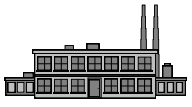
TOXIC SUBSTANCE REDUCTION PLAN
SOFSURFACES INC.

PETROLIA, ONTARIO

NOVEMBER 2014

Diphenlymethane 4,4'-diisocyanate (MDI)
CAS Number: 101-68-8
and
Methylenediphenyl diisocyanate
CAS Number: 26447-40-5



industrial hygiene and environmental advisory services inc.

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PLAN SUMMARY

This Toxic Substance Reduction Plan was developed for SofSurfaces Inc. to comply with the Ontario *Toxic Reduction Act (TRA)* with respect to the reportable substances **diphenylmethane 4,4'-diisocyanate and methylenediphenyl diisocyanate**, both of which are contained in one raw material used to produce landscaping tiles at their facility in Pertrolia, Ontario.

To comply with the TRA requirements, options for reduction; estimated reductions; and projected effectiveness of any reducion options are listed as follows:

- No options for reduction on the use of these substances are anticapated. These substances are integral components in the binder used in the manufacturing of these tiles, and unless an equally effective substitute, with a lesser benign environmental-footprint can be procured at a reasonable price, these substances will be used for the foreseeable future. Consequently emissions to the air, water and land are not expected to be reduced.

- These substances are universally used in similar processes and are highly reactive when mixed with a polyol resulting environmentally in miniscule amounts of airborne emissions and, whatever are contained in any excess tile residue ground for reuse or fine trimming and floor dust sent as solid waste for land fill, have been transformed chemically into an environmentally-inert material. Thus estimating possible reduction of releases of these substances from this facility, given the present and projected use, is not relevant.

- Projection of effectiveness of options for reduction: Limited.

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1. FACILITY INFORMATION

1.1 FACILITY IDENTIFICATION AND SITE ADDRESS

Facility Name: SofSurfaces Inc.

Facility Address: 4393 Discovery Line, Petrolia, Ontario, N0N 1R0

NPRI Identification Number: 0000011442

Ontario MOE Identification Number: ON1073453

UTM Coordinates: Zone 17, Easting 406546, Northing 4749641

NAICS Code: 326150

1.2 PARENT COMPANY:

Name: SofSurfaces Inc.

Address: 4393 Discovery Line, Petrolia, Ontario

Percentage of business owned by company: 100%

Buisness Number: 133865727

1.3 FACILITY PUBLIC CONTACT:

Name: Matt Wemple

Position: Director of Operations

Address: 4393 Discovery Line, Petrolia, Ontario

Phone Number: 519-882-8799 (222)

E-mail: wemplem@sofsurfaces.com

1.4 FACILITY TECHNICAL CONTACT:

Same as above

1.5 HIGHEST RANKING EMPLOYEE:

Name: John Prins
Position: President
Address: 4393 Discovery Line, Petrolia, Ontario
Phone Number: 519-882-8799
E-mail: prinsj@sofsurfaces.com

1.6 PERSON COORDINATING THE PREPARATION OF THE PLAN:

Same as 1.3

1.7 PERSON WHO PREPARED THE PLAN:

Name: Steve Kwok, P.Eng.
Position: Consultant
Address: 1 Valloncliffe Road, Thornhill, Ontario, L3T 2W6
Phone Number: 416-660-0730
E-mail: stephenkwok@rogers.com

1.8 PLANNER RESPONSIBLE FOR MAKING RECOMMENDATIONS:

Same as above

1.9 PLANNER RESPONSIBLE FOR CERTIFICATION:

Same as above

2. STATEMENT OF INTENT

SofSurfaces Inc. is committed to the protection of the environment and will undertake all necessary measures and procedures, whenever feasible, to mitigate the release of these two reportable substances to the environment.

3. OBJECTIVES OF PLAN AND TARGETS

SofSurfaces Inc. will continue efforts to optimize the manner of use of these substances in the production of the polyurethane foam by constant quality control testing in order to maintain the lowest practical application rates, and to ensure that through judious handling procedures, spills are prevented, both of which are the only potential releases of these substances to the environment.

The targets are to maintain the present levels of airborne emissions, which are at present miniscule, and attempt to lessen the amount of waste sent for land disposal.

