U. S. Steel Canada
A Subsidiary of United States Steel

Lake Erie Works
2013 Annual Toxics Reduction Report
(O. Reg. 455/09)

Issued November 10, 2016

Basic Facility Information

Section 1 – Facility Information	
Owner	U. S. Steel Canada Inc.
Facility name	Lake Erie Works
Address	2330 Regional #3 Road
City	Nanticoke
Province	Ontario
Postal Code	N0A 1L0
Spatial Coordinates	UTM Zone: 17 UTM Easting: 573853 UTM Northing: 4740111
Section 2 – Owner's Mailing Address	
Same as above (Y / N)	No
Address	386 Wilcox Street
City	Hamilton
Province	Ontario
Postal code	L8N 3T1
Section 3 – Owner's Primary Contact Person	
Name	John Benson
Title	Manager, Environmental Department
Phone	(519) 587 – 4541 ext 5189
Fax	(519) 587 - 7706
Email address	JBenson@uss.com
Section 4 – Additional Facility Information	
NAICS Code	331110
NPRI ID	3855
# of Employees	1341
Licence # of Toxic Substance Reduction Planner	TSRP0050

Basic Facility Information (Cont.)

Lake Erie Works was commissioned in 1980 making it the most modern integrated steel mill in North America. The plant is located on 1660 hectares of land on the north shore of Lake Erie. Lake Erie Works is an integrated steel plant and produces approximately 2.5 million tonnes of steel per year. Process operations at the plant include Cokemaking, Ironmaking, Basic Oxygen Furnace Steelmaking, Continuous Casting, Hot Strip Rolling and Pickling. There are no finishing operations at the plant.

Raw materials (coal and iron ore) are brought to the area by self-unloading ships. Coal is heated in the Coke Ovens, where volatile components of coal are vapourized and the remaining carbon is transformed into coke. The coke is then used as a reductant in the Blast Furnace. The gas generated during coking fuels the coking battery and is used in the reheat furnaces in the Hot Strip Mill. The liquid components generated during coking are separated in an adjacent By-Products Plant and are sold.

Coke, iron ore pellets, and dolomite are conveyed to the Blast Furnace, which has a capacity to produce 7,000 tonne/day of molten pig iron. From the Blast Furnace, molten iron is carried to the steelmaking shop in specialized railway cars where it is charged into two Basic Oxygen Furnaces. After mixing the molten iron with scrap steel, fluxes and additives, oxygen is blown into the melt to remove carbon and impurities. The molten steel is treated to adjust its composition to meet the requirements of the final product then transferred to the Continuous Casting process.

The casting complex consists of two casting strands in which the molten steel is solidified into steel slabs. Most slabs cast at Lake Erie Works are rolled in the Hot Strip Mill for further processing, although some are sold as slabs.

The hot strip rolling facility reheats the slabs to the desired rolling temperature for converting them into strip. The slab is rolled to a finished thickness of 2-16 millimetres. The strip is then cooled and coiled for sale or further processing off-site. A portion of the hot-rolled strip is processed at the Lake Erie Works Pickle Lines where hydrochloric acid is used to remove iron oxide from the steel surface to produce Pickled & Oiled hot-rolled sheet.

The plant has extensive environmental control measures. Water is recycled extensively and treated before exiting the plant. Air cleaning equipment is used at the Coke Ovens, Blast Furnace and Basic Oxygen Furnaces to minimize emissions. In addition, a detailed landscaping plan was implemented during construction. This includes earthen berms up to 10 meters high surrounding the plant, water filled lagoons and extensive tree planting.

