

CENTRAL WIRE

# Toxic Substance Reduction Plan

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Central Wire (Perth)

Doug Ross

12/17/2012

Ontario industries must comply to the Ontario Toxic Substance Reduction Act (2009) and Ontario Reg 455/09. This document is the toxic substance plan for Central Wire (Perth)

## Contents

Company Narrative.....	3
Description of Toxic Substances .....	3
Facility Information.....	4
Statement of Intent and Objective.....	7
Description of Facility.....	7
Stages & Processes.....	8
Tracking & Quantification.....	13
Costs Estimates.....	27
Identification and Option Description.....	29
Planner Recommendations and Rationale.....	32
Planner Certifications.....	34

## **Toxic Substance Reduction Plan – Central Wire Industries Ltd. (Perth)**

Central Wire Industries Ltd (CWI) manufactures stainless steel wire, nickel alloy wire and related products in alloys tailored to meet specific customer requirements.

Wire diameters from 0.003 inches to 0.5 inch in a variety of surface finishes, coatings and packages.

Located in Perth, Ontario, the company known as Central Wire was founded in 1955 to manufacture red metal wire for weaving of fourdrinier fabric for the paper industry. Over the years the firm developed the expertise in the production of fine stainless steel wire for the fourdrinier fabric and many other applications serving a wide variety of domestic and international markets.

In 1989 CWI acquired an additional plant in Dumas, Arkansas. CWI operations were further strengthened in 1998 with the purchase of a facility in Lancaster, South Carolina.

In January of 2003 Central Wire announced the acquisition of the Greening Donald stainless wire plant in Erin, Ontario.

Other acquisitions included facilities in Union IL (2005), Perris CA (2005), and Fond Du Lac WI (2010).

Wire drawing is one of the oldest metal working technologies in the world. The process entails pulling or drawing material through a series of “dies” of specific diameters to satisfy parameters of both customers and downstream processes. The drawn wire can be further processed after a heat treatment called a solution anneal. When annealing of the drawn wire is required, the wire is passed through a horizontal tube furnace, with the tubes having a controlled atmosphere to facilitate heat transport and inhibit any oxidation so the wire maintains its luster. The process heats the wire to critical temperature and quickly quenching the wire to achieve properties that make wire malleable for future processing. Similar to the drawing process any scrap generated through set-up or off spec product is handled as part of documented non-conforming material procedures or scrapped into the proper hopper and then collected for transfer to recyclers. The toxic substances are present in the annealing process as a component of product and are neither created, added nor removed from the bulk metal.

The wire drawing process or annealing process may need to be repeated to achieve the desired properties for the customer.

### **1. Description of Toxic Substances at Central Wire Industries (Perth)**

There are four Phase 1 toxic substances that are subject to the criteria set out in the Toxics Reduction Act, 2009 and Ontario regulation 455/09.

These substances are:

Chromium (NA-04)

Manganese (NA-09)

Nickel (NA-11)

Copper (NA-06)

## **2. Facility Information:**

Facility Name:	CENTRAL WIRE INDUSTRIES Ltd. (Perth)
NPRI Identification Number:	04642
Two Digit NAICS Code:	33
Four Digit NAICS Code:	3312
Six Digit NAICS Code:	331222
Number of Fulltime Employees:	80
UTM Spatial Coordinates (NAD83)	Latitude: 44.90470 Longitude: -76.24810 Datum: 18

### **2.1. Owner of the Facility:**

Name:	Central Wire Industries Ltd.
Address:	1 North Street, Perth, ON K7H 5S2
Phone Number:	1-613-267-3752
Fax Number:	1-613-267-3929
E-mail:	<a href="mailto:info@centralwire.com">info@centralwire.com</a>

### **2.2. Operator of the Facility:**

Name:	Central Wire Industries
Address:	1 North Street, Perth, ON K7H 5S2
Phone Number:	1-613-267-3752
Fax Number:	1-613-267-3929
E-mail:	<a href="mailto:info@centralwire.com">info@centralwire.com</a>

### **2.3. Highest ranking Employee at the Facility:**

Name: Paul From  
Title: President and CEO  
Address: 1 North Street Perth, ON K&H 2S2  
Phone Number: 1-613-267-3752  
Fax Number: 1-613-267-3929  
E-mail: [pfrom@centralwire.com](mailto:pfrom@centralwire.com)

### **2.4. Parent Company:**

Legal Name: Central Wire Industries  
Address: 1 North Street, Perth, ON K7H 5S2  
Percentage of Facility Owned by Company: 100%  
CCRA Business Number: 100875202

### **2.5. Toxic Substances for Which Facility Must Prepare Plan:**

These substances are:

Chromium	(NA-04)	CAS: 7440-47-3
Manganese	(NA-09)	CAS: 7439-96-5
Nickel	(NA-11)	CAS: 7440-02-0
Copper	(NA-06)	CAS: 7440-50-8

### **2.6. Plan Contacts:**

#### **Person Coordinating the Preparation of the Plan:**

Name: Doug Ross  
Title: General Manager  
Address: 1 North Street, Perth, ON K7H 2S2  
Phone Number: 1-613-267-3752  
Fax Number: 1-613-267-3929  
E-mail: [dross@centralwire.com](mailto:dross@centralwire.com)

**Person who Prepared the Plan:**

Name:	Al McMillan
Title:	General Manager
Address:	1 Erinville Drive, Erin ON N0B-1T0
Phone Number:	1-519-833-9632
Fax Number:	1-519-833-2213
E-mail:	<u><a href="mailto:amcmillan@centralwire.com">amcmillan@centralwire.com</a></u>

**Statement of Intent:**

It is not Central Wire Industries' intent to reduce our use of the contaminants Manganese (Mn), Chromium (Cr), Nickel (Ni), and Copper (Cu) in our processes. The contaminants are components of product and their use relates directly to our business volume. We do intend to make the most efficient use of the substances and to minimize waste in our operations and reduce transfers to recyclers. The substances Manganese (Mn), Chromium (Cr), Nickel (Ni) and Copper (Cu) are not created in any of Central Wire's operations.

**Objective:**

The volume of toxic substances used in our operations is directly related to our business activities. It is our objective to maximize the efficiencies of our operations and in turn reduce the amount of Manganese (Mn), Chromium (Cr), Nickel (Ni) and Copper (Cu) transferred for recycling, in compliance with Federal, Provincial and local legislation.

**Description of Facility (Perth) – Main Operations**

Central Wire Industries Perth facility is 58,000 sq-ft currently employing 82 people fulltime. The plant operates 5 days - 24 hours, with the production staff working a non-rotating 3 shift schedule. The Perth facility manufactures stainless steel and nickel alloy wire ranging in diameters of 0.002 inches (0.05 mm) up to 0.275 inches (6.9 mm) in a range of tempers, finishes and packages. Main manufacturing operations / processes at the mill consist of Pre-coating, Drawing (DD), and Annealing (Heavy/Intermediate), Fine Wire Drawing, Fine Wire Annealing and Ultra Fine Wire Drawing. The toxic substances are present as a component of the product with any scrap being collected and segregated into the appropriate bins for recycling. Off-spec or non-conforming wire is identified as such and placed in a holding area for disposition.

