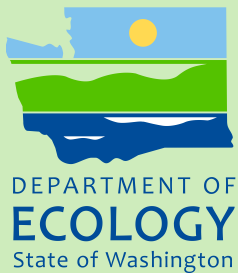


Appendices A, B, G, H, and I

Roofing Materials Assessment: Investigation of Toxic Chemicals in Roof Runoff



February 2014

Supplement to Publication No. 14-03-003

Publication and Contact Information

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Persons with a speech disability can call 877-833-6341.*

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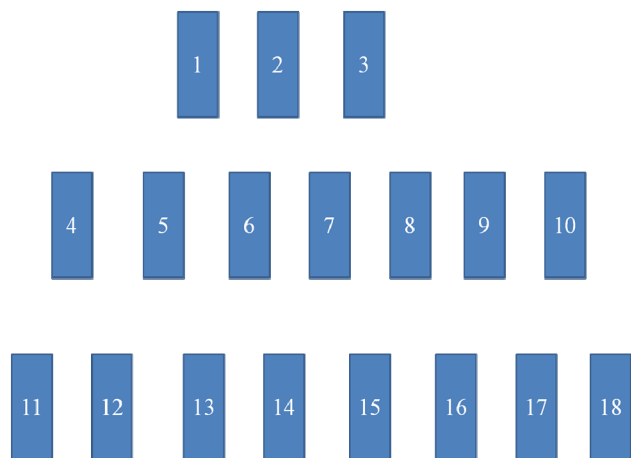
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Appendix A. Panel Construction



Roof Type Location



- 1-3 Asphalt shingle
- 4 Painted galvanized metal
- 5 Treated wood shake
- 6 Asphalt shingle with algae resistant granules
- 7 Copper
- 8 Untreated wood shingle
- 9 Glass (control)
- 10 Concrete tile
- 11 Zincolume ®
- 12 Polyvinyl chloride (PVC)
- 13 Modified built-up roofing with styrene butadiene styrene (SBS) cap sheet
- 14 Ethylene propylene diene monomer (EPDM)
- 15 Built-up roofing with oxidized asphalt cap sheet
- 16 Thermoplastic polyolefin (TPO)
- 17 Modified built-up roofing with atactic polypropylene (APP) cap sheet
- 18 Glass (control)

1-3. Asphalt Shingle (AS^A)



The products used were laminated shingles from the six manufacturers selling shingles in this market area. These are CertainTeed, GAF, IKO, Malarkey, Owens Corning, and PABCO. Each brand was installed horizontally across the deck and in a repeating vertical sequence of the six brands up the deck. The sequence of brands up the deck was different for each of the three decks. Each deck had 17 courses of shingles to cover the 96" dimension up the deck. Thus five of the brands were repeated three times and one brand repeated twice.

The decks were assembled with a single layer of #15 felt over the plywood and shingles nailed per the manufacturer's instructions. The shingles were nailed with industry standard electro-galvanized nails, four nails per shingle. Each course up the deck consisted of a full shingle and a part shingle for a combined length of 48.5". This enabled about 1/4" overhang at each side to avoid runoff from the wood deck into the water collection system. The end-to-end seam for each course was alternated between the left side and the right side so that these joints did not line up on consecutive courses. The top course on the deck was held in place with roof cement as needed so that there were no nails or roof cement on exposed surfaces.

4. Manufacturer-Painted Galvanized Steel (PAZ)



The hot dipped galvanized steel material was produced by SteelScape in their Kalama Washington facility. The metal roof panels and trim were formed and supplied by Champion Metal of Washington as their Snap-Loc standing seam panel. It is produced from a 26 gauge G-90 galvanized steel coil pre-painted with a Silicone-Modified Polyester cool chemistry formulation paint supplied by Akzo Nobel. The five fasteners (exposed to the collected precipitation) were painted hot dip galvanized steel with washers and painted to match the panels.

5. Cedar Shake Treated with Copper Chromated Arsenate (TWO)



The deck is comprised of Certi-Last® preservative treated Certi-Split® 24" x 1/2" Premium Grade Western Red Cedar Handsplit and Resawn Shakes. The shakes were treated with chromated copper arsenate (CCA) to AWPAC U1 standard, and air dried 3 months. However, the shakes did meet the Western Wood Preservers Institute's best management practices (BMPs) to minimize leaching but not the BMP paperwork requirements. The shakes were installed on a 4' by 8', 3/4" thick plywood panel at an exposure of 10". A double course of shakes was installed at the eave.

Overhangs were constructed as per Department of Ecology construction lead on the job site. This consisted of 1 1/2" at the eaves, with approximately 1/2" - 3/4" overhang at the rake edges and approximately 1" at the ridge. A 4" horizontal course of shakes was applied at the ridge. Maze Nails stainless steel 2" nails were used. 36" Type 30 felt was used at the eave, and 18" Type 30 felt interwoven with each course at 20" above the butts, as per the Cedar Shake and Shingle Bureau's New Roof Construction Manual.

6. Algae Resistant Asphalt Shingle (AAR)



The products used were algae resistant laminated shingles containing copper granules from the six manufacturers selling shingles in this market area. These are CertainTeed, GAF, IKO, Malarkey, Owens Corning, and PABCO. Each brand was installed horizontally across the deck, and in a repeating vertical sequence of the six brands up the deck. The deck had 17 courses of shingles to cover the 96" dimension up the deck. Thus five of the brands were repeated three times and one brand repeated twice.

The decks were assembled with a single layer of #15 felt over the plywood and shingles nailed per the manufacturer's instructions. The shingles were nailed with industry standard electro-galvanized nails, four nails per shingle. Each course up the deck consisted of a full shingle and a part shingle for a combined length of 48.5". This enabled about 1/4" overhang at each side to avoid runoff from the wood deck into the water collection system. The end to end seam for each course was alternated between the left side and the right side so that these joints did not line up on consecutive courses. The top course on the deck was held in place with roof cement as needed so that there were no nails or roof cement on exposed surfaces.

7. Copper (CPR)



The test panel consists of three H00, 1/8 Hard, cold rolled, 16 ounce copper panels with double locked standing seams spaced at 16" on center. The system was made up of a layer of 30 pound asphaltic felt paper applied (tacked using monel staples) over the 3/4" plywood substrate. Minimum 4 pounds per 100 square feet, rosin-sized building paper was installed over the felt. Next, the copper panels were installed using hidden cleats (also called clips) folded into the seams at 12" on center. The cleats were attached to the substrate with 2 stainless steel ring shanked (barbed) nails per cleat.

8. Untreated Cedar Shingle (WOS)



The deck is comprised of Certigrade® 18" Number One Grade Western Red Cedar Perfection Shingles. They were installed on a 4' by 8', 3/4" thick plywood panel at an exposure of 5 1/2". A double course of shingles was used at the eave. Overhangs were constructed as per Department of Ecology construction lead on the job site. This consisted of 1 1/2" at the eaves, with approximately 1/2" overhang at the rake edges and approximately 1" at the ridge. A 4" horizontal course of shingles was applied at the ridge. Maze Nails stainless steel 1 1/2" nails were used. 36" Type 30 felt was used at the eave, as per the Cedar Shake and Shingle Bureau's New Roof Construction Manual.

9. Frosted Glass Steep-Slope - Control (GST)



The glass panel is 4' by 8' of 3/8" thick frosted glass. Frosted glass was used to provide additional texture in an attempt to increase contact time. The glass panel was adhered to 2" x 6" HEM/FIR kiln dried lumber using "GE Silicone II", Premium Waterproof Silicone, 100% Silicone. The silicone was allowed to set over a 48-hour period indoors with the panel in a horizontal position before being installed at the study site. The glass panel was installed at a rise of 6" per foot or 26 degrees of pitch to represent residential steep-slope roofing.

10. Concrete Tile (CTI)



The deck for the tiles was 5/8" plywood. The concrete tiles installed on the test deck were the Barcelona 900 tiles supplied by Boral Roofing's Tacoma plant and were manufactured in their Lathrop, California plant. Tiles were installed on the roof deck per the TRI/WSRCA Installation Guide for Moderate Climate Guide (ICC-ESR 2015P). A drip edge metal was installed on the eave edge, and the roofing tiles were installed in a direct deck application.

11. Zincalume® (ZIN)



- ASC Building Products “Delta Rib”.
- 24" coverage through fastened panel.
- 29 gauge with Zincalume finish.
- Screw fasteners #14 x 1" with unpainted finish.
- No mastics, sealants, or non-metal closures were used.
- Flashings installed are Gables for the sides and Peak for the uphill side. No eave trim.
- Panels were turned up at the top and turned down at the bottom.

12. Polyvinyl Chloride (PVC)



The PVC membrane was loose laid and was held in place by induction welding to PVC coated insulation plates that were secured with screws at the bevel siding transition on the three non-draining sides, extended up the bevel siding and turned down the outside face and nailed off. At the gutter collection area, a drip edge was formed by extending the roof deck out past the structural members followed by the PVC membrane forming an edge as it extended over the drip edge and turned down under the drip edge and then secured on the vertical face below the water collection point. A strip of PVC membrane was installed on the underside of the drip edge to prevent any water from bypassing the gutter. The two down slope corners were sealed with hot air welded PVC flashing membrane at corners and splices.

13. Modified Built-up Roof with Styrene Butadiene Styrene Cap Sheet (BUS)



The built-up roofing was applied to a low-slope platform. Felt base sheets were nailed to the 4' by 8' plywood face of the support structure. A layer of hot asphalt was then applied to the top of the base sheet. A series of slightly overlapping interplay Type IV ply sheets were applied onto the hot asphalt layer. Another layer of hot asphalt was then applied to the top of the interplay Type IV ply layer. The styrene butadiene styrene (SBS) impregnated cap sheet was then placed on the top of the hot asphalt with each cap sheet overlapping the first by a few inches. As the cap sheet was being placed, the sheet was pulled back and more hot asphalt was applied liberally as needed. This created a seal between the cap sheets, and excess hot asphalt oozed out between the cap sheets. Finally, loose granules were applied on the excess hot asphalt.

The base, interplay Type IV ply, and cap sheets were applied across the width of the plywood platform perpendicular to the slope. Each overlapped the first by a few inches, creating a stacked shingle-like effect.

14. Ethylene Propylene Diene Monomer (EPDM)



The EPDM membrane was loosely laid on the plywood deck and self-adhered to a membrane securement strip which was fastened into the decking at the bevel siding transition on the three non-draining sides and turned down the outside face and nailed off. At the gutter collection area, a drip edge was formed by extending the roof deck out past the structural members followed by the EPDM membrane forming an edge as it extended over the drip edge and turned down under the drip edge and then secured on the vertical face below the water collection point. A strip of EPDM flashing membrane was installed on the underside the drip edge to prevent any water bypassing the gutter. The corners were sealed with EPDM flashing membrane.

15. Built-up Roof with Oxidized Asphalt Cap Sheet (BUR)



The built-up roofing was applied to a low-slope platform. Felt base sheets were nailed to the 4' by 8' plywood face of the support structure. A layer of hot asphalt was then applied to the top of the base sheet. A series of slightly overlapping interplay Type IV ply sheets were applied onto the hot asphalt layer. Another layer of hot asphalt was then applied to the top of the interplay Type IV ply layer. The cap sheet was then placed on the top of the hot asphalt with each cap sheet overlapping the first by a few inches. As the cap sheet was being placed, the sheet was pulled back and more hot asphalt was applied liberally as needed. This created a seal between the cap sheets and excess hot asphalt oozed out between the cap sheets. Finally, loose granules were applied on the excess hot asphalt.

