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

Hamilton Works

Toxic Substance Reduction Plan Summary

Name of Substance	CAS # of Substance
Ammonia	7664-41-7
Carbon Monoxide	630-08-0
Chlorine	7782-50-5
Chromium	7440-47-3
Ethylene	74-85-1
Hexavalent Chromium	1333-82-0
Hydrochloric Acid	7647-01-0
Hydrogen Sulphide	7783-06-4
Lead	7439-92-1
Manganese	7439-96-5
Methanol	67-56-1
n-Hexane	110-54-3
Nitrogen Oxides (as (NO_2)	11104-93-1
Phosphorus (Total)	NA-22
TPM (Total Particulate Matter)	N/A – M08
PM10 (Particulate Matter ≤ 10 Microns)	N/A – M09
PM2.5 (Particulate Matter ≤ 2.5 Microns)	N/A – M10
Selenium	7782-49-2
Styrene	100-42-5
Sulphur Dioxide	7446-09-5
Sulphuric Acid	7664-93-9
Total Reduced Sulphur (as H_2S)	No CAS # in NPRI
Vanadium	7440-62-2

Issued December 31, 2013

BASIC FACILITY INFORMATION

Facility Identification and Site Address		
Company Name	U. S. Steel Canada Inc.	
Facility Name	Hamilton Works	
Facility Address	Physical Address: 386 Wilcox Street, Hamilton, Ontario L8N 3T1	Mailing Address: (Same as physical address)
Facility Latitude	43.264380	
Facility Longitude	-79.827229	
Number of Employees	1105	
NPRI ID	2984	
MOE ID Number (O. Reg 127/01)	5097	

Canadian Parent Company (PC) Information	
Legal Name	U.S. STEEL CANADA INC. ACIER U.S. CANADA INC.
Business Address	386 Wilcox Street, Hamilton, Ontario L8L 8K5
Mailing Address	386 Wilcox Street, P.O. Box 2030, Hamilton, Ontario L8N 3T1
Percent Ownership for each PC	100 per cent
CRA Business Number	105011837

Primary North American Industrial Classification System Code (NAICS)	
2 Digit NAICS Code	33 - Manufacturing
4 Digit NAICS Code	3311 - Iron & Steel Mills & Ferro-Alloy Manufacturing
6 Digit NAICS Code	331110 - Iron & Steel Mills & Ferro-Alloy Manufacturing

Spatial Coordinates (NAD83)	Map Datum	Zone	Accuracy Estimate	UTM Easting	UTM Northing
Southwest corner of property	NAD83	17	100	594756	4791659.00
Physical location of main entrance	NAD83	17	100	595333	4791386.00

Company Contact Information	
Facility Public Contact	Trevor D Harris
	tdharris@uss.com
	Phone: (905) 577-4447
	Fax: (905) 308-7002

Company Contact Information	
Facility Technical Contact	Andrew Sebestyen, *Manager - Environmental Affairs*
	asebestyen@uss.com
	Phone: (905) 527-8335 ext. 2547
	Fax: (905) 777-7614

BASIC FACILITY INFORMATION (cont.)

Company Contact Information	
Plan Coordination & Preparation	Emelita Simbahon, P.Eng.
	esimbahon@uss.com
	Phone: (905) 527-8335 ext. 3692
	Fax: (905) 777-7614
Company Contact Information	
Highest Ranking Employee	Kevin Wong, *Plant Manager*
	KWong1@uss.com
	Phone: (905) 577-4432
	Fax: (905) 777-7649

Planner Information	
Planner Responsible for Making Recommendations	Emelita Simbahon, P.Eng.
	Planner License No. TSRP0066
	esimbahon@uss.com
	Phone: (905) 527-8335 ext. 3692
	Fax: (905) 777-7614

Planner Information	
Planner Responsible for Certification	Emelita Simbahon, P.Eng.
	Planner License No. TSRP0066
	esimbahon@uss.com
	Phone: (905) 527-8335 ext. 3692
	Fax: (905) 777-7614

NOTE:

This Plan Summary accurately reflects the plan of each toxic substance listed on page 1.

Name & CAS # of Substance	Ammonia	7664-41-7

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use and creation of Ammonia providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use and creation of Ammonia to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Ammonia to air, water, land and City sewer.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

The coke battery is designed to convert coal to coke by destructive thermal distillation. Ammonia is created incidentally during this process but a large percentage is recovered and sold as Anhydrous Ammonia. Traces of Ammonia are also inherently present in the feed water that is taken from the Hamilton Bay and used in the plant as non-contact cooling water or process aid.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified to reduce the creation of Ammonia in cokemaking. Coal is vital to the cokemaking process and Ammonia is created incidentally during the destructive thermal distillation process to convert coal into coke. There is no alternative type of Ammonia-free water that is cost effective and readily available to substitute baywater.	
Product Design or Reformulation	No further option can be identified since the in-process and finished products are inherent to the existing coking process, operation and equipment. The use of baywater has no effect in the current design or formulation of the existing products.	
Equipment or Process Modification	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 0.5%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)

Spill and Leak Prevention	Repair the baywater leak in front of the 'E' Blast Furnace **(Estimated Reduction = 0.001%)**	• Planning & Approval (Q4 2013) • Remove a gearbox for overhaul of one large baywater valve, isolate the 72" supply line to repair the 2" air release, change the 10" isolation valves for the emergency crossover, blank the 16" to West Side Transfer Station (Q2 2014)
On-Site Reuse or Recycling	No option can be identified to reduce the creation of Ammonia in cokemaking. Coal is vital to the cokemaking process and Ammonia is created incidentally during the destructive thermal distillation process to convert coal into coke. System and practices are already in place so that any spill of coal is being recovered and put back into the process. No feasible option to address the use of Ammonia as a substance in baywater was found.	
Improved Inventory Management or Purchasing Techniques	Since Ammonia is created based on the amount of coke produced regardless of coal inventory, no option for reduction under this category would be applicable. No option under this category is applicable for baywater since the facilities only take in water as needed and no inventory is kept on site.	
Training or Improved Operating Practices	No option can be identified to reduce the creation of Ammonia in cokemaking. Coal is vital to the cokemaking process and Ammonia is created incidentally during the destructive thermal distillation process to convert coal into coke. For baywater usage, optimization of supply and usage is already being practiced. An example is closing supply lines that are not used such as the option under the Equipment or Process Modification category.	