4. DESCRIPTION OF SUBSTANCES AT FACILITY

The main products at this facility are rubber tiles for playgrounds and home patio usage. The two reportable substances covered in this Plan are diphenylmethane 4,4; diisocyanate (MDI) and methylenediphenyl diisocyanate, which are components in Lupranate® 5230 Isocyanate, a prepolymerized material used for binding recycled rubber tire crumb. This binder material is supplied by BASF Canada Inc. Mississauga, Ontario, and, according to the Material safety Data sheet (MSDS), MDI makes up up to 32.5% and methylenediphenyl diisocyanate less than1% of this material.

5. PROCESS STAGES

A process flow diagram (Figure 1) is attached to show the movement of the reportable substances within the SofSurfaces facility.

Receiving:

The Lupranate® material is delivered in bulk. One 45,000 lb batch is delivered by transport tanker per month and pumped directly into one of the three 5,000 gal holding tanks located over a dyked area. The material is then pumped to the Blending tanks (2).

A Spill ContingencyPlan has been developed and instituted to address the storage and transfer of these materials. The activities and areas associated with tote movement, storage and delivery line transfer have extremely limited access to any drains or storm sewers.

Blending and Dispensing:

Specific amounts of the Lupranate® material are mixed with a set amount of a non-WHMIS controlled polyol, pigment paste, and rubber crumb into a physical closed blending system.

Production:

The blending material is then dispensed to either one of two carousel press or to one of five manual moulding lines, where by heat and pressure, the tiles are formed and cured.

Finishing

The tiles are then trimmed. This residue, along with floor dust, is sent to the local landfill. Any other larger tile residue is ground for recycle to the process through a granulator, while off-spec tiles are stored for retail sale.

Shipping:

The finished tiles are packaged and stored at the western area of the facility and, when required, the finished tiles are transferred by forklift to the Shipping Area for loading onto transport vehicles.

6. TOXIC SUBSTANCE ACCOUNTING

Tracking

Actual Lupranate® use is maximum 2 tonnes per 3-shift day within the Blending system or about 8% of the rubber crumb input. In 2014 the total used is expected to be slightly below 550 tonnes.

The two reportable substances in the Lupranate® are aliphatic-based diisocyanate prepolymers: they have relatively low vapour pressures and are stored in closed containers which are opened only infrequently for short periods during hook-up to the lines leading to the blending containers. Thus there are negligible airborne monomer emissions during blending, dispending and moulding locations.

The only discernible air emissions of monomeric diisocyanates can occur at the blending equipment, but since the reportable substances in the Lupranate® are quite reactive with the polyol, there should be only trace levels of the monomeric released and vented by the local and general ventilation in the area to the outside environment.

After moulding the tiles are surface sanded on a conveyor line and the solid wastes are collected in the dust collector and readied for land disposal. Any excess trimmings or solid tile residue are granulated and recycled to the process. Off-spec tile are stored for retai sale.l

Quantification

The polyurethane reaction occurs almost to completion on the mixing of the two components. In fact industrial hygiene air sampling at various times at the critical areas where the materials are poured has never shown minor to non-detectable MDI monomer emissions.

Tile production is constant during the workweek with both the manual and the two carousel lines operating at maximum throughput 24-hours per day. Thus, emission rates calculated over a one-hour period provide the maximum rates and are consistent maximums whether used over 30-minutes, one hour, or 24-hour periods.

As detailed in the previous IH studies with sampling at the most likely monomer emissions, levels of both the MDI monomer and polymer were below analytical detection or reporting limits; and thus, the emission rates calculated based on this detection limit are conservative maximum emission estimates. These results are backed-up by repeated annual industrial hygiene studies indicating non-detectable MDI levels in the workplace (detection limits of 0.02 to 0.03 μg). The most recent test in early 2014 conducted during production with the two (2) new binders, specifically designed for the process. The area samples were positioned to detect residual isocyanate compounds to be potentially released to the air. This should provide conservative emission rates with average data quality.

The previously calculated emission rates for MDI from the existing carousel line and the manual pressing line are thus still considered valid. The production parameters of exhaust flow 1.699 m^3/s (3,600 cfm), operating temperature (310 ^oF [154.4 ^oC]), maximum production rate, and part type, for the two carousel lines.