The base, interplay Type IV ply, and cap sheets were applied across the width of the plywood platform perpendicular to the slope. Each overlapped the first by a few inches, creating a stacked shingle like effect.

16. Thermoplastic Polyolefin (TPO)



The TPO membrane was relaxed, loose laid, and is held in place by induction welding to TPO coated insulation plates that were secured with screws at the bevel siding transition. The membrane was extended up the bevel siding on the three non-draining sides and turned down the outside face and nailed off. At the gutter collection area, a drip edge was formed by extending the roof deck out past the structural members followed by the TPO membrane forming an edge as it extended over the drip edge and turning down the face and secured below the collection point. A strip of TPO flashing membrane was installed on the underside the drip edge to prevent any water bypassing the gutter. The two down slope corners were sealed with hot air welded TPO flashing membrane at corners and splices.

17. Modified Built-up Roof with Atactic Polypropylene Asphalt Cap Sheet (BUA)



The built-up roofing was applied to a low-slope platform. Felt base sheets were nailed to the 4' by 8' plywood face of the support structure. The bottom side of an atactic polypropylene (APP) impregnated cap sheet was heated with a large propane torch. This caused the underside of the cap sheet to slightly liquefy and created a bonded seal as it was placed on the base layer. The cap sheet was continually torched as it is rolled onto the base sheet. Additional heat was applied as needed to seal the seams of the cap sheets. The base and cap sheets were applied across the width of the plywood platform perpendicular to the slope. Each overlapped the first by a few inches, creating a stacked shingle like effect.

18. Frosted Glass Low-Slope - Control (GLO)



The glass panel is 4' by 8' of 3/8" thick frosted glass. Frosted glass was used to provide additional texture in an attempt to increase contact time. The glass panel was adhered to 2 x 6" HEM/FIR kiln dried lumber using "GE Silicone II", Premium Waterproof Silicone, 100% Silicone. The silicone was allowed to set over a 48-hour period indoors with the panel in a horizontal position before being installed at the study site. The glass panel was installed at a rise of 1/4" per foot or 1.2 degrees of pitch to represent commercial low-slope roofing.

Appendix B. Sampling Procedure Details

The sections below describe procedures followed and minor deviations from the Quality Assurance (QA) Project Plan (Ecology, 2013a).

Procedures for Sampling and Analysis of Pilot-Study Roofing Panels

Decontamination Procedures

Panels

The construction of the pilot-scale roofing panels occurred from January 22-28, 2013. Upon completion, the panels were covered with plastic sheeting to keep the exposure time to the environment the same between the panels. After all the roofing panels had been finished, the plastic sheeting was removed. Each panel was decontaminated on January 28, 2013 to remove any contaminants from transportation and the construction processes. Each panel was rinsed for approximately 10 minutes with tap water applied from the upper end of the panel. Each panel was then rinsed with two gallons of distilled deionized water provided by Department of Ecology's Manchester Environmental Laboratory (MEL). The panels were not rinsed between rain events.

After initial panel decontamination, minor differences in the decontamination procedures from those described in the QA Project Plan (Ecology, 2013a) included:

- The panels were exposed to rain events which occurred on January 30 and February 5 and 6, 2013, prior to the first successful sample collection on February 21-22, 2013.
- Between sampling the runoff from each panel, the mixing and measuring devices were decontaminated with a 10% nitric acid rinse, three distilled deionized water rinses, a pesticide-grade acetone rinse, and a final distilled deionized water rinse in the field.

Gutters

The Teflon®-lined HDPE gutters were decontaminated initially prior to deployment. The gutters were scrubbed with Liquinox detergent solution, three times with tap water, 10% nitric acid, three times with laboratory-provided distilled deionized water, and pesticide-grade acetone. The gutters were allowed to air dry before staff obtained an equipment rinse blank by combining a distilled water rinse from three gutters to ensure they were properly cleaned. Gutters were then wrapped with aluminum foil until they were placed on the collecting edge of each roof panel.

Following sampling of a rain event, the gutters were rinsed with distilled deionized water to remove small aerially borne particles, insects, pollen, and pieces of roofing material that had become dislodged (also known as hitchhikers). The hitchhikers remained in the gutters and were not carried by the rain flow into the collection containers. The gutters remained on the apparatus between rain events; however, they were moved into place (so that runoff was collected in the stainless-steel pot) at the beginning of a rain event.

Stainless-Steel Runoff Containers, Mixer, and Pump Tubing

Each roofing panel had a dedicated stainless-steel runoff collection container and sampling tubing system throughout the course of the study. Stainless-steel runoff collection containers were fabricated for the study from 304 grade stainless-steel. The sampling tubing system consisted of two Teflon® tubing sections connected by a short section of Silastic® tubing.

Prior to each sampling event, all sampling equipment was thoroughly decontaminated in accordance with the QA Project Plan (Ecology, 2013a). All stainless-steel sampling gear (56-liter stainless-steel runoff collection containers, mixing device, and measuring device) and tubing (Teflon® and Silastic®) was washed with Liquinox detergent, followed by three sequential rinses with tap water, a 10% nitric acid rinse, three deionized water rinses, and a pesticide-grade acetone rinse. The equipment was then air-dried and wrapped in aluminum foil (dull side in).

Between sampling the runoff from each panel, the mixing device and measuring device were decontaminated with a 10% nitric acid rinse, three distilled deionized water rinses, a pesticide-grade acetone rinse, and a final distilled deionized water rinse in the field.

This decontamination procedure differs from the QA Project Plan (Ecology, 2013a) as follows:

- The tap water and Liquinox rinses described in the QA Project Plan were eliminated because of the volume of water that would be required and the volume of waste that would have required disposal. The final distilled deionized water rinse was added to remove any excess acetone, as there was not sufficient time to completely air dry the equipment between the sampling of the panels.
- Dilute nitric acid/ water rinsate was neutralized with baking soda and disposed to the ground. Acetone rinsate was managed as a dangerous waste.

All sampling and handling activities were conducted by staff wearing non-talc nitrile disposable gloves. Staff followed “clean hands dirty hands” procedures, ensuring that only clean hands touched the decontaminated equipment. Gloves were changed often, as appropriate, to prevent contamination and at a minimum between sampling runoff from each type of panel.

Sample Labeling

In addition to the unique, 11-digit, alpha-numeric identification number assigned to each sample (described below), each sample was also assigned a seven-digit work order number and a sequential, two-digit sample number required by MEL.

The unique, 11-digit, alpha-numeric identification number consisted of three alphabetical numeric characters that represent the roofing type, 6 numeric digits representing the date, and two digits that represent sample number. For example, a sample collected from the Zincolume® roof on November 24, 2012 would be labeled as follows:

ZIN-11-24-12-01

For a replicate sample, the numbers would be recorded as follows:

ZIN-11-24-12-01(field notebook would record sample taken at 9:15)
ZIN-11-24-12-02 (field notebook would record field split taken at 9:25)
ZIN -11-24-12-03 (field notebook would record MS taken at 9:35)
ZIN -11-24-12-04 (field notebook would record MSD taken at 9:45)

Each sample couriered to the laboratory had both a sample tag supplied by the lab and a bottle label applied prior to sampling. Each label contained the following information clearly printed in indelible ink:

- Unique sample number as described above
- Laboratory assigned sample number
- Date of sample collection
- Time of sample collection (using a 24-hour clock)
- Analyses required
- Sample preservation (if any)

Event Deployment

Rain events were targeted for sampling when the weather forecast predicted at least 0.1 inch of precipitation in a 24-hour period. Weather reports were reviewed daily to determine whether 6 hours had elapsed since the preceding event with less than 0.1 inch of precipitation and if the rain event was of sufficient size. Based on best professional judgment of the staff and these criteria, the stainless-steel containers were deployed.

For each deployment, staff prepared using the following procedures:

1. Contacted laboratory to inform of a possible sampling event.
2. Printed out new field forms for the field notebook.
3. Transported the foil covered stainless-steel runoff collection containers from the storage area in the Department of Ecology's basement to the study location via push carts.
4. Placed each dedicated collection container with its roof panel. Each collection container was placed in a large plastic tubs.
5. Filled the large plastic tubs with ice.
6. Moved the gutters into place centered over the collection containers.
7. Removed the foil cover from each collection container.
8. Replaced the protective housing around the collection container and plastic tub to keep out rain water.
9. Rechecked all gutter placements.
10. Locked the perimeter fence of the study site.
11. Hoped for rain.

Sample Collection

Rain events were sampled when precipitation generated adequate sample volume (not less than 0.1 inch or 7.5 liters). If sample volume approached the maximum collection container volume (56.8 liters), staff recorded the time and quickly removed the gutters from the apparatus ceasing runoff collection. Sample collection containers were not allowed to overflow. In addition, some rain events were stopped by removing the gutters to maintain the defined 24-hour limit of a rain event or to achieve a specific amount of precipitation (rain event size).

For each rain event, field staff prepared for sampling using the following procedures:

1. Set stainless-steel sampling containers and gutters in place when an event was predicted.
2. Placed ice in the plastic containers that surrounded the stainless-steel containers to maintain near ambient conditions.
3. Awaited and monitored the rain event.
4. Labeled the sample bottles as described above.
5. Downloaded precipitation data from the rain gage and confirmed the requirements for a rain event were met.
6. Removed the gutters to cease collection of rain in the stainless-steel containers.
7. Calibrated the pH meter and specific conductance meter per standard operating procedures (SOPs) EAP031 and EAP032, respectively (Ward, 2006 and 2011).

For each rain event, staff collected samples using the following procedures conducted at each panel. Staff:

1. Set out the appropriate pre-labeled sample bottles, sample tubing, field filter system (if using), and the peristaltic pump.
2. Donned a new set of nitrile gloves.
3. Removed the measuring device from the aluminum foil (first panel) or retrieved it following field decontamination, touching it only with clean gloves. Measured the depth of the sample in the collection pot using 1-cm hatch marks on the decontaminated stainless-steel measuring rod. The volume of water collected from each roof panel was then obtained from a premade worksheet correlating the depth reading to volume collected. Recorded the depth, volume, and any addition notes, such as visual appearance of the sample, in the field notebook.
4. Opened the head of the peristaltic pump and placed midsection of the panel specific Silastic® tubing in the pump head.
5. Removed the rain cover box and exposed the stainless-steel sample collection pot.
6. Donned a new set of nitrile gloves.
7. Removed the mixing device from the foil (first panel) or retrieved it following field decontamination, using clean gloves. Removed the foil covering from the ends of the Teflon® tubing and attached one end of the tubing to the mixing device.
8. Mixed the contents of the stainless-steel container by raising and lowering the mixing device without breaking the surface at a rate of approximately 9 inches per second for at least 30 seconds prior to turning on the pump.