Name & CAS # of Substance	Carbon Monoxide	630-08-0

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use and creation of Carbon Monoxide providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use and creation of Carbon Monoxide to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Carbon Monoxide.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Carbon Monoxide (CO) is incidentally created from the combustion of natural gas and coke oven gas in the central boiler station (CBS), coke ovens, galvanizing furnaces and also to heat up idled systems at the Steelmaking area. CO is also emitted when excess coke oven gas is flared in the By-Products bleeder stacks.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	Substitute natural gas with coke oven gas (COG) as fuel for no. 8 Boiler **(Estimated Reduction = 0.13%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of CO has no effect in the current design or formulation of cold rolled and galvanized steel products.	

Equipment or Process Modification, Spill and Leak Prevention, On-Site Reuse or Recycling, Training or Improved Operating Practices	Modify the controls and equipment at no. 8 Boiler to allow the use of COG in lieu of natural gas **(Estimated Reduction = 0.13%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
	Shut off supply and use of natural gas in heating up idled systems at Steelmaking **(Estimated Reduction = 0.011%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with the fuel combustion processes because supply of coke oven gas is finite and is dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed.	

Name & CAS # of Substance	Chlorine	7782-50-5

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Chlorine providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Chlorine during the feedwater chlorination process to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Chlorine to air and water.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Chlorine is incidentally created when sodium hypochlorite is used to treat the feed water pumped in from the Hamilton Bay is chlorinated using sodium hypochlorite to prevent bacteria and algae growth on the surfaces of pipes and coolers. Sodium hypochlorite does not contain the chlorine molecule until it reacts with the compounds in water. Chlorine that is not consumed during the water treatment process is destroyed as the water flows through the dechlorination process using sodium bisulfite prior to getting discharged to the Hamilton Bay.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified to reduce the creation of Chlorine because there is no alternative clean water that does not require chlorine treatment, is cost effective and readily available to substitute baywater. There is also no option identified to substitute sodium hypochlorite with other chemicals that do not create Chlorine since Chlorine (Cl_2) is still the preferred and approved media to treat municipal and industrial water and wastewaters to control microorganisms because of its capacity to inactivate most pathogenic microorganisms quickly.	
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products are inherent to the existing cokemaking, cold rolling and galvanizing processes, operation and equipment. The use of baywater has no effect in the current design or formulation of existing products.	
Equipment or Process Modification	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 50%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)

Spill and Leak Prevention	Repair the baywater leak in front of the 'E' Blast Furnace **(Estimated Reduction = 0.11%)**	• Planning & Approval (Q4 2013) • Remove a gearbox for overhaul of one large baywater valve, isolate the 72" supply line to repair the 2" air release, change the 10" isolation valves for the emergency crossover, blank the 16" to West Side Transfer Station (Q2 2014)
On-Site Reuse or Recycling	No option for reduction was found that is technically and economically feasible.	
Improved Inventory Management or Purchasing Techniques	No option under this category is applicable to reduce the creation of Chlorine during treatment of baywater since the facilities only take in baywater as needed and no inventory is kept on site. While certain inventory of sodium hypochlorite is kept, reduction of its inventory level does not equate to reduction of Chlorine creation. Chlorine is created only upon usage and contact of sodium hypochlorite with water.	
Training or Improved Operating Practices	No Chlorine treatment during the winter season **(Estimated Reduction = 25%)**	• Presentation of Proposal (Q4 2013) • Approval (Q4 2013) • Implementation (Q1 2014)

Name & CAS # of Substance	Chromium	7440-47-3

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Chromium providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Chromium to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Chromium to air and land.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Chromium is incidentally introduced into the cokemaking process and products as an impurity in coal. It is intentionally added in steelmaking as it is an essential component that provides certain mechanical properties to steel products. Trivalent Chromium is intentionally introduced as a functional component of the chromate coating of passivated galvanized steel to resist corrosion during storage/handling in conformance to customer specifications. Chromium is incidentally present in BOF oxides, slag fines and BF filter cake, which are the by-products of the steelmaking and ironmaking processes. Large quantities of these legacy piles are stored onsite but gradually shipped out to recyclers. Chromium also exists as a minor impurity in intake water taken from the Hamilton Bay (baywater).

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option is available under this category due to the following reasons: • Chromium is an incidental impurity and naturally occurring in coal. Coal is vital to the cokemaking process and the company's choice of supply source is limited to whatever chemical composition is available in the market. • Chromium is inherently present in steel used in cold rolling and galvanizing processes. Galvanized steel production is a core business of the company. Although increased production would mean more usage of Chromium, the risk of substance release is nil since it is well contained in steel as an alloy with other elements. • Chromium already exists as an incidental component in steelmaking and ironmaking by-products. To reduce the quantity of legacy piles, more shipment and transfer of quantities for recycling will happen in the future. • No option to address the use of Chromium due to its presence in baywater	

	has been found to be technically and economically feasible.	
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking, cold rolling and galvanizing processes, operation and equipment. The use of baywater has no effect in the current design or formulation of existing products.	
Equipment or Process Modification	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 0.005%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Spill and Leak Prevention	There is no further option for Chromium reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Chromium which is contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years. Options to address the use of Chromium through its presence in baywater have been evaluated but these were found to be not worth implementing since the annual Chromium reduction is negligible.	
On-Site Reuse or Recycling	There is no further option for Chromium reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scraps or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Chromium which is contained in steelmaking and ironmaking by-products because these materials have more uses to the recyclers. More shipment of legacy piles to the recyclers will be implemented in succeeding years. An option to address the use of Chromium through its presence in baywater has been evaluated but was not economically feasible.	
Improved Inventory Management or Purchasing Techniques	No option is available under this category due to the following reasons: • Coal inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. Selection of coal supplier is also limited to sister companies and industrial partners. • Supply and inventory of hot rolled steel are dictated by customers' demand and allocation from the parent USS company. Cold rolling and	

	galvanizing operations are core businesses of Hamilton Works, therefore, more uses of steel which contain Chromium is preferred. • Options are not applicable in reducing the use of Chromium as contained in ironmaking and steelmaking by-products because these materials have been in on-site inventory for so long and are better off shipped out to recyclers. • Options under this category are also not applicable for baywater since the facility only takes in water as needed and no inventory is kept on site.
Training or Improved Operating Practices	There is no further option for Chromium reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Chromium which is contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years. For baywater usage, optimization of supply and usage is already being practiced. An example is closing supply lines that are not used such as in Option under Equipment or Process Modification category.

