

## Summary of Ontario reportable substances (O-REG 455/09) - 2019

### 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

### Public Contact:

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Advisor  
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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](http://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](http://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.

Report of Tracking and Quantification of Facility-Wide Quantities

Substances (Reported in kilograms)	Chemical Abstract Service CAS Registry Number	USED			CREATED			CONTAINED IN PRODUCT			Reason for Change	
		2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE		
Metals	Cadmium	**	0	0	n/a	0	>100 to 1000	-1	0	0	n/a	system variability
	Lead	**	>100 to 1000	>10 to 100	55%	>1 to 10	>100,000 to 1,000,000	-1	0	0	n/a	system variability
	Mercury	**	>10 to 100	>1 to 10	37%	>100 to 1000	>100 to 1000	n/a	0	>0 to 1	-100%	system variability
	Selenium	**	0	0	n/a	0	0	n/a	0	>0 to 1	-100%	system variability
Polycyclic Aromatic Hydrocarbons (PAH)	7H-Dibenzo(c,g)carbazole	194-59-2	0	0	n/a	>0 to 1	>0 to 1	-3%	0	0	n/a	no reasons - quantities approximately the same
	Acenaphthene	83-32-9	>10,000 to 100,000	>10,000 to 100,000	-52%	>100,000 to 1,000,000	>100,000 to 1,000,000	-19%	>100,000 to 1,000,000	>100,000 to 1,000,000	-38%	system variability
	Acenaphthylene	208-96-8	>10,000 to 100,000	>10,000 to 100,000	-37%	>0 to 1	>1000 to 10,000	-100%	>10,000 to 100,000	>10,000 to 100,000	46542%	system variability
	Benzo(a)anthracene	56-55-3	>1000 to 10,000	>1000 to 10,000	-69%	>10,000 to 100,000	>10,000 to 100,000	-34%	>10,000 to 100,000	>10,000 to 100,000	20%	system variability
	Benzo(a)phenanthrene, aka chrysene	218-01-9	>1000 to 10,000	>1000 to 10,000	-69%	>100,000 to 1,000,000	>10,000 to 100,000	-21%	>10,000 to 100,000	>10,000 to 100,000	n/a	system variability
	Benzo(a)pyrene	50-32-8	>1000 to 10,000	>1000 to 10,000	n/a	>10,000 to 100,000	>1000 to 10,000	16%	>10,000 to 100,000	>100 to 1000	-1%	system variability
	Benzo(b)fluoranthene	205-99-2 / 205-62-3	0	0	n/a	>10,000 to 100,000	>10,000 to 100,000	-39%	>10,000 to 100,000	>10,000 to 100,000	-38%	system variability
	Benzo(e)pyrene	192-97-2	0	>10,000 to 100,000	-100%	>10,000 to 100,000	>10,000 to 100,000	349%	>10,000 to 100,000	>1000 to 10,000	-8%	system variability
	Benzo(g,h,i)perylene	191-24-2	0	0	n/a	>10,000 to 100,000	>1000 to 10,000	-9%	>10,000 to 100,000	>1000 to 10,000	-9%	system variability
	Benzo(k)fluoranthene	207-08-9	0	0	n/a	>1000 to 10,000	>1000 to 10,000	n/a	>1000 to 10,000	>1000 to 10,000	n/a	system variability
	Dibenzo(a,h)anthracene	53-70-3	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
	Dibenzo(a,j)acridine	224-42-0	>1 to 10	>0 to 1	55%	>0 to 1	>0 to 1	-2%	0	0	n/a	system variability
	Dibenzo(a,l)pyrene	189-55-9	>1 to 10	>0 to 1	55%	>0 to 1	>0 to 1	-3%	0	0	n/a	system variability
	Fluoranthene	206-44-0	>10,000 to 100,000	>1000 to 10,000	-4%	>10,000 to 100,000	>10,000 to 100,000	-30%	>10,000 to 100,000	>1000 to 10,000	84%	system variability
	Fluorene	86-73-7	>100,000 to 1,000,000	>10,000 to 100,000	-14%	>100,000 to 1,000,000	>10,000 to 100,000	-16%	>100,000 to 1,000,000	>10,000 to 100,000	15%	system variability
	Indeno(1,2,3-c,d)pyrene	193-39-5	0	0	n/a	>1000 to 10,000	>100 to 1000	-14%	>1000 to 10,000	>100 to 1000	-18%	system variability
	Perylene	198-55-0	0	0	n/a	>10,000 to 100,000	>10,000 to 100,000	183%	>10,000 to 100,000	>1000 to 10,000	-6%	system variability
	Phenanthrene	85-01-8	>100,000 to 1,000,000	>10,000 to 100,000	-10%	>100,000 to 1,000,000	>100,000 to 1,000,000	-25%	>100,000 to 1,000,000	>100,000 to 1,000,000	-32%	system variability
	Pyrene	129-00-0	>10,000 to 100,000	>100 to 1000	1%	>100,000 to 1,000,000	>100,000 to 1,000,000	-44%	>100,000 to 1,000,000	>100,000 to 1,000,000	-35%	system variability