9. Continued mixing, while a second staff person removed the sample bottle caps, with clean hands. The second staff person turned on the peristaltic pump. Approximately 25 mL of the initial sample was discarded to eliminate potential tubing contamination. The second staff person then collected the sample from the effluent end of the Teflon® tubing into the laboratory pre-cleaned sample bottles. The sample bottles were filled and then capped. The time at the end of the sampling process was recorded.
10. If dissolved metals were being sampled, the SOP EAP029 (Ward, 2010) method was followed. The staff person continued to mix the sample while the second staff person filled the upper portion of the filtration apparatus provided by MEL with the sample. An attached hand vacuum pump was then used to help pass the water through the filter. The filtrate was poured from the collection bottle into the pre-preserved sample bottle from the lab. The sample bottles were filled and then capped. The time at the end of the sampling process was recorded in the field notebook.
11. Recorded the sample numbers and other data in the field notebook.
12. Placed the sample bottles in a cooler.
13. Took additional samples for duplicate samples, or matrix spikes and matrix spike duplicates samples, as required following the same methods mentioned above.
14. Rinsed and filled a beaker with the sample water after the sample bottles had been filled. Measured pH and specific conductance were measured according to SOPs EAP031 (Ward, 2006) and EAP032 (Ward, 2011), respectively. The temperature from the specific conductance meter was also measured and all values were recorded in the field notebook.
15. Washed out the gutter with at least 100 mL of laboratory-provided distilled water.
16. Decontaminated the measuring stick and mixing device in the field, as described in the decontamination procedures, before sampling the next panel.
17. Collected distilled water blank samples by pouring laboratory-provided distilled deionized water directly into the sample bottles (one for each total metals, PAHs and phthalates, and PBDEs).

After all the panels had been sampled, staff

1. Checked all bottle labels, attached bottle tags, completed the chain-of-custody forms, packed up the coolers, added ice, and moved the coolers to the refrigeration unit to await pickup by the MEL courier.
2. Moved all sampling equipment into the cleaning room and decontaminated sampling equipment as described above.
3. Covered all decontaminated equipment in aluminum foil and stored for next rain event.

QA Samples and Blanks

Initial Blank Samples

The following blank samples were obtained after initial gutter and roof panel decontamination:

- Two initial distilled water blanks. One prepared with MEL-provided distilled deionized water. The second prepared with distilled deionized water from the cleaning room at

Ecology's Headquarters facility. Staff prepared blanks for total metals, PAH and phthalates, and PBDEs analyses for each of the two types of blank water.

- One initial equipment rinse blank. This blank was a composite of a rinse from at least four gutters with MEL-provided distilled deionized water. This initial gutter equipment rinse was analyzed for total metals, PAHs, phthalates, and PBDEs.

Rain Event Blank Samples

For each rain event sampled, the following blanks were collected:

- One distilled water blank for total metals, PAHs, phthalates, PBDEs, and dissolved metals (if dissolved metals were sampled from the panels) analyses. The blank was prepared by pouring laboratory-provided distilled deionized water directly into the sample bottles.
- For dissolved metals, a filter blank as described in the QA Project Plan (Ecology 2013a) was not prepared. This omission is not thought to affect the quality of the data, as all filters were pre-washed by the laboratory.
- One equipment rinse blank was a composite of a rinse from two decontaminated stainless-steel containers, two tubing systems, the measuring device, and the mixing device. These were obtained just prior to placement of the collection pots for each sampling event. Equipment rinse blanks were prepared for each of the parameters being sampled.

Rain Event Replicates and Splits

For each rain event sampled, the following replicates and splits were collected:

- Samples were obtained from each of the three asphalt shingle panels without algae-resistant (AR) copper granules. These samples were obtained for all parameters in accordance with Tables 9 and 10 of the QA Project Plan, as appropriate. These were replicate samples.
- Three panels were selected for split sampling from the remaining panels (i.e., not including the asphalt shingle without AR granules) where sufficient sample volume was available. Staff rotated the split sample locations to ensure that, over the course of the study, splits were obtained from all of the panels. Split samples for all parameters were not always collected from a single panel. Split samples were collected for all parameters sampled during a rain event.

Rain Event MS/MSD Samples

For each rain event sampled, the matrix spike and matrix spike duplicate (MS/MSD) samples were collected. Three panels were selected for MS/MSD sampling for each rain event. Panels were selected where sufficient sample volume was available. Staff rotated the MS/MSD sample locations to ensure that over the course of the study MS/MSDs were obtained from all of the panels. MS/MSDs for all parameters were not always collected from a single panel. MS/MSD samples were collected for all parameters sampled during a rain event.

The procedure described in the preceding paragraph was followed with the following exception:

- An error occurred in reading the labels for the first rain event, and no MS/MSD was conducted on one of the three sets of samples taken for MS/MSD analysis. Because three sets of MS/MSDs were run for each sampling event, this omission had little impact on the data quality.

Sample Packing and Shipping

Samples collected for laboratory analysis were labeled, packed, and shipped as follows. Staff:

1. Ensured the sample bottle was tagged, logged in the field notebook, and recorded on the chain-of-custody (CoC) form.
2. Placed samples from each panel in a zip-lock bag.
3. Packed insulated ice chests with bubble wrap to secure and protect sample bottles during transport. Packed the coolers with crushed ice in zip-locked plastic bags.
4. Maintained the temperature in the ice chest as listed in Table 12 of the QA Project Plan (Ecology, 2013a) ($\pm 2^{\circ}\text{C}$).
5. Completed a CoC form for each ice chest. Placed the CoC in a plastic zip-locked bag and placed it inside of the ice chest. Field staff controlled all samples until they were delivered to the secure storage cooler in the basement of Ecology Headquarters, which is under the control of Ecology.
6. Called the courier from MEL to let him know to transport the sample to the laboratory on the following weekday. Samples were taken to:
Department of Ecology
Manchester Environmental Laboratory
7411 Beach Drive East
Port Orchard, WA 98366-8204
360-871-8800
7. After storing the samples in the cooler, field staff informed the laboratory project manager of how many samples to expect and when to expect them to arrive.

Chain-of-Custody Forms

Chain-of-custody (CoC) forms developed for this project were used for samples submitted to the laboratory for analysis. The CoC form contained the following information for each sample:

- Unique sample number
- Matrix code (i.e., 10 for water)
- Source code (i.e., 17 for surface runoff)
- Date and time of sample collection (using a 24-hour clock)
- Analyses required
- Number of sample containers for each location

- Printed name and signature of field crew member with responsibility for ensuring custody of samples
- Signature of person who received the samples at the laboratory
- Contact information for person receiving data
- Name or reference number of the QA Project Plan for the project
- SIC (charge code)
- Date results are needed (not more than 11 days after shipping)

Once the laboratory had received the samples and signed the CoC form, the completed form was scanned and emailed to Nancy Winters (nwin461@ecy.wa.gov).

Field Notebook Records

All records for the project were maintained in a waterproof, field notebook for each event. The following information was recorded for each field rain event:

- Calibration records of pH meter and specific conductance meter each day of use
- Date and time rain was initiated
- Date and time rain stopped
- Calculated rain duration
- Rain intensity (mm/hr) downloaded from the rain gage data logger
- Calculated rain depth (mm) downloaded from the rain gage data logger
- Depth and calculated volume of runoff collected from each roof type
- Measured pH and specific conductance of runoff collected from each roof type
- Name of samplers
- Any unusual observations about the event
- Any unusual observations or procedures at each sample station (panel)
- Sample identification number for each sample (field replicate, MS, MSD, equipment rinse sample, and laboratory water blank) taken, with description and time each sample bottle was filled
- Time the samples were moved to the courier pick up cooler

If a correction was required, a single line was drawn through the incorrect datum, and the correct datum was written above. The corrections were initialed.

At the end of each rain event, the field notebook was reviewed by the second field crew person (i.e., the person not doing the recording). Corrections were made or omissions added during the review as described above.

Each day that recordings in the field notebook were made, the pages completed that day were scanned and downloaded to Ecology's server.

Re-Deployment

At the end of each rain event, the stainless-steel containers, mixing device, and tubing were decontaminated as described above. The equipment was covered with aluminum foil and stored inside Ecology Headquarters.

Maintenance of Pilot-Scale Roofing Area

No gasoline-powered equipment was permitted to be used to maintain any of the landscaping around the fenced study location at Ecology Headquarters or used to maintain the area surrounding the roofing panels. Normally this area at Ecology Headquarters is not mowed until September of each year. Staff monitored vegetation growth in the area surrounding the roofing panels monthly until mid-March and weekly thereafter. Staff maintained the vegetation using hand-held electronic equipment (such as an electronic weed-whacker), as necessary to keep vegetation from growing on or over the panels or the equipment. Staff ensured that no residual vegetation landed on the panels.

Modified Synthetic Precipitation Leaching Procedure (SPLP)

To determine the effectiveness of the post-manufacture applied coatings at reducing metals leaching, Ecology assessed coupons (samples) with and without coatings using a modified SPLP method. The method prescribes leaching in a simulated rain medium for an 18- to 20-hour period in which the samples are tumbled. Ecology modified the method as described in Appendix E of the QA Project Plan (Ecology, 2013a). To assess the concentration in the leachate per surface area, rather than by weight, staff developed the modifications to simulate the volume of precipitation received per square inch of surface area during one year in Lacey, Washington. Thus, each coupon replicate was exposed to a volume of 1.7 liters of leachate. Manufacturers of metal roofing materials provided 1-inch by 1-inch coupons of galvanized steel, Zinalume®, and copper for exposure to assess the relative leaching with and without the post-manufactured coatings. Specific coatings were selected in collaboration with the coating specialist on the Roofing Task Force.

Three replicates of each coupon were used for this analysis. Ecology staff measured the surface areas (including edges) and weighed each coupon prior to and following the application of a coating to obtain a weight of the dried coating. Staff applied two layers of a coating to both sides and all edges of each coupon, as instructed by the coating specialist. Coupons required several days to dry, and they continued to cure in laboratory bottles for approximately one month after application. For the copper coupons, the coatings were already applied, so no coating weight was obtained.

Samples were labeled and shipped to MEL for analysis. Three replicates of each material and coating type were exposed to 1.7 liters of synthetic precipitation and were tumbled for 18 to 20 hours in a pH 5.0 solution. The resulting leachate was then analyzed for five total metals (arsenic, cadmium, copper, lead, and zinc), PAHs, and phthalates. For the galvanized steel

coated with Elastuff™, three additional coupons (samples EPB-04 through EPB-06) were exposed to the modified SPLP procedure and analyzed for PBDEs.

The protocols differed from the QA Project Plan (Ecology, 2013a) as follows:

- The first SPLP metals analyses for replicates -01 and -02 for all coupons were contaminated with zinc from the filters. The lab repeated the SPLP leaching and extracted the leachate from the second round for analyses of metals without filtering. (Filtering was described in the method, however was not necessary as the liquid could easily be decanted.) For equivalency, the -03 replicates were subjected to a second leaching to assess the concentrations of metals in the leachate. Only those metals results from the second leaching were used for analysis in the report. The second round of leaching may have had an impact on the metals data, but this was not able to be determined.

Laboratory Quality Control (QC)

Generally, MEL met the data quality objectives (DQOs) and measurement quality objectives (MQOs) described in the QA Project Plan (Ecology, 2013a), with the following exceptions:

- Two of the Rain Event 5 samples could not be analyzed for PAHs and phthalates, due to over evaporation of the extracts.
- The matrix spike/matrix spike duplicate percent recovery for anthracene in the QA Project Plan was determined to be a typographical error and was replaced by the laboratory percent recovery of 51 to 113%.
- Results for several compounds were rejected by the laboratory due to failure to meet the surrogate percent recoveries.

These exceptions did not result in a completeness of less than the 90% as prescribed in the QA Project Plan. While the laboratory data were qualified, they were deemed useable to meet the objectives of this study.

Appendix C. Rain Gage Data and Field Notes (separate file on web)

Appendix C (327 pages) is linked to the report as a separate file on the web.

Appendix D. Data Tables (separate file on web)

Appendix D (37 pages) is linked to the report as a separate document on the web.

Appendix E. Laboratory Data and Narratives (not available on web)

Appendix E (742 scanned pages) is too large to post to the web.

