FINAL

Toxics Substance Reduction Plan for Copper (CAS# NA - 06)

99 Golf Course Line, Ridgetown, Ontario

Prepared for:

Martinrea Metallic Canada Inc.
99 Golf Course Line
Ridgetown, Ontario, N0P 2C0

Attn: Ian Wood
Industrial Engineering

December 20, 2018

Pinchin File: 226172

MEMBER OF
THE PINCHIN GROUP

INTRODUCTION

Martinrea is a diversified global automotive supplier, engaged in the design, development and manufacturing of metal parts, assemblies and modules, complex fluid management systems and aluminum products. The manufacturing facility located at 99 Golf Course Line, in Ridgetown, Ontario produces vehicle bodies for Automotive Manufactures using metal stamping, welding and brazing processes.

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APPENDICES

1.0 BASIC FACILITY INFORMATION

Substance Information		
Name	Copper and its compounds	
CAS #	NA - 06	
Facility Information		
Company Name	Martinrea Metallic Canada Inc.	
Facility Address	99 Golf Course Line, Ridgetown, Ontario	
Site Coordinates (main entrance of site)	427573 E, 4697616 N; Zone 17	
NPRI ID	4891	
MOE ID		
Number of Full-Time Employees in 2017	260	
2-Digit NAICS Code	33 - Manufacturing	
4-Digit NAICS Code	3363 - Motor vehicle parts manufacturing	
6-Digit NAICS Code	336370 – Motor vehicle metal stamping	
Parent Company Information		
Company Name	Martinrea International Inc.	
Company Address	30 Aviva Park Drive, Vaughan, ON, L4L 9C7	
Percent Ownership by Parent Company	100%	
Business Number	897419461	
Facility Contact Information		
Public Contact	Don Giller General Manager 519.674.0711 519.674.0500	don.giller@martinrea.com 99 Golf Course Line, Ridgetown, ON N0P 2C0

Technical Contact	Ian Wood Industrial Engineering 519.674.0711 Ext. 223 519.674.0500	ian.wood@martinrea.com 99 Golf Course Line Ridgetown, Ontario N0P 2C0
Company Coordinator	Kimberley Harkins Quality Engineer 519.674.0711 Ext. 258 519.674.0500	kimberley.harkins@martinrea.com 99 Golf Course Line Ridgetown, Ontario N0P 2C0
Person who Prepared the Plan	Kris Mask Regional Practice Lead Pinchin Ltd. kmask@pinchin.com	519.682.4492 Ext. 3303 519.682.4493 5 Superior St., Tilbury, ON N0P 2L0
Highest Ranking Employee	Don Giller General Manager 519.674.0711 519.674.0500	don.giller@martinrea.com 99 Golf Course Line, Ridgetown, ON N0P 2C0
Planner Responsible for Making Recommendations	Kris Mask, TSRP#0125 Regional Practice Lead 519.682.4492 Ext. 3303 519.682.4493	kmask@pinchin.com 5 Superior St., Tilbury, ON N0P 2L0
Planner Responsible for Certification	Kris Mask, TSRP#0125 Regional Practice Lead 519.682.4492 Ext. 3303 519.682.4493	kmask@pinchin.com 5 Superior St., Tilbury, ON N0P 2L0

2.0 STATEMENT OF INTENT

Martinrea Metallic Canada Inc. is committed to playing a leadership role in protecting the environment. The use of Copper and its compounds is an integral part of the products that we manufacturer, and it is not technically or economically feasible to reduce. We will continue to use these substances in strict accordance with all applicable environmental regulations.

3.0 SUBSTANCES REQUIRING PLANS

Based on the facility's 2017 NPRI Report the facility is voluntary preparing a plan for Copper and its compounds. Copper and its compounds is contained in the copper brazing wire used to create braze welds, MIG welding wire and Copper weld caps used to weld the parts produced by the facility.

4.0 OBJECTIVES OF THE PLAN & ANY TARGETS

Martinrea Metallic Canada Inc. prides itself on technological innovation in order to produce high quality products in an environmentally responsible manner. Although no options have been identified, as part of the continuous improvement practices at the facility, technical advances will be monitored for new opportunities to reduce the use of Copper and its compounds at the facility.

5.0 PROCESS DESCRIPTION

A detailed process description, including Process Flow Diagrams, is provided in Appendix I.

6.0 TOXIC SUBSTANCE ACCOUNTING INFORMATION

Accounting information used to quantify the Copper and its compounds used at the facility, including the methods used to track and quantify the substance and a rationale for selecting each method are provided in Appendix II. Where applicable, an explanation of "no approximate balance" of inputs and outputs is also provided.

A summary of the estimate of direct and indirect annual costs associated with specifically with the use, releases, and disposal of Copper and its compounds are provided in Appendix III.

7.0 OPTIONS CONSIDERED FOR REDUCTION

7.1 Material or Feedstock Substitution

Identification of Options

The specifications of the metal and brazing raw materials processed at the facility are based on customer requirements. The specifications for these materials have been the product of extensive safety and quality testing. Therefore, the material cannot be substituted and no options can be identified.

7.2 Product Design or Reformulation

Identification of Options

See Material or Feedstock Substitution. The facility does not have the ability to reformulate the steel or braze wire it receives as it is specified by the customers. Martinrea as a company is actively engaged with the suppliers as part of the continuous improvement process, and added value processes to optimize

material selection for future projects. This is ongoing, and will continue as part of the corporate initiatives. Therefore, at this point in time there are no options identified under this category.

7.3 Equipment or Process Modifications

Identification of Options

Through the continuous improvement process Martinrea has invested considerably in the technology and equipment at the facility. Martinrea already employs computer software which plans out and nests parts on the coils to be cut. This advanced software is designed to produce the maximum yield of stamped parts from coils of steel. This removes the element of human error. Additionally, the facility has invested in using modern feeders/straighteners that reduces the production of off-spec products and minimizes losses at the start and tail of the coils. Currently non-destructive testing is not allowed by their customers on the parts they produce. At this time there are no options to consider, however, Martinrea is constantly reviewing new and emerging technologies for reduction.