Name & CAS # of Substance	Ethylene	74-85-1

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Ethylene providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Ethylene to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Ethylene.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Ethylene is incidentally generated from the cokemaking process. It is emitted as fugitives from the coke ovens and, at the same time, contained in raw coke oven gas (COG) that is sent to the By-Products Plant for the recovery of tar, light oil and anhydrous ammonia. Clean COG is supplied back to the coke ovens as fuel which still contains Ethylene that gets destroyed during combustion in the underfiring system with some minor amounts released to the coke oven stack. Ethylene that is contained in COG is also carried over but destroyed during usage at the Central Boiler Station (CBS).

There are no options identified for implementation to reduce the creation of Ethylene as explained under each category.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	There is no option to reduce the creation of Ethylene in the cokemaking process. The use of coal and the generation of COG are vital to the cokemaking process, which is a core business of the company. Although natural gas does not contain Ethylene and is currently used as an alternate fuel, this cannot totally replace the coke oven gas in cokemaking and steam production because COG is readily available and maximizing its use is cost efficient and more beneficial than flaring to atmosphere.	
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of Ethylene has no effect in the current design or formulation of cold rolled and galvanized steel products.	

Equipment or Process Modification	There is no further option for Ethylene reduction under this category since equipment modification projects and process changes optimizing the use of COG and coal and avoiding wastage have long been implemented. System and practices are already in place so that any spill of coal are being recovered and reused/recycled.
Spill and Leak Prevention	There is no option to reduce the creation of Ethylene in the cokemaking process. The use of coal and the generation of COG are vital to the cokemaking process, which is a core business of the company.
On-Site Reuse or Recycling	There is no further option for Ethylene reduction under this category since equipment modification projects and process changes optimizing the use of COG and coal and avoiding wastage have long been implemented. System and practices are already in place so that any spill of coal are being recovered and reused/recycled.
Improved Inventory Management or Purchasing Techniques	No option is available under this category because supply of coke oven gas is finite and is dependent on coke production. Coal inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. Selection of coal supplier is also limited to sister companies and industrial partners.
Training or Improved Operating Practices	There is no further option for Ethylene reduction under this category since equipment modification projects and process changes optimizing the use of COG and coal have long been implemented. System and practices are already in place so that any spill of coal are being recovered and reused/recycled.

Name & CAS # of Substance	Hexavalent Chromium	1333-82-0

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Hexavalent Chromium providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Hexavalent Chromium to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Hexavalent Chromium, if any.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

The chemical treatment solution used to passivate the surface of the galvanized steel products contains 5% Okemcoat F1 solution that has 14.1% Cr(VI). After the chemical treatment process, the passivation coating on the galvanized products contains 57% Cr(VI), which is sufficient to inhibit corrosion. Studies show that the Cr(VI) on the product surface will gradually transform to Trivalent Chromium through time while the product is stored, handled or used at the customers' end.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified to eliminate or reduce the use of Cr(VI) on passivated galvanized steel products since chromate coating is preferred by customers even though there are already non-Cr(VI) passivation compounds that are available in the market. U. S. Steel has already identified a substitute material which can be applied at any USS galvanizing line. However, customers in North America still continue to order Cr(VI) passivated products.	
Product Design or Reformulation	No option can be identified since the existing formulation of the chromate coating on passivated galvanized steel products is still preferred by customers.	
Equipment or Process Modification	No option can be identified since the existing process and equipment have already been proven as adequate for the application of CR(VI) coating that is required by the customers. Equipment modification projects and process changes optimizing the use of passivation chemical at minimum workers' exposure and avoiding chemical wastage have long been implemented.	

Spill and Leak Prevention	There is no further option for Cr(VI) reduction under this category since equipment modification projects and process changes optimizing the use of passivation chemical and avoiding waste have been in place. Due to the health hazard of the chromates, the chemical treatment system was designed with containment and tank level monitor to prevent tank overflowing, with a tank cover to prevent splashes and with roll directionality so that the solution squeezed off from the strip would flow back to the solution tank. Procedures are also in place to ensure no erroneous application of passivation to products that are not supposed to be passivated.
On-Site Reuse or Recycling	There is no further feasible option for Cr(VI) reduction under this category since the chemical treatment system was designed as a re-circulating system and is operating to recover solution that is carried over on the steel surface and is returned back to the process tank. Any solution that is spilled on the ground is considered contaminated and is not returned to the process to prevent adverse effect to the quality of the solution and carry-over of dirt unto the strip which jeopardizes product quality. For excess solution samples from laboratory analysis, procedures are already implemented to pour these back to the passivation process tank.
Improved Inventory Management or Purchasing Techniques	No further option is available under this category since the chemical inventory at the galvanizing lines has already been limited to one (1) 800-liter tote of concentrated Okemcoat F1 (with 14.1% Cr(VI)) so as not to exceed the quantity threshold specified by the federal Environmental Emergency (E2) regulation, SOR/2011-294. The inventory of premixed 5% passivation solution is only to ensure sufficient supply with respect to the planned production volume. Nevertheless, the substance accounting referred in this Plan is about the actual amount of Cr(VI) used on the coating and in the re-circulating solution, which is not affected by inventory levels.
Training or Improved Operating Practices	There is no further option for Cr(VI) reduction under this category since system and practices are already in place to maximize the use of Cr(VI)-containing chemicals, prevent leak/spill and unnecessary scrapping of passivated galvanized steel. Procedures are also in place so that excess solution samples from laboratory analysis are poured back to the passivation process tank.