Report of Tracking and Quantification of Facility-Wide Quantities

Substances (Reported in tonnes)	Chemical Abstract Service CAS Registry Number	Used			Created			Contained in Product			Reason for Change	
		2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE		
Metals	Nickel	**	>10 to 1000	>10 to 100	-23%	>10 to 100	>100 to 1000	-93%	>10 to 100	>10 to 100	76%	system variability
	Vanadium	7440-62-2	>100 to 1000	>10 to 100	-21%	>1 to 10	>1 to 10	n/a	>100 to 1000	>10 to 100	75%	system variability
	Zinc	**	>0 to 1	>1 to 10	-86%	>1 to 10	>1 to 10	n/a	>1 to 10	>0 to 1	76%	system variability
PAH	Anthracene	120-12-7	>10,000 to 100,000	>100 to 1000	.	>100,000 to 1,000,000	>100,000 to 1,000,000	-1.	>10,000 to 100,000	>1000 to 10,000	.	system variability
	Naphthalene	91-20-3	>1000 to 10,000	>1000 to 10,000	-32%	>1000 to 10,000	>1000 to 10,000	-27%	>1000 to 10,000	>1000 to 10,000	-31%	system variability
Hydrocarbons	1, 2, 4-Trimethylbenzene	* 95-63-6	>10,000 to 100,000	>100 to 1000	-5%	>1000 to 10,000	>10,000 to 100,000	-71%	>10,000 to 100,000	>1000 to 10,000	-17%	system variability
	1, 3-Butadiene	* 106-99-0	>1000 to 10,000	>1000 to 10,000	-16%	>1000 to 10,000	>100 to 1000	-8%	>1000 to 10,000	>100 to 1000	-12%	system variability
	Benzene	* 71-43-2	>10,000 to 100,000	>1000 to 10,000	-23%	>10,000 to 100,000	>10,000 to 100,000	34%	>100,000 to 1,000,000	>1000 to 10,000	9%	system variability
	Biphenyl	92-52-4	>1000 to 10,000	>100 to 1000	-19%	>100 to 1000	>100 to 1000	-25%	>100 to 1000	>100 to 1000	-31%	system variability
	Butane	* **	>100,000 to 1,000,000	>10,000 to 100,000	-11%	>100,000 to 1,000,000	>10,000 to 100,000	-18%	>100,000 to 1,000,000	>10,000 to 100,000	-21%	system variability
	Butene	* 25167-67-3	>10,000 to 100,000	>10,000 to 100,000	-34%	>100,000 to 1,000,000	>10,000 to 100,000	-22%	>100,000 to 1,000,000	>10,000 to 100,000	-29%	system variability
	Cycloheptane	* **	>1000 to 10,000	>1000 to 10,000	50%	>100,000 to 1,000,000	>1000 to 10,000	-1%	>10,000 to 100,000	>1000 to 10,000	-7%	system variability
	Cyclohexane	110-82-7	>10,000 to 100,000	>10,000 to 100,000	-11%	>10,000 to 100,000	>100 to 1000	5%	>1000 to 10,000	>1000 to 10,000	-26%	system variability
	Cyclohexene	† **	>1000 to 10,000	>100 to 1000	-12%	>1000 to 10,000	>1000 to 10,000	-23%	>1000 to 10,000	>1000 to 10,000	-28%	system variability
	Cyclooctane	* **	>1000 to 10,000	>100 to 1000	-8%	>100,000 to 1,000,000	>1000 to 10,000	4%	>10,000 to 100,000	>1000 to 10,000	-11%	system variability
	Decane	* **	>10,000 to 100,000	>1000 to 10,000	-3%	>10,000 to 100,000	>10,000 to 100,000	-22%	>10,000 to 100,000	>1000 to 10,000	-10%	system variability