7.4 Spill and Leak Prevention

Identification of Options

This category is not applicable as the alloys are bound within the steels in solid form. No spills or leaks of contaminants have occurred at the facility. Therefore, there are no options available under this category.

7.5 On-Site Reuse and Recycling

Identification of Options

Similar to equipment or process modifications, the use of advanced nesting/planning software identifies where additional parts can be manufactured from the stamped scrap of other parts. The use of non-destructive testing where possible allows the reuse of parts back into the production stream that reduces the amount of raw materials that need to be purchased. Therefore, there have been no new reduction options identified under this category that the facility has not already implemented.

7.6 Improved Inventory Management or Purchasing Techniques

Identification of Options

Martinrea has a raw inventory action plan outlining and tracking any changes to any purchasing techniques, sales of obsolete materials etc. The coils and braze wire are stored indoors, and protected such that rust is minimized. As the customer specifies the type, thickness, and grades of steel the facility has no ability to purchase outside this specification. Additionally, coils are purchased in as large a coil as possible (i.e. maximum size that can be physically handled) to minimize scrap generated through

changeovers and production setup at the beginning and end of coils. Consequently, at this time there are no new options for reduction that fall under this category.

7.7 Training or Improved Operating Practices

Identification of Options

Each operation at the facility has a formal written standard operating procedure. As well most processes are automated to reduce the chance of loss due to human error. It is suspected that re-training staff on minimizing scrap metal and braze wire, maximizing product use, and training on reducing production of low quality parts could be done. At this time, the amount of steel lost from human error is not quantified, however, the facility will review and comment annually on the status of this quantification.

8.0 OPTIONS TO BE IMPLEMENTED (OR STATEMENT THAT NONE ARE TO BE IMPLEMENTED)

Due to the nature of the processes, the use of Copper and its compounds as a component of the braze weld wire is an inevitable part of the process of braze welding. As such, no technically feasible options were identified or were applicable and therefore no options will be implemented at this time. The facility will continue to monitor areas for further improvement.

9.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

CERTIFICATION BY HIGHEST RANKING EMPLOYEE

As of December 21, 2018, I, Don Giller, certify that I have read the toxic substance reduction plan for the toxic substance 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 that Act.

COPPER (AND ITS COMPOUNDS)

Employee:

Don Giller
General Manager
Martinrea Metallic Inc.
519.674.0711
don.giller@martinrea.com

CERTIFICATION BY LICENSED PLANNER

As of December 21, 2018, I, Kris Mask, TSRP#0125 certify that I am familiar with the processes at Martinrea Metallic Canada Inc. 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 toxic substance reduction plans referred to below for the toxic substances and that the plans comply with that Act and Ontario Regulation 455/09 (General) made under that Act.

COPPER (AND ITS COMPOUNDS)

Planner:

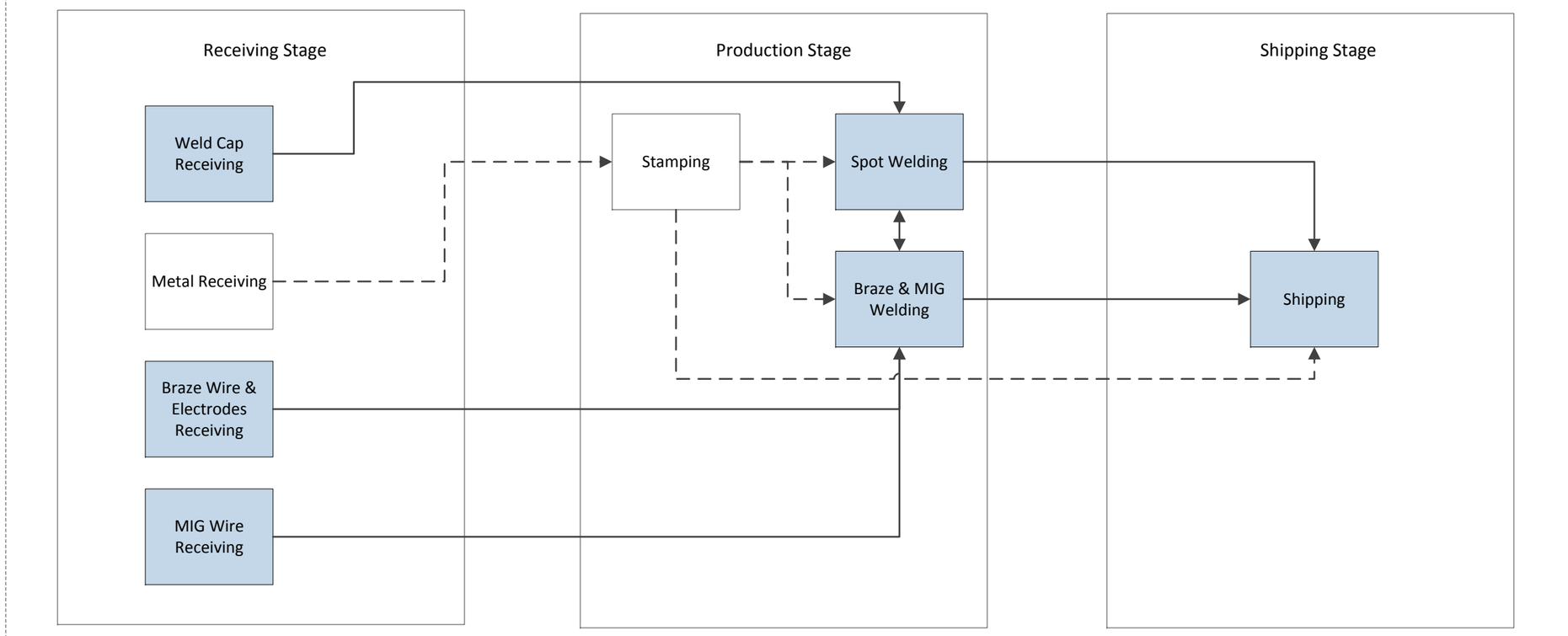
Kris Mask, TSRP#0125
Regional Practice Lead
519.682.4492 Ext. 3303
kmask@pinchin.com