Name & CAS # of Substance	Hydrochloric Acid	7647-01-0

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use and creation of Hydrochloric Acid (HCl) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use and creation of Hydrochloric Acid (HCl) to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of HCl.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

HCl is used at the Cokemaking By-Products Waste Water Treatment Plant (WWTP) to maintain the pH in the first reaction chamber of the cyanide reactor and the second chamber of the fluoride reactor to facilitate the removal of cyanides and fluorides from the wastewater before it is released to the municipal sewer. HCl is created when chlorine that is generated from the chlorination treatment of feed water (baywater) is treated with sodium bisulfite to destroy the chlorine toxicity before the effluent goes out to Hamilton Bay.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified to reduce the use of HCl in the WWTP since other types of inorganic acid that are capable of maintaining and controlling pH levels are also listed as toxic substances in NPRI and could introduce more contaminants. The option of substituting the 29% HCl with less concentrated HCl is also not technically feasible since this is not a reduction *per se*, as more acid solution would be required to maintain the desired pH level in the reactors. No option can be identified to reduce the creation of HCl from treating chlorinated baywater because there is no alternative clean water that does not require chlorine treatment, is cost effective and readily available to substitute the baywater. There is also no option identified to substitute sodium hypochlorite with other chemicals that do not create chlorine since chlorine (Cl_2) is still the preferred and approved media to treat municipal and industrial water and wastewaters to control microorganisms because of its capacity to inactivate most pathogenic microorganisms quickly.	

Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products are inherent to the existing cokemaking, cold rolling and galvanizing processes, operation and equipment. The use of baywater has no effect in the current design or formulation of existing products.	
Equipment or Process Modification	Change cyanide reactor target pH from 3.5 to 4.4 **(Estimated Reduction = 4.5% provided coke produced < 650,000 MT)**	• Trial completed Q1 2013 • Implementation is ongoing
	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 15%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Spill and Leak Prevention	Repair the baywater leak in front of the 'E' Blast Furnace **(Estimated Reduction = 0.03%)**	• Planning & Approval (Q4 2013) • Remove a gearbox for overhaul of one large baywater valve, isolate the 72" supply line to repair the 2" air release, change the 10" isolation valves for the emergency crossover, blank the 16" to West Side Transfer Station (Q2 2014)
On-Site Reuse or Recycling	No option for reduction was found that is technically and economically feasible.	
Improved Inventory Management or Purchasing Techniques	Option under this category is not applicable for HCl reduction because inventory of HCl for use in the By-Products WWTP is dictated by tank levels and coke production rate. Excessive HCl inventory is not practiced. Cokemaking is a core business and high production is favorable. There is also no option to reduce the creation of HCl from treating chlorinated baywater since the facilities only take in baywater as needed and no inventory is kept on site. While certain inventory of sodium bisulphite is kept for dechlorination, reduction of its inventory level does not equate to reduction of HCl creation. HCl is created only upon usage and reaction with sodium bisulphite in baywater. When sodium bisulphite is not used and stays inside the tank/container, no HCl is created.	
Training or Improved Operating Practices	No Chlorine treatment during the winter season **(Estimated Reduction = 7.6%)**	• Presentation of Proposal (Q4 2013) • Approval (Q4 2013) • Implementation (Q1 2014)

Name & CAS # of Substance	Lead	7439-92-1

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Lead providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Lead to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Lead to air and land.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Lead is incidentally introduced into the cokemaking process and products as an impurity in coal. It is incidentally present in scrap used in steelmaking. It is also incidentally present in the zinc coating layer of galvanized steel as well as in spent passivation solution. Combustion of natural gas used as fuel in various parts of the plant emits traces of lead into the atmosphere. Lead is also incidentally present in basic oxygen furnace (BOF) oxides, slag fines and blast furnace (BF) filter cake. Large quantities of these legacy piles are stored onsite but gradually shipped out to recyclers. Lead also exists as a minor impurity in intake water taken from the Hamilton Bay (baywater).

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option is available under this category due to the following reasons: • Lead is an incidental impurity and naturally occurring in coal. Coal is vital to the cokemaking business but the company's choice of supply source is limited to whatever chemical composition is available in the market. • Lead is incidentally present in cold rolling and galvanizing steel. It is in steel, zinc ingot and zinc coating. Galvanized steel production is a core business of the company. Although increased production would mean more usage of Lead, the risk of substance release is nil since it is well contained in steel and coating an alloy with other elements. • Lead already exists as an incidental component in steelmaking and ironmaking by-products. To reduce the quantity of legacy piles, more shipment and transfer of quantities for recycling will occur in the future. • No option to address the use of Lead due to its presence in baywater has been found to be technically and economically feasible.	
Product Design or	No option can be identified since the formulation of in-process and finished	

Reformulation	products as well as the by-products are inherent to the existing cokemaking, cold rolling and galvanizing processes, operation and equipment. The use of baywater has no effect in the current design or formulation of existing products.	
Equipment or Process Modification	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 0.005%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Spill and Leak Prevention	There is no further option for Lead reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scrap or waste have long been implemented. System and practices are already in place so that steel scraps or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Lead which is contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years. Options to address the use of Lead through its presence in baywater have been evaluated but these were found to be not worth implementing since the annual Lead reduction is negligible.	
On-Site Reuse or Recycling	There is no further option for Lead reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scraps or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Lead which is contained in steelmaking and ironmaking by-products because these materials are of value to the recyclers. More shipment of legacy piles to the recyclers will be implemented in succeeding years. An option to address the use of Lead through its presence in baywater has been evaluated but was not economically feasible.	
Improved Inventory Management or Purchasing Techniques	No option is available under this category due to the following reasons: • Coal inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. Selection of coal supplier is also limited to sister companies and industrial partners. • Supply and inventory of hot rolled steel are dictated by customers' demand and allocation from the parent USS company. Use of zinc ingot is dictated by planned production volume. Cold rolling and galvanizing are core businesses of Hamilton Works, therefore, more uses of steel which inherently contain Lead is preferred. • Options are not applicable in reducing the use of Lead as contained in	

	ironmaking and steelmaking by-products because these materials have been in on-site inventory for so long and are better off shipped out to recyclers. • Option under this category is also not applicable for baywater since the facilities only take in water as needed and no inventory is kept on site.
Training or Improved Operating Practices	There is no further option for Lead reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scraps or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Lead which is contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years. For baywater usage, optimization of supply and usage is already being practiced. An example is closing supply lines that are not used such as in Option under Equipment or Process Modification category.

