B&W Heat Treating
Kitchener, ON

2018 Methanol (CAS 67-56-1) Toxic Substance Reduction Plan (for 2017)

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1.0 Statement of Intent and Objectives

1.1 Methanol is used to create a suitable atmosphere for heat treating. Methanol is used as a processing aid, in producing a suitable carbon atmosphere. Methanol acts as a protectant gas to protect the parts from scaling. The use of the substance is critical to the creation of a suitable atmosphere to harden parts. The reduction initiative taken in 2017 was the installation of new process panels at the ovens, to reduce the need for methanol in the process.

1.2 Objective:

Bluewater Thermal Solutions/B & W Heat Treating intends to reduce the amount of methanol used in 2017 over the original amounts identified in the Dec 2012 Toxic Substance Reduction Plan.

1.3 Target

The target for the reduction for the use of the Methanol is 50%, based on the 2011 amount used (279,820 kg) and reported in the 2012 Toxic Reduction Plan.

1.4 Target Timeline

The reduction initiative began in 2016, and was being completed throughout 2017.

1.5 Creation Statement of Intent, Objective and Target

The product is not created at the facility.
Therefore, there is no statement of intent, objective, target, timeline or reason for creation or creation reduction.

2.0 Description of Toxic Substances Found at the Facility

Methanol (CAS 67-56-1) is used in the Batch Department to create a suitable atmosphere for heat treating. It is shipped to the facility through a contracted service via tanker, and stored in a 2500 (US) gallon tank. Methanol is used as a processing aid, in producing a suitable carbon atmosphere. Methanol acts as a protectant gas to protect the parts from scaling. The description of what, where, when, why and how the toxic substances are used at the facility, is further explained in the process flow diagram and in the body of this report. When the Methanol/methanol mixture is introduced into the high temperature zone of a heat-treating furnace, the methanol decomposes to form carbon monoxide and hydrogen in a 1:2 ratio.

Ammonia (CAS NA-16) is two processes, and is shipped to the facility by a contracted service and stored in a 2500 (US) gallon tank. The Ammonia is used as a processing aid. It assists in producing a carbon atmosphere, which is key in hardening of the parts. The Ammonia is released into the heat-treating furnaces to create a suitable atmosphere for the carburization of parts entering the furnace The description of what, where, when, why and how the toxic substances are used at the facility, is further explained in the process flow diagram and in the body of this report.

Sodium Nitrite (CAS 7632-00-0) is in the draw salt used at the facility in three processes, and is in plastic bags. The draw salt is used as a processing aid at the facility. The bags are emptied into the pots where the parts are dipped into a solution to allow for the parts to harden. This hardness is a quality critical component to the part, since the shattering of the part during use would create serious safety issues. In 2012, the draw pots were contaminated, leading to a new start-up of the process. This required a large increase (~100%) in the use of the draw salt, due to this unusual circumstance. The description of what, where, when, why and how the toxic substances are used at the facility, is further explained in the process flow diagram and in the body of this report.

3.0 Facility information

Facility (legal) name	B&W Heat Treating Canada ULC
Facility address	60 Steckle Place, Kitchener, ON N2E 2C3
NPRI Identification number	00064
Two digit NAICS Code	33
Four digit NAICS Code	3328
Six Digit NAICS Code	332810
Number of full time Employees	44
UTM spatial coordinates:	
UTM Zone	38
UTM Easting	470483
UTM Northing	1066525
Facility Owner	Bluewater Thermal Solutions
Highest Ranking Official	Shawn Scott
Public Contact	Shawn Scott
Technical Contact	Shawn Scott
Coordinator of the TSRP	Erin Guo
Person preparing the TSRP	Lari Dakin LD – 50 Enterprises Inc. – Consultant/Planner Cell: (519) 575-8374; E-mail: ld50@execulink.com
Licensed Planner making recommendations	Lari Dakin LD – 50 Enterprises Inc. – Consultant/Planner Cell: (519) 575-8374; E-mail: ld50@execulink.com License number TSRP0270
Licensed Planner certifying the TSRP	Lari Dakin LD – 50 Enterprises Inc. – Consultant/Planner Cell: (519) 575-8374; E-mail: ld50@execulink.com License number TSRP0270
Parent Company information	Bluewater Thermal solutions Suite 302 – 6225 Sheridan Drive New York