	Ethylbenzene	100-41-4	>10,000 to 100,000	>1000 to 10,000	-23%	>10,000 to 100,000	>1000 to 10,000	24%	>10,000 to 100,000	>1000 to 10,000	3%	system variability
	Ethylene	* 74-85-1	>10 to 100	>10 to 100	553%	>10,000 to 100,000	>1000 to 10,000	-23%	>10,000 to 100,000	>1000 to 10,000	-23%	system variability
	Heptane	* **	>10,000 to 100,000	>1000 to 10,000	-10%	>10,000 to 100,000	>10,000 to 100,000	15%	>100,000 to 1,000,000	>10,000 to 100,000	17%	system variability
	Hexane	* **	>100,000 to 1,000,000	>10,000 to 100,000	-15%	>100,000 to 1,000,000	>10,000 to 100,000	39%	>100,000 to 1,000,000	>10,000 to 100,000	3%	system variability
	Hexene	* 25264-93-1	>10,000 to 100,000	>100 to 1000	-2%	>10,000 to 100,000	>10,000 to 100,000	-24%	>10,000 to 100,000	>1000 to 10,000	-18%	system variability
	Isoprene	78-79-5	>1000 to 10,000	>100 to 1000	-23%	>100 to 1000	>10 to 100	9%	>100 to 1000	>100 to 1000	-28%	system variability
	n-Hexane	* 110-54-3	>100,000 to 1,000,000	>10,000 to 100,000	-12%	>10,000 to 100,000	>10,000 to 100,000	87001%	>100,000 to 1,000,000	>10,000 to 100,000	117%	system variability
	Nonane	* **	>10,000 to 100,000	>1000 to 10,000	-14%	>10,000 to 100,000	>10,000 to 100,000	-14%	>10,000 to 100,000	>10,000 to 100,000	-39%	system variability
	Octane	* **	>10,000 to 100,000	>1000 to 10,000	-10%	>100,000 to 1,000,000	>1000 to 10,000	5%	>10,000 to 100,000	>1000 to 10,000	14%	system variability
Pentane	* **	>100,000 to 1,000,000	>10,000 to 100,000	-18%	>100,000 to 1,000,000	>10,000 to 100,000	-14%	>100,000 to 1,000,000	>100,000 to 1,000,000	-25%	system variability	
Pentene	* **	>10,000 to 100,000	>1000 to 10,000	-28%	>10,000 to 100,000	>10,000 to 100,000	-26%	>10,000 to 100,000	>10,000 to 100,000	-26%	system variability	
Propane	* 74-98-6	>1000 to 10,000	>1000 to 10,000	-30%	>10,000 to 100,000	>10,000 to 100,000	25%	>100,000 to 1,000,000	>1000 to 10,000	-8%	system variability	
Propylene	* 115-07-1	>100 to 1000	>10 to 100	-18%	>10,000 to 100,000	>10,000 to 100,000	-38%	>10,000 to 100,000	>10,000 to 100,000	-39%	system variability	
Trimethylbenzene	* 25551-13-7	>10,000 to 100,000	>1000 to 10,000	9%	>10,000 to 100,000	>1000 to 10,000	-8%	>10,000 to 100,000	>1000 to 10,000	-7%	system variability	
Toluene	* 106-88-3	>10,000 to 100,000	>1000 to 10,000	-12%	>100,000 to 1,000,000	>10,000 to 100,000	31%	>100,000 to 1,000,000	>10,000 to 100,000	15%	system variability	
Xylene	* 1330-20-7	>10,000 to 100,000	>10,000 to 100,000	-22%	>100,000 to 1,000,000	>10,000 to 100,000	20%	>100,000 to 1,000,000	>10,000 to 100,000	5%	system variability	

