.19	1.61 (1.68)
3/17/2022 - 3/31/2022	2.01 (2.10)	1.72	1.51	1.98	1.5	1.2	1.33	1.28	2.32	0.97	1.01	0.88
3/31/2022 - 4/14/2022	2.33	1.82 (1.83)	1.45	1.86	1.19	1.04	1.03	1.06	1.26	0.92	0.92	1.22
4/14/2022 - 4/28/2022	1.9	2.1	1.55 (1.69)	2.44	1.32	1.09	1.2	0.98	1.55	1.26	0.93	1.25
4/28/2022 - 5/12/2022	2.26	1.86	1.37	1.31 (1.17)	1.88	1.89	1.15	1.31	2.36	1.15	1.80	1.40
5/12/2022 - 5/26/2022	2.47	1.89	1.36	1.54	2.31 (2.20)	2.28	1.6	1.48	1.2	1.15	0.68	1.22
5/26/2022 - 6/9/2022	2.59	2.2	1.34	1.79	1.6	1.28 (0.99)	1.03	1.11	1.12	0.73	0.50	0.96
6/9/2022 - 6/23/2022	2.92	2.68	1.86	2.38	2.54	1.6	1.54 (1.40)	1.24	0.99	0.59	0.39	0.99
6/23/2022 - 7/7/2022	2.91	2.87	2.04	2.96	1.49	1.04	1.02	0.98 (0.87)	1.04	0.85	0.97	1.15
7/7/2022 - 7/21/2022	2.40	2.50	1.69	2.06	1.36	1.4	1.36	1.21	1.16 (1.27)	0.89	0.82	1.28
7/21/2022 - 8/4/2022	2.99	3.63	3.15	3.92	1.4	1.02	0.72	0.63	0.65	0.60 (0.65)	1.00	1.42
8/4/2022 - 8/18/2022	2.76	2.56	2.11	2.73	3.05	3.19	1.89	2.27	1.79	1.3	2.05 (2.04)	2.15
8/18/2022 - 9/1/2022	2.46	2.33	1.74	1.99	1.38	1.23	1.09	1.05	1.00	0.92	0.86	1.64 (1.56)
9/1/2022 - 9/15/2022	2.43 (2.20)	2.17	1.66	2.00	2.28	2.06	1.66	1.30	1.18	0.98	0.88	1.40
9/15/2022 - 9/29/2022	2.41	3.10 (3.05)	1.61	2.43	1.19	0.70	0.83	0.61	0.63	0.77	0.58	1.11
9/29/2022 - 10/13/2022	2.12	2.48	1.83 (1.74)	2.09	1.46	1.48	1.62	1.35	1.80	0.89	0.67	0.95
10/13/2022 - 10/27/2022	2.53	2.51	1.31	1.53 (1.75)	1.10	0.56	0.70	0.55	0.71	0.63	0.77	1.52
10/27/2022 - 11/10/2022	2.68	2.73	1.31	1.29	0.88 (0.93)	0.62	1.01	1.07	0.97	0.95	0.96	1.45
11/10/2022 - 11/24/2022	2.81	3.04	1.85	2.12	1.40	0.77 (0.85)	0.89	0.78	0.68	0.97	0.87	1.60
11/24/2022 - 12/8/2022	3.2	2.05	1.59	1.81	1.42	1.03	1.20 (1.16)	1.00	1.00	0.93	1.03	1.47
12/8/2022 - 12/22/2022	2.17	1.77	1.12	1.15	1.00	0.99	0.78	1.04 (1.07)	1.14	1.88	1.29	1.11
12/22/2022 - 1/5/2023	2.26	2.21	1.37	1.14	1.40	0.89	1.00	1.10	1.08 (1.02)	1.14	1.01	1.42

Measured Benzene Concentrsion from 2-week monitoring period (ug/m3)