4.0 Stages and Processes that use Methanol

Methanol is used at the chemical receiving process, where it is transferred to a 2500 US Gallon tank by the supplier, so no additional cost is incurred in receiving. A mixture of the Ammonia/nitrogen/methanol is used in the furnaces to create a carbon rich atmosphere. There were no spills of methanol reported in 2017. The methanol is destroyed in the furnaces, decomposing to carbon monoxide and hydrogen. The process flow diagram in Appendix 1 provides a visual description of the stages and processes.

4.1 Chemical receiving and storage process

The figure below shows the flow of the Methanol through the chemical receiving and storage process.

U: Toxic Substance enters the process	From Supplier ----------→-- U	Chemical receiving and storage process (2500 US Gallon Tank)	P ----→ To furnaces → D

Picture 1 shows the tank used to store the methanol.

There were 141,100 kgs of Methanol purchased in 2017. Therefore, 141,100 kilograms of Methanol were used at the chemical receiving and storage process.

Quantification method used is mass balance, with the rationale being that the information was readily available from the MSDS and purchasing records. Due to the nature of this process, no further quantification methods were necessary. There was no intrusive testing needed to quantify the substance in this manner.

4.2 Furnaces (heat-treating) process

The figure below shows the flow of Methanol through the heat-treating process.

U: Toxic Substance enters from receiving/storage

Through piping
----------→-

Heat-treating process

U

D1□

AE1□

Since no records were available at the end of 2017 showing the amount of Methanol left in the tank, it is assumed that all of the Methanol went from the receiving process to the heat-treating process. Therefore, it is calculated that 141,100 kilograms of the Methanol entered the heat-treating process in 2017. The Methanol is destroyed at the furnaces, as described above.

The quantification used was mass balance, with the rationale being the same as above. The information was readily available from the MSDS and purchasing records. Due to the nature of this process, no further quantification methods were necessary. There was no intrusive testing needed to quantify the substance in this manner. There is nothing in this process, other than the spill that led to a change in the amount of material.

The table is section 5 shows the flow and tracking of the Methanol through the facility.

5.0 Tracking and Quantification of Methanol at the Facility Level

Table 1: Tracking of Methanol at the Facility Level

Form of Involvement	Amount (kg)
Enters the facility	141,100
Created at the facility	0
Released (air) from the facility	30
Released (land) from the facility	0
Released (water) from the facility	0
Disposed (on-site) by the facility	0
Disposed (off-site) by the facility	0
Transferred (for recycling) from the facility	0
Contained in product that leaves the facility	0
Destroyed at the facility	141,070
Remains in storage at the facility	0**

*considered negligible

** records of remaining storage were not kept in 2017, so it is estimated that all of the material purchased in 2017, was used in production

As a mass balance process was used, and no significant amounts of material are lost during production, the inputs and outputs balance.

6.0 Cost Estimates for Methanol at the Facility Level

Table 2: Cost Tracking

Item	Current Annual Cost
Operating expense	
• Capital cost	0
• Raw materials	$108,788
• Delivery	$2380
• Direct labour	$400,000
• PPE	$1500
• Training	$700
• Supplies (hoses, piping)	NA
• Maintenance	Not determined
• Utilities (pro-rated to Methanol)	$486,598*

Raw material storage • Floor space cost • Training (WHMIS, Work Instructions - WI) • Secondary containment • Emergency planning • Inspection/monitoring • Reporting and records • Utilities	$1000** see above $750 NA NA NA See above
Process control • Emission control equipment • Sampling and testing • Safety equipment/PPE • Waste collection equipment • Training (WHMIS, WI) • Reporting and records	NA NA See above NA See above NA
Waste • Disposal fees • Sampling and testing • Containers/labels • Storage areas/containment • Transportation fees	NA NA NA See above NA
Emission controls • Capitol costs • Operating costs • Approvals/permits • Recovered materials • Inspection/monitoring • Sampling and testing • Emergency planning • Reporting and records	NA NA NA NA NA NA See above NA
Purchasing • Inventory control • Product/Vendor research	NA NA
Production • Re-work • Disposal management • Training • Emergency planning • Waste collection • Inspections/monitoring • Production trials	NA See above See above See above See above NA NA