Sample Calculations

Carousel Sample Data

Start	Stop	Minutes	Flow Rate (lpm)	Volume (litres)	Analytical (μg)	Concentration [1] (mg/m^3)
10:02	12:07	125	1.0	125	<10	**<0.08**

Carousel Emission Rate (MDI)

$$\text{Emission Rate} = \text{Exhaust Flow}\left(\frac{m^3}{s}\right) \times \text{Emission Concentration}\left(\frac{mg}{m^3}\right)$$

$$= 1.699\left(\frac{m^3}{s}\right) \times <0.08\left(\frac{mg}{m^3}\right)\Big/1000 = <0.000136\left(\frac{g}{s}\right)$$

Emission Factor Determination

$$\text{Emission Factor} = \text{Emission Rate}\left(\frac{g}{s}\right) \times 3600\left(\frac{s}{hr}\right) \Big/ \text{polyurethane throughput}\left(\frac{g}{hr}\right)$$

$$= 0.4893\left(\frac{g}{hr}\right)\Big/42485.23\left(\frac{g}{hr}\right) = <1.152\times10^{-5}\left(\frac{g_{(MDI\text{-}PMDI)}}{g_{(polyurethane)}}\right)$$

Manual Moulding Emission Rate (MDI)

$$\text{Emission Rate} = \text{Emission Factor}\left(\frac{g}{g}\right) \times \text{Polyurethane Throughput}\left(\frac{g}{hour}\right)$$

$$= <1.152\times10^{-5}\left(\frac{g}{g}\right) \times 21242.61506\left(\frac{g}{hour}\right) = <0.000068\left(\frac{g}{s}\right)$$

Based on 4,000 production hours per year, i.e. a schedule of 15 8-hour shifts per week over 50 weeks per year and the exhaust flows at the , the air emissions of MDI (and much lesser methylnediphenyl diisocyanate) are less than 0.01 tonne per year**,** which is an extremely small quantity compared to the overall Lupranate® input.

To quantify land releases, only trimming material and floor dust are land disposal in the Petrolia Landfill site as a non-hazardous waste. Any larger process tile residue is ground and recycled. Quality control estimates from the company indicate less than 10% of the reacted Lupranate® is contained in the material sent to land

disposal. This waste material contains no pure MDI or methylenediphenyl diisocyanate, as these substances are chemiaclly-altered in the moulding process to environmentally-benign polyurethanes of no more than 1.6 tonnes per year**,** based on the 2014 disposal figures.

7. OPTIONS FOR REDUCTION

There are presently no viable substitutes for these two reportable substances used to produce rubber-based tiles economically with the inherent safety factors. Therefore, given the insignificant airborne environmental impact, no realistic options to reduce the use of these substances at this facility are being contemplated or envisaged.

The chopped trimming and floor dust is sent to the local disposal site as non-hazardous waste, which is chemically-inert and do not present any airborne or ground water problems at the disposal site. Recycle of this dust in the process is not an option, nevertheless, reuse as a filler at other industries may be possible.

8. OPTIONS TO BE IMPLEMENTED

Release to Air: None for reduction. Emissions are presently miniscule..

Release to Land: None readily available, but reuse of the trimmings and floor dust should be explored.

9. RECOMMENDATIONS

As determined by the Certified Planner the following recommendations are provided:

- Maintain the Spill Contingency Plan already developed for this facility, included worker training and prepardiness planning, in order to prevent any spills and thereby minimize environmental releases.

- Explore the possibilities of reusing the sanding dust presently sent to landfill at other industries.

10. CERTIFICATION

10.1 CERTIFICATION BY HIGHEST RANKING EMPLOYEE:

As of December 23th, 2014, I, John Prinz, certify that I have read the Toxic Substance Reduction Plan for the substances referred to below and am familiar with its contents, and to my knowledge the Plan is factually accurate and complies with the *Toxic Reduction Act, 2009* and Ontario Regulation 455/09 (General) made under the Act.

Substances: Diphenylmethane 4,4'-diisocyanate and methylenediphenyl diisocyanate

Name: John Prins Date: December 20, 2014
Title: President
Company: SofSurfaces Inc.

10.2 CERTIFICATION BY LICENSED PLANNER:

As of December 23th, 2014, I, Stephen Kwok, certify that I am familiar with the processes at the SofSurfaces Inc. in Petrolia, Ontario that use the toxic substances referred to below, that I agree with the estimates referred to in subparagraphs 7 ii, iv and v of subsection 4 (1) of the *Toxic Reduction Act, 2009* that are set out in the Plan dated December 2nd, 2014 and that the Plan complies with the Act and the Ontario Regulation 455/09 (General) made under the Act.

Substances:Diphenylmethane 4,4'-diisocyanate and methylene diphenyldiisocyanate.

Name: Stephen Kwok (License# TSRP 0200) Date: December 20, 2014
Consultant

Figure 1

Lupranate® Use
Rubber Tile Process Flow Diagram