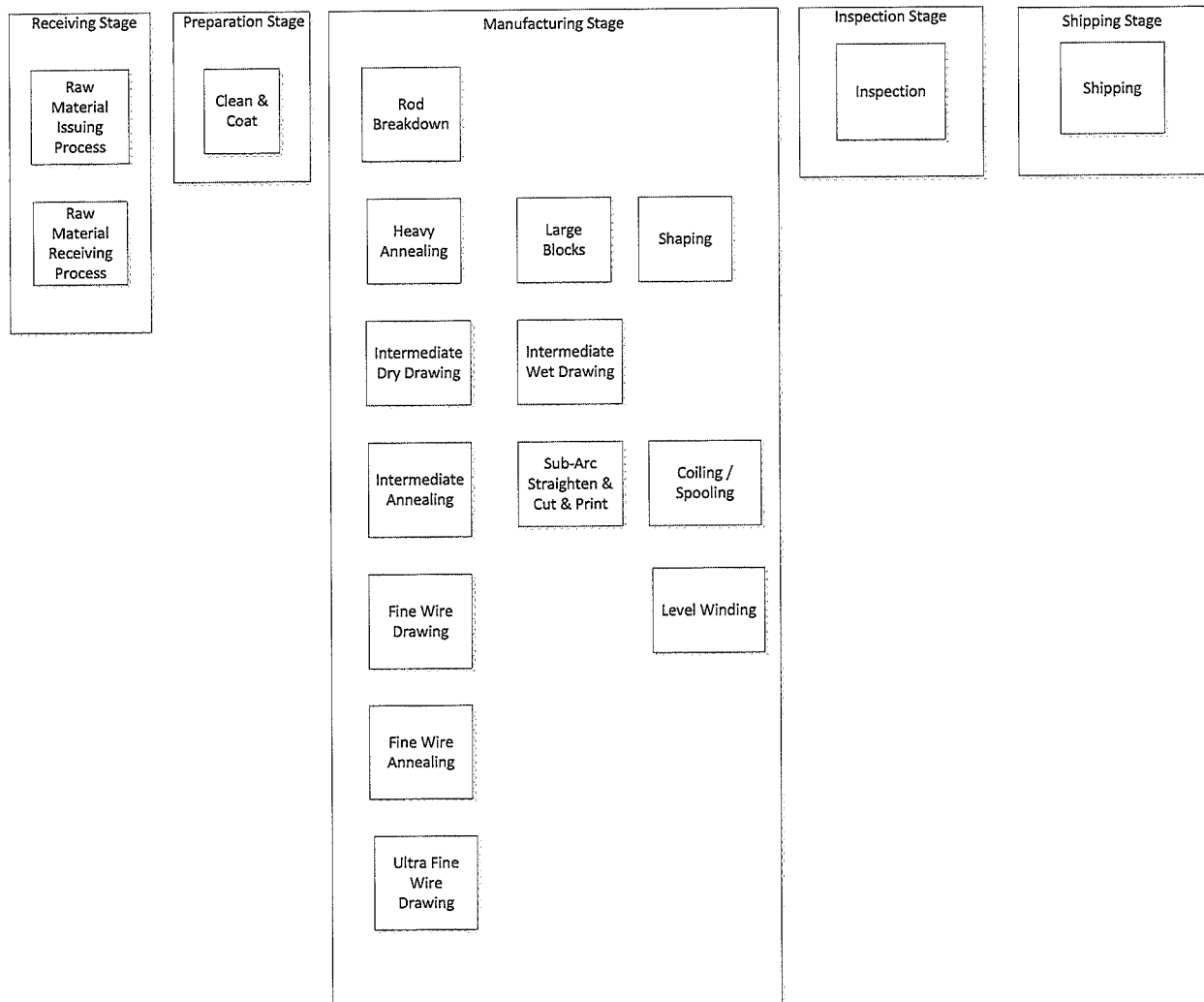
## **Stages and Processes that Use Manganese, Chromium, Nickel, & Copper**


### **Identification of and Description of the Stages that Use Manganese, Chromium, Nickel & Copper:**

The manufacturing of stainless steel wire consists of six stages at the Perth facility. For the calendar year 2011, manganese (Mn), chromium (Cr), nickel (Ni), and Copper (Cu) were present as a component of product at the receiving stage where the raw material is offloaded and weighed into inventory, in the preparation stage where the rod is staged for manufacturing orders and coated to facilitate manufacturing, the manufacturing stage where the rod dimensions and mechanical properties are significantly transformed to meet customer requirements or for subsequent processing, at the inspection stage the finished product is audited for conformance to the job specifications, at the shipping stage the finished wire is moved and weighed into finished goods ready for sale as shown in Figure 1. No process at the facility actually creates manganese, chromium, nickel, and copper.



## Stages & Processes of Stainless Steel & Nickel Alloy Wire Manufacturing



LEGEND	
	Process where substance is present
U-Mn	Use of Manganese
U-Cr	Use of Chromium
U-Ni	Use of Nickel
TR-Mn	Transfer of Manganese
TR-Cr	Transfer of Chromium
TR-Ni	Transfer of Nickel
TR-Cu	Transfer of Copper

## **Identification of the Processes that Use Manganese, Chromium, Nickel & Copper:**

The manufacturing of stainless steel wire begins with the Receiving Process where random wound rod coils weighing approximately 2200 lbs (1000 kgs) each are entered into our raw material inventory. Once a purchase order is received from a customer, a manufacturing order is entered into the manufacturing schedule. The appropriate amount of the required alloy is weighed out of the raw material inventory and allocated into the job. The material itself passes through the Clean & Coat Process where the rod is dipped into a tank of pre-coat solution. The pre-coat is applied to facilitate the drawing process. The coating is cured and the material staged for the next process. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

During the Rod Breakdown Process the wire is pulled through a series of dies of decreasing diameter to achieve the mechanical properties and dimensions required by the customer or in preparation for further processing. This process results in significant transformation of the mechanical and dimensional properties of the raw material. Scrap material generated during set-up and any off-spec material is either placed in the appropriate hopper or identified as non-conforming and placed in a holding area referred to as restricted stock to either be reworked or deemed unsalvageable. The scrap generated in the area is segregated then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Heavy/Intermediate Annealing Process, at this operation the wire is cleaned inline and heated to a critical temperature that results in changes to mechanical properties but not dimensional. Each wire is individually annealed by feeding it through a tube and taking it up into a coil or spool / reel at the exit of the furnace. Scrap generated in the area is segregated and then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Profile Process, at this operation the wire is formed into basic shapes, the wire is pulled through a set of rolls to achieve the mechanical properties and profile required by the customer. Scrap generated in the area is segregated and then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Draw Block Process, at this stage the wire is pulled through one to three dies to achieve the mechanical properties and dimensions required by the customer or in preparation for further processing. Scrap generated in the area is segregated and then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Similar to the Rod Breakdown Process but on a smaller scale the Intermediate Dry Drawing Process, the wire is pulled through a series of dies of decreasing diameter to achieve the mechanical properties and dimensions required by the customer or in preparation for further processing. This process results in significant transformation of the mechanical and dimensional properties of the raw material. Scrap material generated during set-up and any off-spec material is either placed in the appropriate hopper or identified as non-conforming and placed in a holding area referred to as restricted stock to either be reworked or deemed unsalvageable. The scrap generated in the area is segregated then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

The Fine Wire Annealing Process, at this operation the wire is heated to a critical temperature that results in changes to mechanical properties but not dimensional. Each wire is individually annealed by feeding it through a tube and taking it up into a spool / reel at the exit of the furnace. Scrap generated in the area is segregated and then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Wet Draw Process, the wire is pulled through a series of dies of decreasing diameter to achieve the mechanical properties and dimensions required by the customer or in preparation for further processing. This process results in significant transformation of the mechanical and dimensional properties of the raw material. Scrap material generated during set-up and any off-spec material is either placed in the appropriate hopper or identified as non-conforming and placed in a holding area referred to as restricted stock to either be reworked or deemed unsalvageable. The scrap generated in the area is segregated then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Other ancillary processes include clean, sub arc coiling, straight/cut and print, and spooling. In the sub arc coiling process the drawn wire is wound onto coils of specific weight. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Clean Process, at this operation when required the wire is cleaned for additional cleanliness prior to annealing. Scrap generated in the area is segregated and then collected for transfer to recyclers. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

The straight/cut and print process the wire is straight and cut to a specific length. After the wire is cut the cut wire is marked by laser imprinting. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

The Spooling Process the drawn wire is wound onto spools of specific weight. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

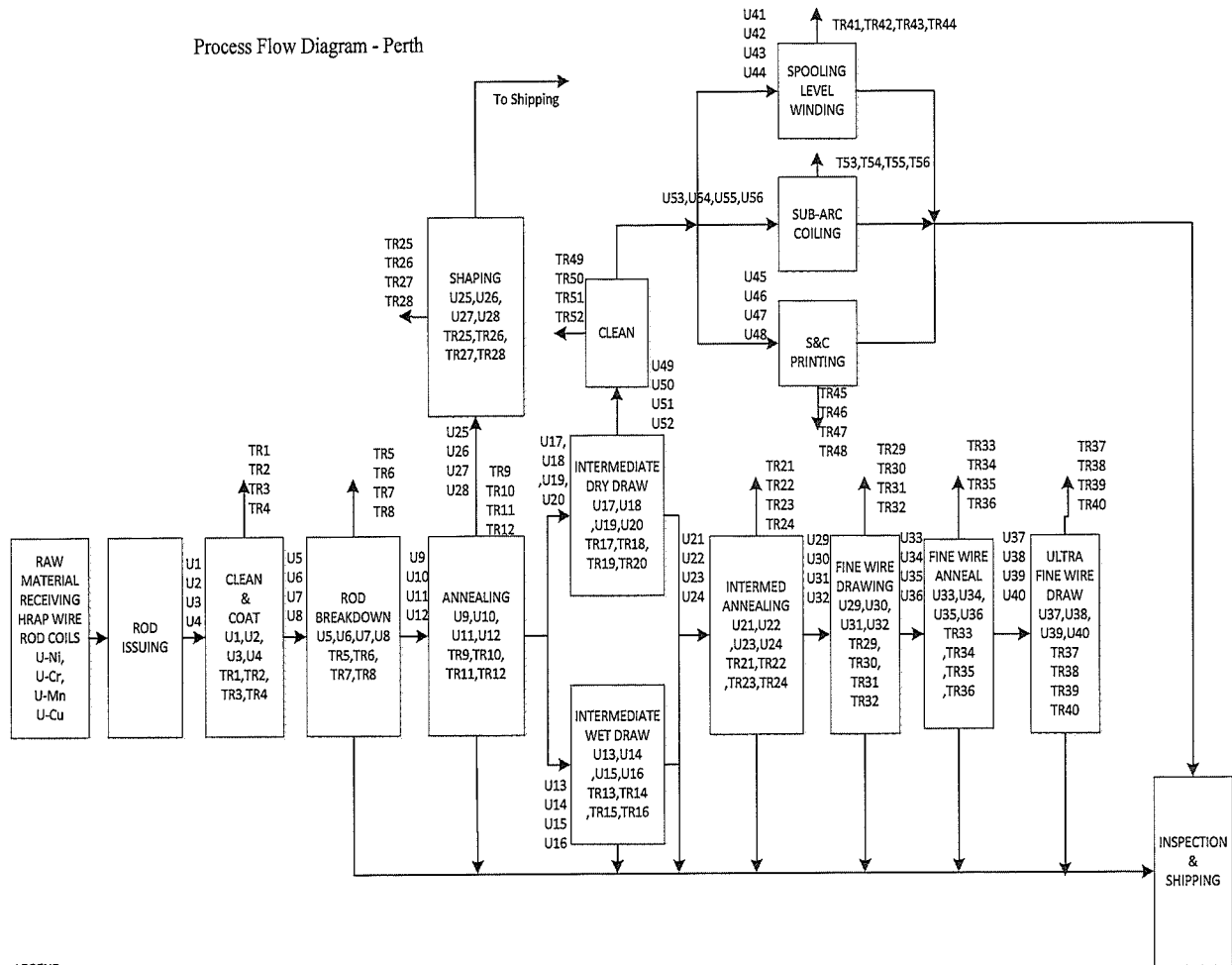
When wire leaves the manufacturing processes it is in a packaged form that is suitable for shipping.

