Toxics Reduction Plan

Chromium VI

Prepared by:

SAPA Canada
5675 Kennedy Road
Mississauga, ON
L4Z 2H9

December 2013

Sapa Mississauga
Toxics Reduction Planning
Chromium VI
November 2013

Contents

1.0 General Information

Toxic Substance	Chromium (VI)
CAS#	n/a
Number of full-time equivalent employees	250
NAICS	331317 aluminum rolling, extruding, drawing
NPRI ID	2737
UTM NAD83 coordinates (entrance)	531488 5050236

Canadian Parent Company

Legal name	n/a
Street address	n/a
% owned by parent	n/a
CCRA Business Number	n/a

Contact info

Owner and operator of facility	SAPA 5675 Kennedy Road Mississauga, ON L4Z2H9
Highest ranking employee	Yong Lee General Manager 5675 Kennedy Road Mississauga, ON L4Z 2H9 (416) 743-1080 Yong.lee@sapagroup.com
Person who coordinated preparation of plan	Michael Zorayan Environmental Coordinator SAPA Canada 5675 Kennedy Road Mississauga, ON L4Z2H9 (416) 743-1080 ext 5274 michael.zorayan@sapagroup.com
Person who prepared plan	Wendy Nadan Nadan Consulting Ltd 151 Montgomery Blvd Orangeville ON L9W 5C1 (519) 940 4724 wendy@nadanconsulting.com

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Planner	Wendy Nadan
License number of planner	TRSP 0092

Nadan Consulting was contracted to prepare a toxics reduction plan for xylene and ethyl benzene by Mr. Michael Zorayan, Environmental Coordinator of SAPA Canada. Quantities of toxic substances used, disposed of offsite and emitted to air were obtained from the 2011 NPRI report completed by Cotter Associates.

Manufacturing processes were reviewed during a site visit. Additional information was provided by facility personnel as required.

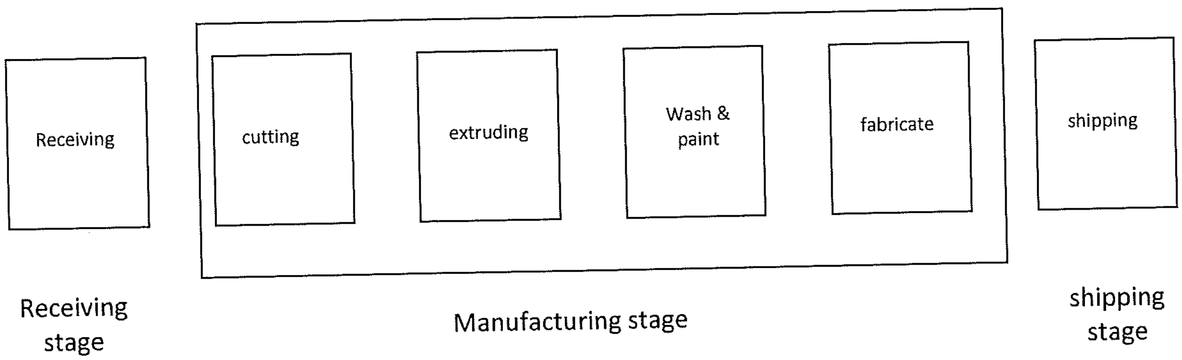
2.0 Statement of Intent

SAPA is committed to reducing the environmental impact of its manufacturing operations. Management will continue to explore options to reduce the usage of toxic substances while providing innovative solutions to our customers.

Objective
SAPA will continue to explore new technologies with the goal of reducing use of toxic substances. As new technologies become available, SAPA will explore the economic feasibility to determine which options will be implemented

3.0 Identification of Stages and Processes

Manufacturing operations at the facility have been separated into the following stages:



An overview of the complete manufacturing process can be found in Figure 1. A process flow chart can be found in Figure 2. Chromium (VI) is found in the pretreatment wash (chromate conversion coating) and in small quantities as a pigment in paints.

Chromate conversion coating is a type of conversion coating used to passivate aluminum, zinc, cadmium, copper, silver, magnesium, and tin alloys. It is primarily used as a corrosion inhibitor, primer, decorative finish, or to retain electrical conductivity. Aluminum parts are suspended on hangers and passed through a spray. The chromate solution adheres to the surface of the aluminum, forming a thin hydrated chromate layer. Coating thickness is in the range 0.00001-0.00004 inches. A flow chart of the pretreatment wash system can be found in Figure 3. Chromate conversion is required to prepare the surface for painting.

Chromium (VI) is carried on the aluminum to the wash booth where excess is rinsed off and collected in the wastewater treatment system. Some of the chromium (VI) is contained in the product and carries through the remainder of the manufacturing process.

The chromate solution is received in the facility in drums. Supply for two months is ordered as necessary. The shelf life of the solution is approximately one year. Four drums are placed on a spill containment pallet for storage outside the wash line area. Two drums at a time are move into the wash line as space is limited.

Purchased chromate solution is diluted for use to about two percent in the wash tank. Drums are rinsed out when empty and the rinse water added to the wash tank.

As the line passes through the spray booth, the aluminum is sprayed with chromate solution. The line then passes through a rinse bay where the aluminum is rinsed to remove unadhered chromate. The aluminum surface cannot dry after chromate spraying with excess chromate. This causes quality problems with subsequent paint adhesion.

The rinse tank is used to top up the spray tank if necessary however there rarely occurs. When the line stops, the aluminum in the chromate spray booth is rinsed with fresh water to prevent excess adhesion. This addition of fresh water is sufficient to keep the tank topped up.

4.0 Material Accounting

Chromium (VI) is received into the plant as a nine percent chromium (VI) oxide in solution. It is also received into the plant as the pigment in some paints. The quantity used is calculated based on purchasing records of materials containing chromium (VI) and the composition of those materials provided by the supplier. The quality of the usage data is considered high as it is based on measured quantities.

The quantity contained in the product after application in the pretreatment wash is based on industry specification and typical thickness. Because the film is thin, it is not practical to measure the actual thickness on site. A sample is sent offsite for measurement monthly. Hence, the method used is the best available. Data quality is considered average. See Figure 4 for material flows in pretreatment wash.

The quantity transferred to the wastewater treatment system is the difference between the quantity used and the quantity contained in product. Emissions to air are considered negligible. An alternative method of determining the quantity transferred to the wastewater treatment system includes analyzing a sample of each batch of untreated wastewater to determine the mass in each batch. This method is labour intensive and costly and hence has not been implemented.

Chromium (VI) is reduced to chromium (III) by sodium metabisulphite in the wastewater treatment system. The quantity of total chromium discharged from the wastewater treatment system is obtained from sample analysis. It is conservatively assumed that 10 percent of total chromium in the discharged effluent is chromium (VI). Most of the chromium is flocculated during wastewater treatment and removed from the aqueous phase via passage through a filter press. The quantity of chromium (VI) disposed of offsite was calculated using the results of analytical testing of a sample of filter cake.

As quantities of chromium in the filter cake and discharged effluent are obtained by sample analysis, the data quality is considered high.

It is assumed that the quantity of chromium (VI) emitted to air during painting is negligible. Overspray is captured in the paint booth filters which are shipped offsite for disposal. It is assumed that the quantity of chromium (VI) contained in the paint filters and sludge is in proportion to the total amount of paint used. Similarly for waste paint. The difference between chromium (VI) used in paint and the quantity shipped offsite is assumed to be contained in product. See Figure 5 for material flows in painting.

As there is no practical method to measure the quantity of chromium (VI) on the painted aluminum, the mass balance approach is considered the best available method.

Since a mass balance approach to calculating emissions has been used, there is an approximate balance between inputs and outputs.

5.0 Cost of Using Chromium VI

Material cost	
Cost of pre-treatment chemicals including Bulk Bond 1423	$90,069
Cost of paint including Cr(VI) containing	$1,008,093
Labour cost	
Total labour	$1,105,443
Cost to run pre-treatment (assume 10%)	$110,544
Utility cost	
Total utilities	$192,350
Waste disposal	
Waste pre-treatment solutions	$92,139
Health and safety	
PPE	$1,000
Regulatory Compliance	
NPRI/TRA/ECA	$5,000

6.0 Options to Reduce the Usage of Chromium (VI)

Options to reduce the use of toxic substances have been identified in each of the seven categories.

OPTION CATEGORY	OPTION No.	DESCRIPTION
Materials or feedstock substitution - pretreatment / wash line	1	Change pretreatment wash chemistry to a Cr(VI)-free product. This will reduce usage of Cr(VI) by 834kg or 88% and contained in product by 441kg or 79%.
Materials or feedstock substitution - paint line	2	Change to Cr(VI)-free paints for those colours that contain Cr(VI). This will reduce usage of Cr(VI) by 116kg or 12% and contained in product by 107kg or 19%.

Product design or reformulation	3	Design product so that it does not require Cr(VI). This could include using steel or plastic in place of aluminum. Product design is controlled by customers. SAPA builds to specification. Potential to work with customers to change requirements. See options 1 and 2.
Equipment or process modification	4	Split the first rinse tank into a shorter line to capture most of the drag out. Use this concentrated rinse to top up the wash tank instead of sending to wastewater treatment. This option is estimated to result in reductions in use of 10% on the pre-treatment line or 84kg.
Spill and leak prevention	5	Train staff to reduce leaks or spills of Cr-containing paint and pre-treatment chemicals. Spills and leaks are not considered to be a significant source of use.
On-site reuse or recycling	6	Re-use scrap aluminum containing substance on-site. Scrap aluminum is currently sent off site for recycling.
On-site reuse or recycling	7	Train staff to reduce the number of line stoppages, therefore reducing the amount of fresh water that is added to the wash tank. This will enable the first rinse tank to be reused for top ups. This option is estimated to reduce usage by 83kg or 9% and quantity destroyed by 83kg or 22%.
Improved inventory management or purchasing techniques	8	Improve purchasing so as to not generate waste materials from extended / expired shelf-life. Not considered to be a significant source of use.

7.0 Technical Feasibility

Each of the options identified above were screened for technical feasibility using the following criteria:

- Availability and reliability of technology
- Impacts on quality, reliability, functionality

- Impact on production rate
- Compatibility with customer requirements
- Availability of employee training
- Compatibility with existing processes
- Space within facility
- Time required for change

See Figure 10 for an alternate pretreatment wash system.

No.	DESCRIPTION	TECHNICAL FEASIBILITY	FEASIBILITY
1	Change pretreatment wash chemistry to a Cr(VI) free product	Alternatives are available however SAPA provides a 25 year warranty for coatings using a Cr(VI) pre-treatment that are used in architectural profiles. No warranty would be provided for a Cr(VI)-free pre-treatment as the coating durability has not been tested and determined. Customers will not accept product for use in architectural profiles without a warranty. This option is not feasible as the reliability has not been proven however SAPA will run tests comparing the durability of conventional coatings vs. Cr(VI)-free profiles in the outdoor environment over five years.	No
2	Change to Cr(VI) free paints	Cr(VI) is used in the pigment of certain colours of paint. Removing Cr(VI) will change the paint colour which is specified by customers.	No
3	Design product so that it does not require Cr(VI).	Product design is controlled by customers who require a coated product with specific colours. SAPA builds to specification.	No
4	Split the first rinse tank into a shorter line to capture most of the drag out.	There is limited space on the pre-treatment line to separate the tanks. Currently drag out is not recycled so this option is not feasible at this time.	No
5	Train staff to reduce leaks or spills of Cr(VI) containing paint and pre-treatment chemicals.	Spills and leaks are not considered to be a significant source of use.	No

6	Re-use scrap aluminum containing substance on-site.	Re-use requires melting and recasting the metal. There is insufficient space at the facility for this process which is conducted at the Toronto facility.	No
7	Train staff to reduce the number of line stoppages, therefore reducing the amount of fresh water that is added to the wash tank. This will enable the first rinse tank to be reused for top ups.	Line stoppages are not currently tracked so it is unclear how much fresh water is added to the treatment tank however rarely is drag-out water used for top-up. Line stoppages can be caused for a variety of reasons: dropped profiles, blocked guns etc. Raising awareness of line stoppages is feasible.	Yes
8	Improve purchasing so as to not generate waste materials from extended / expired shelf-life.	Not considered to be a significant source of use.	No

8.0 Economic Feasibility

Option 7 Train staff to reduce line stoppages
This option has negligible cost associated with it but carries the benefit of improved productivity. The facility currently tracks weight of aluminum painted per hour or shift so any reduction in stoppages will directly improve this data point.

Option 1 will also be investigated
SAPA will run tests comparing the durability of conventional coatings vs. Cr(VI)-free profiles in the outdoor environment over five years. The cost of the tests is also considered low.

9.0 Options that will be Implemented

Option 7 will be implemented.
Step 1 – Devise system to collect data on line stoppages. Due: end 2014
There does not appear to be data collected on when the line stops, for how long or why. The first step therefore is to develop a method for collecting data. Since the operators of the line currently do not record production data, a system that is easy to use and implement must be created. This will require operator input.

Step 2 – Collect data Due: end 2015
Operators will record instances of line stoppage, duration of stoppage and reason.

Step 3 – Corrective Actions Due: March 2016

Based on data collected, operators and managers will develop preventative measures to reduce line stoppages.

Step 4 – Determine whether drag out tank can replenish dip tank Due: July 2016

Option 1 will also be investigated
SAPA will run tests comparing the durability of conventional coatings vs. Cr(VI)-free profiles in the outdoor environment over five years.

10.0 Planner Recommendations

As the planner has worked with the facility throughout the development of the plan, any suggestions to improve the plan have been incorporated into the document. Thus, there are no further recommendations at this time.

11.0 Certification

As of December 12, 2013, I, Yong Lee, certify that I have read the toxic substance reduction plan for chromium (VI) 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 with the exception of the regulatory deadline.

Yong Lee, General Manager

Dec. 23, 2013
Date

As of December 3, 2013, I, Wendy Nadan certify that I am familiar with the processes at SAPA that use chromium (VI), 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 16, 2013 and that the plan complies with that Act and Ontario Regulation 455/09 (General) made under that Act with the exception of the regulatory deadline.