M:\Job\226000s\0226172.000 Martinrea,30AvivaParkDrive,ERC,TRA\Deliverables\226172 Martinrea Ridgetown TSR Plan.docx
Template: Master Report for Toxics Substance Reduction Plan, ERC, May 10, 2016

APPENDIX I

Process Flow Diagrams

(5 Pages)



Legend	
Symbol	**Description**
→	**Solid arrow denotes *PRESENCE* of toxic substance**
- - →	**Dotted arrow denotes *ABSENCE* of toxic substance**
U	**Use** of toxic substance
C	**Creation** of toxic substance
Int	***Intermediate*** step to describe movement of toxic substance within the process
T	***Transformation*** of toxic substance
D	***Destruction*** of toxic substance
P	Toxic substance ***Contained in Product***
A	Onsite release of toxic substance to ***Air***
L	Onsite release of toxic substance to ***Land***
W	Onsite release of toxic substance to ***Water***
DIS_{ON}	
DIS_{OFF}	Onsite or offsite ***Disposal*** of toxic substance
TR	Offsite **Transfer** of toxic substance for treatment or recycling
#,### kg	***Quantification of toxic substance***
DQL	Data Quality Level H "High" AA "Above Average" A "Average" U "Uncertain"

LEGEND

Production Line

A process where toxic substance is created, destroyed, transformed, transferred, released, or disposed

Facility Boundary

Process Description:

At Martinrea the Receiving Stage involves the delivery of Metal, Weld Caps and Weld Electrode/Wire. From there, the raw materials move through the Production Stage which involves Stamping, Spot Welding, and Braze or MIG Welding. Finally, the finished products are sent to the Shipping Stage where they are packaged and shipped to customers

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2470 Milltower Court, Mississauga, ON L5N 7W5

COMMENTS:

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FACILITY WIDE PROCESS FLOW DIAGRAM
COPPER AND ITS COMPOUNDS
TOXIC REDUCTION ACCOUNTING

Martinrea Metallic Canada Inc.
99 Golf Course Line, Ridgetown, Ontario

DRAWN BY	KXM	Dec. 20, 2018
CHECKED BY	Initials	Date
APPROVED BY	Initials	Date

FILENAME: 226172 MARTINREA PFDS.VSDX

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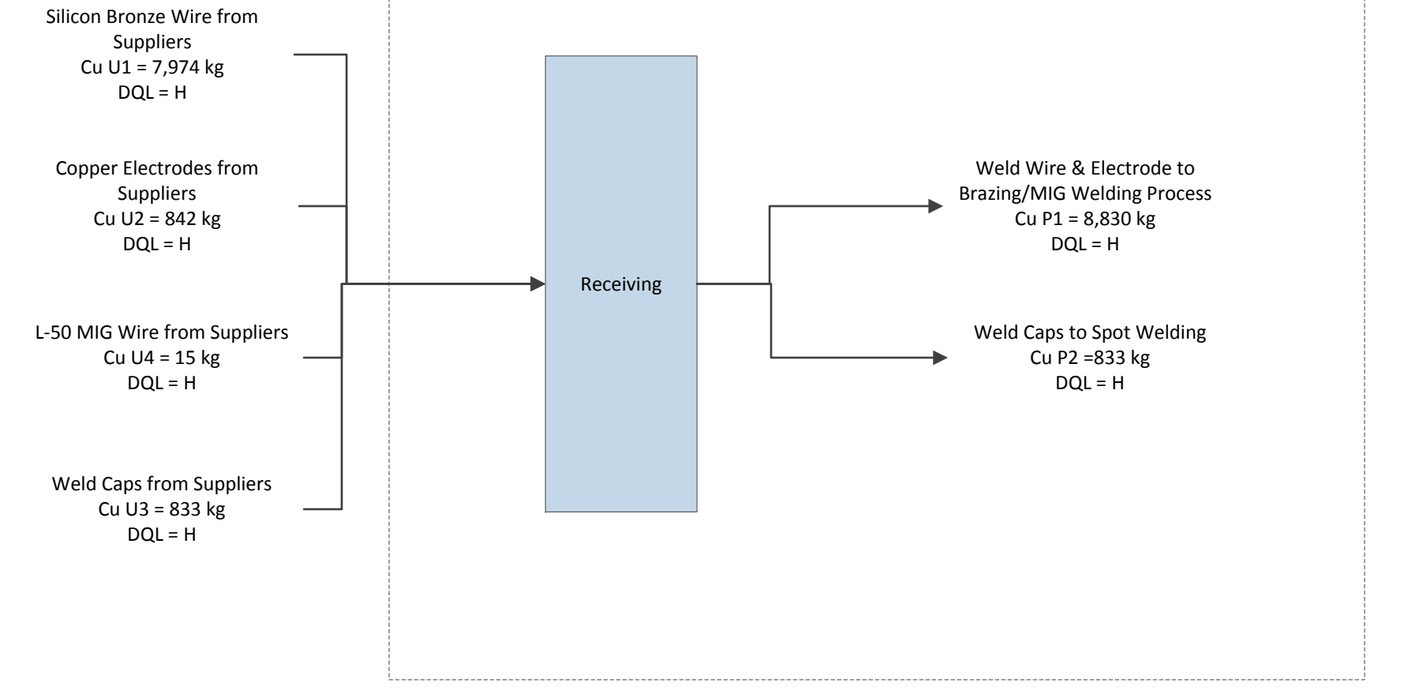
N/A	1 OF 5	0



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LEGEND

Production Line

A process where toxic substance is created, destroyed, transformed, transferred, released, or disposed

Facility Boundary

Process Description:

In the Receiving process Silicon Bronze Wire (U1), Copper Electrodes (U2), and L-50 MIG Wire (U4) are received and sent to the Brazing/MIG Welding Process (P1). Weld Caps (U3) are received and sent to the Spot Welding (P2) process.

