

TOXIC SUBSTANCE REDUCTION PLAN

FOR

**METHYL ISOBUTYL KETONE (MIBK)**

VACUUM METALLIZING LIMITED  
30 DOVEDALE COURT  
TORONTO, ON M1S 5A7

**D. TOXIC SUBSTANCE REDUCTION PLAN FOR METHYL ISOBUTYL KETONE (CAS 108-10-1)**

Methyl ethyl ketone (MIBK) is one of five toxic substances used at the facility for which Toxic Substance Reduction Plans (TSRP's) are required. These solvents are all used in the same processes and in many situations are emitted together. To avoid unnecessary duplication, information common to all of the TSRP's is provided in a single Master Document and this Master Document is referenced by the TSRP for each toxic substance. Accordingly The Master Document and this TSRP for heptane comprise Vacuum Metallizing Limited's complete Toxic Substance reduction Plan for MIBK.

**1. Facility Identification**

See Master Document, Section 1.

**2. Contacts**

See Master Document, Section 2.

**3. Intention to Reduce Use of MIBK and Objective of This TSRP:**

See Master Document, Section 3.

**4. Use of MIBK**

See Master Document, Section 4 for a description of how and where MIBK and other solvents are used at Vacuum Metallizing Limited.

In 2011, all but 2 kg of MIBK used at the facility was purchased from suppliers in drums and used as a thinner paint formulations for spray painting 3141 and 3003 paints, while the remaining MIBK arrived in the remaining paints in the list, below. The following chart illustrates how these paints were used:

	<u>Spray Paint Application</u>		<u>Flowcoat Paint Application</u>	
	<u>Basecoat</u>	<u>Topcoat</u>	<u>Basecoat</u>	<u>Topcoat</u>
3141		X		
3003		X		
3003	X			
US3	X			
SW7000	X			
PSCW-20L	X (machine maintenance only)			

**4.1 Stages and Processes that Use MIBK**

See Master Document, Section 4.1 for a description of the stages and process at vacuum Metallizing Limited.

## 5. *Tracking of MIBK at the Process Level*

See Master Document, Section 5 for a description of each stage and process at Vacuum Metallizing Limited. A process flow diagram is provided for each process to provide a visual illustration of:

- how MIBK enters the process
- whether MIBK is created, destroyed or transformed during the process
- how MIBK leaves the process and what happens to it after it leaves the process

Notational references contained in this TSRP document (e.g. U, Int1, Int2, Dis1, A3) are the same as those used in the Master Document.

The processes in which each of the above-listed paints containing MIBK is used are as follows:

Receiving Stage – Solvent Receiving and Storage Process: All above-listed paints

Basecoat Stage

Spray Painting Preparation, Spray Painting and Spray Paint Curing Processes: 3141, 3003, US3, SW7000

Topcoat Stage

Spray Painting Preparation, Spray Painting and Spray Paint Curing Processes: 3141, 3003

## 6. *Tracking and Quantification of MIBK at the Process Level*

In this section, the following information is identified or presented for each of the processes identified in Section 5 in which MIBK is used:

- the method or combination of methods used to track and quantify MIBK in the process
- why the method or combination of methods was chosen
- the quantification of MIBK in the process
- an explanation of any discrepancy between the input quantity (use of MIBK ) and the output quantity (release and disposal of MIBK)

All MIBK used at Vacuum Metallizing Limited is ultimately released to air or disposed of and none is transformed, destroyed or contained in products (i.e. in cured coatings applied onto customer-supplied components).

In this TSRP, individual releases and disposals of MIBK exiting processes are not quantified and separated from cumulative releases where (a) the amount of an individual release/disposal is not measured, and (b) the quantity of the individual release/disposal is not significant relative to the quantity released/disposed by the primary source of release (e.g. the mass of MIBK releases/disposals from maintenance activities as compared to the amount released/disposed from production activities). Measuring and quantifying these small releases would require source sampling and the associated expense cannot be financially justified considering the small amount of potential savings and the fact that any meaningful toxic substance/cost reduction strategy would not address these small

individual address sources of release but would affect the use of all paints and solvents (and the toxic substances contained within them) in every process.