Engineering • Sampling and testing • Hazard analysis • Design and development	 NA NA NA
Management • Penalties and surcharges • Legal fees • Insurance • Government reporting costs	 NA NA NA $2000

*Based on 90% of overall cost ($540,664) assigned to furnace operation
**Estimated tank storage cost

7.0 Identification and Analysis of Reduction Options for Methanol

7.1 Table Description

The table below (Tables 3) describes the required options for reduction of the toxic substance (Methanol (PM10)) used at the facility.

Table 3: Toxic Substance Reduction Options

Toxic Substance Reduction Category	Option Identification and Description
1) Material or feedstock substitution	Option 1: Replacement of Methanol with a higher level of Ammonia
2) Product design or reformulation	Option 1 applies to this category, as well.
3) Equipment or process modification	Option 2: Add process panels at the furnaces to better control the amount of methanol used.
4) Spill and leak protection	Option 3 replace valving to prevent spills.
5) On-site reuse or recycling	Option 4: Capture lost methanol for reuse.
6) Improved inventory management or purchasing techniques	Option 2 could apply to this category, as well
7) Training or improved operating practices	Option 2 apply to this category

8.0 Implementation of Options for Reduction of Methanol at the Facility

8.1 Table Description

The tables below (Tables 4 – 7) describe estimated reductions, technical feasibility and economic feasibility of the proposed options.

Table 4: Estimated Reduction of the Defined Options

Category	Option	Estimated Reduction
1) Material or feedstock substitution	Option1: Substitute Methanol	Substituting the Methanol with Ammonia would reduce the use of Methanol • Reduction in use: 70,550 kg/year (50%) – (141,100 kg x

	with more NH4	0.5)
2) Product design or reformulation	Option1: Substitute Methanol with more NH4	Substituting the Methanol with Ammonia would reduce the use of Methanol • Reduction in use: 70,550 kg/year (50%)
3) Equipment or process modification	Option 2: Introduce process panels at furnaces	Introducing the use of the process panels at the furnaces, could reduce the amount of Methanol used (over 2012) by 50% • Reduction in use: (50% of 279,820) = 139,910 kg
4) Spill and leak protection	Option 3: Replace valving	Replacing the valving station would reduce the potential for spills and less time would be spent handling the material. • Reduction in material lost (spills): 0 (no spills of methanol)
5) On-site reuse or recycling	Option 4: Capture lost methanol	Capturing the lost methanol for reruse would reduce the amount of material lost. • Reduction in material lost (spills): 0 (no spills of methanol)
6) Improved inventory management or purchasing techniques	Option 2: Introduce process panels at furnaces	Introducing the use of the process panels at the furnaces, could reduce the amount of Methanol used (over 2012) by 50% • Reduction in use: (50% of 279,820) = 139,910 kg
7) Training or improved operating practices	Option 2: Introduce process panels at furnaces	Introducing the use of the process panels at the furnaces, could reduce the amount of Methanol used (over 2012) by 50% • Reduction in use: (50% of 279,820) = 139,910 kg

Table 6: Technically Feasibility of Each Option

Category	Option	Technical Feasibility
1) Material or feedstock substitution	Option1: Substitute methanol with more NH4	Not technically feasible at this time. The substance is a critical component in creating the proper atmosphere for hardening/carburizing of the parts, due to the chemistry with the methanol, also used in this process. Using more ammonia would increase that cost.
2) Product design or reformulation	Option1: Substitute methanol with more NH4	Not technically feasible at this time. The substance is a critical component in creating the proper atmosphere for hardening/carburizing of the parts, due to the chemistry with the methanol, also used in this process. Using more ammonia would increase that cost.
3) Equipment or	Option 2:	Technically feasible. This option was implemented in 2016 -2017.