Wendy Nadan, Toxic Substance Reduction Planner

December 16, 2013
Date

Figure 2: Wash Process Flow Diagram Including Wastewater Treatment

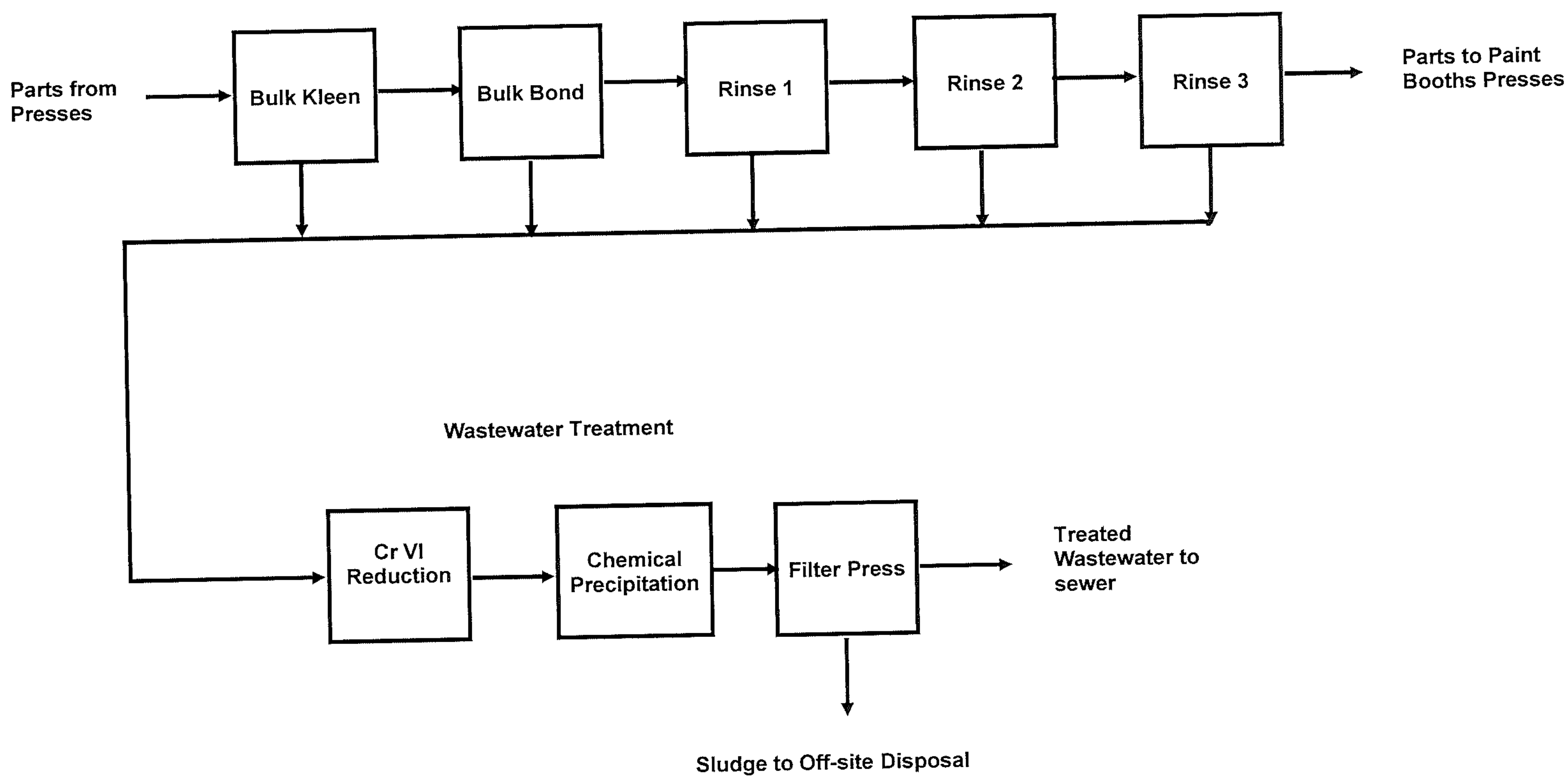
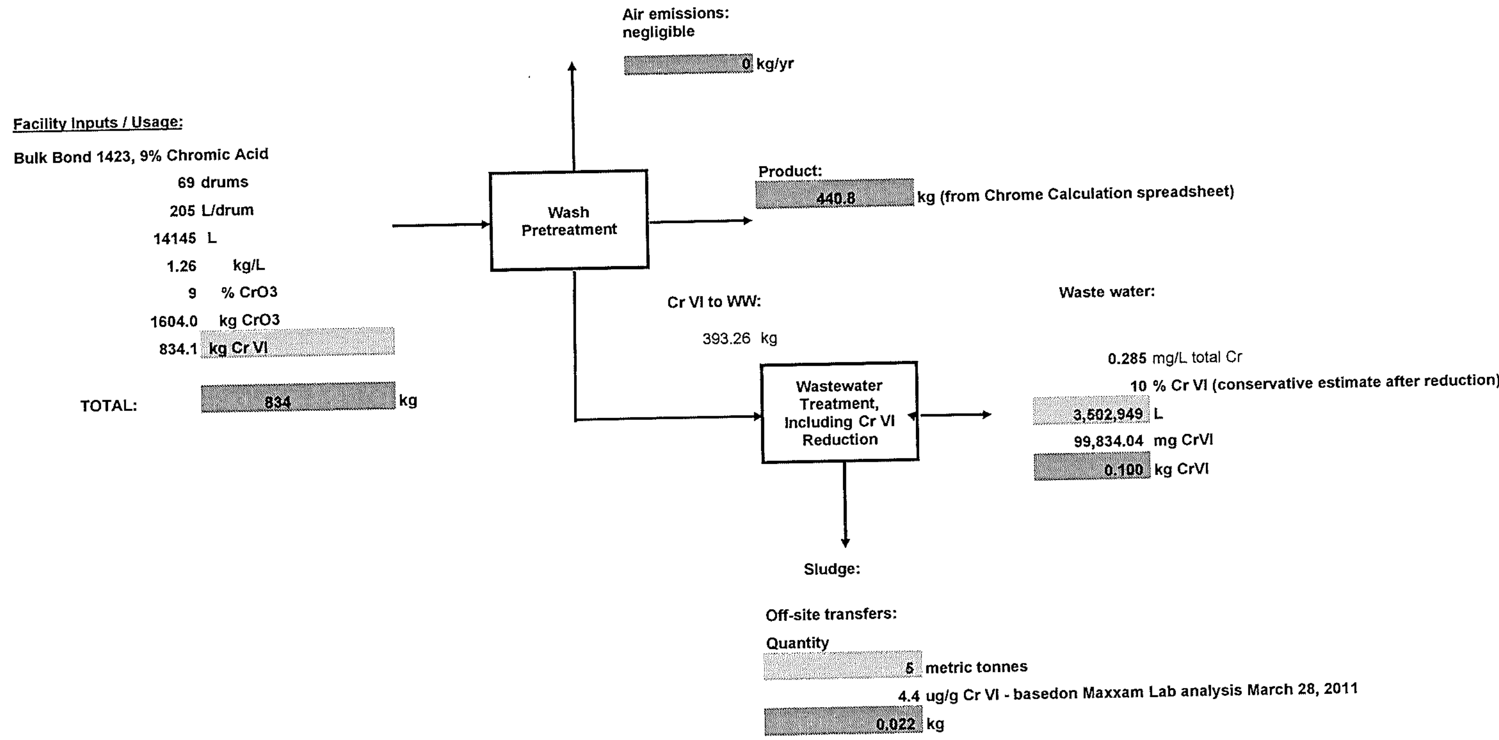


Figure 4: Chromium VI Material Balance and Process Flow Diagram
CAS #

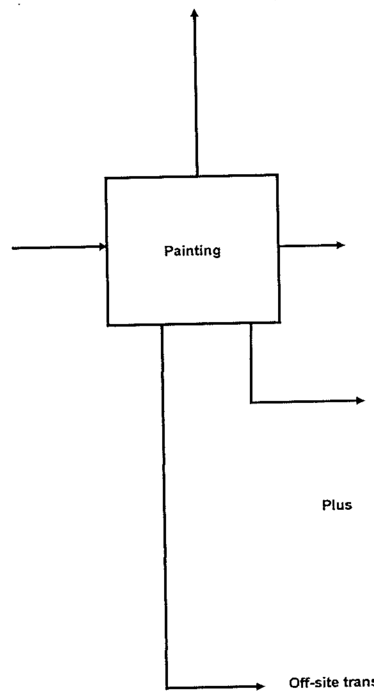


Material Balance

Purchased	Emitted	Created	Contained in Product	Shipped Off-Site	Transformed	Discrepancy
834	0	0	441	0.122	393	0

Comment: Material balance is perfect, since amount destroyed is obtained by difference between purchased and off-site transfers

Figure 5: Chromium VI Material Balance and Process Flow Diagram



Air emissions: Negligible 0.00 kg/yr

Facility Inputs:
Paint:

PPG: 116.3 kg CrVI
Total PPG Paint: 297061
CrVI content: 0.02 % CrVI

TOTAL: 116.3 kg CrVI

Product: 106.7 kg/yr

Off-site transfers of paint waste / sludge
Paint Filters and Sludge (145H)
34 tonnes from Manifests
0.02 % CrVI conservative estimate, same as paint
6.80 kg CrVI

Plus

Off-site transfers of waste paint (off-spec, obsolete)
Waste Paint (145H)
11,762 L from Manifests
0.02 % CrVI conservative estimate, same as paint
2.82 kg CrVI

Off-site transfers of solvent for recyling
Quantity
L from Purchase Orders / Manifests
negligible %Cr VI
- kg

Material Balance

Purchased	Created	Contained in Product	Transfered Off-Site	Released to Air	Destroyed	Discrepancy
116	0	106.66	9.62	0	0	0

Comment: Material balance is perfect, since amount in product is obtained by difference between purchased and off-site transfers

SurTec® 641
Conversion Coating

Properties

- bases on zirconium compounds and polymers
- bi-components process: SurTec 641 A and SurTec 641 B
- used as pre-treatment before painting
- free of chromium, free of phosphates
- gives an excellent protection of the treated metals and guarantees a perfect adhesion of paint
- suited for aluminium and zinc surfaces
- applicable in spray or immersion process

Application

SurTec 641 can be used in spray or immersion application.

The process includes the following products:

- SurTec 641 A
- SurTec 641 B

make-up values:	*spray*	*immersion*
SurTec 641 A	8-12 ml/l	8-12 ml/l
SurTec 641 B	5-10 ml/l	5-10 ml/l
temperature:	20-40°C	20-40°C
pH-value:	2.2-2.8	2.2-2.8
application time:	15-45 s	20-60 s

make-up: Steps for make-up:

1. Fill 75 % of the deionised (DI-)water into the tank.
2. Add SurTec 641 A and SurTec 641 B portion by portion, stirring vigorously.
3. Fill up to the final volume with deionised water.

tank material: steel with acid-resistant coating

heating: not necessary

exhaust: recommended for worker's protection

hints: To reach nearly constant coating conditions, it is recommended to keep 30 % of the old bath at the end of service life for replenishing with 70 % new bath solution.

SurTec 641 conversion layers are nearly colourless, so it may be difficult to identify the formed layer.

recommended process sequence:

for spray application:

1. acidic pickling cleaning, e.g. **SurTec 478**
2. rinse
3. rinse
4. DI-rinse (< 30 µS/cm)
5. Conversion Coating **SurTec 641**
6. hot air drying

for immersion application:

1. alkaline degreasing, e.g. **SurTec 152**
2. rinse
3. rinse
4. acidic pickling, e.g. **SurTec 478**
5. rinse
6. rinse
7. DI-rinse (< 30 µS/cm)
8. Conversion Coating **SurTec 641**
9. hot air drying

Technical Specification

(at 20°C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 641 A	liquid, colourless-yellowish	1.010 (1.00-1.02)	1.9 (1.8-2.0)
SurTec 641 B	liquid, colourless	1.020 (1.01-1.03)	approx. 1.0

Maintenance and Analysis

Check the pH-value regularly and adjust it with SurTec 641 B (if the other parameters allow it) or with nitric acid. Analyse the free acid and adjust the concentration of SurTec 641 A and SurTec 641 B regularly.

Sample Preparation

Take a sample at a homogeneously mixed position. Let it cool down to room temperature. If the sample is turbid, let the turbidity settle down and decant or filter the solution.

Free Acid – Analysis by Titration

reagents: 0.1 N sodium hydroxide solution (NaOH solution)
indicator: bromophenol blue

procedure:

1. Pipette 100 ml bath sample into a 250 ml Erlenmeyer flask.
2. Add 5 drops of indicator.
3. Titrate with 0.1 N NaOH solution from yellow to blue-purple.

calculation: The recorded consumption of 0.1 N NaOH solution should be in the range of 3-5 ml.

correction: rise by 1 ml NaOH solution = addition of 1.6 ml/l SurTec 641 B
+ 2.0-3.0 ml/l SurTec 641 A according to the COD value

Chemical Oxygen Demand (COD) – Analysis by Spectral Photometer

equipment: UV/VIS spectral photometer
COD-test, e.g. Dr. Lange LCK 114, 150-1000 ppm
heating block for digestion

procedure:

1. Pipette 2 ml bath sample in a COD cuvette and mix well.
2. Let digest at 150°C for 2 h.
3. Measure in the spectral photometer.

result: Chemical oxygen demand in ppm.
The COD should be in the range of 200-300 ppm.

correction: rise by 25 ppm = addition of 1 ml/l SurTec 641 A
If the COD is too high: stop the addition of SurTec 641 A, until the desired value is reached again.

Layer Weight on Aluminium – Analysis by Analytical Balance

equipment: analytical balance (+/- 0.1 mg)

reagents: 2 N oxalic acid

procedure:

1. Treat a test part with known surface (in m^2) with SurTec 641 and dry it at 60-80°C.
2. Weigh out the dry part at the analytical balance (= $\mathbf{M_1}$).
3. Remove the conversion coating in 2 N oxalic acid 4 min at room temperature.
4. Rinse with DI-water and wipe off loose components with a soft non-abrasive towel.
5. Rinse again with DI-water and dry it.
6. Weigh out the dry part at the analytical balance again (= $\mathbf{M_2}$).

calculation: $(\mathbf{M_1} - \mathbf{M_2})$ / surface = layer weight in g/m^2
The layer weight should be in the range of 50-150 mg/m^2.