At the inspection stage samples are taken from the finished product and the dimensional and mechanical properties are verified for reporting and the required labeling is correct and present. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

The inspected wire is weighed into stock by the shipper and is ready for release to the customer at the date requested at time of order. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

In 2011 the plant operated 24hrs a day, 5 days per week. Shutdown periods included a 1 week summer maintenance shutdown, 1 week Christmas shutdown and statutory holidays.

# PROCESS FLOW DIAGRAM



## LEGEND

U-Mn	Use of Manganese
U-Cr	Use of Chromium
U-Ni	Use of Nickel
TR-Mn	Transfer of Manganese
TR-Cr	Transfer of Chromium
TR-Ni	Transfer of Nickel

## **TRACKING AND QUANTIFICATION**

Substance enters a process (Use):

U-Mn (i.e. the amount of manganese present in the grade of stainless steel used in the process)

U-Cr (i.e. the amount of chromium present in the grade of stainless steel used in the process)

U-Ni (i.e. the amount of nickel present in the grade of stainless steel used in the process)

U-Cu (i.e. the amount of copper present in the grade of stainless steel used in the process)

**Tracking and Quantification Method:** Mass Balance

### **Method Rationale**

The nature of the business is that all activities and processes at the facility are recorded by weight. A live data system tracks manufacturing orders through the factory by weight. Upon completion of the order the finished product is weighed into inventory. The concentration of the toxic substances is also a function of percent weight of the bulk metal. Mill certificates provided from the vendors provide information of the percent weight is present dependent on alloy. For the reasons listed the use of the Mass Balance technique for the calculations was appropriate. For the purpose of this report the % wt of each substance was based on an average of the companies max and min tolerances for Mn, Cr, Ni, and Cu published in their purchasing specifications.

**Quantification of Manganese, Chromium and Nickel (Table 1)**

TS Calculations		Avg. Substance Conc. (%wt)				Kg Substance Produced			
		Mn	Cr	Ni	Cu	Mn	Cr	Ni	Cu
17/7	5865.5	0.01	0.169	0.0775	0.005	58.7	991.3	454.6	29.3
HC276	8760.9	0.01	0.165	0.50475	0.005	87.6	1445.6	4422.1	43.8
2209	4231.4	0.02	0.235	0.095	0.003	84.6	994.4	402.0	12.7
2594	3435.5	0.02	0.27	0.105	0.005	68.7	927.6	360.7	17.2
302/302H	5619.1	0.01	0.175	0.085	0.005	56.2	983.3	477.6	28.1
302HQ	504.5	0.008	0.185	0.1	0.04	4.0	93.3	50.5	20.2
304/304H	264646.4	0.02	0.19	0.092	0.005	5292.9	50282.8	24347.5	1323.2
304L/304LVM/304M	410173.6	0.02	0.19	0.0975	0.005	8203.5	77933.0	39991.9	2050.9
309L	704.5	0.025	0.25	0.14	0.005	17.6	176.1	98.6	3.5
307	775.9	0.075	0.195	0.09	0.003	58.2	151.3	69.8	2.3
308/308H/308L/308Lsi	244603.2	0.0175	0.215	0.102	0	4280.6	52589.7	24949.5	0.0
309/309L/309Lsi/309Lmo	134043.6	0.025	0.25	0.14	0.005	3351.1	33510.9	18766.1	670.2
310	18351.8	0.02	0.26	0.22	0.004	367.0	4771.5	4037.4	73.4
312	3870.9	0.02	0.3175	0.1025	0.005	77.4	1229.0	396.8	19.4
316/316L/316LVM	141531.4	0.02	0.18	0.12	0.005	2830.6	25475.6	16983.8	707.7
316L/316Lsi	172134.1	0.02	0.18	0.12	0.005	3442.7	30984.1	20656.1	860.7
317L	52600.9	0.02	0.2	0.15	0.005	1052.0	10520.2	7890.1	263.0
321	25707.3	0.02	0.19	0.11	0.005	514.1	4884.4	2827.8	128.5
347	21582.7	0.02	0.19	0.12	0.005	431.7	4100.7	2589.9	107.9
330(35/19 CB)	119859.1	0.006	0.2	0.35	0.003	719.2	23971.8	41950.7	359.6
400	18060.9	0.0125	0	0.665	0.31	225.8	0.0	12010.5	5598.9
410/410L	49444.1	0.01	0.125	0.005	0.005	494.4	6180.5	247.2	247.2
410NiMo	709.1	0.0055	0.125	0.05	0.0075	3.9	88.6	35.5	5.3
409CB	41466.4	0.0075	0.1175	0.005	0.0025	311.0	4872.3	207.3	103.7
420	3502.7	0.005	0.14	0.0025	0.003	17.5	490.4	8.8	10.5
430	63985.5	0.005	0.165	0.003	0.005	319.9	10557.6	192.0	319.9
434	5212.7	0.008	0.167	0.005	0.005	41.7	870.5	26.1	26.1
439Ti	1116.4	0.01	0.19	0.005	0	11.2	212.1	5.6	0.0
20CB3	1917.3	0.02	0.21	0.38	0.04	38.3	402.6	728.6	76.7
600/601	7015.9	0.008	0.155	0.75	0.005	56.1	1087.5	5261.9	35.1
606	635.5	0.034	0.215	0.67	0.005	21.6	136.6	425.8	3.2
622	7952.7	0.005	0.225	0.50535	0.005	39.8	1789.4	4018.9	39.8
625	57034.5	0.003	0.22	0.6	0.004	171.1	12547.6	34220.7	228.1
800	4694.1	0.015	0.23	0.35	0.0075	70.4	1079.6	1642.9	35.2
825	127.3	0.01	0.0215	0.42	0.023	1.3	2.7	53.5	2.9
904L/385	14900.9	0.025	0.215	0.26	0.02	372.5	3203.7	3874.2	298.0
INV36	6076.8	0.005	0.0025	0.37	0	30.4	15.2	2248.4	0.0
MP35N	2651.4	0.0015	0.2	0.355	0	4.0	530.3	941.2	0.0
201/205/211	42215.0	0.0035	0	0.99	0.0035	147.8	0.0	41792.9	147.8
Nit32	6993.6	0.125	0.19	0.021	0.0035	874.2	1328.8	146.9	24.5
Nit50	2280.0	0.06	0.22	0.13	0.005	136.8	501.6	296.4	11.4
Nit60	7600.9	0.09	0.18	0.09	0	684.1	1368.2	684.1	0.0
Tot. Prod. Kg	1984595.9					35072.2	373282.5	320792.7	13935.8

## Quantification of Toxic Substance Flow

### Coat Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. **(Table 1)**

### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, and Cu are known to be the same amount contained in product following the Clean & Coat process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 16,270.6\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 198,988.7\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 168,478\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 5158.0\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 16270.6kg

