Summary of Ontario reportable substances (O-REG 455/09) - 2016

Facility Operator
IMPERIAL OIL
Imperial Oil Sarnia Refinery
602 South Christina Street, P.O. Box 3004
SARNIA, ON, N7T 7M5

Facility Owner
Imperial Oil Limited
505 Quarry Park Blvd. SE,
P.O. Box 2480, Station M
Calgary, Alberta T2C 5N1

Additional Facility Information
NPRI ID: 3704/11174 MOE ID 5132
Number of employees: 330
NAICS 2 Code: 31-33 - Manufacturing
NAICS 4 Code: 3241 - Petroleum & Coal Products Mfg.
NAICS 6 Code: 324110 - Petroleum Refineries
UTM NAD 83: 17N 385773.59 4756731.82

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Provincial regulations set out requirements for business owners to inform Ontarians about the use, creation and emissions of reportable substances in their communities. Under the Toxics Reduction Act (TRA), companies are required to post information quantifying these substances each year.

Substances are identified as "toxic" substances for the purposes of the Act if the substance is listed in the National Pollutant Release Inventory (NPRI). The NPRI is a federal database of emissions (to air, land and water) and waste transfers (on-site and offsite) and is available to the public on Environment Canada site (www.ec.gc.ca/inrp-npri). More information on the TRA is available at the Ontario Ministry of the Environment site (www.ene.gov.on.ca/environment/en/legislation/toxics_reduction_act/index.htm)

Petroleum refineries process crude oil to manufacture finished products that are used and valued by our society such as gasoline and heating oil. Crude oil may contain varying quantities of the substances covered under the Act. Through the tightly controlled multi-step refinery operation, a variety of substances are used, created and destroyed within contained piping and vessels. Finished products are highly regulated for both content (sulphur levels, for example) and use (pollution controls and higher mileage vehicles).

The notice below summarizes tracking and quantification of facility-wide quantities:

- **Used**: Amount of substance that enters the process. Includes amounts already present in raw materials or through addition of products required for processing.
- **Created**: Amount of substance produced during the processing stage.
- **Contained in product**: Amount of substance remaining after process is complete.
- **Emissions**: These are releases of substance from the facility to air, surface water or land; and, waste transfers (on-site and offsite).

Starting with the 2011 reporting year, companies are required to report the year-over-year change in these reportable substances. The tables below report the amount of change between the previous year and the reporting year by comparing the difference of the ranges by order of magnitude. Facilities are also required to report the change in percentage. The percentage of change is calculated from the mid-point of the previous year's range to the mid-point of the reporting year's range, and is reported in the table below as thousand percent. For example, a range change from >1-10 to >1,000-10,000 is equal to three orders of magnitude change, which is equal to 100 thousand percent change. When comparing zero to an amount, the percentage of change is reported as not applicable (n/a). Positive/negative changes for the reporting year indicate an increase/decrease from the previous year

A summary of reasons behind the change for each reportable substance is provided. The changes fall into the following categories:

- **No change**
- **New substance to report**: This substance was not reportable in previous year.
- **System variability**: There are many combined factors that result in system variability. Substances will vary depending on the feedstocks/raw crudes processed. Variability in operation can also affect the results. Analytical results have uncertainty, which can be increased when measuring low/trace levels. As a result, a change in substance range within a given amount may be attributed to system variability, even if the percentage of change is significantly different. This includes changes due to consumer demand fluctuations, shut-down and maintenance activities.
- **Change in production levels**: Change resulted from a sustained increase or decrease in production at the facility.
- **Improvement of data quality**: Change resulted from continuous improvement of the quality of the data used to calculate the amount of substance.

Reporting of substance quantities in ranges is allowed under the regulation to ensure that confidential information is not disclosed. Emissions data is annually reported to NPRI in absolute terms and is not considered confidential information.