The information presented herein for each process, refers to the process description and corresponding process flow diagram presented in the Master Document.

## SOLVENT RECEIVING AND STORAGE PROCESS

MIBK is purchased in drums for use as a paint thinner in 3141 and 3003 paint formulations, is received an ingredient in pails of PCSW-20L paint and as an ingredient in quart and gallon containers of US3 and SW7000 paints, all of which are moved to the Paint Storage Room for storage (input U). Drums to be dispensed are moved onto a rack and stored in horizontal position. Paint may be used as a sprayed basecoat (Int2), a sprayed topcoat (Int3), or a flowcoated basecoat (Int4), but MIBK is not used in any flowcoated topcoat (Int5). MIBK may evaporate when blending paints, upon removing the bung in a drum and inserting a dispensing valve, from a dispensing valve that leaks because it does not thread in or close properly, and from a rag used to clean up the spilled solvent (A1). MIBK may remain in the rag when it is thrown in the trash (Dis1).

Process input/output balance calculation:  $U = \text{Int1} + \text{Int2} + \text{Int3} + \text{Int4} + \text{int5} + \text{A1} + \text{Dis1}$

### a) MIBK that enters the process (U)

#### (i) Quantification Method : Mass Balance

Supplier invoices provide the number of containers received and the net weight of each.

#### (ii) Best Available Method Rationale:

This information is accurate and the method is cost effective as it is obtained directly from accounting documents and information supplied from the manufacturers of the paints and no additional measurements are required. Containers are not opened or damaged during this sub- process and they do not leak so 100% of received material is moved to the Paint Storage Room.

#### (iii) Data Quality:

The quality of the data is considered “High” for reasons presented above.

#### (iv) Calculations of total mass of MIBK that enters the process:

MIBK is purchased for use as a paint thinner and is received in purchased paints.

MIBK used in the process as thinner = (# drums of MIBK received) x (kg of MIBK per drum)

= 13 drums x 165 kg/drum = 2,145 kg.

MIBK received in a paint = (# containers of paint received ) x (litres of paint per container) X (litres of MIBK per litre of paint) X (mass of MIBK per litre of MIBK)

The amount of MIBK used in paint is calculated at 2.2 kg in Table E1.

Total MIBK used in the process  $U = 2,145.0 + 2.2 = 2,147$  kg.

**b) MIBK exiting the process (Int1, Int2, Int3, Int4, Int5, D1, A1):**

(i) *Quantification Method : Combination of mass balance and engineering calculations.*

As explained in the Master Document, MIBK released to air (A1) and disposed (D1) are considered to be negligible (i.e.  $A1 = D1 = 0$ ). Accordingly, the total amount of MIBK exiting the process ( $Int1+Int2+Int3+Int4+Int5+A1+D1$ ) should be equal to 2,147 kg., i.e. the amount entering the process (U), less/plus any increase/decrease in the year-end inventory level versus the starting inventory level.

No records are made of the amount of paint and solvent material drawn from inventory for use in the individual processes at the facility.

Engineering calculations are used to determine the amount of MIBK contained in the paint mix used in each of the subsequent processes as follows:

MIBK usage = (number of production loads painted) x (volume of paint mix per load) x (percentage of paint mix that is MIBK) x (density of MIBK).

The total amount of MIBK exiting the process and which enters a subsequent process is the sum of the calculated usages of MIBK for all paints used in that subsequent process.

The number of production loads, paint mix formulas and paint mix consumption per production load are obtained from operating and production records. The density of MIBK is obtained from supplier records.

(ii) *Best Available Method Rationale:*

This information is cost effective as it is obtained directly from accounting documents, company supervisors, NPRI/ECA documentation and information supplied from the MIBK distributor and no additional measurements are required. In any event the method used is the only one available as the amounts of MIBK drawn from inventory for use in each of the subsequent processes are not recorded and physical measurement is not effective because painted items vary considerably in shape, size and quantity requiring constant modification of machine operating settings.

(iii) *Data Quality*

The quality of the data is considered "Average" as quantifications are derived from fundamental scientific principles, relevant empirical data and judgement based on extensive observation. (Although the data quality associated with the distribution of MIBK usage between the subsequent processes may not be as high as one would like, the data quality for the sum of the individual usages is "High". ) See *Data Quality* in Section 6 of the Master Document.