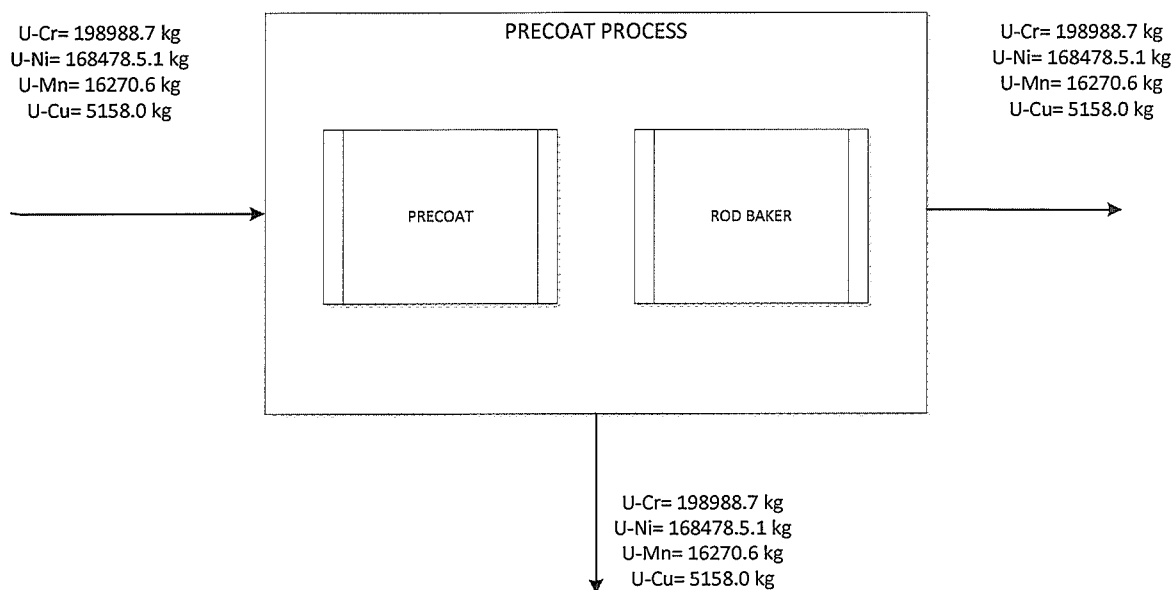
Chromium (Cr) used in this process in 2011: 198,988.7kg

Nickel (Ni) used on this process in 2011: 168,478kg

Copper (Cu) used on this process in 2011: 5158.0kg

No change to dimensional or mechanical properties occurs at this stage hence no transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



## Quantification of Toxic Substance Flow

### Rod Breakdown Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

#### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the rod breakdown process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 24,928.9\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 322,340.1\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 269,846.0\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 8236.8\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 24,928.9 kg

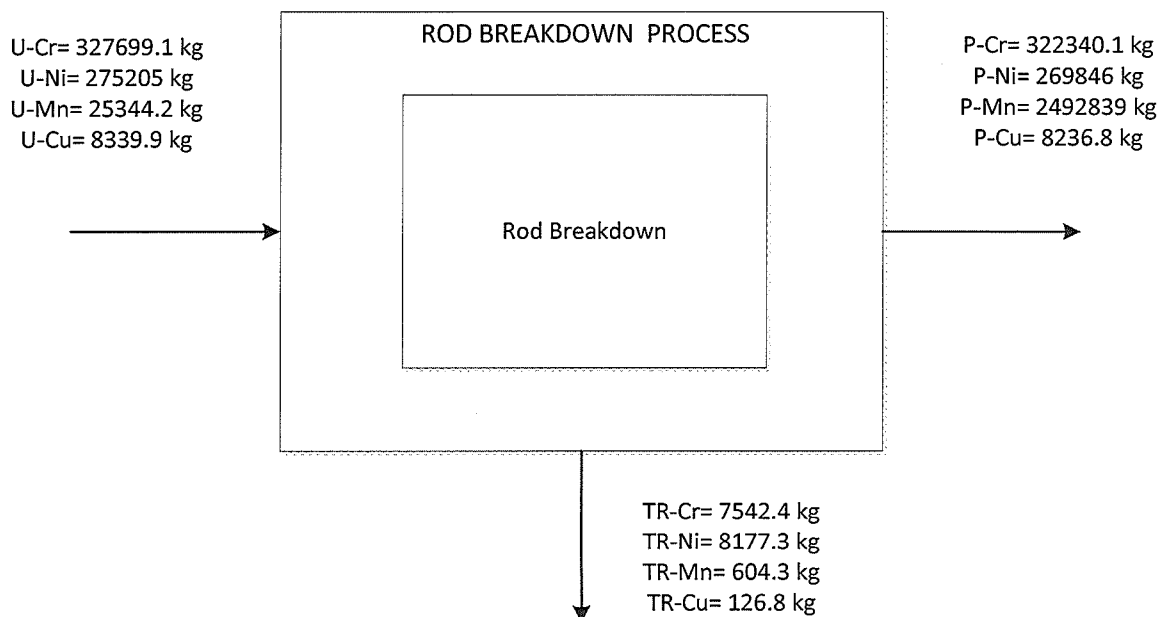
Chromium (Cr) used in this process in 2011: 322,340.1kg

Nickel (Ni) used on this process in 2011: 269,846.0kg

Copper (Cu) used on this process in 2011: 8,236.8kg

Significant change to dimensional or mechanical properties occurs at this stage hence transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)





## Quantification of Toxic Substance Flow

### Heavy / Intermediate Annealing Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

#### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the heavy / intermediate annealing process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 20,289.0\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 266,733.5\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 249,285.5\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 5615.1\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 20,289.0kg

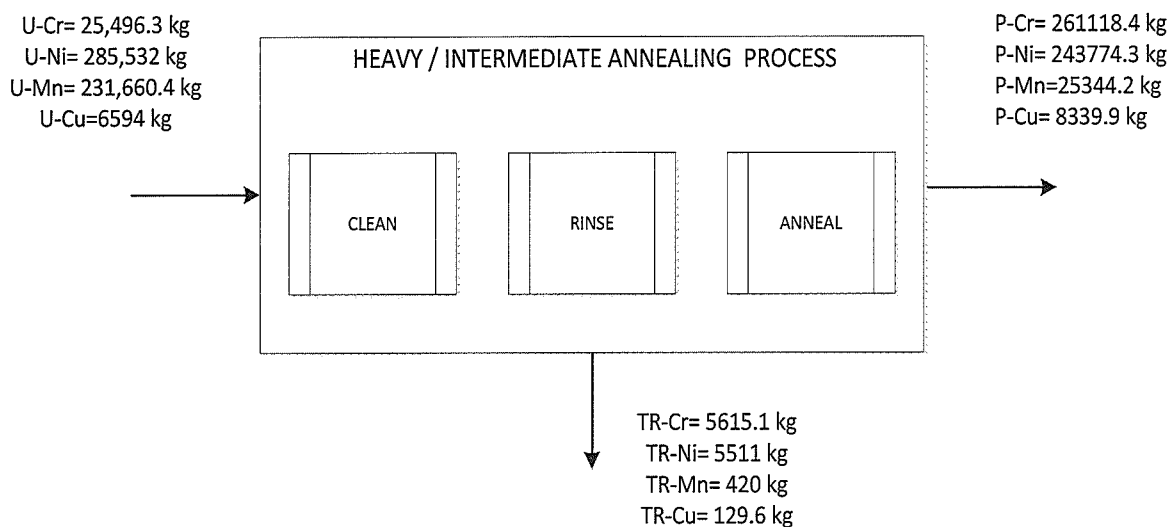
Chromium (Cr) used in this process in 2011: 266,733.5 kg

Nickel (Ni) used on this process in 2011: 249,285.5kg

Copper (Cu) used on this process in 2011: 5615.1kg

Significant change to the mechanical properties occurs at this stage hence transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



## Quantification of Toxic Substance Flow

### Intermediate Dry Drawing Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. **(Table 1)**

#### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the intermediate dry draw process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 11,194.0\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 160,431.6\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 169,024.2\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 31.3\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 11,194.0kg

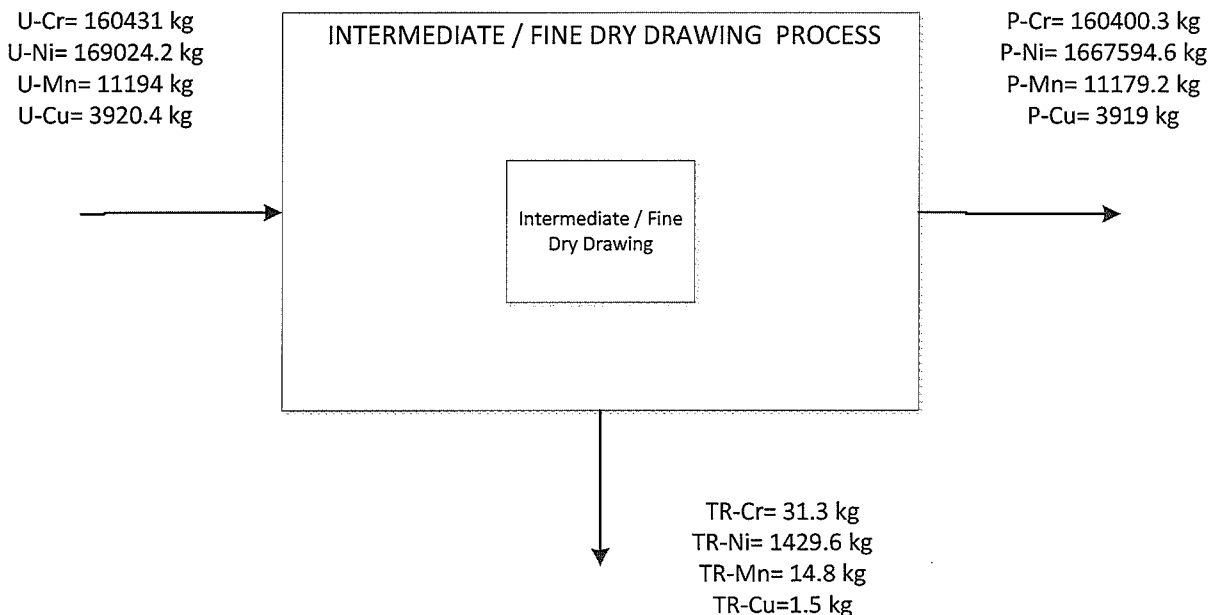
Chromium (Cr) used in this process in 2011: 160,431.6kg