Ingredients

SurTec 641 A

- polymers
- complex fluorides

SurTec 641 B

- zirconium compounds

Consumption and Stock Keeping

The consumption depends heavily on the drag-out. To determine the exact amounts of drag-out, see SurTec Technical Letter 11.

In order to prevent delays in the production process, per 1,000 l bath the following amounts should be kept in stock:

SurTec 641 A	50 kg
SurTec 641 B	25 kg

Product Safety and Ecology

The safety instructions and the instructions for environmental protection have to be followed in order to avoid hazards for people and environment. The Material Safety Data Sheets (according to European legislation) contain explicit details for this.

The following hazard designations and classifications into water hazard classes (WHC) have to be taken into account:

product	*hazard designation*	*water hazard class*
SurTec 614 A	-	WHC 1
SurTec 614 B	Xn - Harmful	WHC 1

Warranty

We are responsible for our products in the context of the valid legal regulations. The warranty exclusively accesses for the delivered state of a product. Warranties and claims for damages after the subsequent treatment of our products do not exist. For details please consider our general terms and conditions.

Further Information and Contact

In our forum, you can discuss topics of the surface technology:
http://forum.SurTec.com/

If you have any questions concerning the process, please contact your local technical department: http://SurTec.com/International.html

21 May 2012/DK, WT

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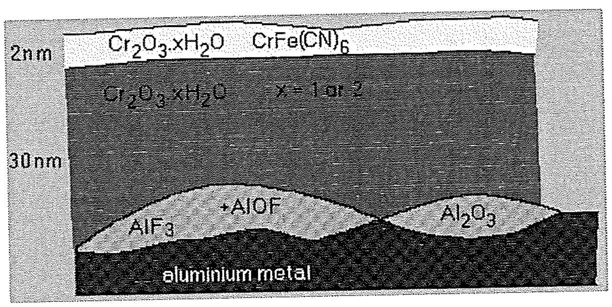
Yellow chromating (Topic: 14082)

Yellow chromating can either be carried out in unaccelerated or accelerated chromate baths. The unaccelerated chromate baths are essentially composed of chromiumthreeoxide (or another source of chromium ions) and of hydrogenfluoride (or complex hydrofluoric acids, or their salts). Nitric acid is added to obtain the desired pH, that is usually around 1,8ñ2,1. Other substances are present in the proprietary formulations to obtain better conditions in the industrial use. The temperature in the bath should be around 25ƒC.

In the accelerated formulations potassium ferricyanide is often added, but many other variations have been developed. Due to environmental considerations cyanides are less used.

Investigation of a chromate layer shows that a thin outer layer of chromium ferricyanide and hydrated chromium oxide covers the bulk of the hydrated chromium oxide coating. Finally, at the interface between the film and the aluminium, small amounts of aluminium oxide and fluoride are present. See also figure below.

Structure of chromate pre-treatment [27].



Chromate conversion coatings lead to a yellow layer on the substrate, and the intensity varies from iridescent yellow to golden tan. The coating weight is comprised between 0,4 and 1,0 g/m2. The limit value of 1 g/m2 has been established because of powdering phenomenon of the conversion coating if exceeded.

Toxics Reduction Plan

Ethyl benzene
Xylene
Toluene

Prepared by:

SAPA Canada
5675 Kennedy Road
Mississauga, ON
L4Z 2H9

December 2013

Contents

1.0 General Information

Toxic Substance	**Xylene, ethyl benzene, toluene**
CAS#	1330-20-7, 100-41-4, 108-88-3
Number of full-time equivalent employees	250
NAICS	331317 aluminum rolling, extruding, drawing
NPRI ID	2737
UTM NAD83 coordinates (entrance)	531488 5050236
Canadian Parent Company	
Legal name	n/a
Street address	n/a
% owned by parent	n/a
CCRA Business Number	n/a
Contact info	
Owner and operator of facility	SAPA 5675 Kennedy Road Mississauga, ON L4Z2H9
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Person who prepared plan	Wendy Nadan Nadan Consulting Ltd 151 Montgomery Blvd Orangeville ON L9W 5C1 (519) 940 4724 wendy@nadanconsulting.com

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Planner License number of planner	Wendy Nadan TRSP 0092

Nadan Consulting was contracted to prepare a toxics reduction plan for xylene, ethyl benzene and toluene by Mr. Michael Zorayan, Environmental Coordinator of SAPA Canada. Quantities of toxic substances used, disposed of offsite and emitted to air were obtained from the 2011 NPRI report completed by Cotter Associates.

Manufacturing processes were reviewed during a site visit. Additional information was provided by facility personnel as required.

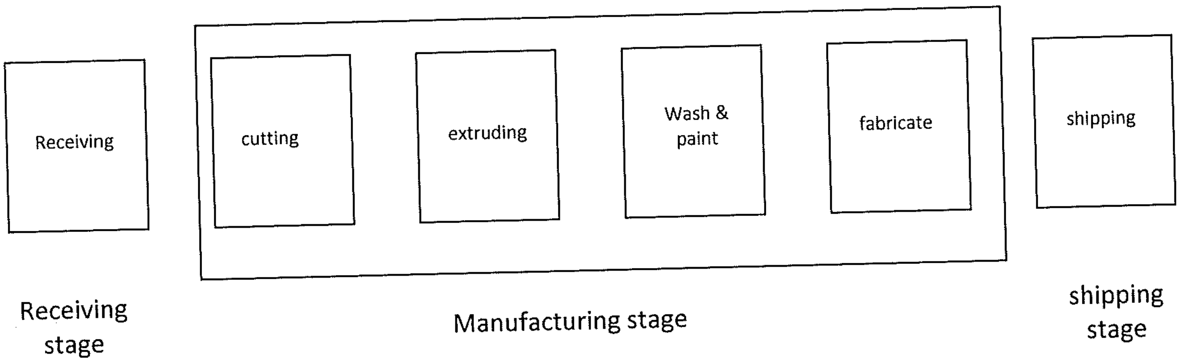
2.0 Statement of Intent

SAPA is committed to reducing the environmental impact of its manufacturing operations by implementing the principle of pollution prevention in daily activities. Key activities include continually seeking ways to reduce the usage of toxic substances.

Objective
SAPA will continue to explore new technologies with the goal of reducing use of toxic substances. As new technologies become available, SAPA will explore the economic feasibility to determine which options will be implemented.

3.0 Identification of Stages and Processes

Manufacturing operations at the facility have been separated into the following stages:



An overview of the complete manufacturing process can be found in Figure 1.

Xylene, ethyl benzene and toluene are received into the plant in the receiving stage and are used in the painting process only. None of the xylene, ethyl benzene or toluene progress any further through the manufacturing process.

The xylene, ethyl benzene and toluene are used as a solvent to keep the paint solids in solution so that it can be applied to the surface uniformly at the desired thickness. Once the paint has been applied to the surface, the solvent is completely removed by evaporation to leave a cured layer. Xylene, ethyl benzene and toluene are used in the solvent mix as it is a readily available industrial solvent, is easy to dry and provides the necessary viscosity to the paints. Toluene is only found in paints, not in the solvent blend.

An ITW Ransburg Electric TurboDisk Reciprocator is used to apply liquid paint to parts. The machine delivers control over paint film deposit while extending equipment life. The reciprocators' advanced features make it lightweight and compact with no hydraulic tubing to run and install. It doesn't require oil fill/flush procedure and eliminates start-up issues due to contaminated control valves. The reciprocator can be configured to deliver stroke lengths from five feet to 32 feet in one foot increments and provides for multiple points of hesitation throughout the stroke length. The counter balanced drive tube provides energy efficient, smooth operation with enhanced acceleration/deceleration control.

Paint is mixed in the paint kitchen and automatically delivered to the paint booths. Once a colour change is required, the paint lines are emptied and flushed and the paint head cleaned. Cleaning solvent is collected and sent offsite as waste for recycling. The solvent is then returned for the facility for reuse in gun cleaning. Unused paint is put back into inventory and used for the next run.

Paint is received in drums ready to use. There is no colour matching on site. The paint is thinned as necessary for application and is then dispensed directly from the drum to the spray head. There is one spray head per booth that is pre-programmed with a spray pattern. There are three booths in series on the line. Parts that need the heaviest paint application will be sprayed through all three booths. Those requiring the lightest application will be sprayed in only one booth.

Booths have direct ventilation outside the facility. All solvents contained in the paint evaporate and are vented outside.

4.0 Material Accounting

Xylene, ethyl benzene and toluene are received into the plant in paint and solvents. See Figure 2, Figure 3 and Figure 4 for the quantities used, emitted to air, recycled and disposed of off site.

The quantity of paints and solvents purchased in a year is taken from purchasing records. The MSDS for each product gives the concentration of each ingredient.

The quantity shipped off site for recycling or disposal is found from waste manifests. It has been assumed that 5 percent of the waste paint and paint sludge is xylene and toluene and 1 percent ethyl benzene. It has been further assumed that waste solvent is 80 percent xylene and 20 percent ethyl benzene. Actual composition of the waste can be requested from the receiving facility.

The difference between the quantity used and the quantity shipped off site has been assumed as emitted to air.

The only other practical method available to quantify emissions to air is source sampling. This method is costly and for this reason has not been used.

Since a mass balance approach to calculating emissions has been used, there is an approximate balance between inputs and outputs.

5.0 Cost of Using Ethylbenzene, Xylene and Toluene

Raw Materials	
Cost of paint in 2011	$1,008,093
Cost of solvent in 2011	$106,658
Utility	
Total utility cost	$192,350
Cost of hydro/gas for paint line	
Waste Disposal	
Total cost waste	$92,139
Waste treatment	$22,723
Cost of waste solvent	
Cost of waste paint	
Cost of paint sludge	
Cost of waste filters	

Labour	
Cost of labour	$1,105,443
Labour to run solvent paint line (assume 25%)	$276,361
Cost of PPE (gloves, respirators, coveralls etc)	$1,000
Regulatory compliance	
Cost of NPRI/air approval/HWIN/TDG	$5,000

6.0 Options to Reduce the Usage of Xylene, Ethyl Benzene and Toluene

Options to reduce the use of toxic substances have been identified in each of the seven categories.

OPTION CATEGORY	OPTION No.	DESCRIPTION
Materials or feedstock substitution	1	Work with paint and solvent suppliers to substitute products that contain less xylene and ethylbenzene including higher-solids paint. (Present in paint and clean-up/dilution solvent.) Reductions would depend on final formulations.
	2	Use zero VOC ceramic coatings from Eon coat. This would result in reduction in usage of: Xylene 41,191kg or 100% Ethylbenzene 11,210kg or 100% Toluene 7,406kg or 1005 Reduction in emissions to air of: Xylene 17,370kg or 100% Ethylbenzene 5,436kg or 100% Toluene 5,118kg or 100% Reduction in off site transfers of: Xylene 23,821kg or 100% Ethylbenzene 5,774kg or 100% Toluene 588kg or 100%
Product design or reformulation	3	Design product (colours and specifications) so that it can be powder coated. See option 3 below.
Equipment or process modification	4	Switch to powder coat painting process from solvent-based painting. This would result in reduction in usage of: Xylene 41,191kg or 100% Ethylbenzene 11,210kg or 100% Toluene 7,406kg or 1005

		Reduction in emissions to air of: Xylene 17,370kg or 100% Ethylbenzene 5,436kg or 100% Toluene 5,118kg or 100% Reduction in off site transfers of: Xylene 23,821kg or 100% Ethylbenzene 5,774kg or 100% Toluene 588kg or 100%
Spill and leak prevention	5 6	Train staff on spill prevention. Not considered to be a major source of reduction since spills and leaks are small volume. Reduce paint overspray. This is estimated to be able to reduce paint usage by 10%. This would result in reduction in usage of: Xylene 1,879kg or 5% Ethylbenzene 500kg or 4% Toluene 741kg or 10% Reduction in emissions to air of: Xylene 1,879kg or 11% Ethylbenzene 500kg or 9% Toluene 741kg or 14% Reduction in off site transfers of: Xylene zero Ethylbenzene zero Toluene zero
On-site reuse or recycling	7	Procure and install a solvent distillation unit for on-site recycling / reuse of solvent. Will reduce "use" amount (purchased amount will decrease) and "off-site transfers" but will not reduce air emissions. Reduction in off site transfers of: Xylene 21,533kg or 90% Ethylbenzene 5,317kg or 92% Toluene zero
Improved inventory management or purchasing techniques	8	Minor potential for reduction. Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing xylene that become waste due to extended storage.
Training or improved operating practices	9	Train operators to reduce solvent used in cleaning. This is expected to result in insignificant reductions.

7.0 Technical Feasibility

Each of the options identified above were screened for technical feasibility using the following criteria:

- Availability and reliability of technology
- Impacts on quality, reliability, functionality
- Impact on production rate
- Compatibility with customer requirements
- Availability of employee training
- Compatibility with existing processes
- Space within facility
- Time required for change

OPTION No.	DESCRIPTION	TECHNICAL FEASIBILITY	
1	Work with paint and solvent suppliers to substitute products that contain less xylene and toluene, including higher-solids paint. (Present in paint and clean-up/dilution solvent.)	This may be possible but will depend on discussions with paint suppliers. The 25 year warranty currently provided by the paint manufacturers would be voided however. Since the warranty is critical to customers of architectural profiles, this option is not technically feasible.	No
2	Use zero VOC ceramic coatings	Unknown if the coating is compatible with existing application equipment or if it can be used on aluminum as current applications are on steel. The thickness of the coating is greater than either powder or solvent paints and is rougher so unknown if customers will accept the finish. The durability on architectural products is also unproven however the manufacturer has conducted extensive testing for corrosion resistance using salt water spraying.	No
3	Design product (colours and specifications) so that it can be powder coated. See option 3 below.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability	No

		has not been proven however SAPA will run tests comparing the durability of conventional coatings vs. powder profiles in the outdoor environment over five years.	
4	Switch to powder coat painting process from solvent-based painting.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability has not been proven however SAPA will run tests comparing the durability of conventional coatings vs. powder coatings in the outdoor environment over five years	No
5 6	Train staff on spill prevention. Reduce paint overspray	Not considered to be a major source of reduction since spills and leaks are small volume. There is considerable waste of paint due to overspray. The overspray is caused by imbalanced air in the room. There is too much incoming air creating positive pressure which results in excessive quantities of paint being sprayed. A report investigating the problem has already been completed. Refer to Trip report dated July 23/13.	No Yes
7	Procure and install a solvent distillation unit for on-site recycling / reuse of solvent.	Will reduce "use" amount (purchased amount will decrease) and "off-site transfers" but will not reduce air emissions. Solvent distillation units are available for on site use and have been installed in many industry sectors. There are safety and fire code concerns with on site distillation however. There is no knowledge of the process or qualified operators. Management does not want to include the new process at the site.	No

8	Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing xylene and toluene that become waste due to extended storage.	Minor potential for reduction. This option is not expected to result in any reduction in use.	No
9	Train operators to use less solvent in clean-up operations.	Clean up between colours on the paint line is an automated process. Painting is fully automated. The reduction possible is considered to be insignificant as enough solvent to fill the lines has to be used.	No

8.0 Economic Feasibility

There is one option that is technically feasible.