Report of Tracking and Quantification of Facility-Wide Quantities

Substances (Reported in tonnes)	Chemical Abstract Service CAS Registry Number	Used			Created			Contained in Product			Reason for Change
		2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	
Ammonia	**	>1 to 10	>1 to 10	-52%	>100 to 1000	>10 to 100	-14%	0	0	n/a	system variability
Asbestos	1332-21-4	0	0	n/a	>10 to 100	>10 to 100	n/a	0	0	n/a	system variability
Carbon Monoxide	630-08-0	0	0	n/a	>1000 to 10,000	>10 to 100	4%	0	0	n/a	no reasons - quantities approximately the same
Cresol	1319-77-3	0	0	n/a	>10 to 100	>1 to 10	7%	0	0	n/a	system variability
Ethylene Glycol	107-21-1	>1 to 10	>1 to 10	n/a	>1 to 10	>1 to 10	n/a	0	0	n/a	system variability
Formaldehyde	* 50-00-0	0	0	n/a	>1 to 10	>0 to 1	-4%	0	0	n/a	no reasons - quantities approximately the same
H2S	7783-06-4	>10,000 to 100,000	>1000 to 10,000	-25%	>10,000 to 100,000	>10,000 to 100,000	-16%	>10,000 to 100,000	>1000 to 10,000	-23%	system variability
Hydrochloric Acid		#N/A	#N/A	n/a	#N/A	#N/A	n/a	#N/A	#N/A	n/a	new substance to report
Hydrogen cyanide	74-90-8	0	0	n/a	>10 to 100	>10 to 100	-20%	0	0	n/a	system variability
Methanol	* 67-56-1	>10 to 100	>10 to 100	77%	>1 to 10	>0 to 1	-4%	>10 to 100	>10 to 100	n/a	system variability
Isopropyl alcohol	67-63-0	0	0	n/a	>0 to 1	>0 to 1	-99%	0	>0 to 1	-100%	system variability
Molybdenum Trioxide	1313-27-5	>10 to 100	>10 to 100	606%	>10 to 100	>1 to 10	-14%	0	0	n/a	system variability
Nitrate Ion	**	0	0	n/a	>100 to 1000	>10 to 100	-7%	0	0	n/a	system variability
Nox	11104-93-1	0	0	n/a	>1000 to 10,000	>100 to 1000	-16%	0	0	n/a	system variability
Particulates	**	0	0	n/a	>100 to 1000	>10 to 100	-5%	0	0	n/a	system variability
Phenol (and its salts)	108-95-2	>0 to 1	>0 to 1	-29%	>10 to 100	>10 to 100	136%	>1 to 10	>0 to 1	-11%	system variability
PM10	**	0	0	n/a	>100 to 1000	>10 to 100	-5%	0	0	n/a	system variability
PM2.5	**	0	0	n/a	>100 to 1000	>10 to 100	-4%	0	0	n/a	no reasons - quantities approximately the same
Sulphur Dioxide	7446-09-5	0	0	n/a	>10,000 to 100,000	>100 to 1000	4%	0	0	n/a	no reasons - quantities approximately the same
Sulphuric acid	7664-93-9	0	0	n/a	>100 to 1000	>10 to 100	-9%	0	0	n/a	system variability
Tetrahydrofuran	* 109-99-9	0	0	n/a	>0 to 1	>0 to 1	n/a	0	0	n/a	no reasons - quantities approximately the same
Total Reduced Sulphur	**	>10,000 to 100,000	>1000 to 10,000	-25%	>10,000 to 100,000	>10,000 to 100,000	-24%	>10,000 to 100,000	>1000 to 10,000	-23%	system variability
Volatile Organic Compounds	**	>1,000,000	>100,000 to 1,000,000	-15%	>1,000,000	>100,000 to 1,000,000	-11%	>1,000,000	>100,000 to 1,000,000	-17%	system variability