Nickel (Ni) used on this process in 2011: 169,024.2kg

Copper (Cu) used on the process in 2011: 31.3kg

Significant change to the dimensional and mechanical properties occurs at this stage hence transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal. Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)

## Quantification of Toxic Substance Flow



### Clean Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

#### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the cleaning process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 4485.4\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 62,826.7\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 53,553.6\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 1,535.0\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 4,485.4kg

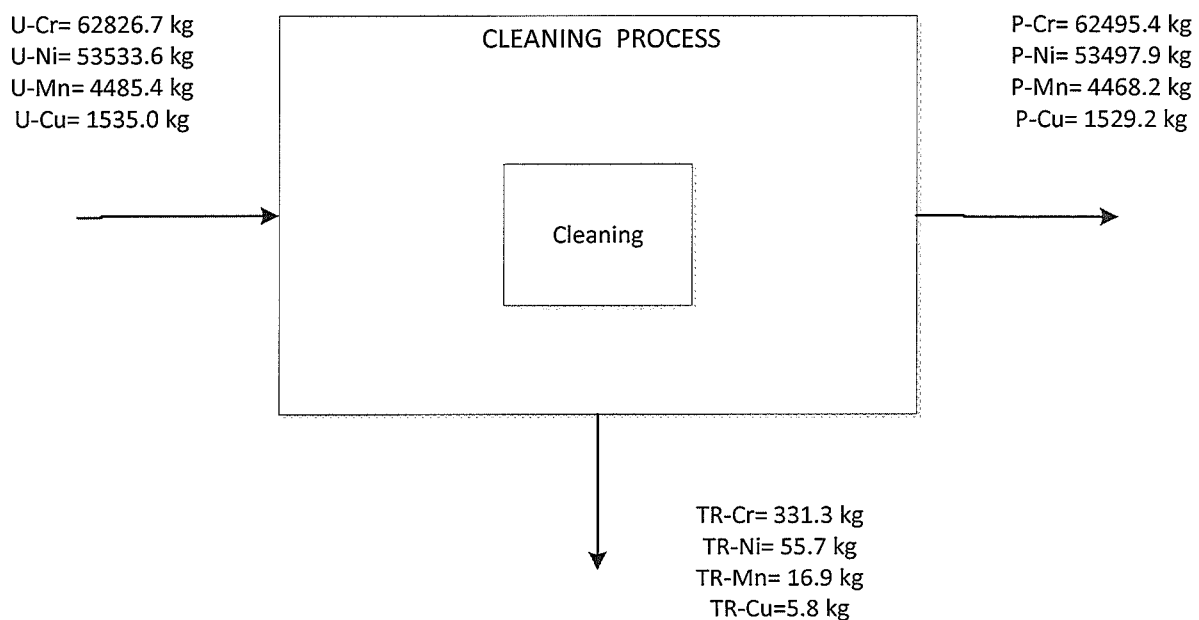
Chromium (Cr) used in this process in 2011: 62,826.7kg

Nickel (Ni) used on this process in 2011: 53,553.6kg

Copper (Cu) used on this process in 2011: 1,535.0kg

Significant change to the dimensional and mechanical properties occurs at this stage hence transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



### Fine Annealing Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the receiving process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 3,605.6\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 49,588.2\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 68,786.4\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 859.6\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 3,605.6kg

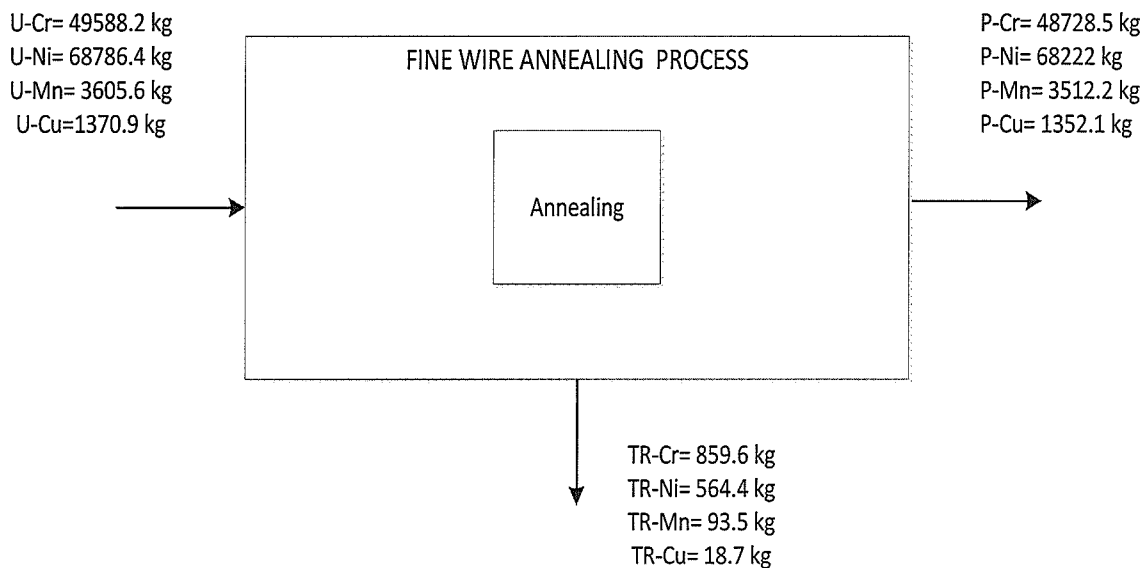
Chromium (Cr) used in this process in 2011: 49,588.2kg

Nickel (Ni) used on this process in 2011: 68,786.4kg

Copper (Cu) used on this process in 2011: 859.6kg

Significant change to the dimensional and mechanical properties occurs at this stage hence transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



## Quantification of Toxic Substance Flow

### Wet Draw Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. **(Table 1)**

### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the wet draw process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 7,122.0\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 95,636.2\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 112,503.9\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 2633.0\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 7,122.0kg

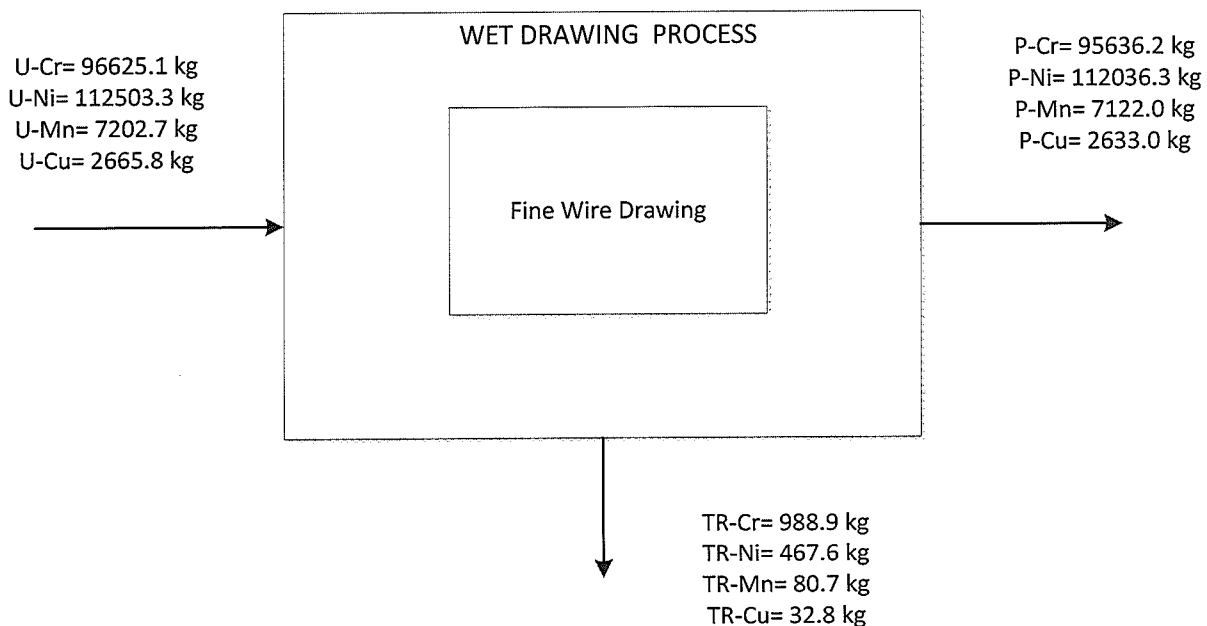
Chromium (Cr) used in this process in 2011: 95,636.2kg