OPTION No.	DESCRIPTION	ECONOMIC FEASIBILITY	
6	Reduce paint overspray	An investigation of the cause of overspray has already been completed. Corrective actions have been identified however the specific options have not been finalized. Once options have been chosen, an economic feasibility analysis will be completed.	

9.0 Options that will be Implemented

The facility will continue to work on the plan to reduce overspray. The next step is to identify which options will be implemented. Target date is June 2014.

SAPA will run tests comparing the durability of conventional coatings vs. powder coatings in the outdoor environment over five years.

10.0 Planner Recommendations

1. Request actual composition of waste shipped offsite from the receiving site.

11.0 Certification

As of December 12, 2013, I, Yong Lee, certify that I have read the toxic substance reduction plan for xylene and ethyl benzene 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 with the exception of the regulatory deadline.

Yong Lee, General Manager

Dec. 23, 2013
Date

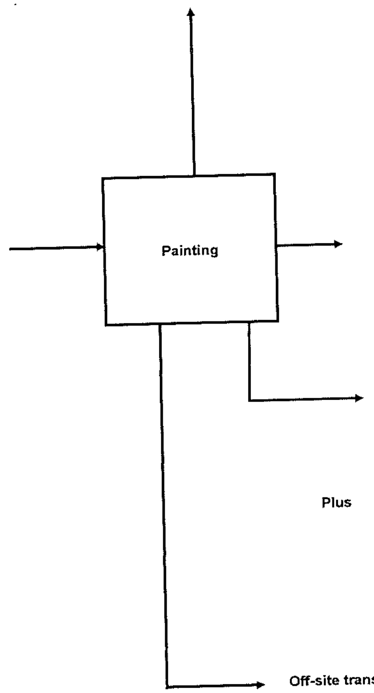
As of December 17, 2013, I, Wendy Nadan certify that I am familiar with the processes at SAPA that use xylene and ethyl benzene, that I agree with the estimates referred to in subparagraphs 7 iii, iv and v of subsection 4 (1) of the Toxics Reduction Act, 2009 that are set out in the plan dated December 17, 2013 and that the plan complies with that Act and Ontario Regulation 455/09 (General) made under that Act with the exception of the regulatory deadline.

Wendy Nadan, Toxic Substance Reduction Planner

December 17, 2013
Date

Figure 2: Xylene Material Balance and Process Flow Diagram
CAS # 1330-20-7

Air emissions: 17,369.56 kg/yr



Facility Inputs:

Paint:

PPG: 18,213 kg

Valspar: 574 kg

Solvent:

Brenntag: - lb

- kg

Xylene Portion: 80 %

- kg

Fielding: 32,563 L of Reclaimed solvent

28,004.38 kg

Xylene Portion: 80 %

22,404 kg

TOTAL: 41,190.70 kg

Product: none

0.0 kg/yr

Off-site transfers of paint waste / sludge

Paint Filters and Sludge (145H)

34 tonnes from Manifests

5 % Xylene (estimate)

1,700 kg

Plus

Off-site transfers of waste paint (off-spec, obsolete)

Waste Paint (145H)

11,762 L from Manifests

5 % Xylene (estimate)

588 kg

Off-site transfers of solvent for recycling (to Fielding via Recubec)

Quantity

26,584 kg

81 % Xylene (90% solvent, 90% of which is xylene)

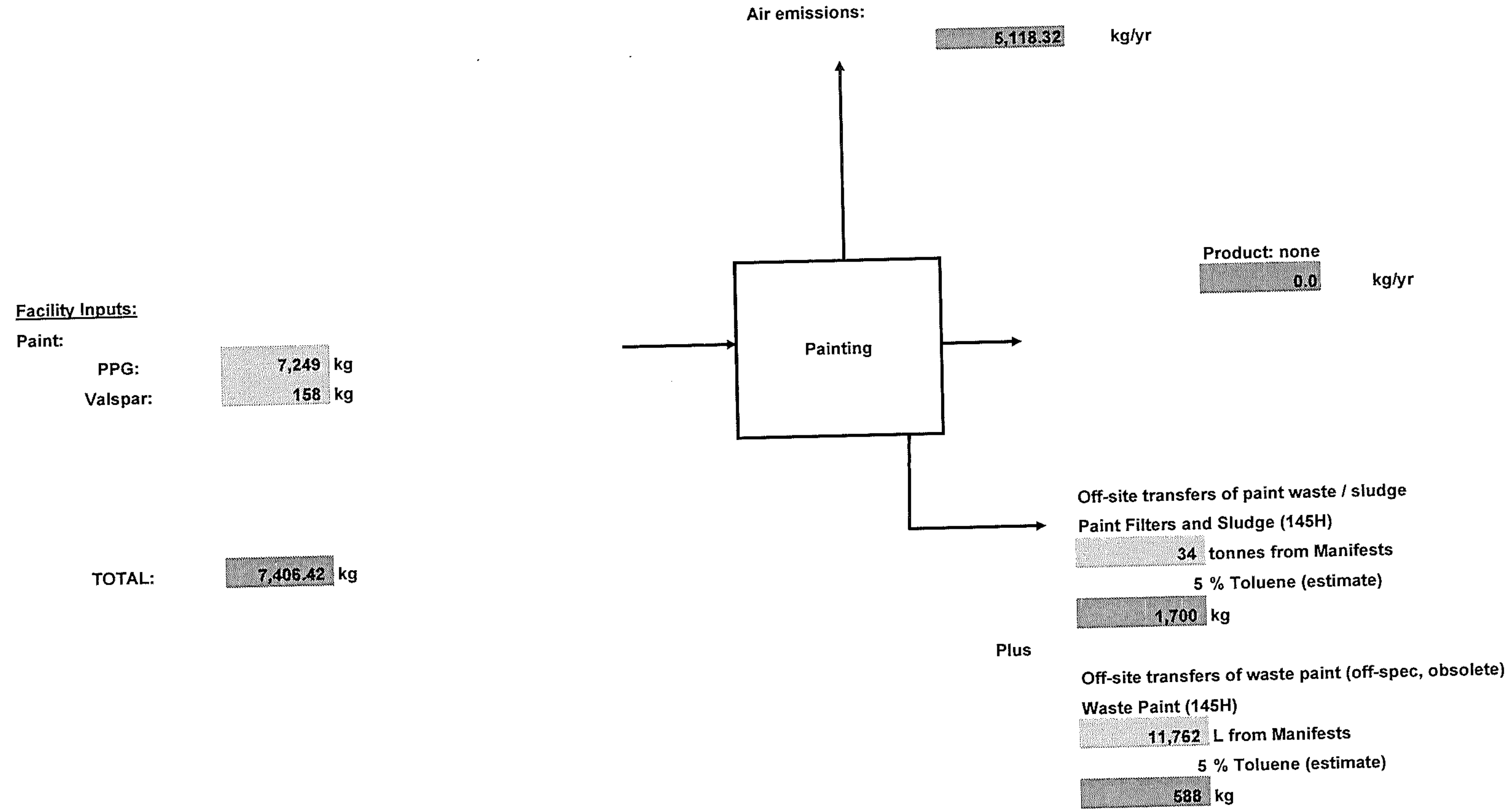
21,533 kg

Material Balance

Purchased	Created	Contained in Product	Transferred Off-Site	Released to Air	Destroyed	Discrepancy
41,191	0	0	23,821	17,370	0	0

Comment: Material balance is perfect, since amount in air emissions is obtained by difference between purchased and off-site transfers

Figure 4: Toluene Material Balance and Process Flow Diagram
CAS # 108-88-3



Material Balance

Purchased	Created	Contained in Product	Transferred Off-Site	Released to Air	Destroyed	Discrepancy
7,406	0	0	2,288	5,118	0	0

Comment: Material balance is perfect, since amount in air emissions is obtained by difference between purchased and off-site transfers

Figure 3: Ethylbenzene Material Balance and Process Flow Diagram
CAS # 100-41-4

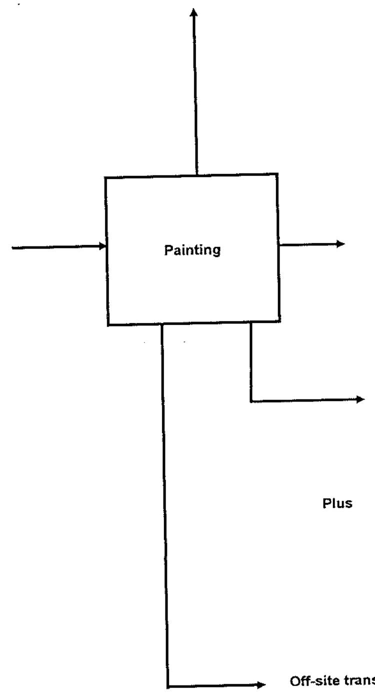
Air emissions: 5,435.69 kg/yr

Facility Inputs:
Paint:
PPG: 4,982 kg
Valspar: 23 kg

Solvent:
Brenntag: 68,343 lb
31,027.72 kg
Ethylbenzene Portion: 20 %
6,205.54 kg

Fielding: 32,563 L of Reclaimed solvent
28,004.38 kg
Ethylbenzene Portion: 0 %
- kg

TOTAL: 11,210.11 kg



Product: none
0.0 kg/yr

Off-site transfers of paint waste / sludge
Paint Filters and Sludge (145H)
34 tonnes from Manifests
1 % Ethylbenzene (estimate)
340 kg

Plus

Off-site transfers of waste paint (off-spec, obsolete)
Waste Paint (145H)
11,762 L from Manifests
1 % Ethylbenzene (estimate)
118 kg

Off-site transfers of solvent for recycling (to Fielding via Recubec)
Quantity
26,584 kg
20 % Ethylbenzene (estimate)
5,317 kg

Material Balance

Purchased	Created	Contained in Product	Transferred Off-Site	Released to Air	Destroyed	Discrepancy
11,210	0	0	5,774	5,436	0	0

Comment: Material balance is perfect, since amount in air emissions is obtained by difference between purchased and off-site transfers

Toxics Reduction Plan

Trimethylbenzene

Prepared by:

SAPA Canada
5675 Kennedy Road
Mississauga, ON
L4Z 2H9

September 2014

Contents

1.0 General Information

Toxic Substance	**Trimethylbenzene**
CAS#	95-63-6
Number of full-time equivalent employees	250
NAICS	331317 aluminum rolling, extruding, drawing
NPRI ID	2737
UTM NAD83 coordinates (entrance)	531488, 5050236
Canadian Parent Company	
Legal name	n/a
Street address	n/a
% owned by parent	n/a
CCRA Business Number	n/a
Contact info	
Owner and operator of facility	SAPA 5675 Kennedy Road Mississauga, ON L4Z2H9
Highest ranking employee	Rhodri Ford Plant Manager 5675 Kennedy Road Mississauga, ON L4Z 2H9 (416) 743-1080 Rhodri.ford@sapagroup.com
Person who coordinated preparation of plan	Michael Zorayan Environmental Coordinator SAPA Canada 5675 Kennedy Road Mississauga, ON L4Z 2H9 (416) 743-1080 ext 5274 michael.zorayan@sapagroup.com
Person who prepared plan	Wendy Nadan Nadan Consulting Ltd 151 Montgomery Blvd Orangeville ON L9W 5C1 (519) 940 4724 wendy@nadanconsulting.com

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Environmental Coordinator
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Technical contact

Wendy Nadan
Nadan Consulting Ltd
151 Montgomery Blvd
Orangeville ON L9W 5C1
519 940 4724
wendy@nadanconsulting.com

Planner
License number of planner

Wendy Nadan
TRSP 0092

Nadan Consulting was contracted to prepare a toxics reduction plan for trimethylbenzene by Mr. Michael Zorayan, Environmental Coordinator of SAPA Canada. Quantities of toxic substances used, disposed of offsite and emitted to air were obtained from the 2012 NPRI report completed by Cotter Associates.

Manufacturing processes were reviewed during a site visit. Additional information was provided by facility personnel as required.

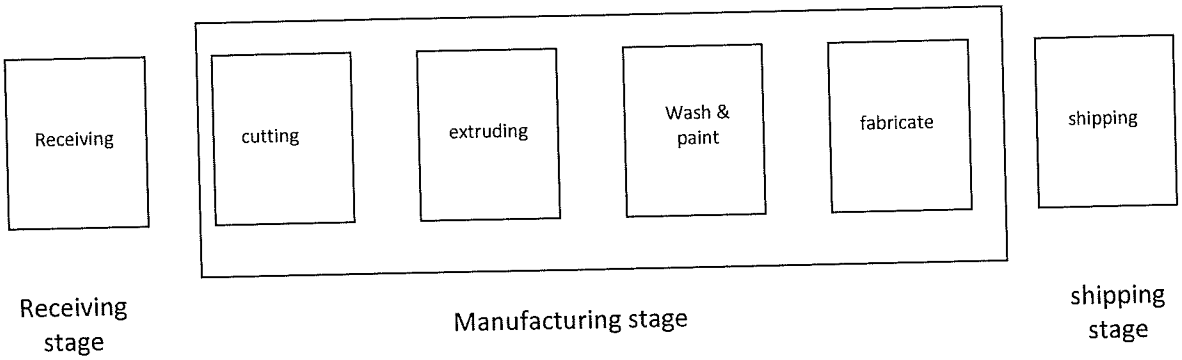
2.0 Statement of Intent

SAPA is committed to reducing the environmental impact of its manufacturing operations by implementing the principle of pollution prevention in daily activities. Key activities include continually seeking ways to reduce the usage of toxic substances.