Other

**Report of Tracking and Quantification of Facility-Wide Quantities**

Substances (Reported in kilograms)	Releases To Air			Releases to Water			Releases to Land			Onsite / Offsite Disposal			Transfer for Treatment and Recycling			Reason for Change	
	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE	2019 (kilograms)	DELTA vs. 2018 (kilograms)	% CHANGE		
Metals	Cadmium	0	0	-12%	0	0	n/a	0	0	n/a	0	0	-100%	0	0	-100%	system variability
	Lead	0	0	-28%	0	0	n/a	0	-1	-95%	0	-52	-100%	0	-57	-100%	system variability
	Mercury	0	0	-19%	0	0	n/a	0	0	43443%	0	0	n/a	0	0	n/a	system variability
	Selenium	0	0	-52%	0	0	n/a	0	0	n/a	0	0	-100%	0	-35	-100%	system variability
Polycyclic Aromatic Hydrocarbons (PAH)	7H-Dibenzo(c,g)carbazole	0	0	-2%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
	Acenaphthene	0	0	-23%	0	0	n/a	0	0	20%	0	-4	-100%	0	0	n/a	system variability
	Acenaphthylene	0	0	-49%	0	0	n/a	0	0	6%	0	0	-100%	0	0	n/a	system variability
	Benzo(a)anthracene	0	0	-13%	0	0	n/a	0	0	-90%	0	-4	-100%	0	0	n/a	system variability
	Benzo(a)phenanthrene, aka chrysene	0	0	13%	0	0	n/a	0	0	-100%	0	0	-100%	0	0	n/a	system variability
	Benzo(a)pyrene	0	0	-11%	0	0	n/a	0	0	7%	0	-3	-100%	0	0	n/a	system variability
	Benzo(b)fluoranthene	0	0	26%	0	0	n/a	0	0	-96%	0	0	-100%	0	0	n/a	system variability
	Benzo(e)pyrene	0	0	12%	0	0	n/a	0	0	14%	0	0	-99%	0	0	n/a	system variability
	Benzo(g,h,i)perylene	0	0	25%	0	0	n/a	0	0	36%	0	0	-98%	0	0	n/a	system variability
	Benzo(k)fluoranthene	0	0	-13%	0	0	n/a	0	0	-90%	0	-17	-100%	0	0	n/a	system variability
	Dibenzo(a,h)anthracene	0	0	-35%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
	Dibenzo(a,j)pyrene	0	0	-47%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
	Dibenzo(a,i)acridine	0	0	-27%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
	Fluoranthene	0	0	-21%	0	0	n/a	0	-1	-97%	0	-2	-100%	0	0	n/a	system variability
	Fluorene	0	0	-37%	0	0	n/a	0	0	-15%	0	-18	-100%	0	0	n/a	system variability
	Indeno(1,2,3-c,d)pyrene	0	0	-6%	0	0	n/a	0	0	-99%	0	0	-100%	0	0	n/a	system variability
	Perylene	0	0	44%	0	0	n/a	0	0	-99%	0	0	-100%	0	0	n/a	system variability
	Phenanthrene	0	0	-38%	0	0	n/a	0	-558	-100%	0	-19	-100%	0	0	n/a	system variability
	Pyrene	0	0	-37%	0	0	n/a	0	-556	-100%	0	-19	-100%	0	0	n/a	system variability