	Substances (reported in kilograms)	Chemical Abstract Service CAS Registry Number	Report of Tracking and Quantification of Facility-Wide Quantities: Used (kg)	Created (kg)	Contained in Product (kg)	Comparison Report - Percentage of Change: Used – Percentage of change	Used – Magnitude of change	Created – Percentage of change	Created – Magnitude of change	Containted in Product – Percentage of change	Containted in Product – Magnitude of change	Reason for Change
Metals	Cadmium	**	>100 to 1000	0	0	-6.8E+2	100 to 1000	N/A	0	N/A	0	system variability
	Lead	**	>1000 to 10,000	0	0	-91	1000 to 10,000	N/A	0	100	10 to 100	system variability
	Mercury	**	>1 to 10	0	>100 to 1000	100	1000 to 10,000	N/A	0	-3	1 to 10	system variability
	Selenium	**	0	0	>100 to 1000	N/A	0	N/A	0	-6.1E+2	100 to 1000	system variability
Polyaromatic Hydrocarbons (PAH)	7H-Dibenzo(c,g)carbazole	194-59-2	0	>0 to 1	0	N/A	0	0	0 to 1	N/A	0	system variability
	Acenaphthene	83-32-9	>100,000 to 1,000,000	>100,000 to 1,000,000	>100,000 to 1,000,000	-55	10,000 to 100,000	3	10,000 to 100,000	-46	100,000 to 1,000,000	system variability
	Acenaphthylene	208-96-8	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	-34	10,000 to 100,000	-3.7E+2	10,000 to 100,000	-51	1000 to 10,000	system variability
	Benzo(a)anthracene	56-55-3	>1000 to 10,000	>10,000 to 100,000	>10,000 to 100,000	N/A	1000 to 10,000	94	100,000 to 1,000,000	0	10 to 100	system variability
	Benzo(a)phenanthrene	218-01-9	>1000 to 10,000	0	0	N/A	1000 to 10,000	100	0 to 1	N/A	0	system variability
	Benzo(a)pyrene	50-32-8	>1000 to 10,000	>1000 to 10,000	>10,000 to 100,000	N/A	1000 to 10,000	95	10,000 to 100,000	60	10,000 to 100,000	system variability
	Benzo(b/j)fluoranthene	205-99-2 / 205-82-3	>1000 to 10,000	0	>10,000 to 100,000	N/A	1000 to 10,000	100	10,000 to 100,000	56	10,000 to 100,000	system variability
	Benzo(e)pyrene	192-97-2	>1000 to 10,000	>10,000 to 100,000	>10,000 to 100,000	-21	1000 to 10,000	0	100 to 1000	51	10,000 to 100,000	system variability
	Benzo(g,h,i)perylene	191-24-2	0	>1000 to 10,000	>10,000 to 100,000	N/A	0	84	10,000 to 100,000	59	10,000 to 100,000	system variability
	Benzo(k)fluoranthene	207-08-9	0	>1000 to 10,000	>1000 to 10,000	N/A	0	N/A	1000 to 10,000	49	1000 to 10,000	system variability
	Dibenz(a,j)acridine	224-42-0	>1000 to 10,000	>0 to 1	0	-21	100 to 1000	0	0 to 1	N/A	0	system variability
	Dibenzo(a,i)pyrene	189-55-9	>1000 to 10,000	>0 to 1	0	-21	100 to 1000	0	0 to 1	N/A	0	system variability
	Fluoranthene	206-44-0	>10,000 to 100,000	>100,000 to 1,000,000	>10,000 to 100,000	-1.5E+2	10,000 to 100,000	-5	10,000 to 100,000	28	1000 to 10,000	system variability
	Fluorene	86-73-7	>100,000 to 1,000,000	>100,000 to 1,000,000	>100,000 to 1,000,000	-81	100,000 to 1,000,000	18	100,000 to 1,000,000	-84	100,000 to 1,000,000	system variability
	Indeno(1,2,3-c,d)pyrene	193-39-5	>1000 to 10,000	>0 to 1	>1000 to 10,000	-21	1000 to 10,000	100	1000 to 10,000	45	1000 to 10,000	system variability
	Perylene	198-55-0	>1000 to 10,000	0	>10,000 to 100,000	-21	1000 to 10,000	100	10,000 to 100,000	57	10,000 to 100,000	system variability
	Phenanthrene	85-01-8	>1,000,000	>1,000,000	>1,000,000	-99	100,000 to 1,000,000	4	10,000 to 100,000	-61	100,000 to 1,000,000	system variability
	Pyrene	129-00-0	>100,000 to 1,000,000	>100,000 to 1,000,000	>100,000 to 1,000,000	-1.5E+2	100,000 to 1,000,000	29	100,000 to 1,000,000	44	100,000 to 1,000,000	system variability