Objective
SAPA will continue to explore new technologies with the goal of reducing use of toxic substances. As new technologies become available, SAPA will explore the economic feasibility to determine which options will be implemented.

3.0 Identification of Stages and Processes

Manufacturing operations at the facility have been separated into the following stages:



An overview of the complete manufacturing process can be found in Figure 1.

Trimethylbenzene is received into the plant in the receiving stage and are used in the painting process only. None of the trimethylbenzene progresses any further through the manufacturing process.

The trimethylbenzene are used as a solvent to keep the paint solids in solution so that it can be applied to the surface uniformly at the desired thickness. Once the paint has been applied to the surface, the solvent is completely removed by evaporation to leave a cured layer. Trimethylbenzene is used in the solvent mix as it is a readily available industrial solvent, is easy to dry and provides the necessary viscosity to the paints. Trimethylbenzene is only found in paints, not in the solvent blend.

An ITW Ransburg Electric TurboDisk Reciprocator is used to apply liquid paint to parts. The machine delivers control over paint film deposit while extending equipment life. The reciprocators' advanced features make it lightweight and compact with no hydraulic tubing to run and install. It doesn't require oil fill/flush procedure and eliminates start-up issues due to contaminated control valves. The reciprocator can be configured to deliver stroke lengths from five feet to 32 feet in one foot increments and provides for multiple points of hesitation throughout the stroke length. The counter balanced drive tube provides energy efficient, smooth operation with enhanced acceleration/deceleration control.

Paint is mixed in the paint kitchen and automatically delivered to the paint booths. Once a colour change is required, the paint lines are emptied and flushed and the paint head cleaned. Cleaning solvent is collected and sent offsite as waste for recycling. The solvent is then returned for the facility for reuse in gun cleaning. Unused paint is put back into inventory and used for the next run.

Paint is received in drums ready to use. There is no colour matching on site. The paint is thinned as necessary for application and is then dispensed directly from the drum to the spray head. There is one spray head per booth that is pre-programmed with a spray pattern. There are three booths in series on the line. Parts that need the heaviest paint application will be sprayed through all three booths. Those requiring the lightest application will be sprayed in only one booth.

Booths have direct ventilation outside the facility. All solvents contained in the paint evaporate and are vented outside.

4.0 Material Accounting

Trimethylbenzene is received into the plant in paint. See Figure 2, Figure 3 and Figure 4 for the quantities used, emitted to air, recycled and disposed of off site.

The quantity of paints purchased in a year is taken from purchasing records. The MSDS for each product gives the concentration of each ingredient.

The quantity shipped off site for recycling or disposal is found from waste manifests. Actual composition of the waste can be requested from the receiving facility.

The difference between the quantity used and the quantity shipped off site has been assumed as emitted to air.

The only other practical method available to quantify emissions to air is source sampling. This method is costly and for this reason has not been used.

Since a mass balance approach to calculating emissions has been used, there is an approximate balance between inputs and outputs.

5.0 Cost of Using Trimethylbenzene

Raw Materials	
Cost of paint in 2011	$1,008,093
Utility	
Total utility cost	$192,350
Cost of hydro/gas for paint line	
Waste Disposal	
Total cost waste	$92,139
Waste treatment	$22,723
Cost of waste solvent	
Cost of waste paint	
Cost of paint sludge	
Cost of waste filters	
Labour	
Cost of labour	$1,105,443
Labour to run solvent paint line (assume 25%)	$276,361

Cost of PPE (gloves, respirators, coveralls etc)	$1,000
Regulatory compliance Cost of NPRI/air approval/HWIN/TDG	$5,000

6.0 Options to Reduce the Usage of Trimethylbenzene

Options to reduce the use of toxic substances have been identified in each of the seven categories.

OPTION CATEGORY	OPTION No.	DESCRIPTION
Materials or feedstock substitution	1	Work with paint and solvent suppliers to substitute products that contain trimethylbenzene including higher-solids paint. Reductions would depend on final formulations.
	2	Use zero VOC ceramic coatings from Eon coat. This would result in reduction in usage of: Trimethylbenzene 2,046kg or 100% Reduction in emissions to air of: Trimethylbenzene 1,209kg or 100% Reduction in off site transfers of: Trimethylbenzene 837kg or 100%
Product design or reformulation	3	Design product (colours and specifications) so that it can be powder coated. See option 3 below.
Equipment or process modification	4	Switch to powder coat painting process from solvent-based painting. This would result in reduction in usage of: Trimethylbenzene 2,046kg or 100% Reduction in emissions to air of: Trimethylbenzene 1,209kg or 100% Reduction in off site transfers of: Trimethylbenzene 837kg or 100%
Spill and leak prevention	5	Train staff on spill prevention. Not considered to be a major source of reduction since spills and leaks are small volume.
	6	Reduce paint overspray. This is estimated to be able to reduce paint usage by 10%. This would result in reduction in usage of: Trimethylbenzene 204kg or 10%

		Reduction in emissions to air of: Trimethylbenzene 120kg or 10% Reduction in off site transfers of: Trimethylbenzene 0kg or 0%
On-site reuse or recycling		Trimethylbenzene waste is only found in paint solid and filters shipped offsite. It is not possible to reuse or recycle these waste streams and hence an option is not available in this category.
Improved inventory management or purchasing techniques	7	Minor potential for reduction. Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing trimethylbenzene that become waste due to extended storage.
Training or improved operating practices	8	Train operators to reduce paint used in cleaning. This is expected to result in insignificant reductions.

7.0 Technical Feasibility

Each of the options identified above were screened for technical feasibility using the following criteria:

- Availability and reliability of technology
- Impacts on quality, reliability, functionality
- Impact on production rate
- Compatibility with customer requirements
- Availability of employee training
- Compatibility with existing processes
- Space within facility
- Time required for change

OPTION No.	DESCRIPTION	TECHNICAL FEASIBILITY	
1	Work with paint suppliers to substitute products that contain less trimethylbenzene, including higher-solids paint.	This may be possible but will depend on discussions with paint suppliers. The 25 year warranty currently provided by the paint manufacturers would be voided however. Since the warranty is critical to customers of architectural profiles, this option is not technically feasible.	No

2	Use zero VOC ceramic coatings	Unknown if the coating is compatible with existing application equipment or if it can be used on aluminum as current applications are on steel. The thickness of the coating is greater than either powder or solvent paints and is rougher so unknown if customers will accept the finish. The durability on architectural products is also unproven however the manufacturer has conducted extensive testing for corrosion resistance using salt water spraying.	No
3	Design product (colours and specifications) so that it can be powder coated. See option 3 below.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability has not been proven however SAPA will run tests comparing the durability of conventional coatings vs. powder profiles in the outdoor environment over five years.	No
4	Switch to powder coat painting process from solvent-based painting.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability has not been proven however SAPA will run tests comparing the durability of conventional coatings vs. powder coatings in the outdoor environment over five years	No
5 6	Train staff on spill prevention. Reduce paint overspray	Not considered to be a major source of reduction since spills and leaks are small volume. There is considerable waste of paint due to overspray. The overspray is caused by imbalanced air in the room. There is too much incoming air creating positive pressure which results in excessive	No Yes

		quantities of paint being sprayed. A report investigating the problem has already been completed. Refer to Trip report dated July 23/13.	
7	Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing xylene and toluene that become waste due to extended storage.	Minor potential for reduction. This option is not expected to result in any reduction in use.	No
8	Train operators to use less paint.	Clean up between colours on the paint line is an automated process. Painting is fully automated. The reduction possible is considered to be insignificant as enough solvent to fill the lines has to be used.	No

8.0 Economic Feasibility

There is one option that is technically feasible.

OPTION No.	DESCRIPTION	ECONOMIC FEASIBILITY	
6	Reduce paint overspray	An investigation of the cause of overspray has already been completed. Corrective actions have been identified however the specific options have not been finalized. Once options have been chosen, an economic feasibility analysis will be completed.	

9.0 Options that will be Implemented

The facility will continue to work on the plan to reduce overspray. The next step is to identify which options will be implemented. Target date is June 2014.

SAPA will run tests comparing the durability of conventional coatings vs. powder coatings in the outdoor environment over five years.

10.0 Planner Recommendations

1. Request actual composition of waste shipped offsite from the receiving site.

11.0 Certification

As of September 25, 2014, I, Rhodri Ford, certify that I have read the toxic substance reduction plan for trimethylbenzene 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 with the exception of the regulatory deadline.

9/26/2014

Rhodri Ford, Plant Manager

Date

As of September 25, 2014, I, Wendy Nadan certify that I am familiar with the processes at SAPA that use trimethylbenzene, 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 17, 2013 and that the plan complies with that Act and Ontario Regulation 455/09 (General) made under that Act with the exception of the regulatory deadline.

September 25, 2014

Wendy Nadan, Toxic Substance Reduction Planner

Date

Toxics Reduction Plan

2-butoxyethanol
Diethylene glycol butyl ether

Prepared by:

SAPA Canada
5675 Kennedy Road
Mississauga, ON
L4Z 2H9

November 2014

Sapa Mississauga
Toxics Reduction Planning
2-butoxyethanol
Diethylene glycol butyl ether
November 2014

Contents

1.0 General Information

Toxic Substance	**2- butoxyethanol, diethylene glycol butyl ether**
CAS#	111-76-2, 112-34-5
Number of full-time equivalent employees	250
NAICS	331317 aluminum rolling, extruding, drawing
NPRI ID	2737
UTM NAD83 coordinates (entrance)	531488, 5050236

Canadian Parent Company

Legal name	n/a
Street address	n/a
% owned by parent	n/a
CCRA Business Number	n/a

Contact info

Owner and operator of facility	SAPA 5675 Kennedy Road Mississauga, ON L4Z2H9
Highest ranking employee	Rhodri Ford Plant Manager 5675 Kennedy Road Mississauga, ON L4Z 2H9 (416) 743-1080 Rhodri.ford@sapagroup.com
Person who coordinated preparation of plan	Michael Zorayan Environmental Coordinator SAPA Canada 5675 Kennedy Road Mississauga, ON L4Z 2H9 (416) 743-1080 ext 5274 michael.zorayan@sapagroup.com
Person who prepared plan	Wendy Nadan Nadan Consulting Ltd 151 Montgomery Blvd Orangeville ON L9W 5C1 (519) 940 4724

wendy@nadanconsulting.com

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Orangeville ON L9W 5C1
519 940 4724
wendy@nadanconsulting.com

Planner Wendy Nadan
License number of planner TRSP 0092

Nadan Consulting was contracted to prepare a toxics reduction plan for 2- butoxyethanol and diethylene glycol butyl ether by Mr. Michael Zorayan, Environmental Coordinator of SAPA Canada. Quantities of toxic substances used, disposed of offsite and emitted to air were obtained from the 2013 NPRI report completed by Cotter Associates.

Manufacturing processes were reviewed during a site visit. Additional information was provided by facility personnel as required.

2.0 Statement of Intent

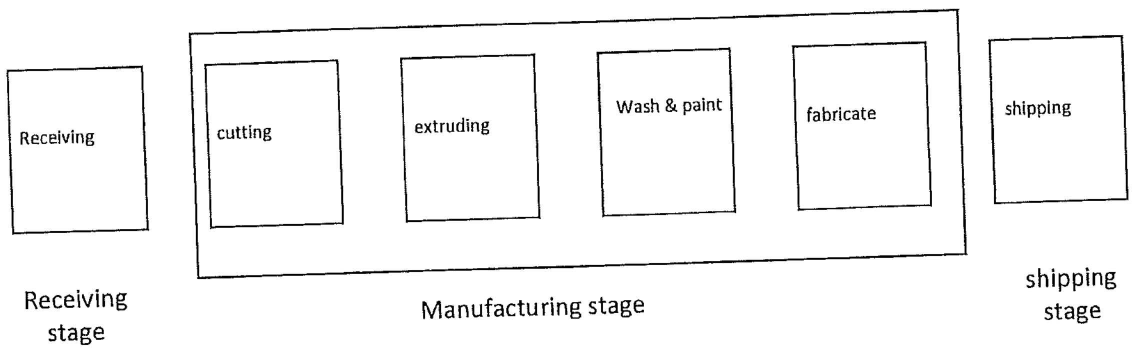
SAPA is committed to reducing the environmental impact of its manufacturing operations by implementing the principle of pollution prevention in daily activities. Key activities include continually seeking ways to reduce the usage of toxic substances.

Objective

SAPA will continue to explore new technologies with the goal of reducing use of toxic substances. As new technologies become available, SAPA will explore the economic feasibility to determine which options will be implemented.

3.0 Identification of Stages and Processes

Manufacturing operations at the facility have been separated into the following stages:



An overview of the complete manufacturing process can be found in Figure 1.

2- butoxyethanol and diethylene glycol butyl ether are received into the plant in the receiving stage and are used in the painting process only. None of the 2- butoxyethanol and diethylene glycol butyl ether progresses any further through the manufacturing process.

The 2- butoxyethanol and diethylene glycol butyl ether are used as a solvent to keep the paint solids in solution so that it can be applied to the surface uniformly at the desired thickness. Once the paint has been applied to the surface, the solvent is completely removed by evaporation to leave a cured layer. 2- butoxyethanol and diethylene glycol butyl ether are used in the solvent mix as it is a readily available industrial solvent, is easy to dry and provides the necessary viscosity to the paints.

2- butoxyethanol is only found in paints, not in the solvent blend. Diethylene glycol butyl ether is purchased as a bulk solvent and in mixed paints.

An ITW Ransburg Electric TurboDisk Reciprocator is used to apply liquid paint to parts. The machine delivers control over paint film deposit while extending equipment life. The reciprocators' advanced features make it lightweight and compact with no hydraulic tubing to run and install. It doesn't require oil fill/flush procedure and eliminates start-up issues due to contaminated control valves. The reciprocator can be configured to deliver stroke lengths from five feet to 32 feet in one foot increments and provides for multiple points of hesitation throughout the stroke length. The counter balanced drive tube provides energy efficient, smooth operation with enhanced acceleration/deceleration control.