These pages are available from Ecology's Environmental Assessment Program upon request. Email jlet461@ecy.wa.gov or phone 360-407-6764.

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Appendix F. Data Qualifier Descriptions and Electronic Data (zip files on web)

The following page provides the data qualifiers used as qualifiers in the electronic data, Excel spreadsheets.

The 11 Excel files are linked to the report on the web as zip files.

Detailed Qualifiers used in the Electronic Data Deliverable

The following qualifiers were used to provide greater detail and are listed in the final two columns of the electronic data deliverables:

- If a method blank had detectable levels of an analyte, roofing results within five times the method blank concentration were qualified as an estimate and flagged with a Bm.
- If an equipment rinse blank had detectable levels of an analyte, roofing results within five times the equipment rinse blank concentration were qualified as an estimate and flagged with a Be.
- If the analyte was detected between the reporting limit (RL) and method detection limit (MDL), the result was qualified as an estimate and flagged with a J for both metals and organics.
- If the analyte was not detected at the MDL, the result was qualified and flagged with a U.
- All dissolved metal results were qualified as estimates and flagged with an H, as none of them met the 15-minute holding time specified by EPA.
- If both the laboratory control spike (LCS) and the laboratory control spike duplicate (LCSD) percent recoveries were not within the quality control (QC) limits specified in the Quality Assurance (QA) Project Plan, the result was qualified as an estimate and flagged with an L.
- If both the matrix spike (MS) and the matrix spike duplicate (MSD) percent recoveries were not within the QC limits specified in the QA Project Plan, the result was qualified as an estimate and flagged with a M. For arsenic and copper, however, flags were applied only to those results for high concentrations, when the high concentration MS/MSDs were not within the percent recoveries specified in the QA Project Plan.
- If the relative percent difference between the MS and the MSD was not within the QC limits specified in the QA Project Plan, the result was qualified as an estimate and flagged with a G.
- If the spectral analysis for an analyte did not meet the laboratory QC limits, it was qualified as an estimated value and flagged with a P.
- If the surrogate recovery was lower than the laboratory QC limits, but greater than 10%, the data were qualified and flagged with an S. If the surrogate recovery was less than 10%, the data were rejected and flagged with an REJ-S.
- If the internal standard for an analyte did not meet the laboratory QC limits, the data were rejected and flagged with an REJ-is.
- If the initial calibration or the continuing calibration for an analyte did not meet the laboratory QC limits, the data were flagged with a cc.

Appendix G. Relative Standard Deviation of Splits and Replicates

Table G-1. Medians and ranges of the relative standard deviation (percent) of split samples.

Parameter	n*	Min	Max	Median	Average
Total Metals					
Arsenic	30	0.0	110	30	43
Cadmium	30	0.0	123	0	32
Copper	30	0.0	100	4	20
Lead	30	0.0	137	13	28
Zinc	30	0.7	103	11	23
Dissolved Metals					
Arsenic	9	0	47	7	13
Cadmium	9	0	71	11	18
Copper	9	0	9	1	3
Lead	9	3	86	32	32
Zinc	9	0	89	11	23
PAHs					
1-Methylnaphthalene	29	0.0	210	0	24
2-Methylnaphthalene	29	0.0	192	2.8	20
Acenaphthene	29	0.0	200	0.0	13
Acenaphthylene	29	0.0	206	0.0	14
Anthracene	29	0.0	843	1.3	46
Benz[a]anthracene	29	0.0	191	0.4	12
Benzo(a)pyrene	29	0.0	206	0.0	19
Benzo(b)fluoranthene	29	0.0	200	0.0	36
Benzo(ghi)perylene	29	0.0	1,059	0.0	51
Benzo(k)fluoranthene	29	0.0	208	0.0	24
Chrysene	29	0.0	1,185	3.9	66
Dibenzo(a,h)anthracene	29	0.0	200	0.0	11
Fluoranthene	29	0.0	192	0.0	25
Fluorene	29	0.0	200	0.7	17
Indeno(1,2,3-cd)pyrene	29	0.0	850	0.0	39
Naphthalene	29	0.0	200	0.0	27
Phenanthrene	29	0.0	200	5.7	39
Pyrene	29	0.0	200	2.4	22
Phthalates					
Bis(2-ethylhexyl) phthalate	29	0.0	204	0.8	16.4

Parameter	n*	Min	Max	Median	Average
Butyl benzyl phthalate	29	0.0	200	0.0	12.2
Diethyl phthalate	29	0.0	194	0.8	23.8
Dimethyl phthalate	29	0.0	208	0.0	28.2
Di-N-butylphthalate	29	0.0	0.0	0.0	0.0
Di-N-octyl Phthalate	29	0.0	200	0.0	25.3
PBDE Congeners					
PBDE-047	24	0.0	114	0.0	14.9
PBDE-049	24	0.0	111	0.0	16.2
PBDE-066	24	0.0	133	0.0	16.2
PBDE-071	24	0.0	113	0.0	15.8
PBDE-099	24	0.0	101	0.0	21.9
PBDE-100	24	0.0	111	0.0	22.9
PBDE-138	24	0.0	100	0.0	15.8
PBDE-153	24	0.0	100	0.0	16.5
PBDE-154	24	0.0	100	0.0	22.4
PBDE-183	24	0.0	200	0.0	18.1
PBDE-184	24	0.0	800	0.0	47.6
PBDE-191	24	0.0	200	0.0	29.5
PBDE-209	24	0.0	100	0.0	14.9

* Number of samples included in statistics.

Table G-2. Medians and ranges of the relative standard deviation (percent) of replicate samples.

Parameter	n*	Min	Max	Median	Average
Total Metals					
Arsenic	10	5.6	42	20	21
Cadmium	10	0.0	87	0	27
Copper	10	4.3	34	16	17
Lead	10	0.0	53	19	24
Zinc	10	8.7	65	27	32
Dissolved Metals					
Arsenic	3	10	36	22	23
Cadmium	3	33	133	49	72
Copper	3	14	33	22	23
Lead	3	24	101	33	53
Zinc	3	57	70	57	61
PAHs					
1-Methylnaphthalene	10	0.0	75	0	14
2-Methylnaphthalene	10	0.0	135	0.0	22
Acenaphthene	10	0.0	5	0.0	0
Acenaphthylene	10	0.0	2	0.0	0

Parameter	n*	Min	Max	Median	Average
Anthracene	10	0.0	76	0.6	8
Benz[a]anthracene	10	0.0	6	0.1	2
Benzo(a)pyrene	10	0.0	125	0.1	13
Benzo(b)fluoranthene	10	0.0	143	0.0	22
Benzo(ghi)perylene	10	0.0	90	0.0	13
Benzo(k)fluoranthene	10	0.0	140	0.0	21
Chrysene	10	0.0	109	2.6	20
Dibenzo(a,h)anthracene	10	0.0	2	0.0	0
Fluoranthene	10	0.0	5	0.0	2
Fluorene	10	0.0	82	0.1	19
Indeno(1,2,3-cd)pyrene	10	0.0	43	0.0	5
Naphthalene	10	0.0	156	0.0	31
Phenanthrene	10	0.3	74	7.5	15
Pyrene	10	0.0	50	0.0	5
Phthalates					
Bis(2-ethylhexyl) phthalate	10	0.0	87	1.1	11.8
Butyl benzyl phthalate	10	0.0	53	0.0	6.4
Diethyl phthalate	10	0.0	3	0.8	1.4
Dimethyl phthalate	10	0.0	3	0.0	0.5
Di-N-butylphthalate	10	0.0	0.0	0.0	0.0
Di-N-octyl Phthalate	10	0.0	82	0.0	11.9
PBDE Congeners					
PBDE-047	3	0.0	8	7.5	5.0
PBDE-049	3	0.0	6	6.0	4.0
PBDE-066	3	0.0	0	0.0	0.0
PBDE-071	3	0.0	0	0.0	0.0
PBDE-099	3	0.0	0	0.0	0.0
PBDE-100	3	0.0	0	0.0	0.0
PBDE-138	3	0.0	0	0.0	0.0
PBDE-153	3	0.0	0	0.0	0.0
PBDE-154	3	0.0	0	0.0	0.0
PBDE-183	3	0.0	0	0.0	0.0
PBDE-184	3	0.0	0	0.0	0.0
PBDE-191	3	0.0	22	0.0	7.4
PBDE-209	3	0.0	0	0.0	0.0

* Number of samples included in statistics.

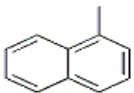
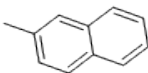
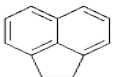

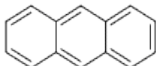
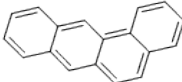
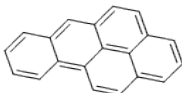
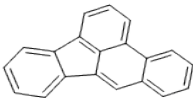
Appendix H. Background Information for Organic Compounds

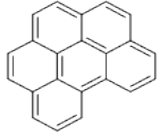
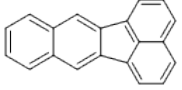
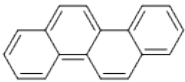
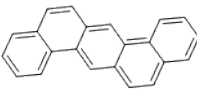
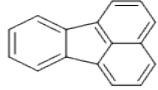
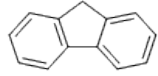
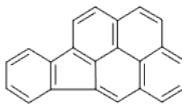
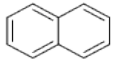
PAHs

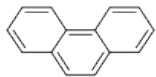
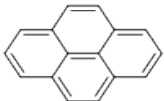
PAHs are stable multi-ring compounds that tend to degrade slowly and many of them are considered persistent, bioaccumulative, or toxic compounds (PBTs) in Washington State. PAH compounds may be directly toxic or carcinogenic to humans or aquatic life and are regulated under the Clean Water Act. Table H-1 illustrates the chemical structure of each of the PAHs assessed in this study and shows their status as carcinogens, toxics, or compounds regulated under the Clean Water Act or as PBTs.

The predominant source of PAHs is combustion products such as emissions from gasoline and motor vehicles, coal fired power plants, wood burning for home heating, burning of organic materials, residential cooking, and tobacco smoke (Ecology, 2012). Industrial sources can include bitumen and asphalt production plants and coal tar production. Asphalt-based roofing materials, such as asphalt shingle and built-up roofing materials, were evaluated in this study to determine whether they leach PAHs to the stormwater. Ultimately in future studies, Ecology will want to assess whether PAHs leach as these roofing materials age.

Table H-1. List of 18 PAHs assessed in this study, chemical structure, and status as a carcinogen and/or toxic compound.