Name & CAS # of Substance	**Manganese** **Selenium** **Vanadium**	**7439-96-5** **7782-49-2** **7440-62-2**

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Manganese (Mn), Selenium (Se) and Vanadium (V) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Manganese, Selenium and Vanadium to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Manganese, Selenium and Vanadium, if any.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Manganese, Selenium and Vanadium are incidentally introduced into the cokemaking process and products as impurities in coal. These are incidentally present in scrap used in steelmaking. Manganese and Vanadium are intentionally added in steelmaking to attain the desired mechanical properties and quality of steel. The by-products of Hamilton Works' steelmaking and ironmaking processes such as BOF oxides, slag fines, BF filter cake, etc. also incidentally contain these elements. Large quantities of these legacy piles are stored onsite but are gradually shipped out to recyclers.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option is available under this category due to the following reasons: • Mn, Se & V are incidental impurities and naturally occurring in coal. Coal is vital to the cokemaking process and the company's choice of supply source is limited to whatever chemical composition is available in the market. • Mn & V are intentionally added during steelmaking to attain the desired properties of steel. Cold rolling and Galvanized steel production are core businesses of the company. Although increased production would mean more usage of Mn & V, the risk of substance release is nil since these elements are well contained in steel as an alloy with other elements. • Mn & V already exist as incidental components in steelmaking and ironmaking by-products. To reduce the quantity of legacy piles, more shipment and transfer of quantities for recycling will occur in the future.	
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking,	

	cold rolling and galvanizing processes, operation and equipment. There is also no option to reduce the use of Mn & V when shipping out legacy piles since the substances already exist as an incidental components in steelmaking and ironmaking by-products. To reduce the quantity of legacy piles, more shipment and transfer of quantities for recycling will occur in the future.
Equipment or Process Modification	No option can be identified for the use of Mn, Se & V in operations since the existing process and equipment have already been proven as adequate for cokemaking, cold rolling and galvanizing. Reduction options under this category are not applicable for the use of Mn & V contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years.
Spill and Leak Prevention	There is no further option for Mn, Se & V reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scrap or waste have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Mn & V which are contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years.
On-Site Reuse or Recycling	There is no further option for Mn, Se & V reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scrap or waste have long been implemented. System and practices are already in place so that steel scraps or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Mn & V which are contained in steelmaking and ironmaking by-products because these materials are utilized by recyclers. More shipment of legacy piles to the recyclers will be implemented in succeeding years.
Improved Inventory Management or Purchasing Techniques	No option is available under this category due to the following reasons: • Coal inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. Selection of coal supplier is also limited to sister companies and industrial partners. • Supply and inventory of hot rolled steel are dictated by customers' demand and allocation from the parent USS company. Cold rolling and galvanizing are core businesses of Hamilton Works, therefore, more uses of steel which contain Mn & V is preferred. • Option is not applicable in reducing the use of Mn & V as contained in ironmaking and steelmaking by-products because these materials have

	been in on-site inventory for so long and are better off shipped out to recyclers.
Training or Improved Operating Practices	There is no further option for Mn, Se & V reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scrap or waste have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. Reduction options under this category are not applicable for the use of Mn & V which are contained in steelmaking and ironmaking by-products since more shipment of legacy piles to recyclers will be implemented in succeeding years.

Name & CAS # of Substance	Methanol	67-56-1

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Methanol providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Methanol to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Methanol.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Methanol is used in the cokemaking process as it is contained in lid seal winter grade material that is applied around each charge lid every after oven charging to seal the lid circumference and prevent emissions from leaking out. Methanol is also an ingredient of denatured alcohol that is injected into compressed air lines when ambient temperature approaches -10^{o}C and colder to prevent freezing.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	Reduce the Methanol content in denatured alcohol from 13.7% to 10% **(Estimated Reduction = 8.7%)**	• Inquiry with Purchasing and suppliers (Complete) • Supplier's risk analysis and evaluation (2014-2015) • Implementation (2016)
	Reduce the Methanol content in winter grade lid sealing compound from 7% to 6% **(Estimated Reduction = 10%)**	• Inquiry with Purchasing and suppliers (Q2 2014) • Supplier's risk analysis and evaluation (Q3 2014) • Implementation (Q4 2014)
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The use of Methanol as contained in lid seal winter grade and denatured alcohol has no effect in the current design or formulation of coke, cold rolled and galvanized steel products.	

Equipment or Process Modification, Spill and Leak Prevention	Activate the rotating lid system of the charge cars **(Estimated Reduction = 6.8%)**	• Planning (Q3 2013) • Engineering (2014) • Implementation (2015)
On-site Reuse or Recycling	There is no further option for Methanol reduction under this category since system and practices are already in place so that any spill of winter grade lid sealing compound is being recovered and reused/recycled. Excess amount that has not been used during the winter is mixed with the summer grade lid seal in the same storage tank, therefore, it is reused.	
Improved Inventory Management or Purchasing Techniques	No option is available under this category because supply of winter grade lid sealing compound is limited to 2 loads per year only. This usage has been determined historically and will not likely change since this was based on the cokemaking production schedule and capacity. There is also no option under this category for denatured alcohol because this material is ordered and delivered as needed. HW does not maintain excess inventory of denatured alcohol since usage is only seasonal.	
Training or Improved Operating Practices	No option is available under this category since best practices are already in place.	

Name & CAS # of Substance	n-Hexane	110-54-3

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of n-Hexane providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of n-Hexane to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of n-Hexane.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

n-Hexane is incidentally created from the combustion of natural gas when used in the Central Boiler Station (CBS), coke ovens, By-Products flare stacks, galvanizing furnaces and in heating up idled systems at the Steelmaking area. Traces of n-Hexane were also detected in coke breeze recovered from sumps and quench basin.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	Substitute natural gas with coke oven gas (COG) as fuel for no. 8 Boiler **(Estimated Reduction = 9.2%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of n-Hexane has no effect in the current design or formulation of cold rolled and galvanized steel products.	