Note: Duplicate values will be expressed in (brackets)
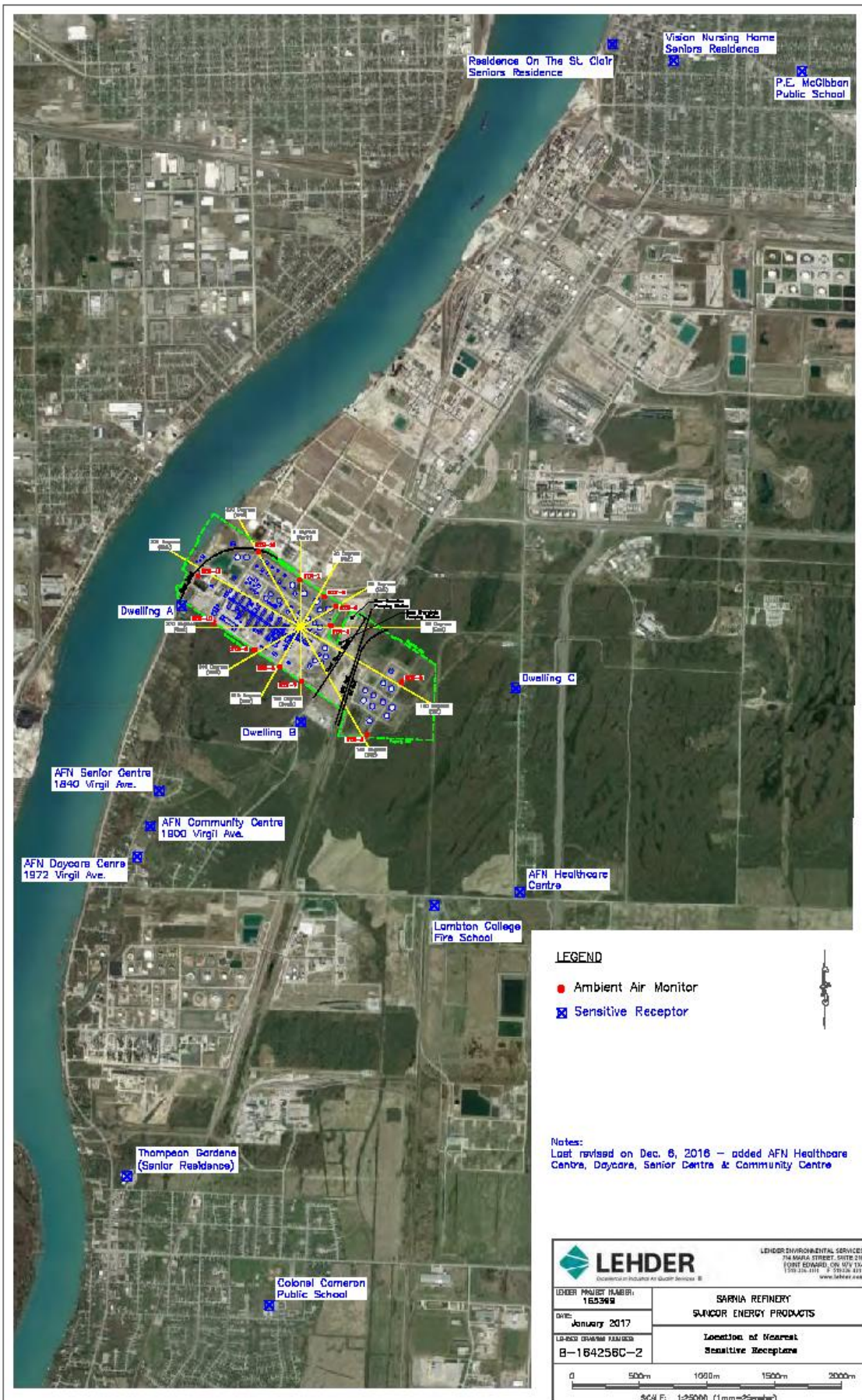
LEGEND

● Ambient Air Monitor

⊠ Sensitive Receptor

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

Vision Nursing Home
Seniors Residence

Residence On The St. Clair
Seniors Residence

P.E. McGibbon
Public School

Dwelling A

Dwelling C

Dwelling B

AFN Senior Centre
1840 Virgil Ave.

AFN Community Centre
1800 Virgil Ave.

AFN Daycare Centre
1972 Virgil Ave.

AFN Healthcare
Centre

Lambton College
Fire School

Thompson Gardens
(Senior Residence)

Colonel Cameron
Public School

LEHDER

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LEHDER PROJECT NUMBER:
165399

SARNIA REFINERY
SUNCOR ENERGY PRODUCTS

DATE:
January 2017

LEHDER DRAWING NUMBER:
B-164256C-2

Location of Nearest
Sensitive Receptors

0   500m   1000m   1500m   2000m

SCALE 1:25000 (1mm=25meter)

Following three full calendar years (2018-2020) of monitoring, a three-year benzene measurement baseline was determined for each monitoring location. This baseline has been updated annually based on the measurements from the previous three calendar years. The updated baseline from the monitoring period (2020-2022) can be found below.

For the monitoring period from 2020-2022 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	0.36	0.83	0.63	0.73	1.24	1.36	0.76	0.33	1.22	0.32	1.36	0.53
Std. Dev Squ	0.0127311	0.011	0.009	0.009	0.016	0.018	0.01	0.012	0.016	0.012	0.018	0.008

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

$$S^2 = [_1 \sum (x_i - X)^2] / (m-1)$$

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 2022 PLM results showed there was no statistical significant increase.

	T - Value											
	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	2.179	0.975	0.949	1.045	1.255	0.137	0.625	0.614	0.206	0.747	-0.039	1.173
Degree of freedom corresponding T value for comparison	3.46	3.551	3.551	3.551	3.551	3.551	3.551	3.551	3.551	3.551	3.551	3.551

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