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COMMENTS:

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RECEIVING PROCESS FLOW DIAGRAM
COPPER AND ITS COMPOUNDS
TOXIC REDUCTION ACCOUNTING

Martinrea Metallic Canada Inc.
99 Golf Course Line, Ridgetown, Ontario

DRAWN BY	KXM	Dec. 20, 2018
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APPROVED BY	Initials	Date

FILENAME: 226172 MARTINREA PFDS.VSDX

SCALE	SHEET	REV
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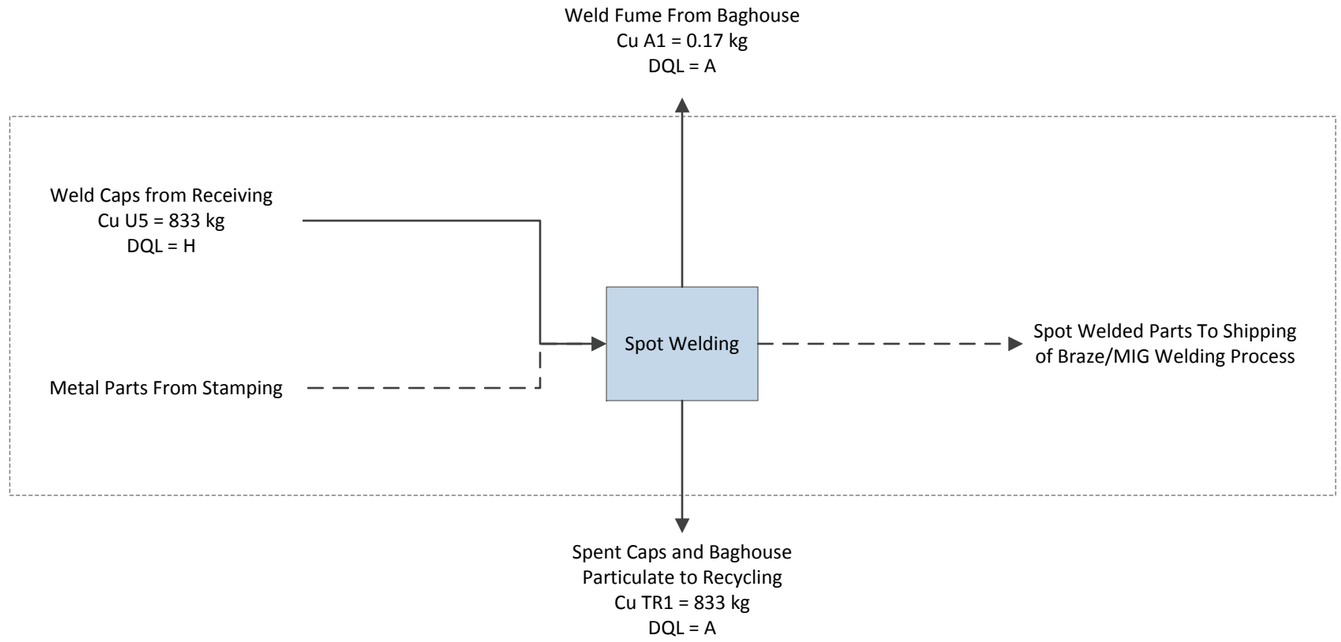

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LEGEND

Production Line

A process where toxic substance is created, destroyed, transformed, transferred, released, or disposed

Facility Boundary

Process Description:

In the Spot Welding Process Copper Weld caps (U5) are used in the spot welders to provide the contact points for the spot welders. In this process a small amount of copper from the Weld Caps is emitted to the air through the facility baghouses (A1). When Weld caps have worn they are removed from the welders and transferred fro recycling (TR1).

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COMMENTS:

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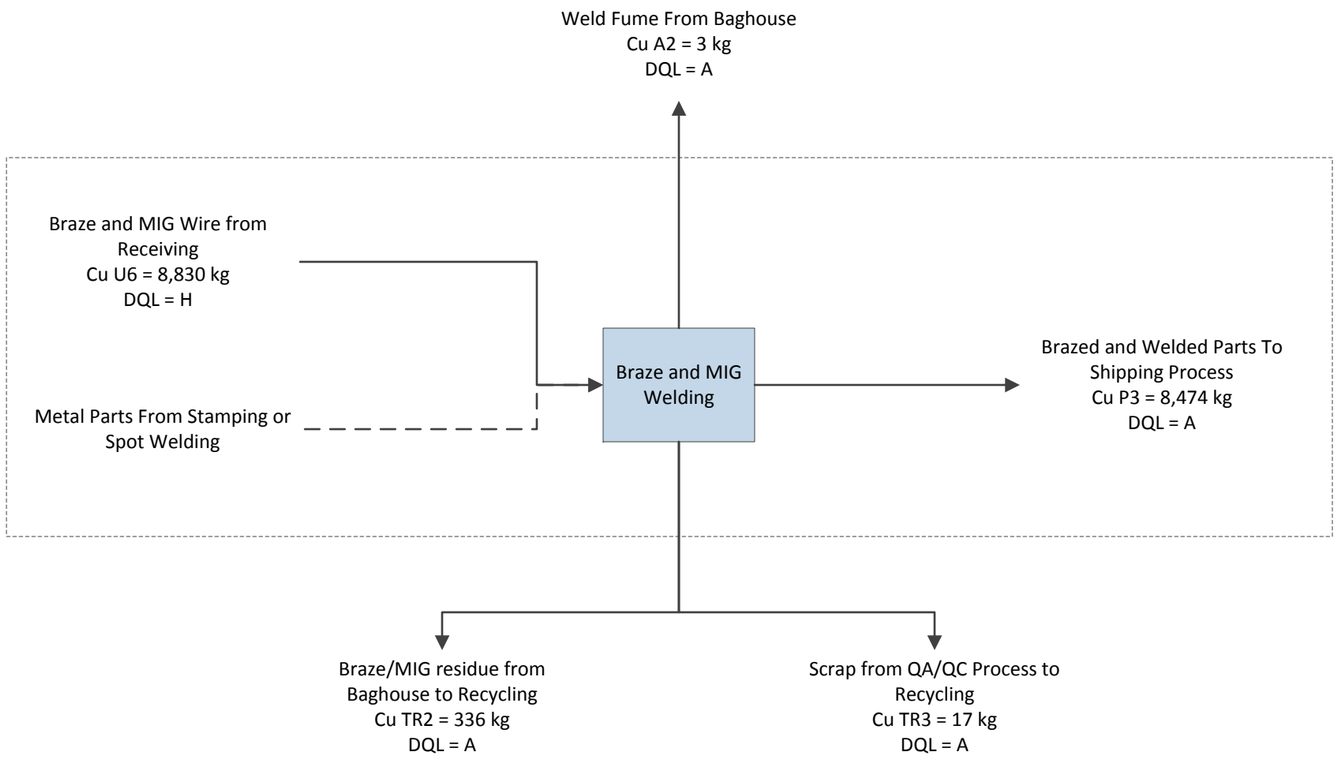
SPOT WELDING PROCESS FLOW DIAGRAM
COPPER AND ITS COMPOUNDS
TOXIC REDUCTION ACCOUNTING