process modification	Introduce process panels at furnaces	
4) Spill and leak protection	Option 3: Replace valving	Technically feasible. Not required as there have been no material losses.
5) On-site reuse or recycling	Option 4: Capture lost material	Technically feasible. Not required as there have been no material losses.
6) Improved inventory management or purchasing techniques	Option 2: Introduce process panels at furnaces	Technically feasible. This option was implemented in 2016 -2017.
7) Training or improved operating practices	Option 2: Introduce process panels at furnaces	Technically feasible. This option was implemented in 2016 -2017. Train personnel on the use of the process panels

Table 7: Economic Feasibility of Technically Feasible Options

Category	Option	Economic Feasibility
1) Material or feedstock substitution	Option1: Substitute methanol with more NH4	Not econmically feasible at this time. Increase in the costs due to more ammonia use.
2) Product design or reformulation	Option1: Substitute methanol with more NH4	Not econmically feasible at this time. Increase in the costs due to more ammonia use.
3) Equipment or process modification	Option 2: Introduce process panels at furnaces	Economically feasible. This option was implemented in 2016 - 2017.
4) Spill and leak protection	Option 3: Replace valving	Not economically feasible – no lost material.
5) On-site reuse or recycling	Option 4: Capture lost material	Not economically feasible – no lost material.
6) Improved	Option 2:	Economically feasible. This option was implemented in 2016 -

inventory management or purchasing techniques	Introduce process panels at furnaces	2017.
7) Training or improved operating practices	Option 2: Introduce process panels at furnaces	Economically feasible. This option was implemented in 2016 - 2017.

8.2 Implementation of Options for the Reduction of Methanol

Optio0n 2 is feasible, and the process was implemented in 2016-2017.

Table 9: Implementation Steps for Options
Process Panels were purchased in 2016, and installed throughout 2017.

Table 10: Overall Timeframe for Reduction
End of 2017.

9.0 Planner Recommendations and Rationale

9.1 Appendix 2

The Planner recommendations and rationale are attached as Appendix 2 to this toxic substance reduction plan.