Parameter	CAS No.	Chemical Structure	Number of Benzene Rings	PBT List	Priority Pollutant	IARC Carcinogen	EPA IRIS Carcinogen	Toxic per MTCA
1-Methylnaphthalene	90-12-0		2			X	X	
2-Methylnaphthalene	91-57-6		2					X
Acenaphthene	83-32-9		2		X			X
Acenaphthylene	208-96-8		2		X			
Anthracene	120-12-7		3		X			X
Benz[a]anthracene	56-55-3		4		X	X	X	
Benzo(a)pyrene	50-32-8		5		X	X	X	
Benzo(b)fluoranthene	205-99-2		4	X	X	X	X	

Parameter	CAS No.	Chemical Structure	Number of Benzene Rings	PBT List	Priority Pollutant	IARC Carcinogen	EPA IRIS Carcinogen	Toxic per MTCA
Benzo(ghi)perylene	191-24-2		6	X	X			
Benzo(k)fluoranthene	207-08-9		4	X	X	X	X	
Chrysene	218-01-9		4	X	X	X	X	
Dibenzo(a,h)anthracene	53-70-3		5	X	X	X	X	
Fluoranthene	206-44-0		3	X	X			X
Fluorene	86-73-7		2		X			X
Indeno(1,2,3-cd)pyrene	193-39-5		5	X	X	X	X	
Naphthalene	91-20-3		2		X			X

Parameter	CAS No.	Chemical Structure	Number of Benzene Rings	PBT List	Priority Pollutant	IARC Carcinogen	EPA IRIS Carcinogen	Toxic per MTCA
Phenanthrene	85-01-8		3		X			
Pyrene	129-00-0		4					X

CAS: Chemical Abstract Service

IARC: International Agency for Research on Cancer

IRIS: Integrated Risk Information System

MTCA: Model Toxics Control Act

Phthalates

The generalized structure of phthalate esters is represented in Figure H-1 where the “R” groups represent alkane chains. Low molecular weight phthalates include dimethyl- and diethyl phthalates. Bis (2-ethylhexyl) phthalate (DEHP), di-N-octylphthalate, and butyl benzyl phthalate have molecular weights over 300, due to their longer alkane chains.

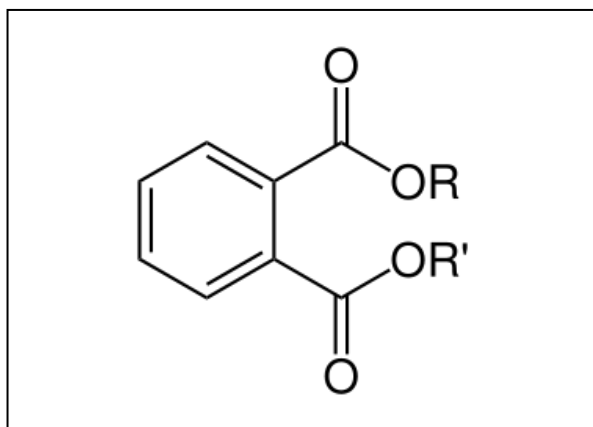


Figure H-1. Generalized chemical structure of phthalates.

Phthalate esters are widely used industrial chemicals which impart flexibility to polyvinyl chloride (PVC) resins (Staples et al., 1997). Phthalates make up 87% of the 10.4 billion pounds per year of the plasticizers manufactured worldwide. DEHP is the most common plasticizer included in the production of PVC; incorporation into PVC constitutes more than 50% of the phthalates produced (SPWG, 2007; ECB, 2008).

Non-plasticizer (non-polymer) uses of DEHP represent a small percentage (<10%) of use. DEHP can be used in a wide variety of products including: insect repellent formulations, cosmetics, rubbing alcohol, liquid soap, detergents, decorative inks, lacquers, munitions, industrial hydraulic and lubricating oils, defoaming agents during paper and paperboard manufacturing, and as pesticide carriers, in photographic film, wire and cable, adhesives, dielectrics in capacitors, and as a vacuum pump fluid (EPA, 2013). Vacuum pumps are used in the wood treatment process and may have released pump fluid with DEHP to the wood shakes.

The impacts of DEHP on human health are not completely understood. While not acutely toxic, DEHP has the potential to cause damage to the liver, testes, and other portions of the reproductive system. There is also some evidence that DEHP may be a carcinogen and endocrine disrupter. Among its endocrine disrupting effects, Swan et al. (2005) reported that exposure of pregnant women to phthalates resulted in decreased anogenital distance in baby boys. A subsequent study by Swan et al. (2009) suggested that “prenatal exposure to antiandrogenic phthalates may be associated with less male-typical play behaviour in boys.” Desvergne et al. (2009) have linked DEHP to obesity. The EPA is currently assessing DEHP for endocrine disruption, as part of the ToxCast high throughput screening program.

PBDEs

PBDEs are members of a broad class of brominated chemicals used as flame retardants. PBDEs are added to products so that they will not catch fire or will burn more slowly if exposed to flame. PBDEs have been added to plastics, upholstery fabrics, and foams that are incorporated into products such as computers, TVs, furniture, and carpet pads (Ecology, 2006). They may also have been added to roofing materials and or coatings.

There are three main types of PBDEs used in consumer products: penta-BDE, octa-BDE, and deca-BDE. Each has different uses and different toxicity. In 2004, manufacturers of penta- and octa-BDE in the U.S. agreed to voluntarily stop producing these two forms (Ecology, 2006). Penta and octa-BDE are considered more toxic than deca-BDE, which continues to be manufactured. However, there is concern that deca- can degrade into both penta- and octa-forms.

PBDEs have been measured in a variety of human tissues, including blood, fat, and breast milk collected from people around the world. The highest levels of PBDEs in human tissues collected from the general public have been found in the U.S. and Canada. In fact, these levels have been reported between 10 and 100 times higher than levels reported for Europe and Japan (Ecology, 2006).

The higher levels are thought to be associated with the fact that North America has used about 95% of the world's supply of the penta-BDE commercial products (Ecology, 2006).

Individual PBDE congeners are named in increasing numerical order from BDE-1 through BDE-209. Numbering is based on the number and position of bromines on the carbon rings, using the system developed by the International Union for Pure and Applied Chemistry (IUPAC) (Ecology, 2006).

The major commercial PBDE products consist mainly of penta-BDEs, octa-BDEs or deca-BDE, but contain other PBDEs. BDE-099 and BDE-047 are the most abundant and second most abundant congeners in penta-BDE commercial mixtures. Penta-BDE is also associated with congeners BDE-100 and BDE-153, whereas BDE-209 is the primary congener in deca-BDE (Ecology, 2006). Table H-2 is excerpted from the Ecology Chemical Action Plan for PBDEs (Ecology, 2006) and shows the congeners most prevalently associated with homologues.

Table H-2. PBDE congeners of particular interest.

Congener	Homologue	Primarily found in
BDE-047	Tetra-BDE	General population, occupational human samples, marine mammals, birds, fish.
BDE-099	Penta-BDE	Penta-BDE commercial product. Also high in human samples and biota (wildlife).
BDE-100		
BDE-153	Hexa-BDE	High in human samples and biota.
BDE-154		
BDE-209	Deca-BDE	Some occupational human samples, sediment, sewage sludge, and house dust. Not widely analyzed.

Source: Ecology, 2006.

McDonald (2002) identifies the likely toxicological endpoints of concern for environmental levels of PBDEs as thyroid hormone disruption, neurodevelopmental deficits, and cancer. He also notes that the available toxicological evidence for these endpoints is surprisingly limited, given their widespread use, bioaccumulative potential, and structural similarity to thyroid hormones and polychlorinated biphenyls (PCBs). Available evidence suggests that the PBDE congeners likely bioaccumulate and have the propensity to disrupt thyroid hormones, cause neurobehavioral deficits, and possibly cause cancer in laboratory animals (McDonald, 2002).

EPA is concerned that certain PBDE congeners are persistent, bioaccumulative, and toxic to both humans and the environment. EPA (2013) identifies the critical endpoint of concern for human health as neurobehavioral effects. Various PBDEs have also been studied for ecotoxicity in mammals, birds, fish, and invertebrates. In some cases, current levels of exposure for wildlife may be at or near adverse effect levels. Effective in 2011, the State of Washington has banned use of all PBDEs in electronics, furniture, and mattresses.

Appendix I. MSDSs for Coatings

The following 46 pages are Material Safety Data Sheets for coatings applied to the coupons (samples) for the leaching procedure.


Material Safety Data Sheets (MSDS)

HMIS-NPCA-MFPA	Health	1
	Flammability	0
	Reactivity	0
	Personal Protection	B

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION		
PRODUCT NAME	SNOW SEAL™	
IDENTIFICATION	SS	
DATE PRINTED		
PRODUCT USE/CLASS	Latex Paints & Coatings, water born dispersion	
MANUFACTURER	Ames Research Laboratories, Inc. Jefferson, Oregon 97352	Corporate Office: PO Box 1350 Jefferson, Oregon 97352-1350
EMERGENCY TELEPHONE	1-888-345-0809	
PREPARER (optional)		
PHONE	(503) 588-3330	
PREPARE DATE	07-01-08	

SECTION 2 – COMPOSITION/INFORMATION ON INGREDIENTS			
ITEM	CHEMICAL NAME	CAS NUMBER	WT/WT % LESS THAN
01	Titanium dioxide	13463-67-7	5.0%
02	Calcium carbonate	471-34-1	15.0%
03			
04	Acrylic-Styrene Polymer	Not Regulated	
05	Water	7732-18-5	> 37

Material is not known to contain Toxic Chemicals under section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372. Product alkaline to PH-10. May causes stomach distress if ingested. Do not ingest.

--EXPOSURE LIMITS --						
ITEM	ACGIH TLV-TWA	TLV-STEL	OSHA PEL-TWA	PEL-CEILING	COMPANY TLV-TWA	SKIN
01	10 mg / m ³	N.E.	15 mg / m ³	N.E.	N.E.	NO
02	10 mg / m ³	N.E.	15 mg / m ³	N.E.	N.E.	NO

(See Section 16 for abbreviation legend)

SECTION 3 – HAZARDOUS IDENTIFICATION	
EFFECTS OF OVEREXPOSURE	
EYE CONTACT	May cause slight irritation
SKIN CONTACT	May cause irritation
INHALATION	May cause respiratory tract irritation
INGESTION	Irritating to mouth, throat and stomach.
CHRONIC HAZARDS	No anticipated effects. This product does not contain regulated levels of NTP,IARC or OSHA listed carcinogens.
PRIMARY ROUTE(S) OF ENTRY	Skin contact, Inhalation, Ingestion, Eye Contact

SECTION 4 – FIRST AID MEASURES	
FIRST AID	
EYE CONTACT	Flush eye with water for at least 15 minutes. Call a physician. PH is roughly 8.5-9.0. Alkaline.
SKIN CONTACT	Remove contaminated clothing and shoes. Wash affected area(s) thoroughly with soap and water. Flush skin after contact. May cause mild skin irritation. Protect with gloves.
INHALATION	Slight ammonia odor. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.
INGESTION	No data shown on latex. Not probable route of exposure.


Material Safety Data Sheets (MSDS)

SECTION 5 - FIRE FIGHTING MEASURES	
FLASH POINT	These Formulations tested in accordance with ASTM E 108-80a Class A with a Zero ignitions with a flame spread test. With Weyerhaeuser Company, Fire Technology Unit. Product was also tested in accordance with ASTM E-84-81a. "Smoke attained was Zero. Product contains dispersed Latex and water solvent. The flames spread index determined meets the criteria for Class A material over A/C/ Substrate.
LOWER EXPLOSIVE LIMIT	N.A.
UPPER EXPLOSIVE LIMIT	N.A.
AUTOIGNITION TEMPERATURE	Zero ignition.
EXTINGUISHING MEDIA	FOAM CO2, DRY CHEMICAL, WATER, FOG foam.
UNUSUAL FIRE AND EXPLOSIVE HAZARDS	None Known. Some Gases, Hydrogen Chloride, carbon monoxide,
SPECIAL FIREFIGHTING PROCEDURES	Containers exposed to fire should be kept cool with water spray. Containers can build up pressure if exposed to heat (fire). As in any fire, wear self-contained breathing apparatus pressure-demand (MSHA/NIOSH approved or equivalent) and full protective gear.

SECTION 6 – ACCIDENTAL RELEASE MEASURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:	
Flush small spills with water. Soak up large spills with sand or earth and remove. Repeat sorbent/sweep cycle until the spill has dried up. Collect and dispose according to local regulations. Avoid runoff into storm sewers and ditches that lead to waterways. This product does not meet the definition of hazardous waste under the U.S. EPA Hazardous Waste Regulations 40 CFR 261. Consult your state or local authorities for proper disposal in the event more restrictive requirements apply.	