Martinrea Metallic Canada Inc.
99 Golf Course Line, Ridgetown, Ontario

DRAWN BY	KXM	Dec. 20, 2018
CHECKED BY	Initials	Date
APPROVED BY	Initials	Date

FILENAME: 226172 MARTINREA PFDS.VSDX

SCALE	SHEET	REV
N/A	3 OF 5	0



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LEGEND

Production Line

A process where toxic substance is created, destroyed, transformed, transferred, released, or disposed

Facility Boundary

Process Description:

Braze and MIG Wire is received (U6) from Receiving and Used the Braze / MIG Weld Process. Air Emissions Braze / MIG process are exhausted from a baghouse (A2). Baghouse reside is transferred off Site for recycling (TR2). All brazed or welded products sent to the QA/QC process for destructive are transferred off site for recycling (TR3). Brazed / MIG welded products are sent to Shipping (P3).

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COMMENTS:

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BRAZE / MIG WELDING PROCESS FLOW DIAGRAM
COPPER AND ITS COMPOUNDS
TOXIC REDUCTION ACCOUNTING

Martinrea Metallic Canada Inc.
99 Golf Course Line, Ridgetown, Ontario

DRAWN BY	KXM	Dec. 20, 2018
CHECKED BY	Initials	Date
APPROVED BY	Initials	Date

FILENAME: 226172 MARTINREA PFDS.VSDX

SCALE	SHEET	REV
N/A	4 OF 5	0

Legend	
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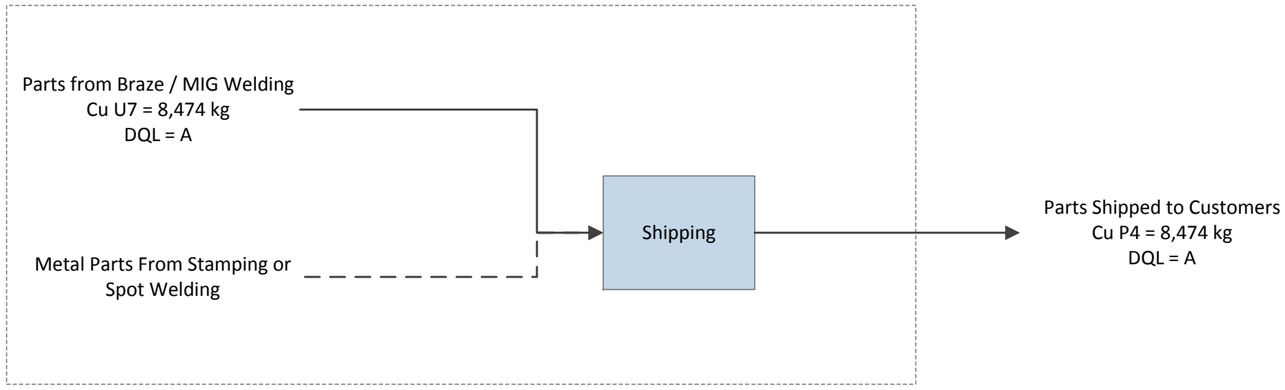
LEGEND

Production Line

A process where toxic substance is created, destroyed, transformed, transferred, released, or disposed

Facility Boundary



Process Description:

Parts from the Brazing/ MIG Welding process (U7) and from the Stamping and Spot Welding Process are packaged and Shipped (P4) to customers.

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COMMENTS:

-

SHIPPING PROCESS FLOW DIAGRAM
COPPER AND ITS COMPOUNDS
TOXIC REDUCTION ACCOUNTING

Martinrea Metallic Canada Inc.
99 Golf Course Line, Ridgetown, Ontario

DRAWN BY	KXM	Dec. 20, 2018
CHECKED BY	Initials	Date
APPROVED BY	Initials	Date

FILENAME: 226172 MARTINREA PFDS.VSDX

SCALE	SHEET	REV
N/A	5 OF 5	0

APPENDIX II

Tracking & Quantifications

(11 Pages)

RECEIVING PROCESS

Refer to Process Flow Diagram 2 of 5 in Appendix I for various stages in the Receiving Process.

U1 - Amount of Copper contained in Silicon Bronze Wire received

Quantification Method:
Mass Balance method using purchasing records and Safety Data Sheets (SDS).