List of Toxic Substances at the Facility

Substance	Chemical Abstracts Service Number
Acenaphthylene	208-96-8
Arsenic	**
Benzene	71-43-2
Benzo(a)anthracene	56-55-3
Benzo(a)phenanthrene	218-01-9
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Benzo(k)fluoranthene	207-08-9
Butane	**
Cadmium	**
Calcium Fluoride	7789-75-5
Carbon Monoxide	630-08-0
Chlorine	7782-50-5
Chromium	**
Dibenzo(a,h)anthracene	53-70-3
Dibenzo(a,i)pyrene	189-55-9
Ethylene	74-85-1
Fluoranthene	206-44-0
Hydrochloric Acid	7647-01-0
Hydrogen Sulphide	7783-06-4
Lead	**
Manganese	**
Mercury	**
n-Hexane	110-54-3
Nitrogen Oxides (as NO2)	11104-93-1
Particulate Matter	**
Phenanthrene	85-01-8
PM10	**
PM2.5	**
Propane	74-98-6
Pyrene	129-00-0
Sulphur Dioxide	7446-09-5
Toluene	108-88-3
Total Reduced Sulphur	**
Volatile Organic Compounds	**
Zinc	**

** No single CAS number applies to this substance

Summary: Tracking and Quantification

Substances	Usage	Creation	Destruction	Releases to Water
	tonnes	tonnes	tonnes	tonnes
Acenaphthylene	0	> 100 to 1,000	0	0
Arsenic	> 10 to 100	0	0	0
Benzene	0	> 1,000 to 10,000	0	0.001
Benzo(a)anthracene	0	> 10 to 100	0	0.001
Benzo(a)phenanthrene	0	> 100 to 1,000	0	0.002
Benzo(a)pyrene	0	> 10 to 100	0	0.001
Benzo(b)fluoranthene	0	> 10 to 100	0	0.001
Benzo(k)fluoranthene	0	> 10 to 100	0	0.0006
Butane	> 100 to 1,000	> 0 to 1	> 100 to 1,000	0
Cadmium	> 0 to 1	0	0	0.010
Calcium Fluoride	> 100 to 1,000	> 10 to 100	> 100 to 1,000	27
Carbon Monoxide	0	> 1,000,000	> 1,000,000	0
Chlorine	> 100 to 1,000	0	> 100 to 1,000	0.2
Chromium	> 100 to 1,000	0	0	0.01
Dibenzo(a,h)anthracene	0	> 10 to 100	0	0.001
Dibenzo(a,i)pyrene	0	> 10 to 100	0	0.001
Ethylene	0	> 1 to 10	0	0
Fluoranthene	0	> 100 to 1,000	0	0.002
Hydrochloric Acid	> 1,000 to 10,000	0	0	0
Hydrogen Sulphide	0	> 10 to 100	> 1 to 10	0
Lead	> 10 to 100	0	0	0.06
Manganese	> 10,000 to 100,000	0	0	0
Mercury	> 0 to 1	0	0	0
n-Hexane	> 100 to 1,000	0	> 100 to 1,000	0
NOx (as NO2)	0	> 100 to 1,000	0	0
Particulate Matter	0	> 1,000 to 10,000	> 1,000 to 10,000	0
Phenanthrene	0	> 100 to 1,000	0	0.003
PM10	0	> 1,000 to 10,000	> 1,000 to 10,000	0
PM2.5	0	> 100 to 1,000	> 100 to 1,000	0
Propane	> 100 to 1,000	> 0 to 1	> 100 to 1,000	0
Pyrene	0	> 10 to 100	0	0.002
Sulphur Dioxide	0	> 1,000 to 10,000	0	0
Toluene	0	> 100 to 1,000	0	0
Total Reduced Sulphur	0	> 10 to 100	> 1 to 10	0
VOCs	> 100 to 1,000	>1,000 to 10,000	>1,000 to 10,000	0
Zinc	> 1,000 to 10,000	0	0	0.4

Summary: Tracking and Quantification (Cont.)