Nickel (Ni) used on this process in 2011: 112,503.9kg

Copper (Cu) used on this process in 2011: 2,633.0kg

Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



### Profile Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the profiling / shaping process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 2,232.8\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 26,852.7\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 17,564.8\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 755.4\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 2,232.8kg

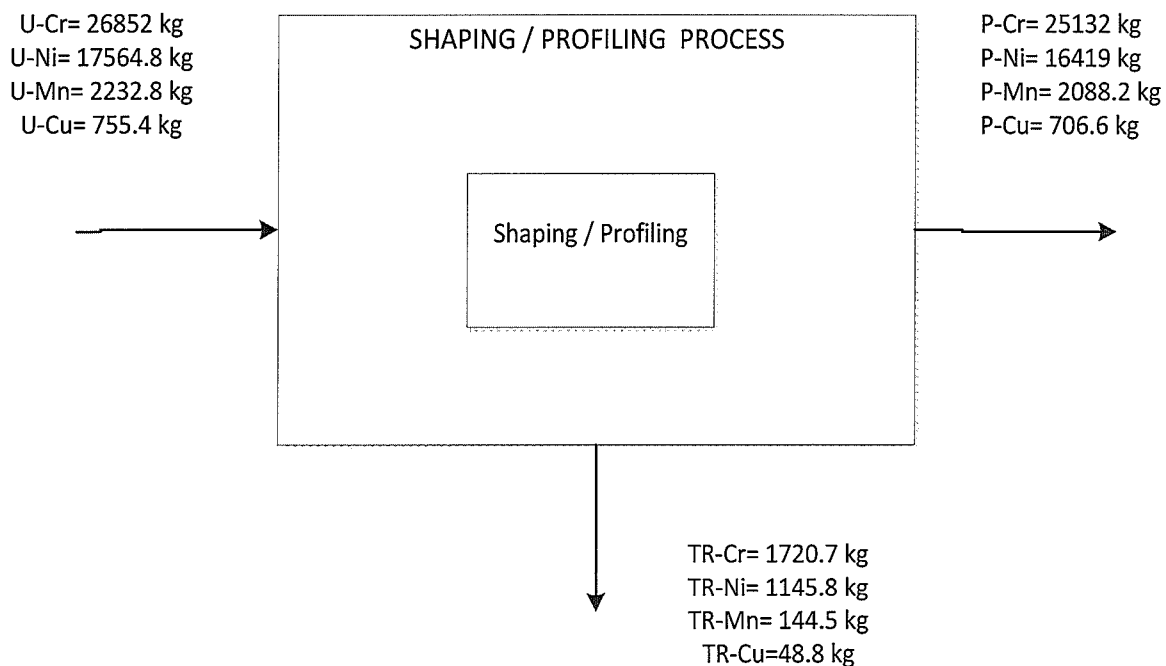
Chromium (Cr) used in this process in 2011: 26,852.7kg

Nickel (Ni) used on this process in 2011: 17,564.8kg

Copper (Cu) used on this process in 2011: 755.4kg

No Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



### Sub Arc Coiling Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the coiling process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Mn}} = 1,067.4\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Cr}} = 13,520.8\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Ni}} = 11,471.6\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Cu}} = 378.1\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 1,067.4kg

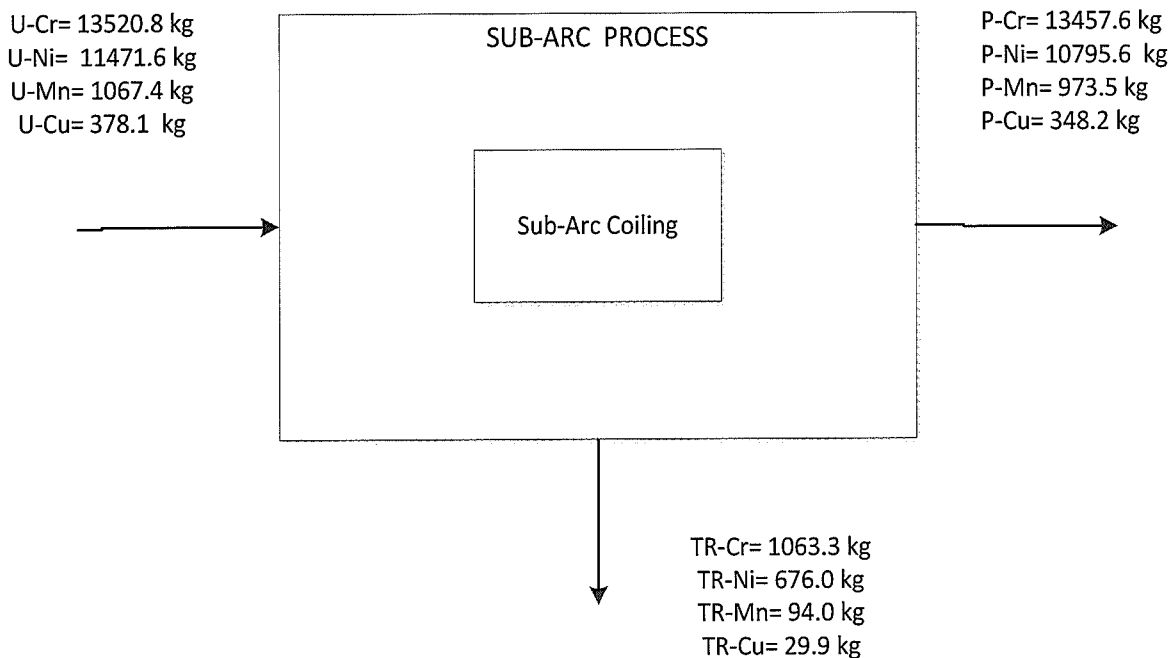
Chromium (Cr) used in this process in 2011: 13,520.8kg

Nickel (Ni) used on this process in 2011: 11,471.6kg

Copper (Cu) used on this process in 2011: 378.1kg

No Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



### Straighten /Cut & Print Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the straighten /cut & print process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 2,141.1\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 23,351.8\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 13,799.1\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 843.9\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 2,141.1kg

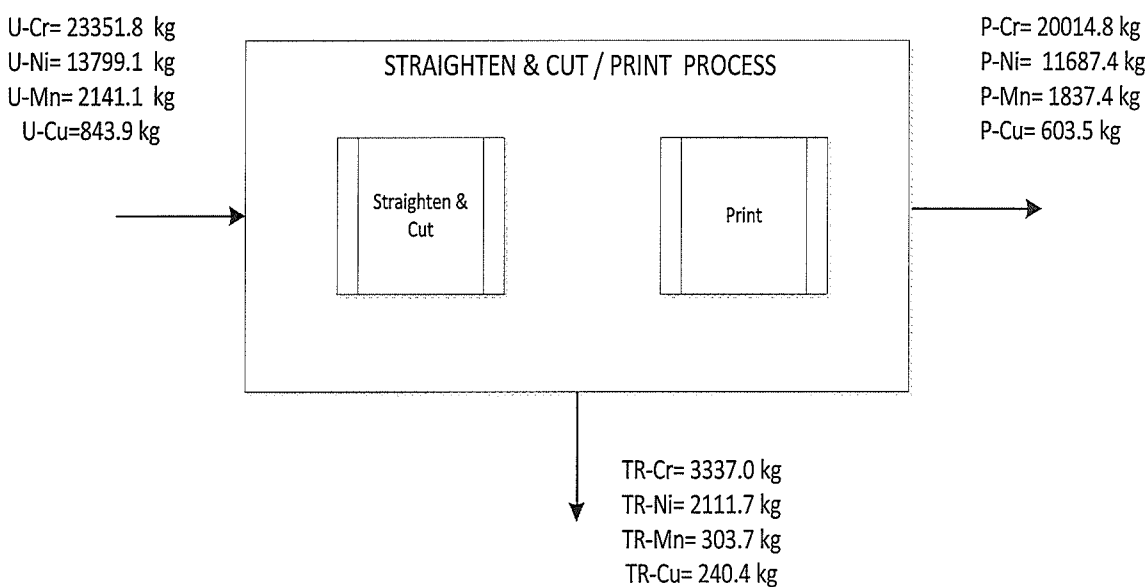
Chromium (Cr) used in this process in 2011: 23,351.8kg

Nickel (Ni) used on this process in 2011: 13,799.1kg

Copper (Cu) used on this process in 2011: 843.9kg

No Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)





### Spooling Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

#### Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the receiving process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 8,238.0\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 95,309.1\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 69,796.8\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 14,517.0\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 8,238.0kg