Best Available Method Rationale:
Safety Data Sheets
SDS information showing constituent composition and compound molecular weights are sources of data that are reliable. In considering other methods, it was determined that this method would yield the highest available quality data.

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

7,974	**kg**	**U1**

Sample Calculation:
Silicon Bronze Wire Received (Kg) x % Copper by Weight = Kg of Copper
Kg Cu = 10,298 kg x .77

U2 - Amount of Copper contained in Copper Electrodes received

Quantification Method:
Mass Balance method using purchasing records and Safety Data Sheets (SDS).

Best Available Method Rationale:
Safety Data Sheets
SDS information showing constituent composition and compound molecular weights are sources of data that are reliable. In considering other methods, it was determined that this method would yield the highest available quality data.

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

842	**kg**	**U2**

Sample Calculation:
Copper Electrodes Recieved (Kg) x % Copper by Weight = Kg of Copper
Kg Cu = 843 kg x .998

RECEIVING PROCESS

U3 - Amount of Copper contained in Copper Caps received

Quantification Method:
Mass Balance method using purchasing records and material specifications.

Best Available Method Rationale:
Resistance Welding Manufacturing Alliance (RWMA) Specification
RWMA Specifications showing constituent composition are sources of data that are highly reliable. In considering other methods, it was determined that this method would yield the highest available quality data.

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

833	**kg**	**U3**

Sample Calculation:
Copper Caps Received (Kg) x % Copper by Weight = Kg of Copper
Kg Cu = 850 kg x .98

U4 - Amount of Copper contained in L-50 MIG Wire received

Quantification Method:
Mass Balance method using purchasing records and Safety Data Sheets (SDS).

Best Available Method Rationale:
Safety Data Sheets

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

15	**kg**	**U4**

Sample Calculation:
Silicon Bronze Wire Received (Kg) x % Copper by Weight = Kg of Copper
Kg Cu = 5,862 kg x 0.25% = 14.66 kg

RECEIVING PROCESS

P1 - Contained in Wire and Electrode going to the Brazing and MIG Welding Process

Quantification Method:
Mass balance based on estimations provided by facility personnel.

Best Available Method Rationale:
The volume or mass of raw materials sent to each process from staging is not actively measured at the facility. However the Client indicated that all blanks are sent to the Hot Stamping process. This method would yield the highest level of data quality.

Data Quality:
H "Highest"

Quantification:
Amount of Copper going to the Brazing & MIG Process.

8,830	kg	P1

Sample Calculation

P1 = U1 + U2 + U4
= 8,830 kg

P2 - Contained in Product going to the Spot Welding Process

Quantification Method:
Mass balance based on estimations provided by facility personnel.

Best Available Method Rationale:
The quantity of weld caps are tracked and recorded by facility personnel. Since there were no releases in the Receiving Process, the amount of material going to the Welding Process is equal to the total amount received. This method is considered reliable and yields a high level of data quality.

Data Quality:
H "Highest"

Quantification:
Amount of copper contained in Weld Caps going to the Spot Welding Process.

833	kg	P2

Sample Calculation

P2 = U3
= 833.00 kg

RECEIVING PROCESS

MASS BALANCE

U1 + U2 + U3 = P1 + P2

U1	7974 kg
U2	842 kg
U3	833 kg
U4	15 kg
TOTAL	**9663 kg**

P1	8830 kg
P2	833 kg
TOTAL	**9663 kg**

Input	=	Ouput
9,663 kg	=	9,663 kg

Summary:
After investigating the input/output balance results, no missing sources of data were found, and no calculation errors were found. Although compositional information was based on SDSs, there was some uncertainty regarding estimations on contained in product. Overall, after analysis of the input/output values, the results are considered to be reasonable and acceptable.

SPOT WELDING PROCESS

Refer to Process Flow Diagram 3 of 5 in Appendix I for various stages in the Spot Welding Process.

U5 - Amount of Copper used in the Spot Welding Process from Receiving

Quantification Method:
The amount of Copper contained in the weld caps loaded onto the pot welders is expected to equal P2 from receiving. There are no expected losses, discharges, transfers or releases. Refer to P2 in the Recieving Process.

Best Available Method Rationale:

Refer to P2 in the Receiving Process

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

833	**kg**	**U5**

Sample Calculation:
Refer to P2 in the Recieving Process.

A1 - Quantity Released to Air from Spot Welding

Quantification Method:
The facility replaces worn weld caps when approximately 1% of the cap weight has been lost. Lost material will be emitted as fume, and that 98% of that fume would be captured by the dust collector system on the exhaust. This assumption was used for the spot welding process at this facility.

Best Available Method Rationale:
The facility does not have testing data on the exhaust emissions or collect weights on material collected from the facility duct collectors. This method yields an average level of data quality as it is based on an estimation.

Data Quality:
A "Average"

Quantification:
Amount of Copper released to air from the Welding Process.

0.17	**kg**	**A1**

Sample Calculation

Copper Emission Rate = U4 x fume emission x (100% - Duct Collector Efficiency)
= 841 kg x 1% x (100% - 98%)
= 0.17 g/s

SPOT WELDING PROCESS

TR1 - Amount of Copper Transferred Off-Site for Recycling

Quantification Method:
Mass balance based on scrap rates and compositional information.

Best Available Method Rationale:
The quantity of weld caps are tracked and recorded by facility personnel. Since the only releases are from air emissions, the amount of material transferred offsite for recycling is equal to the total amount received minus the air emissions. This method is considered reliable and yields an average level of data quality.

Data Quality:
A "Average"

Quantification:
Amount of Copper transferred off-site from the Spot Welding process.

833	**kg**	**TR1**

Sample Calculation

TR1 = Copper Caps Recived - Air Emissions
= 833 kg - 0.17 kg
= 832.83 kg

MASS BALANCE
U4 = A1 + TR1

U5	833.00 kg
TOTAL	**833.00 kg**

A1	0.17 kg
TR1	832.83 kg
TOTAL	**833.00 kg**

Input	=	Ouput
833.00 kg	=	833.00 kg

Summary:
After investigating the input/output balance results, no missing sources of data were found, and no calculation errors were found. Overall, after analysis of the input/output values, the results are considered to be reasonable and acceptable.