Substances	Releases to Air	Disposal	Recycling	Contained in Product
	tonnes	tonnes	Tonnes	tonnes
Acenaphthylene	0.03	0	0	> 100 to 1,000
Arsenic	0.007	0.6	0	> 10 to 100
Benzene	6	0	0	> 1,000 to 10,000
Benzo(a)anthracene	0.009	0	0	> 10 to 100
Benzo(a)phenanthrene	0.02	0	0	> 100 to 1000
Benzo(a)pyrene	0.009	0	0	> 10 to 100
Benzo(b)fluoranthene	0.009	0	0	> 10 to 100
Benzo(k)fluoranthene	0.006	0	0	> 10 to 100
Butane	2.3	0	0	0
Cadmium	0.002	0.9	0	> 0 to 1
Calcium Fluoride	0.3	0	0	0
Carbon Monoxide	1625	0	0	0
Chlorine	0	0	0	0
Chromium	0.01	25	208	> 100 to 1,000
Dibenzo(a,h)anthracene	0.01	0	0	> 10 to 100
Dibenzo(a,i)pyrene	0.009	0	0	> 10 to 100
Ethylene	1.8	0	0	0
Fluoranthene	0.02	0	0	> 100 to 1,000
Hydrochloric Acid	0.2	0	3119	0
Hydrogen Sulphide	24	0	0	0
Lead	0.01	67	2	> 0 to 1
Manganese	1.0	536	4589	> 1,000 to 10,000
Mercury	0.005	0.04	0.01	> 0 to 1
n-Hexane	2	0	0	0
NOx (as NO2)	693	0	0	0
Particulate Matter	1964	0	0	0
Phenanthrene	0.03	0	0	> 100 to 1,000
PM10	828	0	0	0
PM2.5	314	0	0	0
Propane	2	0	0	0
Pyrene	0.02	0	0	> 10 to 100
Sulphur Dioxide	1195	0	0	0
Toluene	1	0	0	> 100 to 1,000
Total Reduced Sulphur	24	0	0	0
VOCs	48	0	0	0
Zinc	0.1	2191	64	> 0 to 1

Comparison of Tracking and Quantification (2013) to Previous Reporting Periods (2012)

Substances	Usage	Creation	Releases to Water	Releases to Air	Disposal (on-site)	Recycling	Contained in Product
	Percent Change (%)						
Acenaphthylene	0	-79.2	0	-70.0	0	0	-79.2
Arsenic	-49.0	0	0	-65.0	-71.4	0	-47.9
Benzene	0	-61.9	-66.7	-71.8	0	0	-61.9
Benzo(a)anthracene	0	-79.4	-50.0	-70.0	0	0	-79.4
Benzo(a)phenanthrene	0	-79.3	-33.3	-71.4	0	0	-79.3
Benzo(a)pyrene	0	-79.4	-50.0	-70.0	0	0	-79.4
Benzo(b)fluoranthene	0	-79.4	-50.0	-70.0	0	0	-79.4
Benzo(k)fluoranthene	0	-79.2	-40.0	-70.0	0	0	-79.2
Butane	-46.8	-66.7	0	-48.8	0	0	0
Cadmium	-62.5	0	-33.3	-50.0	-80.4	0	-66.7
Calcium Fluoride	-14.8	-64.7	-64.7	-25.0	0	0	0
Carbon Monoxide	0	-51.0	0	-53.6	0	0	0
Chlorine	-50.0	0	-80.0	0	0	0	0
Chromium	-34.7	0	-50.0	-50.0	-70.6	-45.4	-46.0
Dibenzo(a,h)anthracene	0	-79.4	-50.0	-66.7	0	0	-79.4
Dibenzo(a,i)pyrene	0	-79.4	-50.0	-70.0	0	0	-79.4
Ethylene	0	-70.5	0	-70.5	0	0	0
Fluoranthene	0	-79.2	-50.0	-66.7	0	0	-79.2
Hydrochloric Acid	-40.1	0	0	-33.3	0	-40.1	0
Hydrogen Sulphide	0	-55.6	0	-61.9	0	0	0
Lead	-51.0	0	-25.0	-66.7	-82.3	-58.3	-87.1
Manganese	-43.6	0	0	-50.0	-78.3	-55.7	-58.6
Mercury	-15.3	0	0	-70.6	-83.1	-47.4	-75.0
n-Hexane	-46.8	0	0	-37.5	0	0	0
NOx (as NO2)	0	-56.1	0	-56.1	0	0	0
Particulate Matter	0	-50.7	0	-49.9	0	0	0
Phenanthrene	0	-79.3	-50.0	-70.0	0	0	-79.3
PM10	0	-50.4	0	-49.1	0	0	0
PM2.5	0	-52.3	0	-54.2	0	0	0
Propane	-46.6	-80.0	0	-41.2	0	0	0
Pyrene	0	-79.2	-33.3	-60.0	0	0	-79.2
Sulphur Dioxide	0	-67.7	0	-67.7	0	0	0
Toluene	0	-67.1	0	-75.0	0	0	-67.1
Total Reduced Sulphur	0	-55.6	0	-61.9	0	0	0
VOCs	-46.5	-64.2	0	-68.6	0	0	0
Zinc	-51.2	0	-20.0	-66.7	-75.9	-62.1	-97.9