SECTION 7 – HANDLING AND STORAGE	
HANDLING:	Use in a well ventilated area. Keep out of reach of children. If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Uses goggles and gloves. Similar to most latex paints.
STORAGE:	Keep container closed when not in use. Dries Rapidly.

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION	
ENGINEERING CONTROLS:	Local exhaust ventilation may be necessary to control any air contaminants to within their TLVs during the use of this product. Contains low levels of Ammonia for PH control Less than 9 ph.
RESPIRATORY PROTECTION:	Wear NIOSH/MSHA approved respiratory protection when the product is mixed or applied in a poorly ventilated area or if workplace levels of ingredients if they exceed the TLV. Follow applicable federal, state, and local regulations.
OTHER PROTECTIVE EQUIPMENT:	Where contact is likely, wear chemical resistant gloves, chemical safety goggles with a face shield, and clean protective clothing to cover arms and legs to keep exposure to a minimum.
HYGIENE PRACTICES:	Do not take internally. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid breathing vapors from heated material.



Material Safety Data Sheets (MSDS)

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES			
BOILING RANGE:	212°F	VAPOR DENSITY:	Is heavier than air
ODOR:	Slight Ammonia Ph 8.0 –9.5 Mild	ODOR THRESHOLD:	N.D.
APPEARANCE:	Thick, white, liquid.	EVAPORATION RATE:	Similar to Latex paint, water based Latex polymers.
SOLUBILITY IN H2O	Dilutable, Miscible.	SPECIFIC GRAVITY:	1.05 to 1.15
% VOLATILES	Volatile is water.		Level is 39-55%
pH @	8.0- 9.5 Ph	FREEZE POINT: 32 degrees F	Near Water at 25 deg C. Do not freeze. Freezing will solidify and destroy the product.
VISCOSITY:	130-160 Krebs	VAPOR PRESSURE:	1.75 mm Hg
PHYSICAL STATE:	White Thick Latex Liquid, Contains acrylic latex	COEFFICIENT OF WATER/OIL DISTRIBUTION:	Water VOC solvents negligible.

(See Section 16 for abbreviation legend)

SECTION 10 –STABILITY AND REACTIVITY	
CONDITIONS TO AVOID:	Long term exposure to elevated temperatures
INCOMPATIBILITY:	Avoid contact with oxidizing material
HAZARDOUS DECOMPOSITION PRODUCTS:	Acrid fumes. Oxides of carbon.
HAZARDOUS POLYMERIZATION:	Will not occur under normal conditions
STABILITY:	This product is stable under normal storage conditions.

SECTION 11 – TOXICOLOGICAL PROPERTIES	
PRODUCT DERMAL LS50:	No Information
PRODUCT LC50:	No Information
PRODUCT ORAL LD50:	No Information

COMPONENT TOXICOLOGICAL INFORMATION:

--CHEMICAL NAME--	DERMAL LD50	ORAL LD50	LC50
This product does not contain regulated levels of NTP, IARC or OSHA			
Existing Health Conditions Affected by Exposure – No known effects on other illnesses			

SECTION 12 – ECOLOGICAL INFORMATION	
ECOLOGICAL INFORMATION:	Contains water based acrylic. Relatively non-toxic to environment.

SECTION 13 – DISPOSAL CONSIDERATIONS	
DISPOSAL METHOD:	Review all local, state, and federal regulations concerning health and pollution for appropriate disposal procedures.

SECTION 14 – TRANSPORTATION INFORMATION	
DOT PROPER SHIPPING NAME:	Not regulated
DOT TECHNICAL NAME:	N.A.
DOT HAZARD CLASS:	N.A.
HAZARD SUBCLASS:	N.A.
DOT UN/NA NUMBER:	N.A.
PACKING GROUP:	N.A.
RESP. GUIDE PAGE:	N.A.
DOT PLACARD AT:	N.A.
DOT CLASS NUMBER:	N.A.
UN PROPER SHIPPING NAME:	Not registered
UN CLASS NUMBER:	N.A.
HAZARD SUBCLASS:	N.A.
UN/NA NUMBER:	N.A.
UN PLACARD AT:	N.A.


Material Safety Data Sheets (MSDS)

SECTION 15 – REGULATORY INFORMATION	
U.S. Federal Regulation: AS FOLLOWS – OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR1910.1200)	
CERCLA – SARA Hazard Category: This product has been reviewed according to the EPA “Hazard Categories” promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories: None	
SARA Section 313: This product does not contain toxic chemical(s) at or above the de minimus concentrations subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR part 372	
Toxic Substances Control Act: This product meets the compositional requirements of the Toxic Substances Control Act and contains only chemical ingredients that are listed on the TOSCA inventory	
California Prop. 65: This product contains no trace amount of a chemical(s) known to California to cause cancer and/or birth defects or other reproductive harm.	
Canadian EPA: This Product contains only chemical ingredients that are listed on the Domestic Substance List of the Canadian Environmental Agency.	
INTERNATIONAL REGULATIONS: AS FOLLOWS--	
CANADIAN WHMIS:	This MSDS has been prepared in compliance with Controlled Product Regulations except for the use of the sixteen headings.
CANADIAN WHMIS CLASS	No Information available.

SECTION 16 – OTHER INFORMATION				
HMIS RATINGS:	HEALTH 1	FLAMMABILITY 0	REACTIVITY 0	PERSONAL PROTECTION B
PREVIOUS MSDS REVISION DATE:	06-12-07			
REASON FOR REVISION:				
VOLATILE ORGANIC COMPOUNDS (VOC's):	0.50 lbs/gal, 60 grams/ltr			
LEGEND:	N.A. not applicable, N.E. Not established, N.D. Not determined			
ABBREVIATIONS USED:	N/A (information or data not available); NTP (National Toxicology Program); IARC (International Agency for Research on Cancer); NIOSH (National Institute of occupational Safety and Health administration); PEL (Permissible Exposure Limit) [8 hr. TWA][OSHA]; TLV (Threshold Limit Value)[8 hr. TWA][ACGIH]; STEL (Short term exposure limit)[15 min. TWA][OSHA]; C (ceiling value).			
DISCLAIMER:	Ames Research Laboratories, Inc. believes that the information provided is accurate and reliable as of the date of this material safety data sheet and is given in good faith. No warranty expressed or implied is made as to the accuracy, reliability or completeness of the information. Any use of this data and information must be determined by the user to be in accordance with applicable Federal, State and Local laws and regulations. Ames Research Laboratories, Inc. urges persons receiving this information to make their own determination as to the information's suitability and applicability for an intended use. Note: This information must be included in all MSDS that are copied and distributed for this material.			

MATERIAL SAFETY DATA SHEET

B66W351
09 00

DATE OF PREPARATION
May 23, 2009

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

B66W351

PRODUCT NAME

SHER-CRYL™ HPA High Performance Acrylic Semi-Gloss Coating, Extra White/Tint Base

MANUFACTURER'S NAME

THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	www.sherwin-williams.com
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
1	111-77-3	2-(2-Methoxyethoxy)-ethanol		
		ACGIH TLV	Not Available	1 mm
		OSHA PEL	Not Available	
7	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
12	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

In a confined area vapors in high concentration may cause headache, nausea or dizziness.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

HMIS Codes

Health	2*
Flammability	0
Reactivity	0

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

SKIN: Wash affected area thoroughly with soap and water.

Remove contaminated clothing and launder before re-use.

INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT	LEL	UEL	FLAMMABILITY CLASSIFICATION
Not Applicable	N.A.	N.A.	Not Applicable

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

- Remove all sources of ignition. Ventilate the area.
- Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits.

Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	9.91 lb/gal	1186 g/l
SPECIFIC GRAVITY	1.19	
BOILING POINT	212 - 500 °F	100 - 260 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	60%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
pH	9.0	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)		
1.59lb/gal	190g/l	Less Water and Federally Exempt Solvents
0.78lb/gal	94g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

TOXICOLOGY DATA

CAS No.	Ingredient Name			
111-77-3	2-(2-Methoxyethoxy)-ethanol	LC50 RAT LD50 RAT	4HR	Not Available 5500 mg/kg
14807-96-6	Talc	LC50 RAT LD50 RAT	4HR	Not Available Not Available
13463-67-7	Titanium Dioxide	LC50 RAT LD50 RAT	4HR	Not Available Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

US Ground (DOT)

Not Regulated for Transportation.

Canada (TDG)

Not Regulated for Transportation.

IMO

Not Regulated for Transportation.

SECTION 15 — REGULATORY INFORMATION

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
	Glycol Ethers	1	

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

MATERIAL SAFETY DATA SHEET

42-100
01 00

DATE OF PREPARATION
Apr 11, 2013

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

42-100

PRODUCT NAME

UNIFLEX® Solvent-Based Elastomeric Finish Coat, White

MANUFACTURER'S NAME

UNIFLEX ROOFING SYSTEMS
101 Prospect Avenue N.W.
Cleveland, OH 44115

Telephone Numbers and Websites

Product Information	(888) 321-3539
Regulatory Information	(216) 566-2902 www.paintdocs.com
Medical Emergency	(216) 566-2917
Transportation Emergency*	(800) 424-9300
*for Chemical Emergency ONLY (spill, leak, fire, exposure, or accident)	

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

% by Weight	CAS Number	Ingredient	Units	Vapor Pressure
12	64742-88-7	Mineral Spirits		
		ACGIH TLV	100 PPM	2 mm
		OSHA PEL	100 PPM	
34	98-56-6	p-Chlorobenzotrifluoride		
		ACGIH TLV	Not Available	5.3 mm
		OSHA PEL	Not Available	
6	67-64-1	Acetone		
		ACGIH TLV	500 PPM	180 mm
		ACGIH TLV	750 PPM STEL	
		OSHA PEL	1000 PPM	
0.1	14808-60-7	Quartz		
		ACGIH TLV	0.025 mg/m3 as Resp. Dust	
		OSHA PEL	0.1 mg/m3 as Resp. Dust	
2	112926-00-8	Amorphous Precipitated Silica		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	6 mg/m3 as Dust	
15	471-34-1	Calcium Carbonate		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	15 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	
8	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

SECTION 3 — HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.
EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

HMIS Codes

Health	2*
Flammability	3
Reactivity	0

Prolonged overexposure to hazardous ingredients in Section 2 may cause adverse chronic effects to the following organs or systems:

- the liver
- the urinary system

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

SECTION 4 — FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

SKIN: Wash affected area thoroughly with soap and water.
Remove contaminated clothing and laundry before re-use.

INHALATION: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

INGESTION: Do not induce vomiting. Get medical attention immediately.

SECTION 5 — FIRE FIGHTING MEASURES

FLASH POINT

72 °F PMCC

LEL

0.9

UEL

12.8

FLAMMABILITY CLASSIFICATION

RED LABEL -- Flammable, Flash below 100 °F (38 °C)

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.

Application to hot surfaces requires special precautions.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

SECTION 7 — HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class IB

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are FLAMMABLE. Keep away from heat, sparks, and open flame.

During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition.

Consult NFPA Code. Use approved Bonding and Grounding procedures.

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally.

Keep out of the reach of children.