Report of Tracking and Quantification of Facility-Wide Quantities

Substances (Reported in tonnes)	Releases To Air			Releases to Water			Releases to Land			Onsite / Offsite Disposal			Transfer for Treatment and Recycling			Reason for Change
	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	2019 (tonnes)	DELTA vs. 2018 (tonnes)	% CHANGE	
<b>Metals</b>																
Nickel	1	-1	-32%	0	0	n/a	7	-22	-76%	0	0	-100%	10	-236	-96%	system variability
Vanadium	4	-2	-32%	0	0	n/a	0	0	94%	0	0	-100%	0	0	-100%	system variability
Zinc	0	0	-16%	0	0	n/a	0	0	n/a	0	-141	-100%	0	-1	-97%	system variability
<b>PAH</b>																
Naphthalene	1	-1	-44%	0	0	n/a	1	-5	-84%	0	-19	-100%	0	0	n/a	system variability
1, 2, 4-Trimethylbenzene *	2	-1	-20%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
1, 3-Butadiene *	1	0	-4%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Benzene *	7	-1	-16%	0	0	-34%	0	-1	-98%	0	-1	-98%	0	0	n/a	system variability
Biphenyl	0	0	-30%	0	0	n/a	0	0	20%	0	-26	-100%	0	0	n/a	system variability
Butane *	63	-14	-18%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Butene *	16	3	23%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Cycloheptane *	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Cyclohexane	7	-2	-24%	0	0	n/a	0	0	n/a	19	2	10%	0	0	n/a	system variability
Cyclooctane *	1	0	-13%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Decane *	1	0	-13%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Ethylbenzene	3	-1	-20%	0	0	n/a	0	0	-46%	0	-64	-100%	0	0	n/a	system variability
Ethylene *	3	0	-2%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Heptane *	5	0	-2%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Hexane *	26	11	71%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Hexene *	2	1	41%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Isoprene	0	0	-20%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
n-Hexane *	12	-4	-25%	0	0	n/a	0	-497	-100%	0	-18	-100%	0	0	n/a	system variability
Nonane *	2	-1	-23%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Octane *	4	0	9%	0	0	n/a	0	0	160790%	0	-5	-100%	0	0	n/a	system variability
Pentane *	52	-7	-11%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Pentene *	4	1	36%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Propane *	40	-5	-10%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Propylene *	18	-4	-19%	0	0	n/a	1	-2	-69%	0	0	-99%	0	0	n/a	system variability
Toluene *	14	-3	-18%	0	0	71%	0	-556	-100%	0	-10	-99%	0	0	n/a	system variability
Xylene *	10	-3	-25%	0	0	n/a	0	-112	-100%	0	-7	-99%	0	0	n/a	system variability
<b>Hydrocarbons</b>																
Ammonia	2	-1	-40%	1	1	352%	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Asbestos	0	0	n/a	0	0	n/a	0	0	n/a	27	27	n/a	0	0	n/a	system variability
Carbon Monoxide	1184	51	5%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Cresol	1	0	1%	0	0	n/a	0	0	-1%	0	-21	-98%	0	0	n/a	system variability
Ethylene Glycol	0	0	-2%	0	0	n/a	0	0	n/a	4	3	747%	0	0	n/a	system variability
Formaldehyde *	4	0	-4%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
H2S	12	-1	-4%	0	0	n/a	0	-56	-100%	3	2	259%	0	0	n/a	system variability
Hydrogen cyanide	41	-11	-21%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Methanol *	4	0	-4%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Isopropyl alcohol	0	-	-1	0	-	n/a	0	-	n/a	0	-	n/a	0	-	n/a	system variability
Molybdenum Trioxide	0	0	n/a	0	0	n/a	16	-12	-42%	0	0	n/a	26	22	606%	system variability
Nitrate Ion	0	0	n/a	198	-14	-7%	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Nox	2034	-391	-16%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Particulates	784	-39	-5%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
PM10	565	-29	-5%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
PM2.5	301	-12	-4%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Sulphur Dioxide	11509	429	4%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Sulphuric acid	192	-18	-9%	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	system variability
Tetrahydrofuran *	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	0	0	n/a	no reasons - quantities approximately the same
Total Reduced Sulphur	17	-1	-6%	0	0	n/a	0	-56	-100%	3	2	259%	0	0	n/a	system variability
Volatile Organic Compounds	294	-27	-8%	0	0	-20%	1	-1167	-100%	0	-40	-100%	0	0	n/a	system variability