(iv) *Calculations of total mass of MIBK that exits the process:*

Calculations for amounts of MIBK leaving the process are presented in Table D2.

Amount exiting to the pretreatment process:

As MIBK is not used in the Pretreatment Process, Int1 = 0.

Mass of MIBK exiting to the Spray Paint Basecoat Preparation Process (Int2), Spray Paint Topcoat Preparation Process (Int3), Flowcoat Paint Basecoat Preparation Process (Int4) and Flowcoat Paint Topcoat Preparation Process (Int5) are calculated as follows:

$$\text{Int}_n = (\% \text{ MIBK in thinner}) \times (\% \text{ thinner in paint mix}) \times (\text{litres paint mix per production load}) \times (\text{density of MIBK})$$

As noted in table D2, the following amounts of MIBK exited the process:

Int1 = 0.0 kg; Int2 = 99.1 kg; Int3 = 2,049.7 kg; Int4 = 0.0 kg; Int5 = 0.0 kg

## PRETREATMENT PROCESS

MIBK was not used in the Pretreatment Process. Accordingly:

Int1 = 0 (used)

A2 = 0 (released to air)

Dis2 = 0 (disposed of)

Rec1 = 0 (recycled internally for reuse)

## PAINT PREPARATION PROCESSES

Paint mix for use in a spray or flowcoating application is blended in or in front of the Paint Storage Room in an open containers which is transported by hand or using a dolly to the spray booth or flowcoater. MIBK is released to air during the time that ingredients are being dispensed and transported to the work station. If a paint spill occurs during dispensing/transport, MIBK is released to air from the spilled material and from rags used to wipe up the spill. MIBK remaining in the rags is disposed of when the rags are discarded.

Process input/output balance calculations:

Spray Paint Basecoat Preparation Process: Int2 = Int6 + A3 + Dis3

Spray Paint Topcoat Preparation Process: Int3 = Int7 + A4 + Dis4

Flowcoat Paint Basecoat Preparation Process: Int4 = Int8 + A5 + Dis5

Flowcoat Paint Topcoat Preparation Process: Int5 = Int9 + A6 + Dis6

### a) MIBK that enters the process (Int2, Int3, Int4, Int5):

Int1 = 0.0 kg; Int2 = 99.1 kg; Int3 = 2,049.7 kg; Int4 = 0.0 kg; Int5 = 0.0 kg. Refer to Solvent receiving and Storage Process (b)(iv), above.

### b) MIBK exiting the process (Int6+A3+Dis3, Int7+A4+Dis4, Int8+A5+Dis5, Int9+A6+Dis6):

Some small amount of MIBK that enters the process evaporates when paint is dispensed and blended or when paint mix is spilled during dispensing/blending and

transport to the painting machine and from rags used to clean up this spill (collectively  $A_x$ ). Any MIBK remaining in the rags is discarded along with the rags ( $Dis_x$ ). No measurements are taken or records maintained to record spills because a spill occurs infrequently and involves a relatively small and insignificant amount of paint. MIBK has a moderate evaporation rate (1.7 vs nBA), so the amount of a solvent lost through evaporation in this process is not significant and is not measured or recorded because containers are left uncovered for only a few minutes at a time.

*(i) Best Available Method Rationale:*

No data is recorded concerning the frequency and volume of spilled paints so this information is based on the memory and opinions of the painting department supervisors.

*(ii) Data Quality:*

The quality of the data is considered “Uncertain”. Considering the small amount of toxic substances released in the subject processes, the cost of improving the quality of the data cannot be justified.

*(iii) Calculations of total mass of MIBK that exits the process:*

Assumptions:

- No amount of MIBK released to air during dispensing and transport unless a spill occurs
- Spills occur on average once per week during blending or transport
- Each spill involves approximately one litre of paint mix
- Paint spills are distributed among paints/processes in accordance with their relative usages.