	Substances (reported in tonnes)	Chemical Abstract Service CAS Registry Number	Report of Tracking and Quantification of Facility-Wide Quantities: Used (tonnes)	Created (tonnes)	Contained in Product (Tonnes)	Comparison Report - Percentage of Change: Used – Percentage of change	Used – Magnitude of change	Created – Percentage of change	Created – Magnitude of change	Containted in Product – Percentage of change	Containted in Product – Magnitude of change	Reason for Change
Metals	Nickel	**	>100 to 1000	0	>10 to 100	-40	10 to 100	N/A	0	23	10 to 100	system variability
	Vanadium	7440-62-2	>100 to 1000	0	>100 to 1000	-31	10 to 100	N/A	0	25	10 to 100	system variability
	Zinc	**	>0 to 1	0	>0 to 1	40	0 to 1	N/A	0	76	0 to 1	system variability
PAH*	Naphthalene	91-20-3	>1000 to 10,000	>1000 to 10,000	>1000 to 10,000	-42	100 to 1000	27	1000 to 10,000	-24	1000 to 10,000	system variability
Hydrocarbons	1, 2, 4-Trimethylbenzene ☆	25551-13-7	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	-1	100 to 1000	-34	1000 to 10,000	-13	1000 to 10,000	system variability
	1, 3-Butadiene ☆	106-99-0	>1000 to 10,000	>1000 to 10,000	>1000 to 10,000	35	1000 to 10,000	3	10 to 100	9	100 to 1000	system variability
	Benzene ☆	71-43-2	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	5	1000 to 10,000	11	1000 to 10,000	10	10,000 to 100,000	system variability
	Biphenyl	92-52-4	>1000 to 10,000	>100 to 1000	>1000 to 10,000	-29	100 to 1000	11	10 to 100	-83	100 to 1000	system variability
	Cyclohexane	110-82-7	>10,000 to 100,000	>10,000 to 100,000	>1000 to 10,000	3	1000 to 10,000	-1	100 to 1000	5	100 to 1000	no change
	Ethylbenzene	100-41-4	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	-2	100 to 1000	-47	1000 to 10,000	-27	1000 to 10,000	system variability
	Ethylene ☆	74-85-1	>0 to 1	>10,000 to 100,000	>10,000 to 100,000	94	1 to 10	1	100 to 1000	1	100 to 1000	system variability
	Isoprene (1, 3 Butadiene, 2-methyl-Batch 2)	78-79-5	>1000 to 10,000	>100 to 1000	>100 to 1000	-6	10 to 100	-21	100 to 1000	-1	1 to 10	system variability
	n-Hexane ☆	110-54-3	>100,000 to 1,000,000	>1000 to 10,000	>10,000 to 100,000	-5	1000 to 10,000	90	10,000 to 100,000	35	10,000 to 100,000	system variability
	Propylene ☆	115-07-1	>100 to 1000	>10,000 to 100,000	>10,000 to 100,000	36	100 to 1000	27	10,000 to 100,000	28	10,000 to 100,000	system variability
	Toluene ☆	108-88-3	>10,000 to 100,000	>100,000 to 1,000,000	>100,000 to 1,000,000	14	10,000 to 100,000	-58	10,000 to 100,000	-26	10,000 to 100,000	system variability
	Xylene ☆	1330-20-7	>10,000 to 100,000	>100,000 to 1,000,000	>100,000 to 1,000,000	11	1000 to 10,000	-46	10,000 to 100,000	-29	10,000 to 100,000	system variability

			Report of Tracking and Quantification of Facility-Wide Quantities			Comparison Report - Percentage of Change						
						Used		Created		Containted in Product		
	Substances (reported in tonnes)	Chemical Abstract Service CAS Registry Number	Used (tonnes)	Created (tonnes)	Contained in Product (Tonnes)	Percentage of change	Magnitude of change	Percentage of change	Magnitude of change	Percentage of change	Magnitude of change	Reason for Change
Other	Ammonia	**	>1 to 10	0	0	28	1 to 10	100	0 to 1	N/A	0	system variability
	Asbestos	1332-21-4	0	0	0	N/A	0	N/A	0	N/A	0	no change
	Carbon Monoxide	630-08-0	0	>1000 to 10,000	0	N/A	0	-7	10 to 100	N/A	0	system variability
	Cresol	1319-77-3	0	>1 to 10	0	100	0 to 1	-9	0 to 1	100	0 to 1	no change
	Ethylene glycol	107-21-1	0	0	0	100	0 to 1	N/A	0	100	0 to 1	system variability
	H2S	7783-06-4	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	3	1000 to 10,000	-60	10,000 to 100,000	-4	100 to 1000	system variability
	Hydrogen cyanide	74-90-8	0	>10 to 100	0	N/A	0	3	1 to 10	N/A	0	system variability
	Isopropyl alcohol	67-63-0	>10 to 100	>0 to 1	>0 to 1	0	0 to 1	-1	0 to 1	0	0 to 1	system variability
	Methanol ☆	67-56-1	>10 to 100	>1 to 10	0	-15	1 to 10	-34	1 to 10	N/A	0	system variability
	Molybdenum Trioxide	1313-27-5	>10 to 100	0	0	61	10 to 100	N/A	0	N/A	0	system variability
	Nitrate	**	0	>100 to 1000	0	N/A	0	24	10 to 100	N/A	0	system variability
	Nox	11104-93-1	0	>1000 to 10,000	0	N/A	0	-19	100 to 1000	N/A	0	system variability
	Particulates	**	0	>100 to 1000	0	N/A	0	58	1000 to 10,000	N/A	0	system variability
	Phenol (and its salts)	108-95-2	>0 to 1	>10 to 100	>0 to 1	-27	0 to 1	61	10 to 100	-27	0 to 1	system variability
	PM10	**	0	>100 to 1000	0	N/A	0	40	100 to 1000	N/A	0	system variability
	PM25	**	0	>100 to 1000	0	N/A	0	12	10 to 100	N/A	0	system variability
	Sulphur Dioxide	1446-09-5	0	>1000 to 10,000	0	N/A	0	10	1000 to 10,000	N/A	0	unplanned event previous year
	Sulphuric acid	7664-93-9	0	>100 to 1000	0	N/A	0	-3	1 to 10	N/A	0	system variability
	Total Reduced Sulphur	**	>10,000 to 100,000	>10,000 to 100,000	>10,000 to 100,000	3	1000 to 10,000	-60	10,000 to 100,000	-4	100 to 1000	system variability
	Volatile Organic Compounds	**	>1,000,000	>1,000,000	>1,000,000	3	10,000 to 100,000	6	10,000 to 100,000	2	10,000 to 100,000	system variability