\*\* No single CAS number applies to this substance

\* also included in Volatile Organic Compounds

**Toxic Reduction Plan Stewardship - 2019 Reporting Year**

Substances	Plan Objectives and Targets	Summary of steps taken during the previous calendar year (2017) 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 (2017) 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 (2017)
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
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 7H-Dibenzo(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, aka chrysene	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
Benzo(b)fluoranthene	Benzo(b)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)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

Metals

PAHs

Polycyclic Aromatic Hydrocarbons	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
	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
	Dibenzo(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
	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
	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
	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	

### Toxic Reduction Plan Stewardship - 2019 Reporting Year

Substances	Plan Objectives and Targets	Summary of steps taken during the previous calendar year (2017) 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 (2017) 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 (2017)
1, 2, 4-Trimethylbenzene	1, 2, 4-Trimethylbenzene enters the facility in purchased feedstock and additives, and is created as a byproduct from thermal cracking. No options to reduce the use or creation of 1, 2, 4-Trimethylbenzene were identified.	No steps	No change	Not applicable - no timeline in plan	No additional actions	No amendments
1, 3-Butadiene	While Imperial Oil has not identified any feasible options to reduce the use or creation of 1, 3-Butadiene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of 1, 3-Butadiene 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
Benzene	While Imperial Oil has not identified any feasible options to reduce the use or creation of benzene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of benzene 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
Biphenyl	While Imperial Oil has not identified any feasible options to reduce the use or creation of Biphenyl at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Biphenyl 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
Butane	While Imperial Oil has not identified any options to reduce the use or creation of butane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of butane 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



Hydrocarbons	Butene	While Imperial Oil has not identified any options to reduce the use or creation of Butene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Butene 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
	Cycloheptane	While Imperial Oil has not identified any options to reduce the use or creation of Cycloheptane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Cycloheptane 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
	Cyclohexane	While Imperial Oil has not identified any options to reduce the use or creation of Cyclohexane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Cyclohexane 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
	Cyclohexene	While Imperial Oil has not identified any options to reduce the use or creation of Cyclohexene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Cyclohexene 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
	Cyclooctane	While Imperial Oil has not identified any options to reduce the use or creation of Cyclooctane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Cyclooctane 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
	Decane	While Imperial Oil has not identified any options to reduce the use or creation of Decane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Decane 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
	Dicyclopentadiene	Dicyclopentadiene was not detected at measurable concentrations in any of the Refinery inputs or outputs and is not created. As such, no technically and economically feasible options to reduce use and/or creation were identified	No steps	No change	Not applicable - no timeline in plan	No additional actions	No amendments
	Ethylbenzene	While Imperial Oil has not identified any feasible options to reduce the use or creation of Ethylbenzene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Ethylbenzene 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
	Ethylene	While Imperial Oil has not identified any options to reduce the use or creation of Ethylene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Ethylene 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
	Heptane	While Imperial Oil has not identified any options to reduce the use or creation of Heptane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Heptane 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
Hexane	While Imperial Oil has not identified any options to reduce the use or creation of Hexane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Hexane 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	