Equipment or Process Modification, Spill and Leak Prevention, On-Site Reuse or Recycling, Training or Improved Operating Practices	Modify the controls and equipment at no. 8 Boiler to allow the use of COG in lieu of natural gas **(Estimated Reduction = 9.2%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
	Shut off supply and use of natural gas in heating up idled systems at Steelmaking **(Estimated Reduction = 0.74%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with the fuel combustion processes because natural gas is supplied by pipeline and flows into the plant processes only as needed.	

Name & CAS # of Substance	Nitrogen Oxides (as NO_2)	11104-93-1

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Nitrogen Oxides (NOx) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Nitrogen Oxides (NOx) to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of NOx.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

NOx is incidentally created from the combustion of coke oven gas (COG) and natural gas when used in the Central Boiler Station (CBS), coke ovens, By-Products flare stacks, galvanizing furnaces and in heating up idled systems at the Steelmaking area. NOx is also incidentally released from the coke oven door leaks and during pushing.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	Substitute natural gas with COG as fuel for no. 8 Boiler **(Estimated Reduction = 1.12%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of NOx has no effect in the current design or formulation of cold rolled and galvanized steel products.	

Equipment or Process Modification, Spill and Leak Prevention, On-Site Reuse or Recycling, Training or Improved Operating Practices	Modify the controls and equipment at no. 8 Boiler to allow the use of COG in lieu of natural gas **(Estimated Reduction = 1.12%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
	Shut off supply and use of natural gas in heating up idled systems at Steelmaking **(Estimated Reduction = 0.09%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with fuel combustion processes because supply of coke oven gas is finite and is dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed.	

Name & CAS # of Substance	Phosphorus (Total)	NA-22

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Phosphorus providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Phosphorus to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Phosphorus to air, water, land and City sewer.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Phosphorus is incidentally introduced into the processes and products as a substance contained in coal, steel and in baywater. Additional amount of phosphorus also comes from the use of phosphoric acid in the By-Products Plant as a catalyst for the recovery of Anhydrous Ammonia.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified to reduce the use of Phosphorus because: (a) It is an incidental impurity and naturally occurring in coal used in the cokemaking process, (b) Phosphoric acid catalyzes the efficient recovery of Anhydrous Ammonia product and its usage rate is dependent on coke production, (c) It is inherently present in steel, and, (d) There is no alternative type of Phosphorus-free water that is cheap enough and readily available to substitute baywater.	
Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products are inherent to the existing cokemaking, cold rolling and galvanizing processes, operation and equipment. The use of baywater has no effect in the current design or formulation of existing products.	
Equipment or Process Modification	Shut off the baywater supply to Ironmaking and Steelmaking **(Estimated Reduction = 0.9%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)

Spill and Leak Prevention	Repair the baywater leak in front of the 'E' Blast Furnace **(Estimated Reduction = 0.002%)**	• Planning & Approval (Q4 2013) • Remove a gearbox for overhaul of one large baywater valve, isolate the 72" supply line to repair the 2" air release, change the 10" isolation valves for the emergency crossover, blank the 16" to West Side Transfer Station (Q2 2014) •
On-Site Reuse or Recycling	There is no further option for Phosphorus reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scraps or wastage have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. No option to address the use of Phosphorus as a substance in baywater was determined to be feasible.	
Improved Inventory Management or Purchasing Techniques	No option is available under this category due to the following reasons: • Coal inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. Selection of coal supplier is also limited to sister companies and industrial partners. • Inventory of phosphoric acid for use in the By-Products plant is dictated by tank levels and coke production rate, hence, there is no possibility of excessive inventory. • Supply and inventory of hot rolled steel are dictated by customers' demand and allocation from the parent USS company. Given these scenarios, there are no further options that can be considered for the reduction of use of Phosphorus under this category. • Options under this category are also not applicable for baywater since the facilities only take in water as needed and no inventory is kept on site.	
Training or Improved Operating Practices	There is no further option for Phosphorus reduction under this category for cokemaking, cold rolling and galvanizing processes since equipment modification projects and process changes optimizing the use of feed material and avoiding scrap or waste have long been implemented. System and practices are already in place so that steel scrap or any spill of coal are being recovered and reused/recycled. For baywater usage, optimization of supply and usage is already being practiced. An example is closing supply lines that are not used such as the option under Equipment or Process Modification category.	

Name & CAS # of Substance	Sulphur Dioxide	7446-09-5

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Sulphur Dioxide (SO_2) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Sulphur Dioxide (SO_2) to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Sulphur Dioxide (SO_2).

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

SO_2 is incidentally created from the combustion of coke oven gas (COG) and natural gas when used in the Central Boiler Station (CBS), coke ovens, By-Products flare stacks, galvanizing furnaces and in heating up idled systems at the Steelmaking area. SO_2 is also incidentally released from the coke oven door leaks and during pushing.

The following options have been identified for implementation to reduce the creation of SO_2. Although the estimated reduction for SO_2 will be marginal, these options are still listed for implementation since these are anyway slated for the reduction of other toxic substances.

The installation of a Desulphurizing process at the By-Products plant to desulphurize the COG before it is supplied to plant users is an option that could result to 80-95% reduction of SO_2. However, this will not be implemented because this requires huge investment with an estimated payback of 134 years.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	Substitute natural gas with COG as fuel for no. 8 Boiler **(Estimated Reduction = 0.004%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)

Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of SO_2 has no effect in the current design or formulation of cold rolled and galvanized steel products.	
Equipment or Process Modification, Spill and Leak Prevention, On-Site Reuse or Recycling, Training or Improved Operating Practices	Modify the controls and equipment at no. 8 Boiler to allow the use of COG in lieu of natural gas **(Estimated Reduction = 0.004%)**	• Planning (Complete) • Application of environmental approval (Complete) • Modification of no. 8 Boiler controls and equipment (Q2 – Q4 2013) • Implementation (Q4 2013)
	Shut off supply and use of natural gas in heating up idled systems at Steelmaking **(Estimated Reduction = 0.0003%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with the fuel combustion processes because supply of coke oven gas is finite and is dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed.	