Paint is mixed in the paint kitchen and automatically delivered to the paint booths. Once a colour change is required, the paint lines are emptied and flushed and the paint head cleaned. Cleaning solvent is collected and sent offsite as waste for recycling. The solvent is then returned for the facility for reuse in gun cleaning. Unused paint is put back into inventory and used for the next run.

Paint is received in drums ready to use. There is no colour matching on site. The paint is thinned as necessary for application and is then dispensed directly from the drum to the spray head. There is one spray head per booth that is pre-programmed with a spray pattern. There are three booths in series on the line. Parts that need the heaviest paint application will be sprayed through all three booths. Those requiring the lightest application will be sprayed in only one booth.

Booths have direct ventilation outside the facility. All solvents contained in the paint evaporate and are vented outside.

4.0 Material Accounting

2- butoxyethanol is received into the plant in paint only, not as bulk solvent.

Virgin solvent is purchased from Univar. Waste solvent is shipped off site to Fielding who recycles and sends it back to the facility. Both the outgoing and incoming solvent are tested for their composition which is different for each shipment.

Diethylene glycol butyl ether is only found in the virgin solvent purchased from Univar, not in the waste solvent shipped off site or the returned recycled solvent. It is also found in paint.

See Figure 2, Figure 3 and Figure 4 for the quantities used, emitted to air, recycled and disposed of off site.

The quantity of paints purchased in a year is taken from purchasing records. The MSDS for each product gives the concentration of each ingredient.

The quantity shipped off site for recycling or disposal is found from waste manifests. Actual composition of the waste is received from the receiving facility. Composition of incoming recycled solvent is also obtained from the supplier.

The difference between the quantity used and the quantity shipped off site has been assumed as emitted to air.

The only other practical method available to quantify emissions to air is source sampling. This method is costly and for this reason has not been used.

Since a mass balance approach to calculating emissions has been used, there is an approximate balance between inputs and outputs.

Diethylene glycol butyl ether and 2-butoxyethanol are not created in the facility or contained in product.

5.0 Cost of Using 2- butoxyethanol and diethylene glycol butyl ether

Raw Materials	
Cost of paint in 2013	$
Utility	$192,350
Total utility cost	
Cost of hydro/gas for paint line	
Waste Disposal	
Cost of waste solvent	
Cost of waste paint	
Cost of paint sludge	
Cost of waste filters	
Labour	
Cost of labour	$1,105,443
Labour to run solvent paint line (assume 25%)	$276,361
Cost of PPE (gloves, respirators, coveralls etc)	$1,000
Regulatory compliance	
Cost of NPRI/air approval/HWIN/TDG	$5,000

6.0 Options to Reduce the Usage of 2- butoxyethanol and diethylene glycol butyl ether

Options to reduce the use of toxic substances have been identified in each of the seven categories.

OPTION CATEGORY	OPTION No.	DESCRIPTION
Materials or feedstock substitution	1	Work with paint and solvent suppliers to substitute products that contain 2- butoxyethanol and diethylene glycol butyl ether including higher-solids paint. Reductions would depend on final formulations.
	2	Use zero VOC ceramic coatings from Eon coat. This would result in reduction in usage of: 2- butoxyethanol/diethylene glycol butyl ether of

		1,905/16,589kg or 100% Reduction in emissions to air of: 2- butoxyethanol/diethylene glycol butyl ether 1,940/16,589kg or 100% Reduction in off site transfers of: 2- butoxyethanol/diethylene glycol butyl ether 45/0kg or 100/0%
Product design or reformulation	3	Design product (colours and specifications) so that it can be powder coated. See option 4 below.
Equipment or process modification	4	Switch to powder coat painting process from solvent-based painting. This would result in reduction in usage of: 2- butoxyethanol and diethylene glycol butyl ether 1,905/16,589kg or 100% Reduction in emissions to air of: 2- butoxyethanol and diethylene glycol butyl ether 1,940/16,589kg or 100% Reduction in off site transfers of: 2- butoxyethanol and diethylene glycol butyl ether 45/0kg or 100/0%
Spill and leak prevention	5 6	Train staff on spill prevention. Not considered to be a major source of reduction since spills and leaks are small volume. Reduce paint overspray. This is estimated to be able to reduce paint usage by 10%. This would result in reduction in usage of: 2- butoxyethanol and diethylene glycol butyl ether 190/1,659kg or 10% Reduction in emissions to air of: 2- butoxyethanol and diethylene glycol butyl ether 194/1,659kg or 10% Reduction in off site transfers of: 2- butoxyethanol and diethylene glycol butyl ether 5/0kg or 100/0%
On-site reuse or recycling		Diethylene glycol butyl ether waste is only found in paint solid and filters shipped offsite. 2-butoxyethanol is also found in insignificant quantities in solvent shipped off site for recycling. It is not possible to reuse or recycle these waste streams and hence an option is not available in this category.

Improved inventory management or purchasing techniques	7	Minor potential for reduction. Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing 2- butoxyethanol and diethylene glycol butyl ether that become waste due to extended storage.
Training or improved operating practices	8	Train operators to reduce paint used in cleaning. This is expected to result in insignificant reductions.

7.0 Technical Feasibility

Each of the options identified above were screened for technical feasibility using the following criteria:

- Availability and reliability of technology
- Impacts on quality, reliability, functionality
- Impact on production rate
- Compatibility with customer requirements
- Availability of employee training
- Compatibility with existing processes
- Space within facility
- Time required for change

OPTION No.	DESCRIPTION	TECHNICAL FEASIBILITY	
1	Work with paint suppliers to substitute products that contain less 2-butoxyethanol and diethylene glycol butyl ether, including higher-solids paint.	This may be possible but will depend on discussions with paint suppliers. The 25 year warranty currently provided by the paint manufacturers would be voided however. Since the warranty is critical to customers of architectural profiles, this option is not technically feasible.	No
2	Use zero VOC ceramic coatings	Unknown if the coating is compatible with existing application equipment or if it can be used on aluminum as current applications are on steel. The thickness of the coating is greater than either powder or solvent paints and is rougher so unknown if customers will accept the	No

		finish. The durability on architectural products is also unproven however the manufacturer has conducted extensive testing for corrosion resistance using salt water spraying.	
3	Design product (colours and specifications) so that it can be powder coated. See option 4 below.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability has not been proven.	No
4	Switch to powder coat painting process from solvent-based painting.	Powder coatings are not as durable as solvent paints. The reliability of the coating over the 25 year period of the warranty for architectural uses has not been established. This option is not feasible as the reliability has not been proven	No
5 6	Train staff on spill prevention. Reduce paint overspray	Not considered to be a major source of reduction since spills and leaks are small volume. There is considerable waste of paint due to overspray. The overspray is caused by imbalanced air in the room. There is too much incoming air creating positive pressure which results in excessive quantities of paint being sprayed. A report investigating the problem has already been completed. Refer to Trip report dated July 23/13.	No Yes
7	Reduce paint purchases / inventory so that there is no off-spec / past shelf-life / unusual colour paints containing xylene and toluene that become waste due to extended storage.	Minor potential for reduction. This option is not expected to result in any reduction in use.	No
8	Train operators to use less paint.	Clean up between colours on the paint line is an automated process. Painting is fully automated. The reduction possible is considered to be insignificant as enough solvent to fill the lines has to be used.	No

8.0 Economic Feasibility

There is one option that is technically feasible.

OPTION No.	DESCRIPTION	ECONOMIC FEASIBILITY	
6	Reduce paint overspray	An investigation of the cause of overspray has already been completed. Corrective actions have been identified however the specific options have not been finalized. Once options have been chosen, an economic feasibility analysis will be completed.	

9.0 Options that will be Implemented

The facility will continue to work on the plan to reduce overspray. The next step is to identify which options will be implemented. Target date is June 2015.

10.0 Planner Recommendations

The planner has visited the site and worked with SAPA staff throughout the development of the plan. Data has been revised or added as necessary to improve the accuracy of the plan. Hence, there are no additional recommendations to improve the plan.

11.0 Certification

As of December 5, 2014, I, Rhodri Ford, certify that I have read the toxic substance reduction plan for 2- butoxyethanol and diethylene glycol butyl ether 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.

Rhodri Ford, Plant Manager

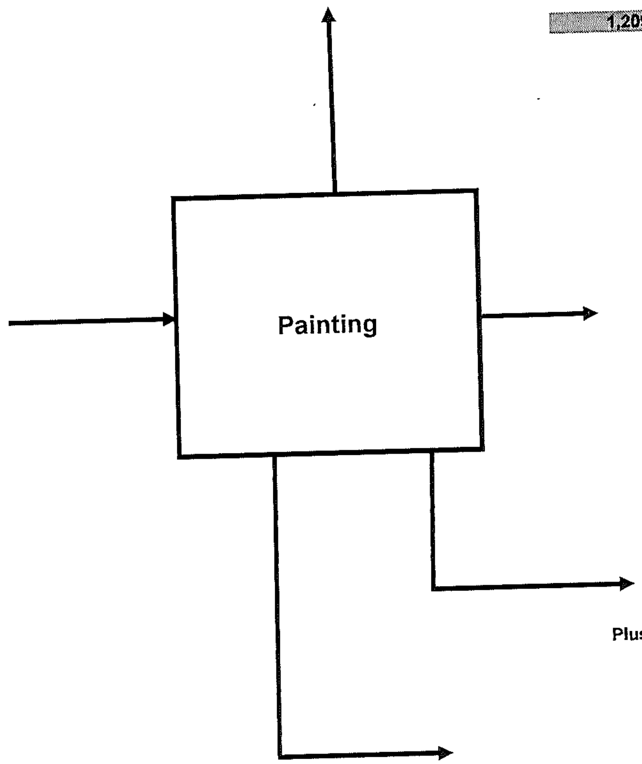
12/18/14
Date

As of December 5, 2014, I, Wendy Nadan certify that I am familiar with the processes at SAPA that use 2- butoxyethanol and diethylene glycol butyl ether, 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 17, 2013 and that the plan complies with that Act and Ontario Regulation 455/09 (General) made under that Act.

Wendy Nadan, Toxic Substance Reduction Planner

September 25, 2014
Date

Trimethylbenzene Material Balance and Process Flow Diagram
CAS # 95-63-6



1,209.00 Air emissions:

Facility Inputs:
Paint:
PPG: 1,692 kg
Valspar: 354 kg

Solvent:
Brenntag: - lb
- kg
TMB Portion: %
- kg

Fielding: kg

TMB Portion:
- kg

TOTAL: 2,046.00 kg

Product: none
0.0 kg/yr

Off-site transfers of paint waste / sludge
Paint Filters and Sludge (145H) and paint solids
13 tonnes from Manifests
5 % TMB (estimate)
663 kg

Plus

Off-site transfers of waste paint (off-spec, obsolete)
Waste Paint (145H)
- L from Manifests
5 % TMB (estimate)
174 kg
Total 837.00 kg, to secure landfill via Recubec, Quebec

Off-site transfers of solvent for recycling (to Fielding)
Quantity
kg TMB
% TMB (Based on data from Fielding)
kg

Material Balance

Purchased	Created	Contained in Product	Transferred Off-Site	Released to Air	Destroyed	Discrepancy
2,046	0	0	837	1,209	0	0

Comment: Material balance is perfect, since amount in air emissions is obtained by difference between purchased and off-site transfers

TOXIC SUBSTANCE REDUCTION PLAN FOR METHYL ISOBUTYL KETONE (CAS No 108-10-1) AND ETHYLENE GLYCOL MONOBUTYL ETHER (CAS No 111-76-2)

SAPA CANADA INC.

Index 1 Tables

Index 2 Figures

1 STATEMENT OF INTENT AND OBJECTIVE OF THE PLAN

Sapa manufactures extruded aluminum products for the industrial, commercial and architectural markets at this location; Sapa Canada Inc. uses Methyl Isobutyl Ketone CAS No 108-10-1 (MIBK) and Ethylene Glycol Monobutyl Ether CAS No 111-76-2 (2-Butoxyethanol) contained in paints that it uses on its paint line.

This facility does not create MIBK and 2-Butoxyethanol; therefore, this plan will not address reducing its creation. Sapa Canada Inc. will strive to eliminate the use of toxic substances at the facility; this plan will determine the technical and economic feasibility of each option to determine which are viable for implementation at this time

In order to reduce the use of MIBK and 2-Butoxyethanol at the facility, Sapa Canada Inc. will implement the options described in 6.1.1 as described below, as Product Design or Reformulation and 6.7.1 as and Training or Improved Operating Practices

2 DESCRIPTION OF TOXIC SUBSTANCE FOUND AT SAPA CANADA INC.

There are two substances that require the development of a toxic substance reduction plan based on the criteria set out in the Toxic Reductions Act, 209 and Ontario Regulation 455/09.

These substances are:

Methyl Isobutyl Ketone (CAS No 108-10-1)

- Contained as solvent in some paints
- The quantification method is mass balance
- Has unique direct and indirect costs

Ethylene Glycol Monobutyl Ether (CAS No 111-76-2)

- Contained as solvent in some paints
- The quantification method is mass balance
- Has unique direct and indirect costs

3 FACILITY INFORMATION

Facility name	Sapa Canada Inc.
Address	5675 Kennedy Road South Mississauga Ontario L4Z 2H9 Canada
NPRI Identification number	2737
Two Digit NAICS Code	33 Manufacturing
Four Digit NAICS Code	3313 Alumina and Aluminum production and processing
Six Digit NAICS Code	331317 Aluminum Rolling, Drawing, Extruding and Alloying
Number of Full-time Employees	250
UTM Spatial Coordinates	UTM Zone 17T Easting 608300 Northing 4831721 Latitude 43.63060 Longitude - 79.65750 Datum 1983

3.1 Owner of the facility information

Name:	Sapa Canada Inc.
Address	5675 Kennedy Road South Mississauga Ontario L4Z 2H9 Canada
Phone Number	905-890-8821
Fax Number	905-890-8385
E-mail:	drazan.mandic@sapagroup.com

3.2 Operator of the Facility Information

Facility name	Sapa Canada Inc.
Address	5675 Kennedy Road South Mississauga Ontario L4Z 2H9 Canada
Phone Number	905-890-8821
Fax Number	877-294-4825
E-mail	ralph.westphal@sapagroup.com

3.3 Highest Ranking Employee at the Facility Information

Name:	Ralph Westphal
Position	Plant Manager
Address	5675 Kennedy Road South Mississauga Ontario L4Z 2H9 Canada
Phone Number	905-890-8821
Fax Number	877-294-4825
E-mail	ralph.westphal@sapagroup.com

3.4 Parent Company Information

Legal Name:	Sapa Canada Inc
Address	5675 Kennedy Road South Mississauga Ontario L4Z 2H9
Percentage of Facility owned	100%
CRA Business Number	857314058

3.5 Toxic Substances for Which Facility Must Prepare Plan

Substance 1 (this plan)	One Methyl Isobutyl Ketone (MIBK)
CAS Number	108-10-1
Substance 2 (this plan)	Ethylene Glycol Monobutyl Ether (2-Butoxyethanol)
CAS Number	111-76-2

3.6 Plan Contacts

Plan prepared and certified by:	German Rincon
Planner License	TSRP0197
Address	134 Gilley Rd North York, Ontario, M3K 1L9 Canada
Phone Number	416-716-0042
Fax Number	416-794-1917
E-mail	german@ec2consulting.ca
Plan Coordinator	Drazan Mandic
Address	5675 Kennedy Rd Mississauga, ON L4Z 2H9 Canada
Phone Number	905-890-8821 ext 2280
Fax Number	1-877-294-4825
E-mail	drazan.mandic@sapagroup.com

4 STAGES AND PROCESSES THAT USE MIBK AND 2-BUTOXYETHANOL

Sapa manufactures extruded aluminum products for the industrial, commercial and architectural markets at this location

The facility operates under NAICS code 331317 - Aluminum Rolling, Drawing, Extruding and Alloying. Processes include aluminum extrusion, cutting/machining, ageing, painting, and assembly.