The formula for calculating mass of MIBK exiting the process due to spills is as follows:

$\text{kg xy/ene used} = (49 \text{ spills per year}) \times (\text{distribution factor for paint/process combination}) \times (1 \text{ litre of paint mix per spill}) \times (\% \text{ of paint mix that is MIBK}) \times (\text{density of MIBK})$

Calculations for the amounts of MIBK exiting the process on account of spills are shown in Table D3. These amounts (in kg) are as follows:

$$(A3+Dis3) = 0.2, (A4+Dis4) = 0.6, (A35+Dis5) = 0.0, (A6+Dis6) = 0.0$$

Amounts exiting each process which are in turn inputs for subsequent painting processes are as follows:

$$\begin{aligned} \text{Spray Paint Basecoat Preparation} & \quad (\text{Int6} = \text{Int2} - A3 - \text{Dis3}) = 99.1 - 0.2 = 98.9 \text{ kg} \\ \text{Spray Paint Topcoat Preparation} & \quad (\text{Int7} = \text{Int3} - A4 - \text{Dis4}) = 2,049.7 - 0.6 = 2,049.1 \text{ kg} \\ \text{Flowcoat Paint Basecoat Preparation} & \quad (\text{Int8} = \text{Int4} - A5 - \text{Dis5}) = 0.0 - 0.0 = 0.0 \text{ kg} \\ \text{Flowcoat Paint Topcoat Preparation} & \quad (\text{Int9} = \text{Int5} - A6 - \text{Dis6}) = 0.0 - 0.0 = 0.0 \text{ kg} \end{aligned}$$

## SPRAY PAINTING AND FLOWCOATING PROCESSES

In the spraying processes, MIBK is released to air in/from the painting machine while paint mix is being applied onto components and from the uncured coating on components that have been painted and which are being staged for the subsequent convection curing process. Some amounts of MIBK are released to air from daily and periodic machine maintenance operations and from the disposal of associated waste materials. Releases/disposals are quantified as (A7+Dis7) from spray painting basecoats and (A8+Dis8) from spray painting topcoat. (A9 from flowcoating basecoats and A10 from flowcoating topcoats are nil.)

MIBK is not used in rinsing paint lines and spray guns or flowcoater plumbing.

Process input/output balance calculation:

Basecoat Spray Painting Process:	$Int6 = Int10 + A7 + Dis7$
Topcoat Spray Painting Process:	$Int7 = Int11 + A8 + Dis8$
Basecoat Flowcoating Process:	$Int8 = Int12 + A9$
Topcoat Flowcoating Process:	$Int9 = Int13 + A10$

**a) MIBK that enters the process (Int6, Int7, Int8, Int9):**

Int6 = 98.9 kg; Int7 = 2,049.1 kg; Int8 = 0.0 kg; Int9 = 0.0 kg. Refer to Paint Preparation Process (b) (iv), above.

**b) MIBK exiting the process (Int10+A7+Dis7, Int11+A8+Dis8, Int12+A9, Int13+A10):**

The greatest amount of MIBK exiting the process is released to air during paint application. A lesser amount exiting the process is contained in uncured paints on parts that are moved to the Curing Process (int10, Int11). Less significant amounts of MIBK evaporate from the surface of coated parts collecting on carts (until the carts are filled at which time they are moved to the curing oven and are released/disposed of from maintenance activities.

*(i) Best Available Method Rationale:*

A common convention used in the painting industry is that 80% of solvents are released from an applied coating during the coating process with the remaining 20% released during the curing process. This analysis uses this convention to determine the mass of MIBK exiting the process and moving to the Curing Process. As no is available data quantifying MIBK exiting the process from maintenance activities or from uncured coating on standing parts, amounts of releases to air and disposals are calculated in the aggregate.

*(ii) Data Quality:*

The quality of the data is considered "Average" because the analysis uses a common industry convention which does not take into account the specific processes and materials used at VML.

*(iii) Calculations of total mass of MIBK that exits the process:*

Convention: 80% of MIBK in applied paint is released in the process and 20% is released in the subsequent curing process.