Name & CAS # of Substance	Sulphuric Acid	7664-93-9

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the use of Sulphuric Acid providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the use of Sulphuric Acid to the extent that circumstances permit.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Concentrated Sulphuric Acid is purchased and delivered to the Oil Recovery Plant (ORP). It is then diluted as it is further used in the Oil Recovery Plant to treat the emulsified oil from the cold rolling mills and separate oil from water. Chemical reaction leads to the destruction of Sulphuric Acid within the process before the effluent is discharged to the East Side Filtration Plant..

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	There is no further option to reduce the use of Sulphuric Acid under this category since reducing the concentration from 93% to 88% was already accomplished in 2012. Further lowering of the acid concentration will no longer be beneficial because it will require more acid addition to satisfy the reaction mechanism as designed. On the other hand, Sulphuric Acid cannot be substituted with other chemicals because the ORP was set up and approved to treat oily effluent through reaction with Sulphuric Acid as per the ORP certificate of approval.	
Product Design or Reformulation	There is no further option to reduce the use of Sulphuric Acid under this category since the reduction due to partial processing of oily effluent through the elimination of downstream processes such as neutralization and coking was already achieved since 2010.	
Equipment or Process Modification, Training or Improved Operating Practices	Ship some oily cold rolling effluent to recyclers instead of processing this at the ORP **(Estimated Reduction = 5-10%)**	• Contact interested recyclers (Complete) • Sampling and testing (Q4 2013) • Negotiation with supplier (Q3 2014) • Trial shipment (Q4 2014)

Spill and Leak Prevention	There is no option identified under this category because the Sulphuric Acid delivery and storage systems have never experienced spills. This means that the current system and practices are sufficient. Option for non-destructive testing of the sulphuric acid tank to check for leaks was already implemented in Feb. 2012 by a 3rd party. Results showed no leaks.
On-site Reuse or Recycling	There is no further option for Sulphuric Acid reduction under this category since system and practices are already in place to recover and reuse tank washings.
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with the fuel combustion processes because supply of coke oven gas is finite and is dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed.

Name & CAS # of Substance	**Hydrogen Sulphide** **Total Reduced Sulphur (as H_2S)**	**7783-06-4** **No CAS #**

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Hydrogen Sulphide (H_2S) and Total Reduced Sulphur (TRS) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Hydrogen Sulphide (H_2S) and Total Reduced Sulphur (TRS) to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of H_2S and TRS.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Total Reduced Sulphur is the total quantities of Hydrogen Sulphide (H_2S) and Carbon Disulphide (CS_2), which are both incidentally generated from the cokemaking process. H_2S is emitted during coke quenching and from coke oven door leaks while CS_2 is from coke oven charging and burning of coke oven gas (COG) at the underfiring system. As the volatile compounds from the coke ovens are processed at the By-Products plant, some H_2S and CS_2 are contained in COG that are carried over but destroyed during usage at the Central Boiler Station (CBS). The light oil produced at the By-Products also incidentally contains CS_2.

There are no options that can be implemented to reduce the creation of H_2S, CS_2 and TRS. The installation of a Desulphurizing process at the By-Products plant to desulphurize the COG before it is supplied to plant users is an option that could result in 88, 45, 68 and 80-95% reduction of H_2S, CS_2, TRS and SO_2, respectively. However, this will not be implemented because this requires huge investment with an estimated payback of 134 years

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	There is no option to reduce the creation of H_2S, CS_2 and TRS in the cokemaking process. The use of coal and the generation of coke oven gas (COG) are vital to the cokemaking process, which is a core business of the company. Although natural gas is a cleaner gas with no content of H_2S, CS_2 and TRS and is currently used as an alternate fuel, this cannot totally replace the COG in cokemaking and steam production because COG is readily available and maximizing its use is more cost efficient and beneficial than flaring to atmosphere.	

Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of H_2S, CS_2 and TRS has no effect in the current design or formulation of cold rolled and galvanized steel products.
Equipment or Process Modification	The installation of a Desulphurizing process at the By-Products plant to desulphurize the COG before it is supplied to plant users is an option that could result to significant reduction of H_2S, CS_2 and TRS as well as SO_2. However, this will not be implemented because this requires huge investment with an estimated payback of 134 years
Spill and Leak Prevention	There is no option to reduce the creation of H_2S, CS_2 and TRS in the cokemaking process. The use of coal and the generation of COG are vital to the cokemaking process, which is a core business of the company.
On-Site Reuse or Recycling	There is no further option for H_2S, CS_2 and TRS reduction under this category for cokemaking since equipment modification projects and process changes optimizing the use of COG and coal and avoiding waste have long been implemented. System and practices are already in place so that any spill of coal are being recovered and reused/recycled.
Improved Inventory Management or Purchasing Techniques	No option is available under this category that is associated with the fuel combustion processes because supply of coke oven gas is finite and is dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed.
Training or Improved Operating Practices	There is no further option for H_2S, CS_2 and TRS reduction under this category for cokemaking since equipment modification projects and process changes optimizing the use of COG and coal and avoiding wastage have long been implemented. System and practices are already in place so that any spill of coal are being recovered and reused/recycled.

Name & CAS # of Substance	Styrene	100-42-5

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Styrene providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Styrene to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Styrene.

DESCRIPTION WHY SUBSTANCE IS CREATED

The coke battery is designed to convert coal to coke by the destructive thermal distillation. Styrene is created incidentally during this process when heavier hydrocarbons present in coal start dissociating. Most Styrene that is created is contained in light oil that is for sale.