	Substances (reported in kilograms)	Report of Tracking and Quantification of Facility-Wide Quantities					Comparison Report - Percentage of Change										
		Releases To Air (kg)	Releases to Water (kg)	Releases to Land (kg)	Onsite / Offsite Disposal	Transfer for Treatment and	Releases To		Releases to		Releases to		Onsite / Offsite Disposal		Transfer for Treatment and		Reason for Change
							Percentage (%)	Amount (kg)	Percentage (%)	Amount (kg)	Percentage (%)	Amount (kg)	Percentage (%)	Amount (kg)	Percentage (%)	Amount (kg)	
Metals	Cadmium	11	0	0	1	0.03	5	1	N/A	0	N/A	0	8.2E+2	0.51	-58	-0.043	system variability
Metals	Lead	35	0	0	131	6	-8	-3	N/A	0	N/A	0	9.1E+2	118.5	-58	-9	system variability
Metals	Mercury	3	0	0	0	0	8	0.24	N/A	0	N/A	0	-18	0	N/A	0	system variability
Metals	Selenium	44	0	21	21	0.0	2.6E+2	32	N/A	0	N/A	21	1.0E+5	21	-58	0	system variability
Polyaromatic Hydrocarbons (PAH)	7H-Dibenzo(c,g)carbazole	0.02	0	0	0	0	7	0.0015	N/A	0	N/A	0	N/A	0	N/A	0	No reasons - quantities approximately the same
Polyaromatic Hydrocarbons (PAH)	Acenaphthene	67	0	0	62	0.00	1.2E+2	37	N/A	0	N/A	0	-86	-392	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Acenaphthylene	121	0	0	123	0	2.6E+2	87	N/A	0	-100	-47	-88	-933	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(a)anthracene	1.4	0	0	7	0	2.0E+2	0.91	N/A	0	N/A	0	-87	-46	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(a)phenanthrene	2	0	0	0.3	0	8	0.1	N/A	0	N/A	0	-97	-10	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(a)pyrene	1	0	0	4	0	13	0.1	N/A	0	N/A	0	-88	-27	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(b/j)fluoranthene	0.8	0	0	3	0	13	0.09	N/A	0	N/A	0	-73	-7	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(e)pyrene	1	0	0	2	0	-24	-0.4	N/A	0	N/A	0	6.1E+4	2	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(g,h,i)perylene	1	0	0	1.4	0	-36	-0.71	N/A	0	N/A	0	-85	-8	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Benzo(k)fluoranthene	0.2	0	0	0.7	0	33	0.049	N/A	0	N/A	0	5.4E+4	0.7	N/A	0.000	system variability
Polyaromatic Hydrocarbons (PAH)	Dibenz(a,j)acridine	0.03	0	0	0	0	5	0.001	N/A	0	N/A	0	N/A	0	N/A	0	No reasons - quantities approximately the same
Polyaromatic Hydrocarbons (PAH)	Dibenzo(a,i)pyrene	0.03	0	0	0	0	-7	-0.002	N/A	0	N/A	0	N/A	0	N/A	0	No reasons - quantities approximately the same
Polyaromatic Hydrocarbons (PAH)	Fluoranthene	3	0	0	21	0.0	87	1	N/A	0	N/A	0	-87	-142	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Fluorene	67	0	0	84	0.00	1.3E+2	38	N/A	0	N/A	0	-90	-763	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Indeno(1,2,3-c,d)pyrene	0.2	0	0	0.936	0	-31	-0.1	N/A	0	N/A	0	7.0E+4	0.934	N/A	0.000	system variability
Polyaromatic Hydrocarbons (PAH)	Perylene	0.5	0	0	0.9354	0	-17	-0.10	N/A	0	N/A	0	1.0E+5	0.935	N/A	0.000	system variability
Polyaromatic Hydrocarbons (PAH)	Phenanthrene	70	0	0	162	0.0	1.7E+2	43	N/A	0	-86	0	-88	-1152	N/A	0	system variability
Polyaromatic Hydrocarbons (PAH)	Pyrene	4	0	0	48	0	17	0.6	N/A	0	N/A	0	-86	-307	N/A	-1	system variability