BRAZE & MIG WELDING PROCESS

Refer to Process Flow Diagram 4 of 5 in Appendix I for various stages in the Braze Welding Process.

U6 - Amount of Copper used in the Braze & MIG Welding Process from Receiving

Quantification Method:
The amount of Copper transferred to the Braze & MIG Welding process is expected to be the same as P1 from the Receiving Process, as there are no expected losses, discharges, transfers or releases. Refer to P1 in the Receiving Process.

Best Available Method Rationale:
Refer to P1 in the Receiving Process

Data Quality Level:
H "Highest"

Quantification:
Amount of Copper entering the process.

8,830	**kg**	**U6**

Sample Calculation:
Refer to P1 in the Receiving Process.

A2 - Braze & MIG Welding with Dust Collector

Quantification Method:
Emission Factor for Shielded Metal Arc Welding, with a conservative baghouse efficiency.

Best Available Method Rationale:
No published emission factors exist for copper brazing, therefore the USEPA AP-42 emission factor for shielded metal arc welding, provided in Section 12.19, Table 12.19-1 was used. Combined with the filter bag efficiencies provided by the supplier, this method was considered to have an average data quality.

Data Quality:
A "Average"

Quantification:
Amount of Copper released to air from the Welding Process.

3	**kg**	**A2**

Sample Calculation
Copper Emission Rate = Mass of Electrode x 38.4 g/kg electrode x (100% - Filter Bag Efficiency) / 1000 g/kg
= 3.39 kg

BRAZE & MIG WELDING PROCESS

TR2 - Amount of Copper Transferred Off-Site for Recycling from the Baghouse

Quantification Method:
Emission Factor for Shielded Metal Arc Welding, with a conservative baghouse efficiency.

Best Available Method Rationale:
No published emission factors exist for copper brazing, therefore the USEPA AP-42 emission factor for shielded metal arc welding, provided in Section 12.19, Table 12.19-1 was used. Combined with the filter bag efficiencies provided by the supplier, this method was considered to have an average data quality.

Data Quality:
A "Average"

Quantification:
Amount of Copper transferred off-site from the Baghouse.

336 **kg** **TR2**

Sample Calculation

TR2 = Mass of Electrode x 38.4 g/kg electrode x (Filter Bag Efficiency) / 1000 g/kg
= 335.68 kg

TR3 - Transferred to Recycling from QA/QC

Quantification Method:
Engineering estimate based on the facility estimation that 0.2% of the material from the Braze Welding process passes into the QA/QC process. All materrials passing through destructive testing in QA/QC are transferred to recycling.

Best Available Method Rationale:
The facility has estimated 0.2% of the material is checked in the QA/QC process. At this time, no other methods or procedures are in place to determine the weight of material sent to QA/QC. This method yields an average level of data quality as it is based on an estimation.

Data Quality:
A "Average"

Quantification:
Amount of Copper going to the QA/QC process.

17 **kg** **TR3**

Sample Calculation:

TR3 = (U6 - A2 - TR2) x 0.2%
= 16.98 kg

BRAZE & MIG WELDING PROCESS

P3 - Contained in Product going to Shipping

Quantification Method:
Mass balance

Best Available Method Rationale:
The amount of Copper going to Shipping from the Braze Welding Stations was calculated using a mass balance approach. Since the usage and releases were quantified, the difference between the usage and releases is equal to the amount of Copper going to Shipping (P3). Since the Air releases and Transfers are known to have an average data quality, P3 will have the same data quality.

Data Quality:
A "Average"

Quantification:
Amount of Copper going to Shipping.

8,474	**kg**	**P3**

Sample Calculation

P3 = (U6 - A2 - TR2 - TR3)
= 8,473.86 kg

MASS BALANCE

U6 = A2 + TR2 + TR3 + P3

U6	8830 kg
TOTAL	**8830 kg**

A2	3 kg
TR2	336 kg
TR3	17 kg
P3	8474 kg
TOTAL	**8830 kg**

Input	=	Ouput
8,830 kg	=	8,830 kg

Summary:
After investigating the input/output balance results, no missing sources of data were found, and no calculation errors were found. Overall, after analysis of the input/output values, the results are considered to be reasonable and acceptable.

SHIPPING PROCESS

Refer to Process Flow Diagram 5 of 5 in Appendix I for various stages in the Shipping Process.

U7 - Amount of Copper entering the Shipping Process from Braze Welding

Quantification Method:
The amount of Copper transferred to Shipping is expected to be the same as P3 from Braze Welding, as there are no expected losses, discharges, transfers or releases. Refer to P3 in the Braze Welding Process.

Best Available Method Rationale:
Refer to P3 in the Braze Welding Process

Data Quality Level:
A "Average"

Quantification:
Amount of Copper entering the process.

8,473.86	**kg**	**U7**

Sample Calculation:
Refer to P3 in the Braze Welding Process.

P4 - Contained in product Shipped

Quantification Method:
The amount of Copper contained in product sent to the customer is expected to be the same as U6.

Best Available Method Rationale:
Refer to U6.

Data Quality:
A "Average"

Quantification:
Amount of Copper contained in product.

8,474	**kg**	**P4**

Sample Calculation

P4 = U7
P4 = 8,473.86 kg

MASS BALANCE

U7 = P4

U7	8474 kg
TOTAL	**8474 kg**
P4	8474 kg
TOTAL	**8474 kg**

Input	=	Ouput
8,474 kg	=	8,474 kg

Summary:
After investigating the input/output balance results, no missing sources of data were found, and no calculation errors were found. Overall, after analysis of the input/output values, the results are considered to be reasonable and acceptable.