Hydrocarbons	Hexene	While Imperial Oil has not identified any options to reduce the use or creation of Hexene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Hexene 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
	Isoprene	While Imperial Oil has not identified any options to reduce the use or creation of Isoprene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Isoprene 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
	n-Hexane	While Imperial Oil has not identified any options to reduce the use or creation of N-Hexane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of N-Hexane 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
	Nonane	While Imperial Oil has not identified any options to reduce the use or creation of Nonane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Nonane 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
	Octane	While Imperial Oil has not identified any options to reduce the use or creation of Octane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Octane 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
	Pentane	While Imperial Oil has not identified any options to reduce the use or creation of Pentane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Pentane 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
	Pentene	While Imperial Oil has not identified any options to reduce the use or creation of Pentene at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Pentene 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
	Propane	While Imperial Oil has not identified any options to reduce the use or creation of Propane at the Sarnia refinery, various projects at Sarnia refinery are expected to reduce fugitive emissions of Propane 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
	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	

**Toxic Reduction Plan Stewardship - 2019 Reporting Year**

Substances	Plan Objectives and Targets	Summary of steps taken during the previous calendar year (2017) 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 (2017) 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 (2017)
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 has reduced the use of Cresol (all isomers, and their salts) with the 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 has reduced the use of Ethylene glycol with the 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
Formaldehyde	Formaldehyde was not detected in any streams used at the facility, nor was it detected in any measureable amounts in any streams in the refinery.	No steps	No change	Not applicable - no timeline in plan	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
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
Isopropyl alcohol	Isopropyl Alcohol primarily enters the Sarnia Refinery as a component of a water treating chemical and is destroyed in the refinery processing. Sarnia Refinery has not identified any technically and economically feasible options to reduce cuse of Isopropyl Alcohol at this time	No steps	No change	Not applicable - no timeline in plan	No additional actions	No amendments
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
Nitrate Ion	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
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
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
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
PM2.5	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
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
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
Tetrahydrofuran	Tetrahydrofuran has not been detected in measurable concentrations in any of the refinery inputs or outputs and is not created.	No steps	No change	Not applicable - no timeline in plan	No additional actions	No amendments
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
Volatile Organic Compounds	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	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

# 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)

Janna Stanford

Report Submitted by

Janna Stanford

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 MECP TRA - Electronic Certification Statement

### Annual Report Certification Statement

As of 2020-07-30, I, Janna Stanford, 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
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
NA - 16	Ammonia (total)
120-12-7	Anthracene
1332-21-4	Asbestos (friable form only)
56-55-3	Benz[a]anthracene
71-43-2	Benzene
50-32-8	Benzo[a]pyrene
205-99-2	Benzo[b]fluoranthene
192-97-2	Benzo[e]pyrene
191-24-2	Benzo[ghi]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
218-01-9	Chrysene
1319-77-3	Cresol (all isomers, and their salts)
NA - 25	Cycloheptane (all isomers)
110-82-7	Cyclohexane
NA - 26	Cyclohexene (all isomers)
NA - 27	Cyclooctane (all isomers)
NA - 28	Decane (all isomers)
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-cd]pyrene
78-79-5	Isoprene
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 $\geq$ 6.0
11104-93-1	Nitrogen oxides (expressed as NO <sub>2</sub> )
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
NA - M09	PM10 - Particulate Matter
NA - M10	PM2.5 - Particulate Matter
74-98-6	Propane
115-07-1	Propylene (propene)
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 (except in alloy) and compounds
1330-20-7	Xylene (mixed isomers)
NA - 14	Zinc (and its compounds)

## Exit Record Certification Statement

### TRA Exit Record Substances

CAS RN	Substance Name
194-59-2	7H-Dibenzo[c,g]carbazole
53-70-3	Dibenz[a,h]anthracene
224-42-0	Dibenz[a,j]acridine
189-55-9	Dibenzo[a,i]pyrene
108-95-2	Phenol (and its salts)

Company Name

Imperial Oil

Highest Ranking Employee

Janna Stanford

Report Submitted by

Janna Stanford

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

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Period	Submission Date	Facility Name	Province	City	Programs
2019	2020-07-30	Sarnia Refinery Plant	Ontario	Sarnia	NPRI, ON MECP TRA, NERM, N FPRER

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.