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m3 (total dust), 3 mg/m3 (respirable fraction), OSHA PEL 15 mg/m3 (total dust), 5 mg/m3 (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	10.27 lb/gal	1230 g/l
SPECIFIC GRAVITY	1.24	
BOILING POINT	132 - 395 °F	55 - 201 °C
MELTING POINT	Not Available	
VOLATILE VOLUME	59%	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	Not Available	
VOLATILE ORGANIC COMPOUNDS (VOC Theoretical - As Packaged)		
	2.07 lb/gal 248 g/l	Less Water and Federally Exempt Solvents
	1.24 lb/gal 148 g/l	Emitted VOC

SECTION 10 — STABILITY AND REACTIVITY

STABILITY — Stable**CONDITIONS TO AVOID**

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

SECTION 11 — TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

Crystalline Silica (Quartz, Cristobalite) is listed by IARC and NTP. Long term exposure to high levels of silica dust, which can occur only when sanding or abrading the dry film, may cause lung damage (silicosis) and possibly cancer.

IARC's Monograph No. 93 reports there is sufficient evidence of carcinogenicity in experimental rats exposed to titanium dioxide but inadequate evidence for carcinogenicity in humans and has assigned a Group 2B rating. In addition, the IARC summary concludes, "No significant exposure to titanium dioxide is thought to occur during the use of products in which titanium is bound to other materials, such as paint."

TOXICOLOGY DATA

CAS No.	Ingredient Name			
64742-88-7	Mineral Spirits	LC50 RAT LD50 RAT	4HR	Not Available Not Available
98-56-6	p-Chlorobenzotrifluoride	LC50 RAT LD50 RAT	4HR	Not Available Not Available
67-64-1	Acetone	LC50 RAT LD50 RAT	4HR	Not Available 5800 mg/kg
14808-60-7	Quartz	LC50 RAT LD50 RAT	4HR	Not Available Not Available
112926-00-8	Amorphous Precipitated Silica	LC50 RAT LD50 RAT	4HR	Not Available 4999. mg/kg
471-34-1	Calcium Carbonate	LC50 RAT LD50 RAT	4HR	Not Available Not Available
13463-67-7	Titanium Dioxide	LC50 RAT LD50 RAT	4HR	Not Available Not Available

SECTION 12 — ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

SECTION 13 — DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

SECTION 14 — TRANSPORT INFORMATION

Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (ocean, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport.

US Ground (DOT)

5 Liters (1.3 Gallons) and Less may be Classed as LTD. QTY. OR ORM-D

Larger Containers are Regulated as:

UN1263, PAINT, 3, PG II, (ERG#128)

Bulk Containers may be Shipped as:

UN1263, PAINT, 3, PG II, (ERG#128)

Canada (TDG)

UN1263, PAINT, CLASS 3, PG II, (ERG#128)

IMO

5 Liters (1.3 Gallons) and Less may be Shipped as Limited Quantity.

UN1263, PAINT, CLASS 3, PG II, (22 C c.c.), EmS F-E, S-E, ADR (D/E)

IATA/ICAO

UN1263, PAINT, 3, PG II

SECTION 15 — REGULATORY INFORMATION

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
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No ingredients in this product are subject to SARA 313 (40 CFR 372.65C) Supplier Notification.

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

SECTION 16 — OTHER INFORMATION

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.



Material Safety Data Sheet

24 HR. CHEMTREC EMERGENCY #: 1-800-424-9300

HAZARD RATING		Fire	
4 - EXTREME			
3 - HIGH			
2 - MODERATE	Health	2 0	Reactivity
1 - SLIGHT			
0 - INSIGNIFICANT		Special	

SECTION 1 - PRODUCT IDENTIFICATION

IDENTITY: Fibered Aluminum Asphalt Coatings
(Asbestos-Free)
27AF, 97AF, 98AF, 299AF

MANUFACTURER:

Karnak Corporation
330 Central Ave.
Clark, NJ 07066 U.S.A.

DATE: April 17, 2003

Telephone #: 1-800-526-4236

24 HR CHEMTREC EMERGENCY NUMBER 1-800-424-9300
(OUTSIDE THE U.S AND CANADA 1-202-483-7616)

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

Components	CAS#	Weight %	OSHA PEL	ACGIH TLV	Other Limits Recommended
Asphalt	64742-93-4	50-90	5mg/m ³	0.5mg/m ³	5mg/m ³ (NIOSH)
Aliphatic Hydrocarbons	8052-41-3	10-50	100 ppm	100 ppm	350mg/m ³ (NIOSH)
(Stoddard)					
Aromatic Petroleum Distillates	64742-95-6	10-50	100 ppm	NE	None
Aluminum Pigment	7429-90-5	5-15	15mg/m ³	10mg/m ³	N/A
Diatomaceous Earth	68855-54-9	2-10	5mg/m ³	10mg/m ³	N/A
Mineral Fibers	Trade Secret	0-10	N/A	N/A	N/A
Additives	Trade Secret	0-5	N/A	N/A	N/A

PEL = Permissible Exposure Limits
TLV = Threshold Limit Value
N.E. = Not Established
N.A. = Not Applicable.

OSHA = Occupational Safety and Health Administration
ACGIH = American Conference of Governmental Industrial Hygienists
NIOSH = National Institute for Occupational Safety and Health

SECTION 3 - HAZARDS IDENTIFICATION

Combustible liquid and Vapor

Potential Health Effects:

Fumes from product can be unpleasant, may cause nausea, headache and irritating to eyes, skin, and respiratory tract.

SECTION 4 - FIRST AID MEASURES

- Eye Contact:** If this product comes in contact with eyes, Flush eye with plenty of water for at least 15 minutes and seek medical attention.
- Skin Contact:** If this product comes in contact with skin, remove material with mineral oil, then wash with soap and plenty of water.
- Inhalation:** If respiratory discomfort occurs, remove to fresh air. If discomfort continues, administer oxygen and get medical attention.
- Ingestion:** If swallowed, do not induce vomiting. Get medical attention.

SECTION 5 - FIRE FIGHTING MEASURES

- Flash Point (PMCC):** 104°F Minimum
- Dust Explosivity Limits:** Not Applicable.
- Extinguishing Media:** Carbon dioxide (CO₂), foam, or dry chemical. Water may be used to Cool containers exposed to heat.
- Fire Fighting Instructions:** Minimize breathing vapors, gases or fumes of decomposition products. Do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
- Unusual Fire Hazards:** When heated above flash point, material will release flammable vapors which can burn or be explosive in confined spaces if ignited. Do not mix with strong oxidants such as liquid chlorine or concentrated oxygen.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Eliminate sources of ignition, and ventilate the area. Add sand or earth or absorb spill with suitable absorbent material and place in a closed container.

Keep product out of sewers and waterways by diking or impounding. Advise authorities if product has entered or may enter sewers or waterways. Assure conformity with applicable governmental regulations.

SECTION 7 - HANDLING AND STORAGE

Vapors are heavier than air and may travel along the ground or be moved by ventilation to locations distant from the point of material handling. To prevent ignition, avoid smoking, keep away from heat, open flames and sources of static or electrical sparking. Use explosion proof motors and equipment. Tank trucks or other containers should be grounded and/or bonded when the material is transferred.

Avoid prolonged or repeated inhalation of vapors or spray mists. Avoid prolonged or repeated skin contact. Adhere to good hygienic practices. Avoid open flames. Use with adequate ventilation.

Store in a cool, dry place, out of direct sunlight and away from heat, sparks, and flame.

Health studies have shown that many petroleum hydrocarbons pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Respiratory Protection: Use supplied-air respirator in confined areas or with vapors in high concentrations.

Ventilation: Local Exhaust: In enclosed areas. Special: None
Mechanical: In enclosed areas. Other: None

Eye Protection: Safety glasses or face shield for liquid material.

Protective Gloves: Solvent impervious gloves.

Other Protective Clothing Equipment: Long sleeves and impervious clothing to protect against splashing.

Work/Hygienic Practices: See Section 7.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Dark liquid. Mild petroleum odor

Vapor Pressure: 3

Boiling Point: 300-350°F

Melting Point (R & B): N/A

Solubility in water: Insoluble.

Specific Gravity (H₂O=1): 0.8 – 0.99

Evaporation Rate (Butyl Acetate=1)@ 77°F: 0.2

Vapor Density (Air = 1): >4

Flash Point (PMCC): 104°F min.

SECTION 10 - STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid:	Keep away from heat, spark, open flames. Auto-ignition temperature unknown.
Incompatibility (Materials to Avoid):	May react with strong oxidizing materials.
Hazardous Decomposition or Byproducts:	Combustion: carbon dioxide (CO ₂), carbon monoxide (CO), nitrogen oxides, smoke, and fumes.
Hazardous Polymerization:	Will not occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

Product may cause respiratory irritation, headache, dizziness, nausea and vomiting. Prolonged or repeated contact with skin may cause dermatitis.

Carcinogenicity: NTP?: No IARC Monographs?: No OSHA Regulated?: No

SECTION 12 - ECOLOGICAL INFORMATION

EPA Hazard Classification Code:

Acute Hazard: ____ Chronic Hazard: ____ Fire Hazard: ____ Pressure Hazard: ____

Reactive Hazard: ____ Not Applicable: X

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose of in accordance with local, state and federal regulations.

SECTION 14 - TRANSPORTATION INFORMATION

The description shown may not apply to all shipping situations. Consult 49 CFR, or appropriate regulations, for additional description requirements.

DOT Shipping Name: Cutback
DOT Label Information: Combustible Liquid
DOT Hazard Class: Non-Hazardous (Ground transport only)
DOT Packing Group: N/A (Ground transport only)

SECTION 15 - REGULATORY INFORMATION

SARA TITLE III - EPA Regulation 40 CFR 302 (CERCLA Section 102); CFR 355 (SARA Section 301-304); CFR 372 (SARA Section 311-313) - NOT APPLICABLE.

This product contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372

1,2,4 – Trimethylbenzene	CAS# 95-63-6	Weight% 0-16
Xylene	CAS# 1330-20-7	Weight% 0-0.3
Cumene	CAS# 98-82-8	Weight% 0-0.1

EPA HAZARD CLASSIFICATION CODE: Acute Hazard/Chronic Hazard/Fire Hazard/Pressure Hazard/Reactive Hazard - NOT APPLICABLE.

TSCA, CANADIAN DSL: Yes

SECTION 16 - OTHER INFORMATION

Revision Statement:

This Material Safety Data Sheet has been revised to follow the ANSI Z400.1 standard.
Supersedes:

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. The information has been completed to the best of our knowledge and is believed to be accurate and reliable as from the date indicated. However, no warranty is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy oneself as to the suitability and completeness of such information for his own particular use.

Material Safety Data Sheet



Date of issue 22 December 2012

Version 8

1. Product and company identification

Product name : CORAFLOX ADS CLEAR LOW VOC HI GLOSS
Code : ADS100CC80
Supplier : PPG Industries, Inc.
One PPG Place
Pittsburgh, PA 15272
Emergency telephone number : (412) 434-4515 (U.S.)
(514) 645-1320 (Canada)
01-800-00-21-400 (Mexico)
Technical Phone Number : 1-800-441-9695 (8:00 am to 5:00 pm EST)

2. Hazards identification

Emergency overview : DANGER!
FLAMMABLE LIQUID AND VAPOR. CAUSES EYE AND SKIN BURNS. CAUSES RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF INHALED OR SWALLOWED. PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE.
Keep away from flames, such as a pilot light, and any object that sparks, such as an electric motor. Keep away from heat. Do not smoke. Do not swallow. Do not get in eyes or on skin or clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Potential acute health effects

Inhalation : May be harmful if inhaled. Irritating to respiratory system. Can irritate eyes, nose, mouth and throat. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
Ingestion : May be harmful if swallowed. May cause burns to mouth, throat and stomach.
Skin : Corrosive to the skin. Causes burns.
Eyes : Corrosive to eyes. Causes burns.