*Negative values indicate a decrease in quantity in 2013 compared to 2012

Substances	Usage	Creation	Releases to Water	Releases to Air	Disposal (on-site)	Recycling	Contained in Product
	Quantity Change (tonnes)						
Acenaphthylene	0	> -100 to -1,000	0	-0.07	0	0	> -100 to -1,000
Arsenic	> -10 to -100	0	0	-0.013	-1.5	0	> -10 to -100
Benzene	0	> -1,000 to -10,000	-0.002	-15.3	0	0	> -1,000 to -10,000
Benzo(a)anthracene	0	> -100 to -1,000	-0.001	-0.021	0	0	> -100 to -1,000
Benzo(a)phenanthrene	0	> -100 to -1,000	-0.001	-0.05	0	0	> -100 to -1,000
Benzo(a)pyrene	0	> -100 to -1,000	-0.001	-0.021	0	0	> -100 to -1,000
Benzo(b)fluoranthene	0	> -100 to -1,000	-0.001	-0.021	0	0	> -100 to -1,000
Benzo(k)fluoranthene	0	> -100 to -1,000	-0.0004	-0.014	0	0	> -100 to -1,000
Butane	> -100 to -1,000	> 0 to -1	0	-2.19	0	0	0
Cadmium	> -1 to -10	0	-0.005	-0.002	-3.7	0	> 0 to -1
Calcium Fluoride	> -100 to -1,000	> -10 to -100	-49.4	-0.1	0	0	0
Carbon Monoxide	0	> -1,000,000	0	-1876	0	0	0
Chlorine	> -100 to -1,000	0	-0.8	0	0	0	0
Chromium	> -100 to -1,000	0	-0.01	-0.01	-60	-173	> -100 to -1,000
Dibenzo(a,h)anthracene	0	> -100 to -1,000	-0.001	-0.02	0	0	> -100 to -1,000
Dibenzo(a,i)pyrene	0	> -100 to -1,000	-0.001	-0.021	0	0	> -100 to -1,000
Ethylene	0	> -1 to -10	0	-4.3	0	0	0
Fluoranthene	0	> -100 to -1,000	-0.002	-0.04	0	0	> -100 to -1,000
Hydrochloric Acid	> -1,000 to -10,000	0	0	-0.1	0	-2088	0
Hydrogen Sulphide	0	> -10 to -100	0	-39	0	0	0
Lead	> -10 to -100	0	-0.02	-0.02	-312	-2.8	> -1 to -10
Manganese	> -1,000 to -10,000	0	0	-1	-1929	-5769	> -1,000 to -10,000
Mercury	> 0 to -1	0	0	-0.012	-0.196	-0.009	> 0 to -1
n-Hexane	> -100 to -1,000	0	0	-1.2	0	0	0
NOx (as NO2)	0	> -100 to -1,000	0	-886	0	0	0
Particulate Matter	0	> -1,000 to -10,000	0	-1957	0	0	0
Phenanthrene	0	> -100 to -1,000	-0.003	-0.07	0	0	> -100 to -1,000
PM10	0	> -1,000 to -10,000	0	-799	0	0	0
PM2.5	0	> -1,000 to -10,000	0	-371	0	0	0
Propane	> -100 to -1,000	> 0 to -1	0	-1.4	0	0	0
Pyrene	0	> -100 to	-0.001	-0.03	0	0	> -100 to