	Substances (reported in tonnes)	Report of Tracking and Quantification of Facility-Wide Quantities					Comparison Report - Percentage of Change										
		Releases To Air (tonnes)	Releases to Water (tonnes)	Releases to Land (tonnes)	Onsite / Offsite Disposal	Transfer for Treatment and	Releases To		Releases to		Releases to		Onsite / Offsite Disposal		Transfer for Treatment and		Reason for Change
							Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	
Metals	Nickel	2	0	0	8	17	-14	-0.3	N/A	0	N/A	0.0	-3	-0.2	-61	-26	system variability
Metals	Vanadium	6	0	0	0.5	0	24	1	N/A	0	N/A	0.0	-26	-0.2	-58	0.0	system variability
Metals	Zinc	0.4	0	0	0.35	0.02	8	0.03	N/A	0	N/A	0.03	8.3E+2	0.32	-59	-0.03	system variability
PAH	Naphthalene	1.4	0	0	0.9	0	2.3E+2	1	N/A	0	N/A	0	-78	-3.3	N/A	0	system variability
Hydrocarbons	1, 2, 4-Trimethylbenzene ☆	3	0	0	0.0	0.00	10	0	N/A	0	N/A	0	N/A	-0.2	N/A	0	system variability
Hydrocarbons	1, 3-Butadiene ☆	1	0	0	0	0	-16	-0.2	N/A	0	N/A	0	N/A	0	N/A	0	system variability
Hydrocarbons	Benzene ☆	9	0.01	0	0.0	0.00	4	0.3	0	0.000	N/A	0	-96	-0.8	N/A	0	No reasons - quantities approximately
Hydrocarbons	Biphenyl	0.1	0	0	0.1	0	18	0.0	N/A	0	N/A	0	-40	-0.1	N/A	0.0	system variability
Hydrocarbons	Cyclohexane	10	0	0	14	0	-1	0	N/A	0	N/A	0	27	3	N/A	0	system variability
Hydrocarbons	Ethylbenzene	3	0	0	0.1	0	-4	-0.1	N/A	0	N/A	0	-80	-0.3	N/A	0	No reasons - quantities approximately
Hydrocarbons	Ethylene ☆	3	0	0	0	0	-18	-1	N/A	0	N/A	0	N/A	0	N/A	0	system variability
Hydrocarbons	Isoprene (1, 3 Butadiene, 2-methyl- Batch 2)	0.06	0	0	0	0	43	0.02	N/A	0	N/A	0	N/A	0	N/A	0	system variability
Hydrocarbons	n-Hexane ☆	14	0	0	0.1	0	-26	-5	N/A	0	N/A	0	-71	-0.2	N/A	0	system variability
Hydrocarbons	Propylene	20	0	0	1	0	37	6	N/A	0	N/A	0	-35	-0.4	N/A	0.00	system variability
Hydrocarbons	Toluene	18	0.002	0	0.3	0	10	2	-55	-0.002	N/A	0	-83	-1	N/A	0	system variability
Hydrocarbons	Xylene	12	0	0	0.4	0	-1	0	N/A	0	N/A	0	-78	-1	N/A	0	system variability

	Substances (reported in tonnes)	Report of Tracking and Quantification of Facility-Wide Quantities					Comparison Report - Percentage of Change										
		Releases To Air (tonnes)	Releases to Water (tonnes)	Releases to Land (tonnes)	Onsite / Offsite Disposal	Transfer for Treatment and	Releases To		Releases to		Releases to		Onsite / Offsite Disposal		Transfer for Treatment and		Reason for Change
							Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	Percentage (%)	Amount (tonnes)	
Other	Ammonia	4	0.0	0	0	0	-23	-1	-95	-1	N/A	0	N/A	0	N/A	0	system variability
	Asbestos	0	0	0	20	0	N/A	0	N/A	0	N/A	0	-62	-33	N/A	0	system variability
	Carbon Monoxide	1040	0	0	0	0	8	73	N/A	0	N/A	0	N/A	0	N/A	0	No reasons - quantities approximately the same
	Cresol	0.8	0	0	0.5	0	3	0.026	N/A	0	N/A	0	-40	-0.3	N/A	0	system variability
	Ethylene glycol	0.04	0	0	5	1	17	0.01	N/A	0	N/A	0	N/A	5	-93	-10	system variability
	H2S	27	0	0	1	0	1.3E+2	15	N/A	0	N/A	0	13	0.1	N/A	0	system variability
	Hydrogen cyanide	50	0	0	0	0	-5	-3	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	Methanol ☆	7	0	0	0	0	29	2	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	Molybdenum Trioxide	0	0	0	19	42	N/A	0	N/A	0	N/A	0	-2	0	-61	-64	system variability
	Nitrate	0	199	0	0	0	N/A	0	-24	-64	N/A	0	N/A	0	N/A	0	system variability
	Nox	2299	0	0	0	0	19	371	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	Particulates	732	0	0	0	0	-58	-1006	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	Phenol (and its salts)	0.1	0.1	0	7	0	-55	-0.1	-23	-0.03	N/A	0	-72	-19	N/A	0	system variability
	PM10	555	0	0	0	0	-40	-370	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	PM25	278	0	0	0	0	-12	-37	N/A	0	N/A	0	N/A	0	N/A	0	system variability
	Sulphur Dioxide	9876	0	0	0	0	-10	-1130	N/A	0	N/A	0	N/A	0	N/A	0	unplanned event previous year
	Sulphuric acid	201	0	0	0	0	3	6	N/A	0	N/A	0	N/A	0	N/A	0	No reasons - quantities approximately the same
	Total Reduced Sulphur	32	0	0	1	0	93	16	N/A	0	N/A	0	13	0.1	N/A	0	system variability
	Volatile Organic Compounds	337	0.01	0	3	0	6	19	-22	-0.002	N/A	0	-67	-6	N/A	-1	system variability