Amounts exiting each process are as follows:

Basecoat Spray Painting Process:	$\text{Int}_{10} = 0.2 \times \text{Int}_6 = 0.2 \times 98.9 = 19.8 \text{ kg}$ $(\text{A}_7 + \text{Dis}_7) = .8 \times \text{Int}_6 = 79.1 \text{ kg}$
Topcoat Spray Painting Process:	$\text{Int}_{11} = 0.2 \times \text{Int}_7 = 0.2 \times 2,049.1 = 409.8 \text{ kg}$ $(\text{A}_8 + \text{Dis}_8) = 0.8 \times 0.0 = 1,639.3 \text{ kg}$
Basecoat Flowcoating Process:	$\text{Int}_{12} = 0.20 \times \text{Int}_8 = 0.20 \times 0.0 = 0.0 \text{ kg}$ $\text{A}_9 = 0.8 \times \text{Int}_8 = 0.0 \text{ kg}$
Topcoat Flowcoating Process:	$\text{Int}_{13} = 0.2 \times \text{Int}_9 = 0.2 \times 0.0 = 0.0 \text{ kg}$ $\text{A}_{10} = 0.8 \times \text{Int}_9 = 0.0 \text{ kg}$

**SPRAY AND FLOWCOATING CURING PROCESSES**

All painted coatings are full cured in a convection oven and it is assumed that 100% of MIBK entering this process exits the process to air.

Process input/output balance calculation:

Spray Painting Basecoat Curing Process:	$\text{Int}_{10} = \text{A}_{11}$
Spray Painting Topcoat Curing Process:	$\text{Int}_{11} = \text{A}_{12}$
Flowcoating Basecoat Curing Process:	$\text{Int}_{12} = \text{A}_{13}$
Flowcoating Topcoat Curing Process:	$\text{Int}_{13} = \text{A}_{14}$

**a) MIBK that enters the process (Int6, Int7, Int8, Int9):**

$\text{Int}_{10} = 19.8 \text{ kg}$ ;  $\text{Int}_{11} = 409.8 \text{ kg}$ ;  $\text{Int}_{12} = 0.0 \text{ kg}$ ;  $\text{Int}_{13} = 0.0 \text{ kg}$ . Refer to Paint Preparation Process (b) (iv), above.

**b) MIBK exiting the process (A11, A12, A13, A14):***(i) Best Available Method Rationale:*

Method is based on extensive observation and logic and is the only one that makes sense.

*(ii) Data Quality:*

Because the output mass of MIBK is equal to input mass, the quality of the data for the process output can be no better than that of the input. Accordingly the data is considered "Average".

*(iii) Calculations of total mass of MIBK that exits the process:*

Amounts exiting each process are the same as those entering the process as follows:

Spray Painting Basecoat Curing Process:	$\text{A}_{11} = \text{Int}_{10} = 19.8 \text{ kg}$
Spray Painting Topcoat Curing Process:	$\text{A}_{12} = \text{Int}_{11} = 409.8 \text{ kg}$

Flowcoating Basecoat Curing Process:	A13 = Int12 = 0.0 kg
Flowcoating Topcoat Curing Process:	A14 = Int13 = 0.0 kg

## FACILITY-WIDE ACCOUNTING

All MIBK used has been accounted for. There is a variance of 2 kg between the input usage amount (U) of 2,147 kg (reported to NPRI) and the output amount of 2,149 kg calculated herein, due to the fact that different procedures were used for reporting NPRI emissions and usages in this TSRP.

Facility-level quantification data for MIBK used at Vacuum Metallizing Limited in year 2011 is outlined in Table E4.

### 7. *Opportunities for Reducing the Use of MIBK*

Refer to Master Document, Section 7 for a general discussion about opportunities for reducing solvent use at Vacuum Metallizing Limited, for a list of options that were considered and evaluated.

As noted in the Master Document, Option (i), “Recapture, recycle offsite and re-use solvents used to rinse spray guns and paint lines” is the only option identified as being technically and economically feasible. However, in year 2011 this option did not apply to MIBK as only mineral spirits was used for the subject purpose.