PROCESS SUMMARY

Process	Stream	Amount (kg)	Data Quality
RECEIVING PROCESS			
U1 - Amount of Copper contained in Silicon Bronze Wire received	U1	7,974	H "Highest"
U2 - Amount of Copper contained in Copper Electrodes received	U2	842	H "Highest"
U3 - Amount of Copper contained in Copper Caps received	U3	833	H "Highest"
U4 - Amount of Copper contained in L-50 MIG Wire received	U4	15	H "Highest"
P1 - Contained in Wire and Electrode going to the Brazing and MIG Welding Process	P1	8,830	H "Highest"
P2 - Contained in Product going to the Spot Welding Process	P2	833	H "Highest"
SPOT WELDING PROCESS			
U5 - Amount of Copper used in the Spot Welding Process from Receiving	U5	833	H "Highest"
A1 - Quantity Released to Air from Spot Welding	A1	0.17	A "Average"
TR1 - Amount of Copper Transferred Off-Site for Recycling	TR1	833	A "Average"
BRAZE & MIG WELDING PROCESS			
U6 - Amount of Copper used in the Braze & MIG Welding Process from Receiving	U6	8,830	H "Highest"
A2 - Braze & MIG Welding with Dust Collector	A2	3	A "Average"
TR2 - Amount of Copper Transferred Off-Site for Recycling from the Baghouse	TR2	336	A "Average"
TR3 - Transferred to Recycling from QA/QC	TR3	17	A "Average"
P3 - Contained in Product going to Shipping	P3	8474	A "Average"
SHIPPING			
U7 - Amount of Copper entering the Shipping Process from Braze Welding	U7	8,474	A "Average"
P4 - Contained in product Shipped	P4	8,474	A "Average"

Input/Output Balance

U1 + U2 + U3 + U4 = A1 + TR1 + A2 + TR2 + TR3 + P4 = 0 kg

Net amount unaccounted for: 0 kg

Net amount comment: **Acceptable**

APPENDIX III

Financial Accounting

(1 Page)

DIRECT COSTS ASSOCIATED WITH PROCESSING

Material	2017 Purchases	Unit	Unit Cost $/unit	Total $
Material				
Silicon Bronze Wire	10,298	kg	Detailled Costs for facility operations are maintained within the facility finance records.	
Copper Electrodes	843	kg		
Copper Caps	850	kg		
L-50 Electrode	5,862	kg		
Aluminized Steel	7,564,876	kg		
SUB-TOTAL				
Other				
Labour (direct & indirect)	Detailled Costs for facility operations are maintained within the facility finance records			
Processing Costs				
Recycling				
Disposal				
Personal Protective Equipment				
TOTAL COSTS				

APPENDIX IV

Planners Recommendation & Rationale

(1 Page)

Planner Recommendation & Rationale

Planner: Kris Mask, TSRP#0125

As part of the planning process, Pinchin was actively engaged with Martinrea Metallic Canada Inc. team. As options and recommendations were identified they were discussed with the appropriate personnel. Meetings were held to discuss the regulation, toxics use reduction options, and the feasibility of their implementation. As such, this planner has no additional recommendations or rationale that are not already included in this plan.

APPENDIX V

Regulatory Requirements Plan Checklists

All Plans will contain the following:	
☒	Substance name and Chemical Abstracts Service (CAS) Registry number, if any
☒	The National Pollutant Release Inventory (NPRI) identification number and the identification number assigned by the MOE under Ontario Regulation 127/01 (Airborne Contaminant Discharge Monitoring and Reporting), if assigned
☒	The legal and trade names of the owner and the operator of the facility, the street address of the facility and the mailing address of the facility, if different
☒	The number of full-time employee equivalents at the facility
☒	The two- and four-digit North American Industry Classification System (NAICS) codes and the six-digit NAICS Canada code
☒	If applicable, the name, position and telephone number for the following individuals, and mailing addresses, if different:
☒	Public contact
☒	Technical contact
☒	The person who is responsible for coordinating Plan preparation
☒	The person who prepared the Plan, if different from coordinator
☒	Highest Ranking Employee at the facility who has management responsibilities relating to the facility and who is responsible for making certification
☒	The spatial coordinates of the facility expressed in Universal Transverse Mercator (UTM) within a North American Datum 83 (NAD83) datum
☒	For each Canadian parent company of the facility, if applicable
☒	The legal name of the person
☒	The street and mailing address of the company, if different from the facility
☒	If available, what percentage of the facility is owned by the parent company and
☒	Business number assigned by the Canada Customs and Revenue Agency
☒	Basic facility information (see separate checklist)
☒	Planner license numbers (for Planner who provided recommendations and for certifying Planner)
☒	Statement of intent to reduce the use and/or creation of toxic substance (or reasons for not including one)

☒	Objectives of the Plan (required for all Plans) and any targets (optional)
☒	Description of each process that uses the toxic substance • Description of how, when, where & why the substance is used or created • Records of identification and description of stages and processes of facility's operation and process flow diagrams
☒	Toxic substance accounting information • Quantifications at process level for previous year • Record of methods and rationale for selecting each method used to track and quantify toxic substance • If applicable, record of explanation of "no approximate balance" of inputs and outputs for each process
☒	Estimate of direct and indirect annual costs associated with the toxic substance being used, created or released, disposal, transferred, contained in product, transformed, destroyed
☒	Options considered for reduction • Identification of toxic reduction options in each of 7 toxic reduction categories stipulated in O. Reg. 455/09 or explanation of why no option could be identified • Estimate of potential reductions in use, creation, contained in product, release (air, land and water), disposal, transfer of toxic substances achieved if option was implemented • Identification of technically feasible options • Analysis of economic feasibility of technically feasible options, including anticipated savings and payback
☒	For each option to be implemented • A description of implementation steps and timetable • A summary of estimated toxics reduction OR • If no options were implemented • Provide the rationale for this decision
☒	Planner recommendations
☒	Certifications by the Highest Ranking Employee and the toxics reduction planner