** No single CAS number applies to this substance

☆also included in Volatile Organic Compounds

	Toxic Reduction Plan Stewardship - 2016 Reporting Year						
	Substances	**Plan Objectives and Targets**	**Summary of steps taken during the previous calendar year (2016) to implement the toxics reduction options identified in the plan and the reduction amount resulting from these steps**	**Comparison of steps taken during the previous calendar year (2016) to steps included in the plan**	**Indication of whether timeline(s) set out in plan will be met**	**Additional actions taken during the previous calendar year (2016) to achieve the plan's objectives and the reduction amount resulting from the additional actions**	**Amendments made to the plan during the previous calendar year (2015)**
Metals	Cadmium	Cadmium (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Cadmium (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Lead	Lead (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Lead (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Mercury	Mercury (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Mercury (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Selenium	Selenium (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Selenium (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Nickel	Nickel (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Nickel (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Vanadium	Vanadium (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Vanadium (and its compounds) is also found in trace quantities in the purchased feed. No reduction objectives have been identified	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Zinc	Zinc (and its compounds) is naturally occurring in trace quantities in the crude oil required by the refinery to run its base business. Zinc (and its compounds) is also found in trace quantities in the purchased feed. Additionally, the Zinc (and its compounds) used at BP&S is required to achieve finished product quality specifications. No reduction objectives have been identified	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Polyaromatic Hydrocarbons (PAH)	7H-Dibenzo(c,g)carbazole	7H-Dibenzo(c,g)carbazole enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of 7HDibenzo(c,g)carbazole were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Acenaphthene	Acenaphthene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Acenaphthene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Acenaphthylene	Acenaphthylene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Acenaphthylene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(a)anthracene	Benzo(a)anthracene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(a)anthracene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(a)phenanthrene	Benzo(a)phenanthrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(a)phenanthrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(a)pyrene	Benzo(a)pyrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(a)pyrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments

	Toxic Reduction Plan Stewardship - 2016 Reporting Year						
	Substances	**Plan Objectives and Targets**	**Summary of steps taken during the previous calendar year (2016) to implement the toxics reduction options identified in the plan and the reduction amount resulting from these steps**	**Comparison of steps taken during the previous calendar year (2016) to steps included in the plan**	**Indication of whether timeline(s) set out in plan will be met**	**Additional actions taken during the previous calendar year (2016) to achieve the plan's objectives and the reduction amount resulting from the additional actions**	**Amendments made to the plan during the previous calendar year (2015)**
Polyaromatic Hydrocarbons (PAH)	Benzo(b/j)fluoranthene	Benzo(b/j)fluoranthene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(b/j)fluoranthene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(e)pyrene	Benzo(e)pyrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(e)pyrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(g,h,i)perylene	Benzo(g,h,i)perylene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(g,h,i)perylene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Benzo(k)fluoranthene	Benzo(k)fluoranthene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Benzo(k)fluoranthene were identified	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Dibenz(a,j)acridine	Dibenzo(a,j)acridine enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Dibenzo(a,j)acridine were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Dibenzo(a,h)anthracene	Dibenzo(a,h)anthracene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Dibenzo(a,h)anthracene were identified	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Dibenzo(a,i)pyrene	Dibenzo(a,i)pyrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Dibenzo(a,i)pyrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Fluoranthene	Fluoranthene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Fluoranthene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Fluorene	Fluorene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Fluorene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Indeno(1,2,3-c,d)pyrene	Indeno(1,2,3-c,d)pyrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Indeno(1,2,3-c,d)pyrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Perylene	Perylene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Perylene were identified	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Phenanthrene	Phenanthrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Phenanthrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Pyrene	Pyrene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Pyrene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Anthracene	Anthracene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Anthracene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Naphthalene	Naphthalene enters the facility in purchased feedstock, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of Naphthalene were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments

	Toxic Reduction Plan Stewardship - 2016 Reporting Year						
	Substances	**Plan Objectives and Targets**	**Summary of steps taken during the previous calendar year (2016) to implement the toxics reduction options identified in the plan and the reduction amount resulting from these steps**	**Comparison of steps taken during the previous calendar year (2016) to steps included in the plan**	**Indication of whether timeline(s) set out in plan will be met**	**Additional actions taken during the previous calendar year (2016) to achieve the plan's objectives and the reduction amount resulting from the additional actions**	**Amendments made to the plan during the previous calendar year (2015)**
Hydrocarbons	Propylene	While Imperial Oil has not identified any options to reduce the use or creation of Propylene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Propylene in the coming years. These projects include but are not limited to tank upgrades and improvements to the fugitive emission monitoring program	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Toluene	While Imperial Oil does not intend to reduce the use or creation of Toluene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Toluene in the coming years. These projects include but are not limited to tank upgrades and improvements to the fugitive emission monitoring program.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Xylene	While Imperial Oil has not identified any feasible options to reduce the use or creation of Xylene (all isomers) at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Xylene (all isomers) in the coming years. These projects include but are not limited to tank upgrades and improvements to the fugitive emission monitoring program.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Ammonia	While Imperial Oil has not identified any feasible options to reduce the use or creation of Ammonia (total) at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Ammonia (total) in the coming years. These projects include but are not limited to improvements to the fugitive emission monitoring program	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Asbestos	There are no new uses of Asbestos (friable form only) and the refinery does not create Asbestos (friable form only).	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Carbon Monoxide	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of Carbon Monoxide at this time	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Cresol	Cresol (all isomers, and their salts) primarily enters the Sarnia Refinery as a blend additive used in lube oil blending. Cresol (all isomers, and their salts) is not created at the Sarnia Refinery. Sarnia Refinery will be reducing the use of Cresol (all isomers, and their salts) with the planned closure of the lube oil blending operations of the refinery	Reduced the use of the blend additive containing Cresol and reduction was achieved per documented plan.	No Change	Reduction plan timeline met	No additional actions	No amendments
	Ethylene glycol	Ethylene glycol primarily enters the Sarnia Refinery as a blend additive used in lube oil blending. Ethylene glycol is not created at the Sarnia Refinery. Sarnia Refinery will be reducing the use of Ethylene glycol with the planned closure of the lube oil blending operations of the refinery	Reduced the use of the blend additive containing Ethylene glycol and reduction was achieved per documented plan.	No Change	Reduction plan timeline met	No additional actions	No amendments
	H2S	While Imperial Oil has not identified any feasible options to reduce the use or creation of HYDROGEN SULPHIDE at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of HYDROGEN SULPHIDE in the coming years. These projects include but are not limited to tank upgrades and improvements to the fugitive emission monitoring program	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
	Hydrogen cyanide	While Imperial Oil has not identified any feasible options to reduce the use or creation of Hydrogen cyanide at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Hydrogen cyanide in the coming years. These projects include but are not limited to improvements to the fugitive emission monitoring program	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments

Toxic Reduction Plan Stewardship - 2016 Reporting Year							
	Substances	**Plan Objectives and Targets**	**Summary of steps taken during the previous calendar year (2016) to implement the toxics reduction options identified in the plan and the reduction amount resulting from these steps**	**Comparison of steps taken during the previous calendar year (2016) to steps included in the plan**	**Indication of whether timeline(s) set out in plan will be met**	**Additional actions taken during the previous calendar year (2016) to achieve the plan's objectives and the reduction amount resulting from the additional actions**	**Amendments made to the plan during the previous calendar year (2015)**
Other	Methanol	Methanol enters the facility as an additive and is destroyed in hydrocarbon processing. Methanol is also created as a by-product in the production of hydrogen which is necessary for many refinery processes. No options to reduce the use or creation of Methanol were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Molybdenum Trioxide	While Imperial Oil has not identified any feasible options to reduce the use or creation of Molybdenum Trioxide at the Sarnia refinery, Molybdenum Trioxide is not released in products or to the environment from refinery operations. All Molybdenum Trioxide is contained in solid catalysts and recovered through recycling operations	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Nitrate	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of NITRATE ION IN SOLUTION AT PH >=6.0 at this time	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Nox	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of Nitrogen oxides (expressed as NO2) at this time	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Particulates	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of TOTAL PARTICULATE MATTER at this time	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Phenol (and its salts)	Sarnia Refinery has already eliminated the primary use of Phenol (and its salts) and does not create any Phenol (and its salts).	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	PM10	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of PM10 - PARTICULATE MATTER	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	PM25	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of PM2.5 - PARTICULATE MATTER	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Sulphur Dioxide	Sarnia Refinery has not identified any technically and economically feasible options to reduce creation of Sulphur Dioxide at this time	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Sulphuric acid	Various projects at Sarnia refinery are expected to reduce fugitive emissions of Sulphuric acid in the coming years. These projects are being evaluated in support of environmental emissions objectives not directly related to Toxic Substance Reductions. Sarnia Refinery does not use Sulphuric acid and no economically feasible options to reduce Sulphuric acid creation were identified.	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments
Other	Total Reduced Sulphur	While Imperial Oil has not identified any feasible options to reduce the use or creation of TOTAL REDUCED SULPHUR (EXPRESSED AS HYDROGEN SULPHIDE) at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of TOTAL REDUCED SULPHUR (EXPRESSED AS HYDROGEN SULPHIDE) in the coming years. These projects include but are not limited to tank upgrades and improvements to the fugitive emission monitoring program	No steps	No Change	Not applicable - no timeline in plan	No additional actions	No amendments

Report Submission and Electronic Certification

NPRI - Electronic Statement of Certification

Specify the language of correspondence

English

Comments (optional)

I hereby certify that I have exercised due diligence to ensure that the submitted information is true and complete. The amounts and values for the facility(ies) identified below are accurate, based on reasonable estimates using available data. The data for the facility(ies) that I represent are hereby submitted to the programs identified below using the Single Window Reporting Application.
I also acknowledge that the data will be made public.
Note: Only the person identified as the Certifying Official or the authorized delegate should submit the report(s) identified below.