		-1,000					-1,000
Sulphur Dioxide	0	> -1,000 to -10,000	0	-2505	0	0	0
Toluene	0	> -100 to -1,000	0	-3	0	0	> -100 to -1,000
Total Reduced Sulphur	0	> -10 to -100	0	-39	0	0	0
VOCs	> -100 to -1,000	> -1,000 to -10,000	0	-105	0	0	0
Zinc	> -1,000 to -10,000	0	-0.1	-0.2	-6882	-105	> -10 to -100

*Negative values indicate a decrease in quantity in 2013 compared to 2012

The following substances are primarily associated with cokemaking operations: acenaphthylene, benzene, benzo(a)anthracene, benzo(a)phenanthrene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, dibenzo(a,i)pyrene, fluoranthene, ethylene, phenanthrene, pyrene and toluene.
Lake Erie Works' coke production was on hot idle between April 2013 and September 2014. Therefore the coke battery was operational for only three and a half months in 2013 compared to twelve months in 2012. As a result of decreased coke production in 2013 compared to 2012, the "creation", "contained in product", "releases to air and water" quantities related to the abovementioned substances also decreased in 2013 compared to 2012.

The following substances are primarily related to ironmaking and steelmaking operations: arsenic, cadmium, chromium, lead, manganese, mercury, zinc, hydrochloric acid, calcium fluoride, n-hexane, carbon monoxide, butane and propane.
Lake Erie Works' blast furnace iron production and basic oxygen furnace steel production operations were hot idled between April and September 2013 due to a work stoppage.
The "usage", "creation", "releases to air", "releases to water" and "contained in product" quantities of noted substances were lower in 2013 due to reduced steel production compared to 2012.
Substance quantities are also impacted by the disposal and recycling of secondary materials which vary from one year to another (example: the timing in which some secondary materials are sent to landfill, or recycled back into commerce as a useful raw material for other applications).

The following substances are impacted by all operations at Lake Erie Works: nitrogen oxides, chlorine, total reduced sulphur, hydrogen sulphide, sulphur dioxide, volatile organic compounds, particulate matter, PM2.5 and PM10.
The quantities associated with "usage", "creation", "releases to water" and "releases to air" were lower in 2013 compared to 2012 because of reduced coke, iron and steel production.

Reduction Objectives

Please refer to the Reduction Summary Plans for the reduction objective for each substance:
http://www.ourcommunityourfuture.com/wp-content/uploads/2013/06/TRA-Reduction-Plan-Summary-Issued-2012-LEW.pdf

http://www.ourcommunityourfuture.com/wp-content/uploads/2013/06/U.-S.-Steel-Canada-Lake-Erie-Works-2013-Toxic-Substance-Reduction-Summary-Plans.pdf

Steps Taken to Achieve Objectives and Assess Effectiveness

The substances reported by Lake Erie Works are either required for its products and processes, are generated as unavoidable by-products, or are incidental trace elements in raw materials. Where feasible, these substances are managed by recycling and maintaining inventories that are as low as possible.

For further details please refer to the following two web links:
http://www.ourcommunityourfuture.com/wp-content/uploads/2013/06/TRA-Reduction-Plan-Summary-Issued-2012-LEW.pdf

http://www.ourcommunityourfuture.com/wp-content/uploads/2013/06/U.-S.-Steel-Canada-Lake-Erie-Works-2013-Toxic-Substance-Reduction-Summary-Plans.pdf

Certification

As of *November 10, 2016*, I *John Benson*, certify that I have read the records created for the purposes of section 11.2 of Ontario Regulation 455/09(General) made under the Toxics Reductions Act, (2009) in respect of the use and creation of the toxic substances referred to above and am familiar with their contents and to my knowledge they are factually accurate.

John Benson
Environmental Manager
U. S. Steel Canada Inc – Lake Erie Works