10.0 Plan Certification for Methanol

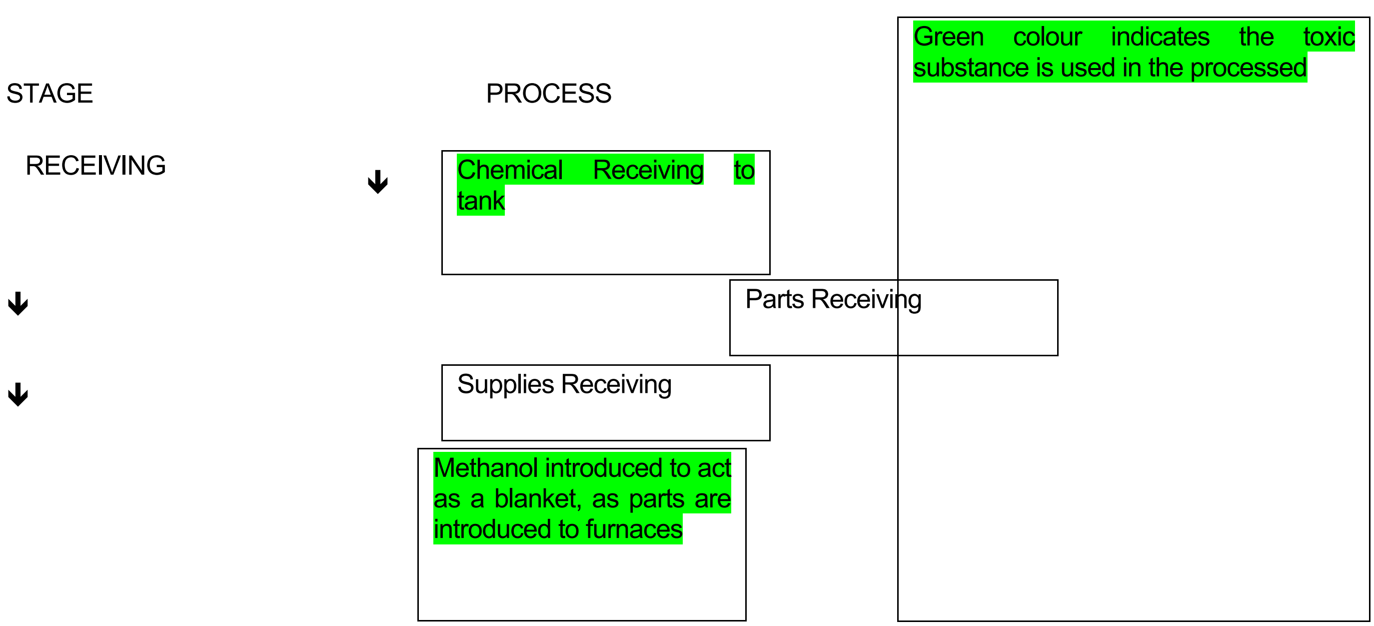
10.1 Appendix 3

The Planner Certification is attached as Appendix 3 to this toxic substance reduction plan.

11.0 References

11.1

No documented references were used in the creation of this plan.



PRODUCTION

↓

↓

Methanol is destroyed

QUALITY CONTROL PROCESS

↓

QC – Testing

↓

SHIPPING PROCESS

Parts shipped

Planner Recommendations and Rationale

Area of Recommendation	Recommendation	Rationale
Expertise relied on in preparing the report	No further recommendations	The Planner making recommendations was also responsible for developing the plan
Identification and	No further recommendations	The Planner making recommendations was

description of stages and processes		also responsible for developing the plan
Description of how, when, where & why the substance is used	No further recommendations	The Planner making recommendations was also responsible for developing the plan
Process flow diagrams	No further recommendations	The Planner making recommendations was also responsible for developing the plan
Data and methods used in toxic substance accounting	See description of how, when, where & why the substance is used above	See description of how, when, where & why the substance is used within the plan
Analysis of input/output balances	B&W Heat treating should measure the amount of material still stored on-site at the end of the calendar year.	This would allow for a more accurate measure of the amount of toxic substance used in the year. This would make the input/output balance more accurate, as well.
Reduction estimates for the identified options	No further recommendations	The company identified reasonable estimates.
Technical and economical feasibility analysis	No further recommendations	The processes used at the facility are based on the use of this toxic substance (Methanol. The company identified technical and/or economical feasible options.
Direct and indirect costs associated with the use, disposal and amount contained in product	No further recommendations	The Planner making recommendations was also responsible for developing the plan
Implementation steps in the plan and the likelihood of success	No further recommendations	The company identified and a=carried out the steps to reduction.
Additional technically and economically feasible options, not considered	The company has mentioned that eliminating the customer base, thus eliminating the need for the process using the toxic substance is an option. However, the deliberate elimination of a customer, depending on the portion of the business, would not be a recommended option.	Potential plant shutdown makes this option unrealistic at this time.

Certification Statement (Licensed Planner)
As of January 11, 2018, I, Lari Dakin certify that I am familiar with the processes at Bluewater Thermal Solutions/B&W Heat Treating that uses the toxic substance referred to

below, that I agree with the estimates referred to in subparagraphs 7 iii, iv and v of subsection 4 (1) of the Toxics Reduction Act, 2009 that are set out in the plan dated [January 2018] and that the plans comply with that act and Ontario Regulation 455/09 (General) made under that act, and the plans meets all other requirements of the act and regulation, with the exception of not being completed in 2017.

Methanol – 67-56-1

Name:	Lari Dakin
Signature:	
License Number:	TSRP0270

Certification Statement (Highest Ranking Employee)

I, Shawn Scott], certify that, during 2017, a review of the toxic substance reduction plan for the toxic substance referred to below was conducted in accordance with the *Toxics Reduction Act, 2009* and Ontario Regulation 455/09 (General) made under that Act. As of January 11, 2018], I also certify that I have read the toxic substance reduction plan dated January, 2018 for that substance and am familiar with its contents and to my knowledge this version of the plan is factually accurate and complies with the *Toxics Reduction Act, 2009* and Ontario Regulation 455/09, with the exception of not being completed in 2017.

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Name:	Shawn Scott
Signature:	
Title:	General Manager