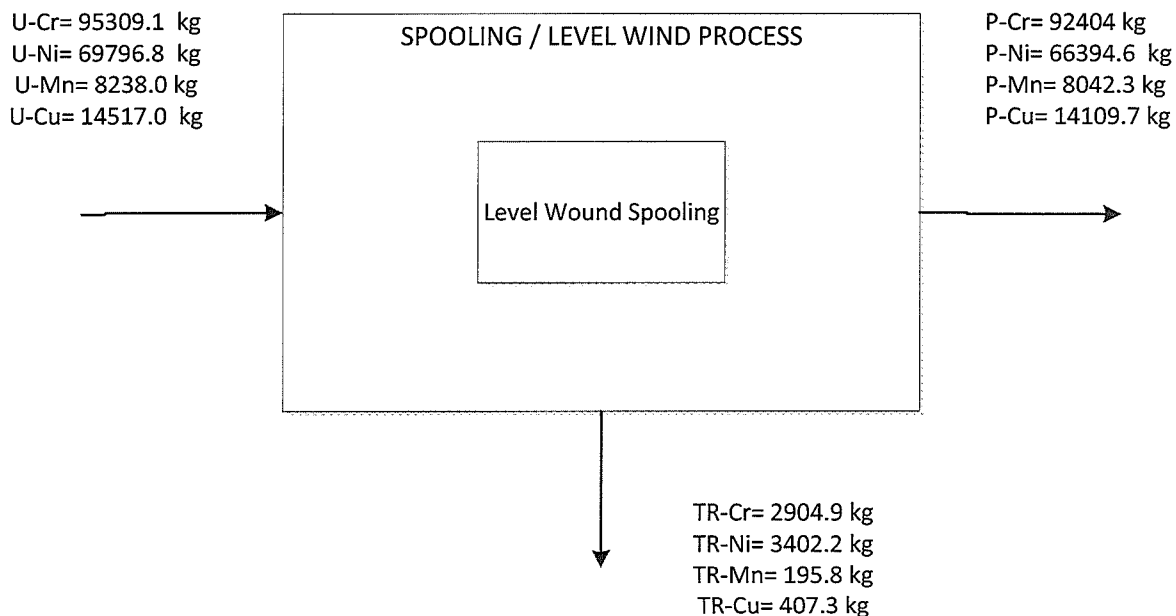
Chromium (Cr) used in this process in 2011: 95,309.1kg

Nickel (Ni) used on this process in 2011: 69,796.8kg

Copper (Cu) used on this process in 2011: 14,517.0kg

No Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



### Intermediate Wet Draw Process:

The toxic substances enter the process as a constituent of the raw material in concentrations specific to the grade of stainless steel being processed. (Table 1)

Quantification Method:

- Mass Balance – the amount of Mn, Cr, Ni, & Cu are known to be the same amount contained in product following the intermediate wet draw process.

$$U_{\text{Mn}} = U_1 + T_1$$

$$U_{\text{Cr}} = U_2 + T_2$$

$$U_{\text{Ni}} = U_3 + T_3$$

$$U_{\text{Cu}} = U_4 + T_4$$

$$U_{\text{Mn}} = 7,317.3\text{kg} + 0\text{kg}$$

$$U_{\text{Cr}} = 92,402.2\text{kg} + 0\text{kg}$$

$$U_{\text{Ni}} = 77,677.3\text{kg} + 0\text{kg}$$

$$U_{\text{Cu}} = 10,287.5\text{kg} + 0\text{kg}$$

Manganese (Mn) used in this process in 2011: 7,317.3kg

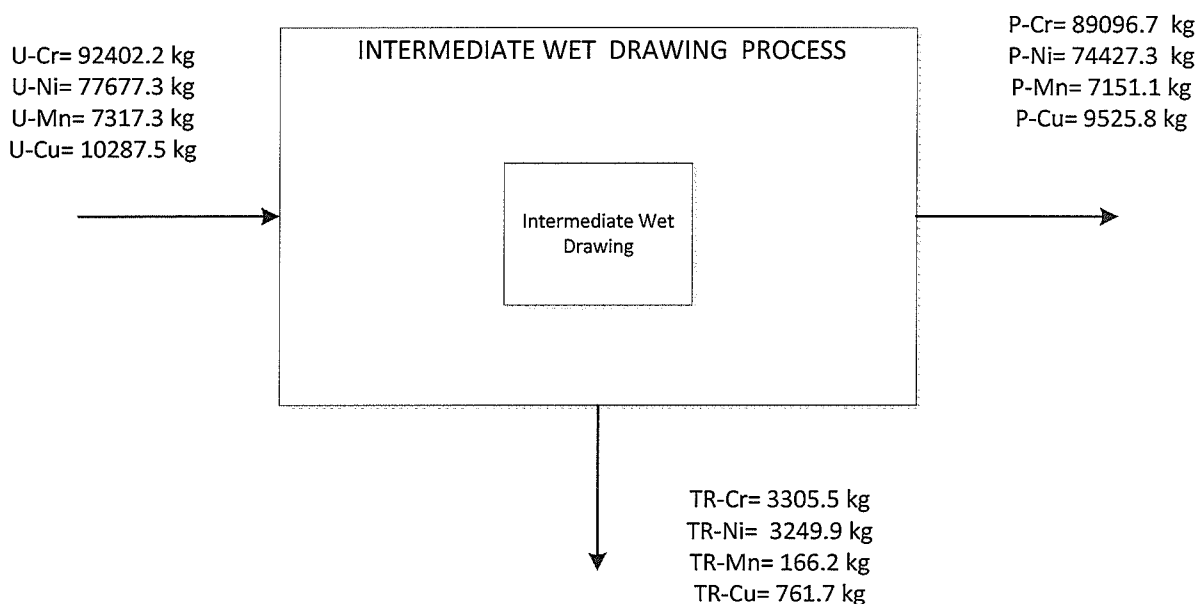
Chromium (Cr) used in this process in 2011: 92,402.2kg

Nickel (Ni) used on this process in 2011: 77,677.3kg

Copper (Cu) used on this process in 2011: 10,287.5kg

No Significant change to the dimensional or mechanical properties occurs at this stage hence minimal transfers for offsite recycling. The toxic substances are present as a component of product and are neither created, added nor removed from the bulk metal.

Use + Creation = Transformed + Destroyed + Contained in Product + On site / Off site Release (to Air, Land, Water) + Offsite Transfer (for treatment, recycling)



## Costs Associated With the Production of Toxic Substances at Central Wire (Perth) - 2011

Costs Associated With Manganese, Chromium, Nickel, & Copper

<b>Direct Costs</b>		Mn	Cr	Ni	Cu
Personnel - Direct	\$ 2,067,700.00	\$41,354.00	\$413,540.00	\$186,093.00	\$10,338.50
Utilities	\$ 727,400.00	\$14548.00	\$145,480.00	\$65,466.00	\$3,637.00
Dies & Tubes	\$ 250,000.00	\$5,000.00	\$50,000.00	\$22,500.00	\$1,250.00
Supplies	\$ 584,000.00	\$11,680.00	\$116,800.00	\$52,560.00	\$2,920.00
Other Direct	\$ 26,000.00	\$520.00	\$5,200.00	\$2,340.00	\$130.00
Direct Prod. Costs	\$3,655,100.00	\$73,102.00	\$731,020.00	\$328,959.00	\$18,275.00
<b>Manufacturing Costs</b>					
Personnel - Mfg./SGA	\$1,623,000.00	\$32,460.00	\$324,600.00	\$146,070.00	\$8,115.00
Operating Costs	\$674,000.00	\$13,480.00	\$134,800.00	\$60,660.00	\$3,370.00
General Costs	\$893,400.00	\$17,868.00	\$178,680.00	\$80,406.00	\$4,467.00
Manufacturing Costs	\$3,190,400.00	\$63,808.00	\$638,080.00	\$278,136.00	\$15,952.00
<b>Total Dir. &amp; Mfg Costs</b>	<b>\$6,845,500.00</b>	<b>\$136,910.00</b>	<b>\$1,369,100.00</b>	<b>\$616,095.00</b>	<b>\$34,227.50</b>

### Costs Associated With the Transfer of Toxic Substances at Central Wire (Perth) - 2011

ITEM	Qty	Unit	Unit Cost	Total	Notes
Transfers	88953.63	Kg			
TSRA Transfers	28,020.39	Kg			
Direct Labour	3,126.66	Hr	\$28.00	\$87,546.48	Produce 62.61 lbs/ Lbr Hr. (28.45 Kg/ Lbr Hr)
Direct Labour TSRA Substances	984.89	Hr	\$28.00	\$27,576.92	
Indirect Labour	130.00	Hr	\$28.00	\$3,640.00	Transfer cost 2.5 hrs / week
Electricity (TSRA)	28,020.39	Kg	\$0.149	\$4,175.04	Annual \$799,000.00
Gas (TSRA)	28,020.39	Kg	\$0.006	\$168.12	Annual \$32,200.00
Total Consumed		Kg			
Cost of TSRA Transfers				-\$35,560.08	
Total Revenue from Transfers	88953.63	Kg	\$3.41	\$303,558.02	
Total Revenue from Contaminants	28,020.39	Kg	\$1.07	\$29,981.82	
Transfer Revenue (Mn Content)	1,779.07	Kg	\$0.07	\$124.53	
Transfer Revenue (Cr Content)	17,790.73	Kg	\$0.68	\$12,097.69	
Transfer Revenue (Ni Content)	8,005.83	Kg	\$0.31	\$2,481.80	
Transfer Revenue (Cu Content)	444.77	Kg	\$0.02	\$8.89	
Transfer Revenue				\$29,981.82	
Net Cost(-)/Gain(+)				-\$5,578.26.48	