The facility receives aluminum logs via truck. Logs are cut into billets. Billets are heated and extruded to create profiles that will either be painted or assembled into products, such as window frames, etc. Facility emissions are associated with painting, heating processes, and ancillary support processes.

The raw materials used at Sapa consist primarily of aluminum and paint. Products include a variety of extruded aluminum products for the industrial, commercial and architectural markets.

Aluminum logs are received from suppliers, and cut to desired length (billets) at the facility. The billets are pre-heated and then fed into extrusion machines/presses where they are extruded to a desired shape.

After extrusion, parts may be further cut or machined, and some parts are also painted.

The painting process involves a pretreatment wash, followed by painting, and baking in an oven. All of the paint line emissions are vented to a common source, a large stack outside the building designated as source 1-N.

An Electric TurboDisk Reciprocator is used to apply liquid paint to parts. The machine delivers control over paint film deposit while extending equipment life. The reciprocators' advanced features make it lightweight and compact with no hydraulic tubing to run and install. It doesn't require oil fill/flush procedure and eliminates start-up issues due to contaminated control valves.

The reciprocator can be configured to deliver stroke lengths from 5' to 32' in one-foot increment and provides for multiple points of hesitation throughout the stroke length. The counter-balanced drive tube provides energy efficient, smooth operation with enhanced acceleration/deceleration control.

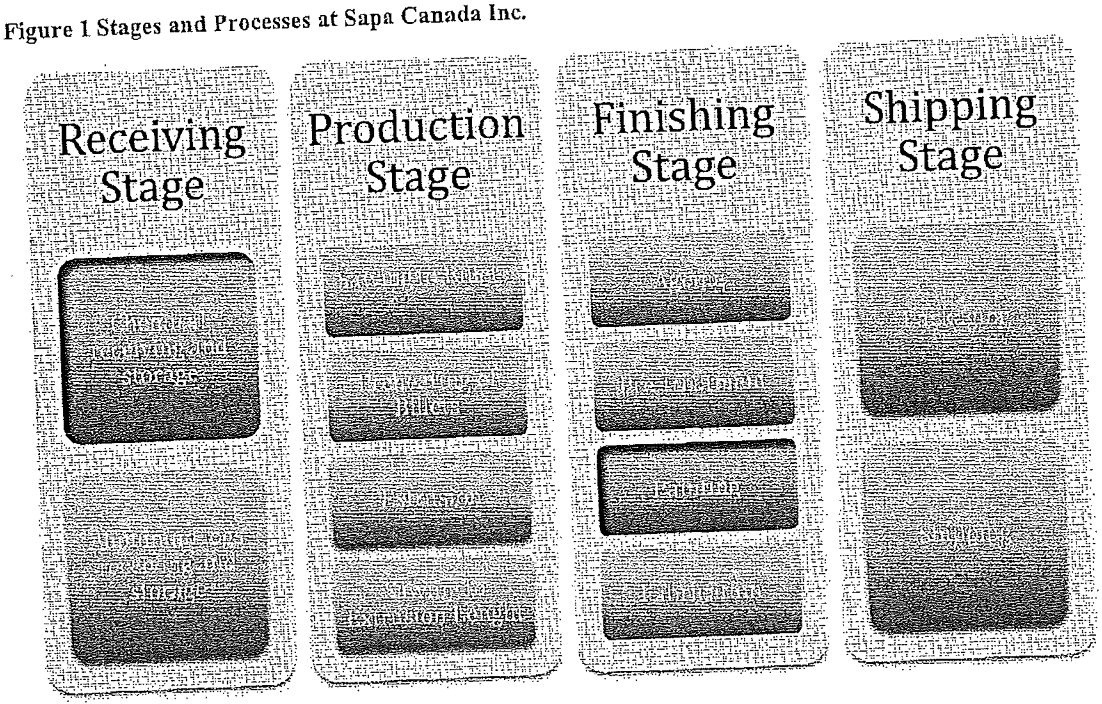
Paint is mixed in the paint kitchen and automatically delivered to the paint booths. Once a color change is required, the paint lines are emptied and flushed and the paint head cleaned. Cleaning solvent is collected and sent offsite as waste for recycling. The solvent is then returned for the facility for reuse in gun cleaning. Unused paint is put back into inventory and used for the next run.

After painting, parts may undergo further machining or assembled into other products, before ultimately being shipped to customers.

4.1 Identification and Description of the Stages that use MIBK and 2-Butoxyethanol

The manufacturing operations at Sapa Canada Inc. consist of four stages: Receiving Stage, Production Stage, Finishing Stage and Shipping Stage. Figure 1 represents the different stages and processes at Sapa Canada Inc. MIBK and 2-Butoxyethanol are present in the Receiving Stage and the Finishing Stage. In the Receiving Stage, MIBK and 2-Butoxyethanol are present during the Chemical receiving and Storage. In the Finishing Stage MIBK and 2-Butoxyethanol were used in order to paint the parts that required this type of finish. MIBK and 2-Butoxyethanol is not created at the facility.

Figure 1 Stages and Processes at Sapa Canada Inc.



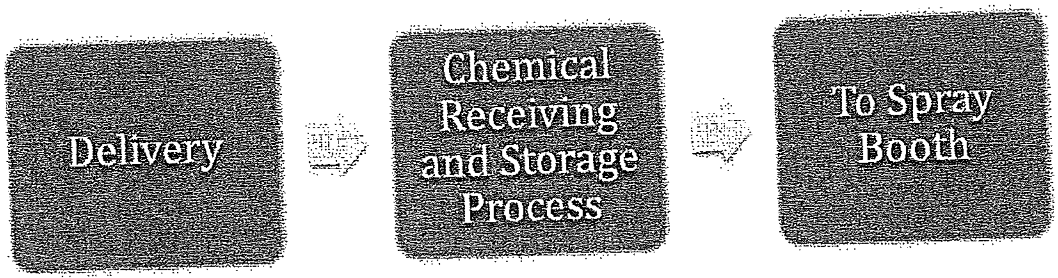
4.2 Description of Processes that use MIBK and 2-Butoxyethanol

This facility uses MIBK and 2-Butoxyethanol as components of paints supplied by PPG Industries Inc and Valspar.

4.3 Chemicals receiving and storage

Figure 2 is a process flow diagram describing the movement of MIBK and 2-Butoxyethanol trough the chemical receiving and storage process. During the Chemical receiving and Storage Process, paints that contain MIBK and 2-Butoxyethanol are delivered to the facility in drums. These drums are transported to a mixing area or paint kitchen, where the paints are combined with a solvent at a ratio of 76 parts paint, 19 parts Xylene CAS No 1330-20-7 and 5 parts Butyl Carbitol CAS No 112-34-5 (Diethylene Glycol Butyl Ether). Once the mix is ready, it is pumped to three automated robotic booths.

Figure 2 Process Flow Diagrams for MIBK and 2-Butoxyethanol on Chemical Receiving and Storage Process



U MIBK and 2-Butoxyethanol is received in drums: Use
P MIBK and 2-Butoxyethanol is pumped to paint booths: contained in Product
➔ Presence of MIBK and 2-Butoxyethanol

4.3.1 Methods and Records for the Tracking and Quantification of MIBK and 2-Butoxyethanol in the Chemical Receiving and Storage Process

The quantification method used was mass balance using inventory and purchasing records. The amount of MIBK and 2-Butoxyethanol contained by each product is contained in the MSDS provided by the supplier and Sapa Canada Inc. maintains purchasing records up to date. Since these records are readily available, accurate and no spills have occurred this is the best available method.

4.3.2 Calculations

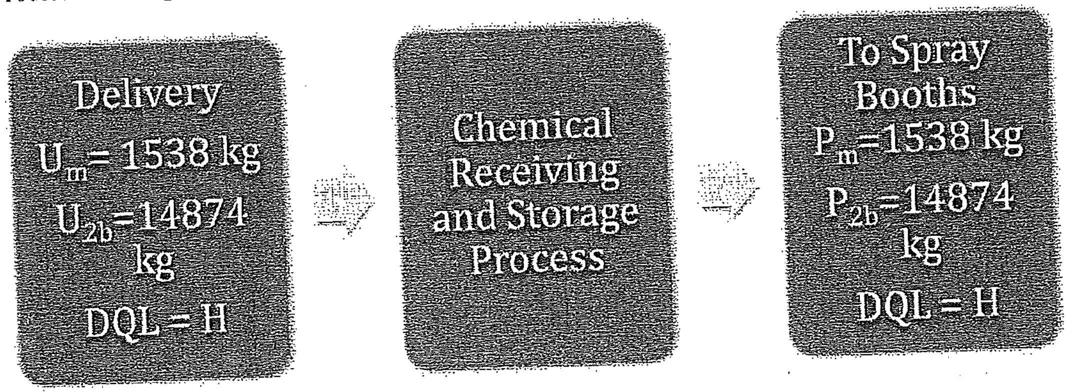
4.3.2.1 Total MIBK and 2-Butoxyethanol that enters the process U (kg):

As per appendix A, the total of MIBK used by Sapa Canada Inc. during the year was 1538 kg. Therefore, U_m=1538 kg. On other hand the amount of 2-Butoxyethanol used was 14874 kg Therefore, U_{2b}=14874 kg

4.3.2.2 Total MIBK and 2-Butoxyethanol that leaves the process P (kg)

Since no spills where registered, the mass balance yields a total of 1538 kg of MIBK and 14874 kg of 2-Butoxyethanol leaving the process contained in the product. Therefore, P_m=1538 kg and P_{2b}=14874 kg. This is the best available method, since it is accurate, no spills were recorded and the information is readily available. Figure 3 shows the respective flow diagram with the quantifications.

Figure 3 Process Flow Diagram for MIBK and 2-Butoxyethanol in chemical Receiving and Storage Process Including Quantification Information



U MIBK and 2-Butoxyethanol is received in drums: Use
P MIBK and 2-Butoxyethanol is pumped to spray booths: contained in Product
➔ Presence of MIBK and 2-Butoxyethanol
DQL Data Quality Level: H=High, AA= Above Average, A=Average, U=Uncertain

4.3.2.3 Input/ Output Balance for the Chemical Receiving and Storage Process

Use + Creation = Transformed + Destroyed + Contained in Product + Released To Air + Released to Land + Released to Water + On-site or Off-Site Disposal + Off-Site Transfer for Recycling

U = P

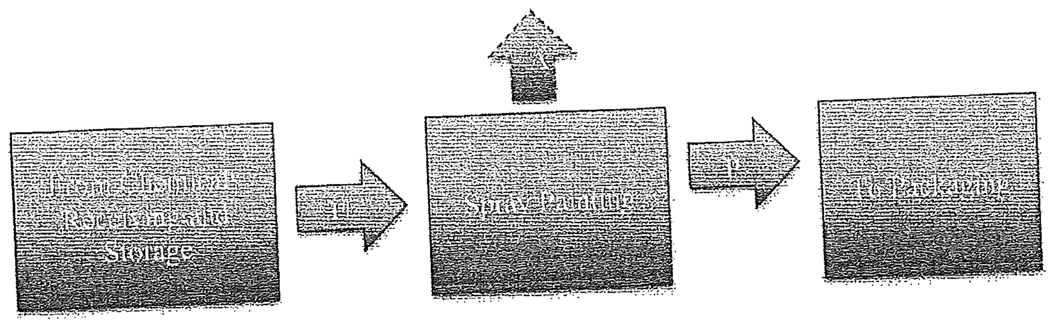
1538 kg = 1538 kg
14874 kg = 14874 kg

4.4 Spray Painting

Sapa Canada Inc. uses MIBK and 2-Butoxyethanol contained in paints purchased from PPG and Valspar in order to apply a finishing coat to some of its products.

Figure 4 shows a representation of the flow of MIBK and 2-Butoxyethanol during the spray painting process.

Figure 4 Process Flow Diagrams For MIBK and 2-Butoxyethanol During the Spray Painting Process



Process Containing MIBK and 2-Butoxyethanol

Production Line with MIBK and 2-Butoxyethanol

Release or Disposal of MIBK and 2-Butoxyethanol

U Use of MIBK and 2-Butoxyethanol

A On-site Release of MIBK and 2-Butoxyethanol to Air

4.4.1 Methods and Records for the Tracking and Quantification of MIBK and 2-Butoxyethanol in the Line Flushing Process

We will use the Mass balance Method in order to calculate the amount of MIBK and 2-Butoxyethanol that is released to air during the Spray Painting Process. According to Sapa Canada Inc.'s ECA we will assume that 100% of MIBK and 2-Butoxyethanol is emitted to air.