### 8. *Economic Analysis of Opportunities for Reduction in Use of MIBK*

Direct cost: Annual purchases of MIBK: 2,147 kg x \$2.55/kg = \$5,475

Indirect Costs:

- Receiving and storing MIBK
- Dispensing MIBK
- Paying supplier Invoices
- Building overheads associated with plant storage area
- Equipment maintenance costs
- Spill cleanup costs
- Compliance reporting cost
- Employee training cost
- Personal Protective Equipment
- Limitation on production output due to MOE emission limits

The following are economic evaluations for each of the options identified as potentially reducing the use of MIBK. Note that for each option, the possible impact of each of the above indirect costs was considered and that where an indirect cost does not appear in the analysis, it was determined that the indirect cost had a negligible impact, or that the indirect cost was not applicable to the subject option.

i) Option (c): Replace MIBK with non-voc solvent

Assume same volume of MIBK and of replacement solvent would be required.

Cost of MIBK non-voc replacement solvent:

$$= 2,147 \text{ kg} \div 0.802 \text{ kg/l} = 2,677 \text{ litres} \times \$3.74/\text{litre} = \$10,020.$$

The increase in cost associated with Option (c) (before supplier markups) would be  $\$10,020 - \$5,475 = \$4,545$ .

Identified potential indirect cost savings and an evaluation of each are as follows:

Potential Savings: Ability to increase production output without exceeding MOE emission limits

*Evaluation: No impact as company is operating under the limit and is unlikely to exceed it.*

Potential Savings: Reduced compliance reporting costs.

*Evaluation: Cost would not decrease with the implementation of this option because replacements are not available for all toxic substances used at the facility so compliance reporting would still be required. In addition, the cost of compliance reporting is not variable because reporting is performed by the company president who whose pay would remain the same regardless of whether or not he performs this function or how many hours he works.*

*Conclusion: Option is not economically feasible because it would result in significant increase in cost.*

ii) Options (i) and (j): Recapture, recycle on-site/off-site and reuse solvents used to clean spray guns and paint lines

Options do not apply to MIBK.

iii) Option (l): Purchase MIBK in smaller quantities:

Only 2 kg of MIBK were received at the facility in purchased paint, while the balance was purchased in drums for use as paint thinner. Only one or two drums are purchased per order/shipment and this quantity cannot be reduced without impacting production.

*Evaluation: Implementing option would increase cost without reducing usage.*

*Conclusion: Option is not economically feasible.*

## 9. **Implementation of Opportunities for Reducing the Use of MIBK**

Vacuum Metallizing Limited does not plan to implement any of the identified options to reduce the usage of MIBK at the facility because no option was found to be both technically and economically feasible at the present time for reasons presented in the Master Document.

As noted, Option (d) "Replace HVHP spray guns with more efficient LVLP or LVHP spray guns" is to be evaluated and results included in the June 1<sup>st</sup> TSRP update.

The company will continue to monitor the availability and cost of a non-voc replacement for MIBK and include updated evaluation(s) in the TSRP updates.

## 10. Certifications

### Certification by Toxic Reduction Planner:

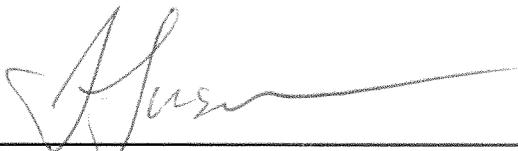
As of Dec-18, 2012, I Kaleem Muhammad certify that I am familiar with the processes at Vacuum Metallizing Limited that uses or creates the toxic substance methyl isobutyl ketone, that I agree with the estimates referred to in subparagraphs 7 iii, iv and v of subsection 4(l) of the *Toxics Reduction Act, 2009* that are set out in the plan for methyl isobutyl ketone dated December 15, 2012 and that the plan complies with the act and Ontario Regulation 455/09 (General) made under that Act.



Kaleem Muhammad License #TSRP0252

### Certification by highest-ranking employee of the facility having management responsibilities relating to the facility:

I, Jeffrey Sugar, certify that during 2012, a review of the toxic substance reduction plan for methyl ethyl ketone was conducted in accordance with the *Toxics Reduction Act, 2009* and Ontario Regulation 455/09 (General) made under that Act. As of December 15, 2012, I also certify that I have read the toxic substance reduction plan dated December 15, 2012 for methyl isobutyl ketone and am familiar with its contents and to my knowledge the version of the plan is factually accurate and complies with the *Toxics Reduction Act, 2009* and Ontario Regulation 455/09.