**Table 2 Identification and Option Description in Seven Categories for Reducing use of Mn, Cr, Ni, & Cu**

<b>Category</b>	<b>Option</b>	<b>Technical Feasibility</b>
<b>1. Materials or Feedstock Substitution:</b>	<i>Option 1:</i> Offer to customers' material containing less of the substances (Ni, Cr, Mn).	The toxic substances identified in Central Wire's operations are components contained in the feedstock give each alloy specific properties which in turn lend the material to its specific end use. Offering material with lower Ni, Cr, Mn content would not satisfy the customer's specifications nor application. The substances (Ni, Cr, Mn) are not added, created nor transformed during our processes but pass through as a component of the alloys. Therefore material or feedstock substitution is not a technically feasible option.
<b>2. Product Design or Reformulation:</b>	<i>Option 2:</i> Design new alloys with reduced content of the toxic substances manganese, chromium and nickel.	Central Wire does not add, create or transform the contaminants they are present as a component of product. Central uses alloys that are produced to recognized international standards. If a reformulation were to take place the material would no longer conform to the international standards, the characteristics that make an alloy suitable for its intended application would also be compromised making our products unsuitable for sale to the market place. Therefore this option is not technically feasible.
<b>3. Equipment or Process Modifications:</b>	<i>Option 3:</i> Modify drawing and annealing equipment to use less of the contaminants.	Central Wire's equipment does not create, add or transform manganese, chromium or nickel. The equipment is used to manufacture wire to customer required dimensional & mechanical properties.

	<i>Option 4: Alter current processes to use manganese, chromium and nickel</i>	Central Wire's equipment does not create, add or transform manganese, chromium or nickel. The equipment is used to manufacture wire to customer required dimensional & mechanical properties.
<b>4. Spill &amp; Leak Prevention:</b>	<i>No options identified in this category.</i>	Leaks and spills of our product are not an inherent risk. The materials used in Central Wires operations are in a continuous solid strand, there are no spurious losses to the environment. The identified substances Nickel, Chrome, Manganese are a component of the solid. No technically feasible options for spill & leak prevention.
<b>5. On Site Reuse or Recycling:</b>	<i>Option 5: On site processes to identify reuse / recycling opportunities.</i>	The nature of Central Wire's process does allow opportunities to rework off spec product. Documented procedures are in place within the Quality management System that control the use of off spec or non-conforming material to be further processed. Products that are identified as non conforming for its intended use are segregated and identified in a separate inventory. The inventory is reviewed for suitable feedstock for an alternate item. Waste materials are collected, quantified and separated based on alloy composition and recycled offsite. There are no releases to land air or water. On site reuse is a monitored process and reduces the offsite transfers and limits the need to purchase replacement raw materials. It is not technically feasible to increase the amount of onsite reuse recycling / recycling as it is already in place and implemented to its fullest extent.

<b>6. Improved Inventory Management:</b>	<i>Option 6:</i> Minimize the amount of manganese, chromium and nickel bearing materials inventoried.	Inventories levels are related to customer demand, market pricing and strategic purchasing. It is not technically feasible to reduce the amount of manganese, chromium or nickel.
<b>7. Training or Improved Operating Practices:</b>	<i>Option 7:</i> Improve the documented training processes to provide operators with skills to operate equipment efficiently, key components of the program are education on minimizing scrap and non-conforming product.	Operating practices do not impact the amounts of manganese, chromium and nickel used in Central Wire's operations. It is not a technically feasible option to reduce the use of toxic substances in our operations.
	<i>Option 8:</i> Scheduling maximizes the opportunities to sequence job orders of similar alloys and diameters to minimizing set-up scrap.nue with the succeeding manufacturing order.	Scheduling is based on customer orders and lead time. It is not technically feasible option for scheduling to reduce the use of toxic substances.

#### **Technical Feasibility of Options:**

The technical feasibility of reduction options offered under the seven toxic substance reduction categories was reviewed. The use of toxic substances at Central Wire is customer driven and the contaminants themselves are contained in product no technically feasible options progressed to the financial feasibility stage.

## **Planner Recommendation and Rationale**

### **Central Wire Industries – Perth**

Central Wire Industries Ltd. manufactures stainless steel wire, nickel alloy wire and related products from various metals as specified by their customers. Chromium, Manganese, Nickel and Copper make up a percentage of the stainless steel and nickel alloys used to make the wire they processed last year.

A master toxic substance reduction plan for Chromium, Manganese, Nickel and Copper was prepared by the General Manager, Doug Ross with assistance from Mr. Al McMillan the General Manager of the company's Erin facility. Mr. Ross is knowledgeable about the operations at the facility he manages in Perth ON.

The stages and processes identified in the report reflect the site operations. Earlier versions of the plan did not identify the Stages but Mr. McMillan corrected this omission. It was noted that the Clean & Coat process flow did not have any material transferred off-site for recycling but Mr. Ross wanted to include it because it is possible for this to occur (it just didn't in 2011). It is clear that chromium, manganese, nickel and copper are used in production because they are a part of the metal and achieve certain performance requirements dictated by the customers.

The data used for the toxic substance accounting was calculated from known material specifications from suppliers, purchasing data, and recycled metal weights. It assumed no other loss which is reasonable. The data and toxic substance accounting and input/output balances are equal because material is weighed as it enters the facility and as it flows through the processes.

An earlier version of the plan was missing direct and indirect costs associated with the use of the toxins. These have been added and are well known since all the activity at the site centers on creating wire products and would have been incurred regardless of the use of the toxic substance. The breakdown in costs was proportionate to the percentage of chromium, manganese, nickel and copper. Additional costs that could have been added are costs to prepare the NPRI and TRPs for the facility.



An option for reduction that was not explored in depth was discussing the possibility of choosing raw materials with reduced chromium, manganese and nickel levels. This may be a complex option to implement since materials are ordered for individual jobs. It may be possible to identify higher volume raw material which is ordered regularly that could be analysed for options with less chromium, manganese and nickel. In addition, machine specific scrap data might help identify equipment or procedural opportunities for reductions. Starting with the processes with the highest material scrap rates, it may be possible to quantify improvements that directly relate to using fewer raw materials. It should be noted that Central Wire is a very lean environment and a facility wide scrap reduction goal of having less scrap than the previous year as a percentage of total material processed does exist.

The reduction estimates and economic feasibility analyses were not generated because there were no technically feasible options identified.

### **CERTIFICATION BY HIGHEST RANKING EMPLOYEE**

As of December \_\_\_, 2012 I, Paul From, certify that I have read the toxic substance reduction plan for the toxic substances referred to below and am familiar with its contents, and to my knowledge the plan is factually accurate and complies with the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 (General) made under the Act.

Manganese      Chromium

Nickel          Copper

Paul From

President & CEO

Central Wire Industries Ltd.

### **CERTIFICATION BY LICENSED PLANNER**

As of December \_\_\_, 2012, I Al McMillan, certify that I am familiar with the processes at Central Wire Industries Ltd. (Erin) that use or create the toxic substances referred to below, 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 plan dated December \_\_\_, 2012 and the plan complies with the act and Ontario Regulation 455/09 (General) made under the act.

Manganese      Chromium

Nickel          Copper

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Al McMillan - General Manager Central Wire (Erin)

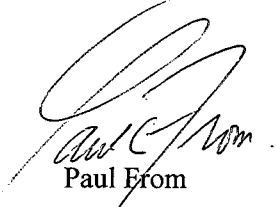
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### **CERTIFICATION BY HIGHEST RANKING EMPLOYEE**

As of December \_\_\_, 2012 I, Paul From, certify that I have read the toxic substance reduction plan for the toxic substances referred to below and am familiar with its contents, and to my knowledge the plan is factually accurate and complies with the Toxics Reduction Act, 2009 and Ontario Regulation 455/09 (General) made under the Act.

Manganese      Chromium

Nickel          Copper



Paul From

President & CEO

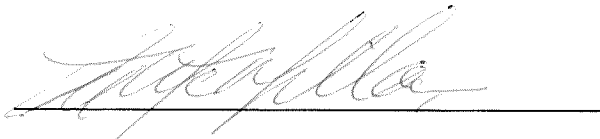
Central Wire Industries Ltd.

### **CERTIFICATION BY LICENSED PLANNER**

As of December \_\_\_, 2012, I Al McMillan, certify that I am familiar with the processes at Central Wire Industries Ltd. (Erin) that use or create the toxic substances referred to below, 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 plan dated December \_\_\_, 2012 and the plan complies with the act and Ontario Regulation 455/09 (General) made under the act.

Manganese          Chromium

Nickel              Copper



Al McMillan - General Manager Central Wire (Erin)

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