4.4.2 Calculations

4.4.2.1 Total MIBK and 2-Butoxyethanol entering The Process

1538 Kg of MIBK and 14874 kg of 2-Butoxyethanol enter this process coming from the paint kitchen. Therefore, U_m=1538 kg and U_{2b}=14874 kg

4.4.2.2 *Total MIBK and 2-Butoxyethanol Emitted to Air*

As mentioned before by using our 100% assumption the MIBK and 2-Butoxyethanol emitted to air will be:

A_m=1538 kg and A_{2b}=14874 kg

4.4.2.3 *Total MIBK and 2-Butoxyethanol Contained in Product*

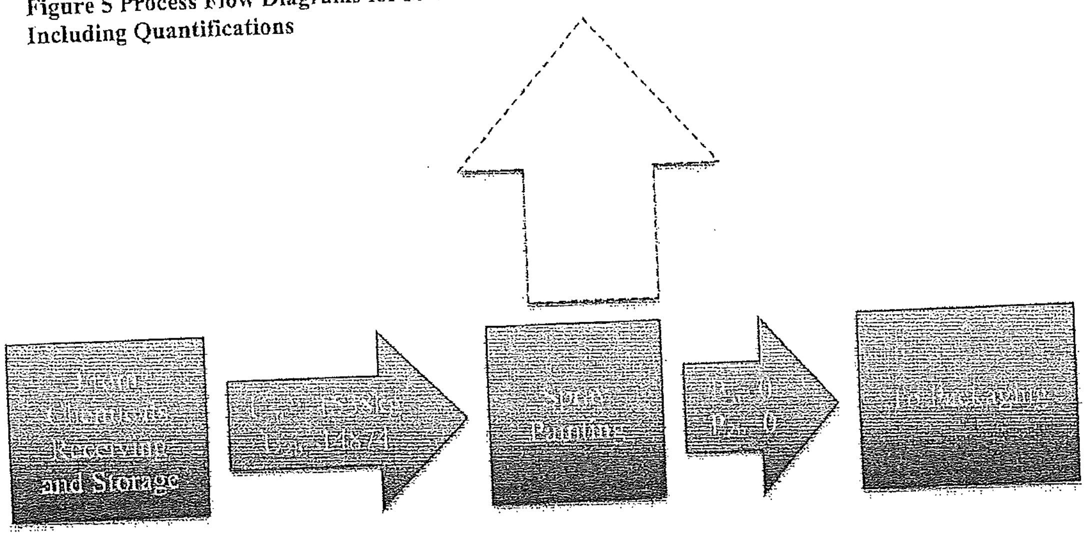
By using Mass balance

P_m= 0 kg and P_{2b}= 0 kg

4.4.2.4 *Best Available Method Rationale*

Quantification methods are selected based on their economic achievability while meeting industry standards and legal requirements (NPRI, ECA)

Figure 5 Process Flow Diagrams for MIBK and 2-Butoxyethanol during Line Flushing Process Including Quantifications



Process Containing MIBK and 2-Butoxyethanol

Production Line with MIBK and 2-Butoxyethanol

Release or Disposal of MIBK and 2-Butoxyethanol

U Use of MIBK and 2-Butoxyethanol

A On-site Release of MIBK and 2-Butoxyethanol to Air

4.5 Facility-Wide Accounting Information

Table 1 Presents a summary of facility-wide quantifications for MIBK and 2-Butoxyethanol

Table 1 Summary Facility Level Quantifications for MIBK and 2-Butoxyethanol

Form of Involvement	Amount of Substance (kg)
Enters the facility (use)	1538 and 14874
Created at the facility	0
Released (air) from the facility	1538 and 14878
Released (land) from facility	0
Released (water) from facility	0
Disposed of (on-site) by the facility	0
Disposed (off-site) by the facility	0
Transferred for recycling from the facility	0
Contained in product (leaves the facility)	0
Transformed	0
Destroyed	0

5 ESTIMATED DIRECT AND INDIRECT COSTS

5.1 Raw Materials

Cost of paints that contain the substances approximately $2,140,000

5.2 Maintenance

Cost of Maintenance associated with paint line $101,000

5.3 Process Related Utilities

	Total	Prorated
• Water	$57,362	
• Electricity	$2,549,675	
• Natural Gas	$721,845	

5.4 Labor

Cost of Labor associated with paint line $522,000

5.5 Environmental Compliance

Prices paid for external consultants, fees paid to the ministry and environment Canada and any other associated cost $33,000

5.6 Transfer of Material for Recycling or Disposal

Associated with paint line $9,700 (paint-related only – does not include chrome and xylene transfers)

Table 2 Costs Associated with the Use of MIBK and 2-Butoxyethanol at Sapa Canada Inc.

Item	Total Cost
Raw Materials	$2,140,000
Maintenance	$101,000
Labor	$522,000
Recycling /Disposal	$9,700
Environmental Compliance	$33,000
Water	$57,362
Electricity	$2,549,675
Natural Gas	$721,845
TOTAL	**$6,134,582.00**

6 IDENTIFICATION AND ANALYSIS OF TOXIC SUBSTANCE REDUCTION OPTIONS FOR MIBK AND 2-BUTOXYETHANOL

This plan will generate possible options for toxic reduction in seven categories: Material or Feedstock Substitution Options, Product Design or Reformulation, Equipment or Process Modification, Spill and Leak Prevention, Onsite Reuse or Recycling, Improved Inventory Management or Purchasing Techniques, Training or Improved Operating Practices.

6.1 Material or Feedstock Substitution Options

6.1.1 Work with paint supplier (PPG) to substitute products to reduce percentage of MIBK

Work with paint supplier (PPG) to substitute products that contain Methyl Isobutyl Ketone (MIBK), CAS Number 108-10-1. PPG to look from product and technical stewardship point of view to see if there is possibility to reduce percentage of MIBK. Reduction depends on particular paint single formula/recipe used at Sapa, if feasible.

If the paint in question uses global platform formula/recipe, option would not be feasible.

6.1.1.1 *Technical Feasibility*

Table 3 shows is a tool to assess the viability of this option

Table 3 Assessment Tool: Assess Technical Feasibility

Factor	Response for Criteria			
	N/A	Yes	No	Further Review Req.
Is technology available and reliable				PPG to look from product and technical stewardship point of view to see if there is possibility to reduce percentage of MIBK
Will the technology withstand the operation demands?				Testing Required
Is the technology applicable to the facility?				If the paint in question uses global platform formula/recipe, option would not be feasible.
Is the implementation compatible with customers' requirements				Testing required
Is training available?		Y		
Quality of exhaust air		Y		
Is there sufficient water supply to implement		Y		
Effects of machine on electricity		Y		
Fuel Supply & Storage	N/A			
Is there sufficient Space		Y		
Time required to implement changes		Y		
HSE		Y		

Further review is required before determining whether this option is feasible or not.

6.1.1.2 *Economic Feasibility*

This study will be performed once technical feasibility is determined

6.2 Product Design or Reformulation

6.2.1 Consider designing products with colors and specifications that can be powder coated.

It is estimated that application of powder coats reduces the use of solvent by 90% or more, however in this case it has been shown that Powder coatings are not as durable as solvent paints

6.2.1.1 Technical Feasibility

Factor	Response for Criteria			
	N/A	Yes	No	Further Review Req.
Is technology available and reliable		Yes		
Will the technology withstand the operation demands?			No	
Is the technology applicable to the facility?			No	A major overhaul of the whole plant would be required costing north of 1 million dollars
Is the implementation compatible with customers' requirements			No	Coats are not as durable as solvent based paint
Is training available?		Y		
Quality of exhaust air		Y		
Is there sufficient water supply to implement		Y		
Effects of machine on electricity		Y		
Fuel Supply & Storage	N/A			
Is there sufficient Space		Y		
Time required to implement changes		Y		
HSE		Y		

This option is not technically feasible at the moment

6.3 Equipment or Process Modification

6.3.1 Modifying the equipment in order to apply powder coating

Same as in 6.2.1

6.3.1.1 Technical Feasibility Analysis

Factor	Response for Criteria			
	N/A	Yes	No	Further Review Req.
Is technology available and reliable		Yes		
Will the technology withstand the operation demands?			No	
Is the technology applicable to the facility?			No	A major overhaul of the whole plant would be required costing north of 1 million dollars
Is the implementation compatible with customers' requirements			No	Coats are not as durable as solvent based paint
Is training available?		Y		
Quality of exhaust air		Y		
Is there sufficient water supply to implement		Y		
Effects of machine on electricity		Y		
Fuel Supply & Storage	N/A			
Is there sufficient Space		Y		
Time required to implement changes		Y		
HSE		Y		

This option is not technically feasible

6.4 Spill and Leak Prevention

Not considered to be a major source of reduction since spills and leaks are small volume

6.5 Onsite Reuse or Recycling

Paint waste is only found in paint solid and filters shipped offsite. It is not possible to reuse or recycle these waste streams and hence an option is not available in this category.

6.6 Improved Inventory Management or Purchasing Techniques

Minor potential for reduction. Paints containing MIBK don't become waste due to extended storage.

6.7 Training or Improved Operating Practices

6.7.1 Distance between parts prepared for painting could be reduced from 12" to 6'

Depending on complexity (part shape/profile), there is a possibility for paint flow output reduction. Simpler part shapes would require to apply less thick paint. Distance between parts prepared for painting could be reduced from 12" to 6". This would initially increase production, but in the long run paint usage should be reduced due to steady thickness of the paint applied.

Training operators to reduce paint overspray is expected to result in certain paint reductions

6.7.1.1 Estimated reductions

It is difficult to estimate the amount saved by reducing overspray due to training and to changing the distance between parts from 12" to 6", however Sapa Canada Inc. will provide training to its employees for safety and compliance reasons.

6.7.1.2 Technical Feasibility Analysis

Error! Reference source not found. shows the technical feasibility for the implementation of this option, which indicates that this is a feasible option.

Table 4 Technical Feasibility Assessment Tool for Training

Factor	Response for Criteria			
	N/A	Yes	No	Further Review Req.
Is technology available and reliable		Y		
Will the technology withstand the operation demands?		Y		
Is the technology applicable to the facility?		Y		
Is the implementation compatible with customers' requirements		Y		
Is training available?		Y		
Quality of exhaust air		Y		
Is there sufficient water supply to implement		Y		
Effects of machine on electricity		Y		
Fuel Supply & Storage	N/A			
Is there sufficient Space		Y		
Time required to implement changes		Y		
HSE		Y		

6.7.1.3 *Economic Feasibility*

It is estimated that training could last one day for 5 workers, therefore the capital investment will be:

Total Capital Cost= (5*8*$18) = $ 800

Since it is not possible at the moment to estimate reductions, payback period cannot be determined.

7 IMPLEMENTATION OF OPTIONS FOR REDUCTION OF THE USE OF MIBK AND 2-BUTOXYETHANOL AT THE FACILITY

In order to reduce the use of MIBK and 2-Butoxyethanol at the facility, Sapa Canada Inc. will implement the options described in 6.1.1 as Product Design or Reformulation and 6.7.1 as and Training or Improved Operating Practices

Table 5 Description and Timetable for Implementation of Option 6.1.1

Step	Description	Estimated Timeline
1	PPG to look from product and technical stewardship to see if there is possibility to reduce percentage of MIBK.	6 Months

We can also see in Table 6 a detail of the estimated reduction per such implementation

Table 6 Estimate of Reduction of MIBK and 2-Butoxyethanol by Implementation of Option 6.1.1

Type	Estimated Reduction in kg	Anticipated Date
Use	Depends on supplier	6 Months
Creation	0	6 Months
Release to Air	Depends on Supplier	6 Months
Release to Water	0	6 Months
Release to Land	0	6 Months
Disposal off-site	0	6 Months
Disposal on-site	0	6 Months
Transfer off-site for recycling	0	6 Months
Contained in Product	0	6 Months

Sapa Canada Inc. is also studying the option to reduce the distance between parts prepared from painting and train the staff to reduce overspray. The time frames for this are more difficult to estimate, since they depend on testing performed at Sapa Canada Inc. Table 7 and Table 8 present the timetable and estimated reductions for such option.

Table 7 Description and Timetable for Implementation of Option 6.7.1

Step	Description	Estimated Timeline
1	Depending on complexity (part shape/profile), there is a possibility for paint flow output reduction. Simpler part shapes would require to apply less thick paint.	12 Months
2	Train operators to reduce paint overspray is expected to result in certain paint reductions	3 Months

Table 8 Estimate of Reduction of Pentane by Implementation of Option 6.7.1

Type	Estimated Reduction in kg	Anticipated Date
Use	13	4-6 months
Creation	0	4-6 months
Release to Air	13	4-6 months
Release to Water	0	4-6 months
Release to Land	0	4-6 months
Disposal off-site	0	4-6 months
Disposal on-site	0	4-6 months
Transfer off-site for recycling	0	4-6 months
Contained in Product	0	4-6 months

8 PLANNER RECOMMENDATIONS AND RATIONALE

It is clear that Sapa Canada Inc. is committed to the reduction of use of Toxics, however the quality and durability requirements of its products do not allow exploring any other alternative than the ones described in this Toxic Substance Reduction Plan. For that reason, I have no recommendations at the moment.

9 PLAN CERTIFICATIONS FOR MIBK AND 2-BUTOXYETHANOL

9.1 CERTIFICATION BY THE HIGHEST RAKING EMPLOYEE

As of December 20, 2016. I Ralph Westphal, 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 factual and accurate and complies with the *Toxics Reduction Act, 2009* and Ontario Regulation 455/09 (General) made under that Act

MIBK and 2-Butoxyethanol

Ralph B. Westphal

Ralph Westphal
Plant Manager
Sapa Canada Inc. Inc.

9.2 CERTIFICATION BY LICENSED PLANNER

As of December 20, 2016. I German Rincon, certify that I am familiar with the processes at Sapa Canada Inc. Inc. That use the toxic substance referred to below, that I agree with the reductions referred to in subparagraphs 7 iii, iv and v of subsection 4 (1) of the *Toxics Reductions Act, 2009* that are set out in the plan dated December 20, 2016 and that the plan complies with that Act and Ontario Regulation 455/09 (General) made under that Act.

MIBK and 2-Butoxyethanol

German A Rincon

German Rincon [Planner License # TSRP0197]
General Manager
EC^2 Environmental and Chemical Consulting

10 APPENDIX B: PROCESS FLOW DIAGRAM FOR SAPA CANADA INC.

Process Flow Diagram