Jeffrey Sugar, President  
Vacuum Metallizing Limited

**TABLE E1**

**CALCULATION OF THE MASS OF MIBK ENTERING THE PROCESS**

Paint	Volume Per Container (litres)	No. Containers Received	Paint Usage (litres)	MIBK by Volume (%)	MIBK Usage (litres)	Density of MIBK (kg/litre)	MIBK Usage (kg)	Starting Inventory	Ending Inventory	Inventory Incr/(Decr)	
										Units	(kg MIBK)
US3	3.8	2	7.6	1.0%	0.1	0.802	0.1	0.0	0.0	0.0	0
SW7000	0.95	26	24.7	1.0%	0.2	0.802	0.2	0.0	0.0	0	0
PSCW-20L	18.9	13	245.7	1.0%	2.5	0.802	2.0	0.0	0.0	0	0
					2.8		2.2				0

**TABLE E2**

**AMOUNT OF MIBK EXITING THE SOLVENT RECEIVING AND STORAGE PROCESS (AMOUNTS ENTERING SUBSEQUENT PROCESSES)**

PAINT	SUBSEQUENT PROCESS	PROCESS ID	MIBK IN PAINT (%)	PAINT IN MIX (%)	MIBK IN MIX (%)	MIX PER PRODUCTION LOAD (litres)	MIBK PER PRODUCTION LOAD (litres)	DENSITY OF MIBK (kg/litre)	MIBK PER PRODUCTION LOAD (kg)	PRODUCTION LOADS	MIBK USED (kg)
3141	Spray - Topcoat		0.0%	50.0%	50.0%	3.80	1.90	0.802	1.524	891	1,357.7
3003	Spray - Topcoat		50.0%	50.0%	25.0%	3.80	0.95	0.802	1.752	395	692.0
Subtotal	Spray Topcoat	Int3									2,049.7
3003	Spray - Basecoat		50.0%	50.0%	25.0%	3.80	0.95	0.802	1.752	55	96.4
US3	Spray - Basecoat		1.0%	66.7%	0.7%	2.62	0.02	0.802	0.014	7	0.1
PSCW-20L	Spray - Basecoat		4.0%	66.7%	2.7%	0.53	0.01	0.802	0.011	202	2.3
SW7000	Spray - Basecoat		20.0%	16.7%	3.3%	2.62	0.09	0.802	0.070	4	0.3
Subtotal	Spray - Basecoat	Int2									99.1
TOTAL			20.0%	71.4%	45.1%	4.00	1.81	0.802	1.448	58	2,148.8

**TABLE E3**

**ALLOCATION AMONG PROCESSES OF MIBK EXITING PAINT PREPARATION PROCESSES DUE TO SPILLS**

PAINT DISPENSED IN PAILS	SUBSEQUENT PROCESS	PROCESS ID	TOTAL MIX SPILLED (litres)	DIST'N FACTOR (Table A2)	ALLOCATED SPILL VOLUME (litres)	MIBK IN SPILLED MIX (%)	ALLOCATED MIBK IN PAINT (litres)	DENSITY OF MIBK (kg/litre)	MIBK IN SPILLED PAINT (kg)
3141	Spray - Topcoat		49	0.03	1.4	50.0%	0.69	0.802	0.5
3003	Spray - Topcoat		49	0.01	0.5	25.0%	0.12	0.802	0.1
Subtotal	Spray Topcoat	A4+Dis4							0.6
3003	Spray - Basecoat		49	0.01	0.5	25.0%	0.12	0.802	0.1
US3	Spray - Basecoat		49	0.00	0.0	0.7%	0.00	0.802	0.0
PSCW-20L	Spray - Basecoat		49	0.00	0.0	2.7%	0.00	0.802	0.1
SW7000	Spray - Basecoat		49	0.00	0.0	3.3%	0.00	0.802	0.0
Subtotal	Spray - Basecoat	A3+Dis3							0.2
TOTAL									0.8



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*Toxic Reduction Planner's Recommendations:*