Company Name

Imperial Oil

Certifying Official (or authorized delegate)

Rohan Davis

Report Submitted by

Rohan Davis

I, the Certifying Official or authorized delegate, agree with the statements above and acknowledge that by pressing the "Submit Report(s)" button, I am electronically certifying and submitting the facility report(s) for the identified company to its affiliated programs.

ON MOE TRA - Electronic Certification Statement

Annual Report Certification Statement

As of 30/05/2017, I, Rohan Davis, certify that I have read the reports on the toxic substance reduction plans for the toxic substances referred to below and am familiar with their contents, and to my knowledge the information contained in the reports is factually accurate and the reports comply with the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 (General) made under that Act.

TRA Substance List

CAS RN	Substance Name
95-63-6	1,2,4-Trimethylbenzene

106-99-0	1,3-Butadiene
194-59-2	7H-Dibenzo(c,g)carbazole
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
NA - 16	Ammonia (total)
1332-21-4	Asbestos (friable form only)
71-43-2	Benzene
56-55-3	Benzo(a)anthracene
218-01-9	Benzo(a)phenanthrene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
192-97-2	Benzo(e)pyrene
191-24-2	Benzo(g,h,i)perylene
205-82-3	Benzo(j)fluoranthene
207-08-9	Benzo(k)fluoranthene
92-52-4	Biphenyl
NA - 24	Butane (all isomers)

25167-67-3	Butene (all isomers)
NA - 03	Cadmium (and its compounds)
630-08-0	Carbon monoxide
1319-77-3	Cresol (all isomers, and their salts)
NA - 25	Cycloheptane (all isomers)
110-82-7	Cyclohexane
NA - 27	Cyclooctane (all isomers)
NA - 28	Decane (all isomers)
189-55-9	Dibenzo(a,i)pyrene
224-42-0	Dibenzo(a,j)acridine
100-41-4	Ethylbenzene
74-85-1	Ethylene
107-21-1	Ethylene glycol
206-44-0	Fluoranthene
86-73-7	Fluorene
50-00-0	Formaldehyde
NA - 31	Heptane (all isomers)

NA - 32	Hexane (all isomers excluding n-hexane)
25264-93-1	Hexene (all isomers)
74-90-8	Hydrogen cyanide
7783-06-4	Hydrogen sulphide
193-39-5	Indeno(1,2,3-c,d)pyrene
78-79-5	Isoprene
67-63-0	Isopropyl alcohol
NA - 08	Lead (and its compounds)
NA - 10	Mercury (and its compounds)
67-56-1	Methanol
1313-27-5	Molybdenum trioxide
91-20-3	Naphthalene
110-54-3	n-Hexane
NA - 11	Nickel (and its compounds)
NA - 17	Nitrate ion in solution at pH >= 6.0
11104-93-1	Nitrogen oxides (expressed as NO2)
NA - 33	Nonane (all isomers)

NA - 34	Octane (all isomers)
NA - 35	Pentane (all isomers)
NA - 36	Pentene (all isomers)
198-55-0	Perylene
85-01-8	Phenanthrene
108-95-2	Phenol (and its salts)
NA - M09	PM10 - Particulate Matter
NA - M10	PM2.5 - Particulate Matter
74-98-6	Propane
115-07-1	Propylene
129-00-0	Pyrene
NA - 12	Selenium (and its compounds)
7446-09-5	Sulphur dioxide
7664-93-9	Sulphuric acid
109-99-9	Tetrahydrofuran
108-88-3	Toluene
NA - M08	Total Particulate Matter

NA - M14	Total reduced sulphur (expressed as hydrogen sulphide)
25551-13-7	Trimethylbenzene (all isomers excluding 1,2,4-Trimethylbenzene)
7440-62-2	Vanadium (and its compounds)
NA - M16	Volatile Organic Compounds (VOCs)
1330-20-7	Xylene (all isomers)
NA - 14	Zinc (and its compounds)

Exit Record Certification Statement

TRA Exit Record Substances

CAS RN	Substance Name
77-73-6	Dicyclopentadiene
120-12-7	Anthracene
53-70-3	Dibenzo(a,h)anthracene

Company Name

Imperial Oil

Highest Ranking Employee

Rohan Davis

Report Submitted by

Rohan Davis

Website address

I, the highest ranking employee, agree with the certification statement(s) above and acknowledge that by

checking the box I am electronically signing the statement(s). I also acknowledge that by pressing the 'Submit Report(s)' button I am submitting the facility record(s)/report(s) for the identified facility to the Director under the Toxics Reduction Act, 2009. I also acknowledge that the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 provide the authority to the Director under the Act to make certain information as specified in subsection 27(5) of Ontario Regulation 455/09 available to the public.

Submitted Report

Period	Submission Date	Facility Name	Province	City	Programs
2016	30/05/2017	Sarnia Refinery Plant	Ontario	Sarnia	NPRI,ON MOE TRA,NERM,NFPRER

Note: If there is a change in the contact information for the facility, a change in the owner or operator of the facility, if operations at the facility are terminated, or if information submitted for any previous year was mistaken or inaccurate, please update this information through SWIM or by contacting the National Pollutant Release Inventory directly.