Category	Options To Be Considered for Implementation,	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified because coal is vital to the cokemaking business. Styrene is created incidentally in the production of coke as a result of the chemical structure of coal.	
Product Design or Reformulation	No further option can be identified since the types of finished products are inherent to the existing coking process, operation and equipment.	
Equipment or Process Modification	No further option can be identified since the types of finished products are inherent to the existing coking process, operation and equipment.	
Spill and Leak Prevention	No further option can be identified since the types of finished products are inherent to the existing coking process, operation and equipment.	
On-Site Reuse or Recycling	No further option can be identified since the types of finished products are inherent to the existing coking process, operation and equipment.	
Improved Inventory Management or Purchasing Techniques	Since Styrene is created based on the amount of coke produced regardless of coal inventory, no option for reduction under this category would be applicable.	
Training or Improved Operating Practices	Since Styrene is created in the production of coke, no option for reduction under this category would be applicable.	

Name & CAS # of Substance	**TPM** (Total Particulate Matter) **PM10** (Particulate Matter ≤ 10 Microns) **PM2.5** (Particulate Matter ≤ 2.5 Microns)	N/A – M08 N/A – M09 N/A – M10

STATEMENT OF INTENT

U. S. Steel Canada – Hamilton Works is committed to reducing or, where possible, eliminating the creation of Particulates (PM10, PM2.5 and TPM) providing that circumstances permit it, while complying with all Federal and Provincial Regulations.

REDUCTION OBJECTIVES

Our objective is to reduce the creation of Particulates (PM10, PM2.5 and TPM) to the extent that circumstances permit. We continue to implement best operating and maintenance practices to reduce the releases of Particulates to air and land.

DESCRIPTION WHY SUBSTANCE IS CREATED OR USED

Particulates are incidentally created from combustion of natural gas and coke oven gas as these fuels are used in the Central Boiler Station (CBS), coke ovens, galvanizing furnaces and other plant operations. Particulates are also incidentally created in coal storage, coal handling and cokemaking processes. Road particulates are incidentally created by vehicular traffic inside the plant.

Category	Options To Be Considered for Implementation	Potential Implementation Steps and Time Line
Materials or Feedstock Substitution	No option can be identified under this category to eliminate or reduce the creation of Particulates from raw material receiving/storage, cokemaking and product/by-products/wastes handling processes as well as from vehicular traffic because these are associated with coal, which is vital to the cokemaking business. There is also no option to reduce the creation of Particulates from the fuel combustion processes. Although natural gas is a cleaner gas and is currently used as an alternate fuel, this cannot totally replace the coke oven gas in cokemaking and steam production because coke oven gas is readily available and maximizing its use is more beneficial than flaring to atmosphere. Nevertheless, the option to replace coke oven gas with natural gas has been evaluated but determined to be not economically feasible.	

Product Design or Reformulation	No option can be identified since the formulation of in-process and finished products as well as the by-products are inherent to the existing cokemaking processes, operation and equipment. The creation of Particulates has no effect in the current design or formulation of cold rolled and galvanized steel products.	
Equipment or Process Modification	Pave key roads that are utilized by large trucks **(Estimated Reduction = 6.5%)**	• Planning (Q2 2013) • Approval of funding (Q1 2014) • Implementation (Q4 2014)
	Shut off supply and use of natural gas in heating up idled systems at Steelmaking **(Estimated Reduction = 0.005%)**	• Planning &Approval (Q2 2013) • Implementation (Q4 2013)
Spill and Leak Prevention	No options have been identified for installation at the present time, but further investigation will be considered for spill and leak prevention.	
On-Site Reuse or Recycling	There is no further option to reduce the creation of Particulates under this category because reuse or recycling processes are already in place for Particulates collected in the coal handling baghouse and coke oven baghouse. Reduction options under this category are not applicable for Particulates created from fuel combustion processes because these can no longer be recovered after being emitted to the stack. The coke oven gas (COG) that is directed for use in the CBS instead of flaring out of the flare stacks would not have an impact to the amount of Particulates emitted. The amount of Particulates from COG combustion would still be the same except for the change of source location. Reduction options under this category are not applicable for Particulates generated due to vehicular traffic. Particulates collected from the road are of assorted composition and not applicable for reuse. Particulates that were suppressed or contained by dust suppression methods tend to stay on the ground and become sources for road dust as soon as the effectiveness of suppression lapses through time and weather condition.	
Improved Inventory Management or Purchasing Techniques	No option is available under this category because raw material (coal) inventory is managed to minimize quantities, however, excess inventory must be built for the winter months when shipping is not possible. The selection of coal suppliers are also limited due to complex linkages between sister U. S. Steel plants and industrial partners. No option is available under this category that is associated with the fuel combustion processes because the supply of COG is finite and dependent on coke production. On the other hand, natural gas is supplied by pipeline and flows into the plant processes only as needed. This category is not applicable to the creation of Particulates due to vehicular traffic because road dust is incidentally present all over the plant as a result of existing operations and processes.	

Training or Improved Operating Practices	Develop a presentation for employees that have direct responsibilities in managing road dust levels and raw materials management at the Docks to communicate the importance of their roles and responsibilities to reduce fugitive Particulates generation **(Estimated Reduction = 0.34%)**	• Planning (Q2 2013) • Preparation of presentation materials (Q2 2014) • Implementation (Q4 2014)

CERTIFICATION BY HIGHEST RANKING EMPLOYEE

As of 31 December 2013, I certify that I have read the toxic substance reduction plans for all substances listed in the front page of this Summary and am familiar with their contents, and to my knowledge that plans are factually accurate and comply with the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 (General) made under this Act.

Frank W. Harrison – Director, Environmental and Corporate Affairs
U. S. Steel Canada Inc.

CERTIFICATION BY LICENSED PLANNER

As of December 31, 2013, I, Emelita Simbahon, certify that I am familiar with the processes at U. S. Steel Canada – Hamilton Works that use or create toxic substances listed in the front page of this Summary, that I agree with the estimates referred to in subparagraphs 7 iii, iv, and v of subsection 4 (1) of the Toxics Reduction Act, 2009 that are set out in the plans dated December 31, 2013 and that the plans comply with that Act and Ontario Regulation 455/09 (General) made under this Act.

Emelita Simbahon [Planner License #TSRP0066]
Environmental Engineer / Toxic Substance Reduction Planner & Certifier
U. S. Steel Canada – Hamilton Works