Over-exposure signs/symptoms

Repeated exposure to high vapor concentrations may cause irritation of the respiratory system and permanent brain and nervous system damage. Inhalation of vapor/aerosol concentrations above the recommended exposure limits causes headaches, drowsiness and nausea and may lead to unconsciousness or death. There is some evidence that repeated exposure to organic solvent vapors in combination with constant loud noise can cause greater hearing loss than expected from exposure to noise alone.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

This Material Safety Data Sheet has been prepared in accordance with Canada's Workplace Hazardous Materials Information System (WHMIS) and the OSHA Hazard Communication Standard (29 CFR 1910.1200).

See toxicological information (Section 11)

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
PARACHLOROBENZOTRIFLUORIDE	98-56-6	40 - 70
heptan-2-one	110-43-0	1 - 5
3-dodecyl-1-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidine-2,5-dione	79720-19-7	0.1 - 1
xylene	1330-20-7	0.1 - 1
ethylbenzene	100-41-4	0.1 - 1

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

If ingestion, irritation, any type of overexposure or symptoms of overexposure occur during or persists after use of this product, contact a POISON CONTROL CENTER, EMERGENCY ROOM OR PHYSICIAN immediately; have Material Safety Data Sheet information available. Never give anything by mouth to an unconscious or convulsing person.

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Seek immediate medical attention.
- Skin contact** : Remove contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Do NOT use solvents or thinners.
- Inhalation** : Remove to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel.
- Ingestion** : If swallowed, seek medical advice immediately and show this container or label. Keep person warm and at rest. Do NOT induce vomiting.
- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

5. Fire-fighting measures

- Flammability of the product** : Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

- Suitable** : Use dry chemical, CO₂, water spray (fog) or foam.
- Not suitable** : Do not use water jet.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Hazardous combustion products** : Decomposition products may include the following materials:
carbon oxides
nitrogen oxides
halogenated compounds
metal oxide/oxides
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : **No** action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- Environmental precautions** : **Avoid** dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Large spill** : **Stop** leak if without risk. Move containers from spill area. Approach release from upwind. Use spark-proof tools and explosion-proof equipment. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.
- Small spill** : **Stop** leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

7. Handling and storage

- Handling** : **Put** on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Do not swallow. Do not get in eyes or on skin or clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. Vapors are heavier than air and may spread along floors. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container. If this material is part of a multiple component system, read the Material Safety Data Sheet(s) for the other component or components before blending as the resulting mixture may have the hazards of all of its parts.
- Storage** : **Store** in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Do not store above the following temperature: 120F / 49C.

8. Exposure controls/personal protection

Name	Result	ACGIH	OSHA	Ontario	Mexico	PPG

8 . Exposure controls/personal protection

PARACHLOROBENZOTRIFLUORIDE	TWA	Not established	Not established	Not established	Not established	25 ppm
heptan-2-one	TWA	50 ppm	100 ppm	25 ppm	50 ppm	Not established
	STEL	Not established	Not established	Not established	100 ppm	Not established
xylene	TWA	100 ppm	100 ppm	100 ppm	100 ppm	Not established
	STEL	150 ppm	Not established	150 ppm	150 ppm	Not established
ethylbenzene	TWA	20 ppm	100 ppm	100 ppm	100 ppm	Not established
	STEL	Not established	Not established	125 ppm	125 ppm	Not established

Key to abbreviations

A	= Acceptable Maximum Peak	S	= Potential skin absorption
ACGIH	= American Conference of Governmental Industrial Hygienists.	SR	= Respiratory sensitization
C	= Ceiling Limit	SS	= Skin sensitization
F	= Fume	STEL	= Short term Exposure limit values
IPEL	= Internal Permissible Exposure Limit	TD	= Total dust
OSHA	= Occupational Safety and Health Administration.	TLV	= Threshold Limit Value
R	= Respirable	TWA	= Time Weighted Average
Z	= OSHA 29CFR 1910.1200 Subpart Z - Toxic and Hazardous Substances		

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : ☒ this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Engineering measures : ☒ Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : ☒ Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Eyes : ☒ Chemical splash goggles and face shield.

Hands : ☒ Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Gloves : ☒ nitrile, neoprene

Respiratory : ☒ If workers are exposed to concentrations above the exposure limit, they must use appropriate, certified respirators. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

8 . Exposure controls/personal protection

- Skin** : ☒ Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Environmental exposure controls** : ☒ Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

- Physical state** : ☒ Liquid.
- Flash point** : ☒ Closed cup: 37.78°C (100°F)
- Explosion limits** : ☒ Lower: 0.9%
- Color** : ☒ Not available.
- Odor** : ☒ Not available.
- pH** : ☒ Not available.
- Boiling/condensation point** : ☒ 37.78°C (>100°F)
- Melting/freezing point** : ☒ Not available.
- Specific gravity** : ☒ 1.32
- Density (lbs / gal)** : ☒ 11.02
- Vapor pressure** : ☒ 0.71 kPa (5.3 mm Hg) [room temperature]
- Vapor density** : ☒ Not available.
- Volatility** : ☒ 69% (v/v), 67.01% (w/w)
- Evaporation rate** : ☒ 0.03 (butyl acetate = 1)
- Partition coefficient: n-octanol/water** : ☒ Not available.
- % Solid. (w/w)** : ☒ 32.99

10 . Stability and reactivity

- Stability** : ☒ Stable under recommended storage and handling conditions (see Section 7).
- Conditions to avoid** : ☒ Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
- Materials to avoid** : ☒ Reactive or incompatible with the following materials: acids, oxidizing materials, strong alkalis
- Hazardous decomposition products** : ☒ Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : ☒ Under normal conditions of storage and use, hazardous polymerization will not occur.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
<input checked="" type="checkbox"/> PARACHLOROBENZOTRIFLUORIDE	LD50 Oral	Rat	13 g/kg	-
	LD50 Dermal	Rabbit	>2.7 g/kg	-
	LC50 Inhalation	Rat	33080 mg/m3	4 hours
heptan-2-one	Vapor			
	LD50 Oral	Rat	1.6 g/kg	-
	LD50 Dermal	Rabbit	10.206 g/kg	-
	LD50 Oral	Rat	2 g/kg	-
3-dodecyl-1-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidine-2,5-dione				

11 . Toxicological information

xylene	LD50 Oral LD50 Dermal LC50 Inhalation Vapor	Rat Rabbit Rat	4.3 g/kg >1.7 g/kg 5000 ppm	- - 4 hours
ethylbenzene	LD50 Oral LD50 Dermal LC50 Inhalation Vapor	Rat Rabbit Rat	3.5 g/kg >5000 mg/kg 4000 ppm	- - 4 hours

Conclusion/Summary : ☒ Not available.

Chronic toxicity

Conclusion/Summary : ☒ Not available.

Defatting irritant

: ☒ Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Target organs

: ☒ Contains material which causes damage to the following organs: brain, central nervous system (CNS).
Contains material which may cause damage to the following organs: peripheral nervous system, upper respiratory tract, skin, eye, lens or cornea, nose/sinuses, throat.

Carcinogenicity

Carcinogenicity : ☒ Contains material which may cause cancer, based on animal data. Risk of cancer depends on duration and level of exposure.

Classification

Product/ingredient name	ACGIH	IARC	NTP	OSHA
<input checked="" type="checkbox"/> ethylbenzene	A3	2B	-	-

Carcinogen Classification code: ACGIH: A1, A2, A3, A4, A5
IARC: 1, 2A, 2B, 3, 4
NTP: Proven, Possible
OSHA: +
Not listed or regulated as a carcinogen: -

12 . Ecological information

Environmental effects : ☒ No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
<input checked="" type="checkbox"/> heptan-2-one	Acute LC50 131000 to 137000 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
xylene	Acute LC50 3300 to 4093 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
ethylbenzene	Acute LC50 4200 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 5100 to 5700 ug/L Marine water	Fish - Atlantic silverside - Menidia menidia	96 hours
	Acute EC50 2930 to 4400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Chronic NOEC 3300 ug/L Marine water	Fish - Atlantic silverside - Menidia menidia	96 hours
	Chronic NOEC 6800 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees. Section 6. Accidental release measures

14 . Transport information

Regulation	UN number	Proper shipping name	Classes	PG*	Additional information
UN	263	PAINT	3	III	
IMDG	263	PAINT	3	III	
DOT	263	PAINT	3	III	<p>Reportable quantity 15038.8 lbs / 6827.6 kg [1367.8 gal / 5177.6 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</p> <p>Remarks USA Only: Can be reclassified as Combustible Liquid. Non-Bulk highway shipments (Less than or Equal to 450Liters) can be shipped as non-regulated.</p>

PG* : Packing group

Reportable quantity RQ : CERCLA: Hazardous substances.: butan-1-ol: 5000 lbs. (2270 kg); ethylbenzene: 1000 lbs. (454 kg); xylene: 100 lbs. (45.4 kg); n-butyl acetate: 5000 lbs. (2270 kg);

15 . Regulatory information

United States inventory (TSCA 8b) : All components are listed or exempted.

Australia inventory (AICS) : 1000kg

Canada inventory (DSL) : At least one component is not listed in DSL but all such components are listed in NDSL.

China inventory (IECSC) : All components are listed or exempted.

Europe inventory (REACH) : Please contact your supplier for information on the inventory status of this material.

Japan inventory (ENCS) : 1000kg

Korea inventory (KECI) : At least one component is not listed.

Product code **ADS100CC80**

Date of issue 22 December 2012 Version 8

Product name **CORAFLOX ADS CLEAR LOW VOC HI GLOSS**

15. Regulatory information

New Zealand (NZIoC) : ☒ Substance Use Restricted
 Philippines inventory (PICCS) : ☒ At least one component is not listed.

United States

U.S. Federal regulations :

☒ SARA 302/304/311/312 extremely hazardous substances: No products were found.☒ SARA 302/304 emergency planning and notification: No products were found.☒ SARA 302/304/311/312 hazardous chemicals: heptan-2-one☒ CERCLA: Hazardous substances.: butan-1-ol: 5000 lbs. (2270 kg); ethylbenzene: 1000 lbs. (454 kg); xylene: 100 lbs. (45.4 kg); n-butyl acetate: 5000 lbs. (2270 kg);

SARA 311/312 MSDS Distribution - Chemical Inventory - Hazard Identification:

Chemical name	CAS #	Acute	Chronic	Fire	Reactive	Pressure
PARACHLOROBENZOTRIFLUORIDE	98-56-6	Y	N	Y	N	N
heptan-2-one	110-43-0	Y	N	Y	N	N
3-dodecyl-1-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidine-2,5-dione	79720-19-7	Y	N	N	N	N
ethylbenzene	100-41-4	Y	Y	Y	N	N
Product as-supplied :		<input checked="" type="checkbox"/> Y	<input checked="" type="checkbox"/> Y	<input checked="" type="checkbox"/> Y	<input checked="" type="checkbox"/> N	<input checked="" type="checkbox"/> N

SARA 313

Supplier notification : ☒ ethylbenzene

CAS number 100-41-4 Concentration 0.1 - 1

Additional environmental information is contained on the Environmental Data Sheet for this product, which can be obtained from your PPG representative.

California Prop. 65

☒ **WARNING:** This product contains a chemical known to the State of California to cause cancer.

Canada

WHMIS (Canada) : ☒ Class B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). Class E: Corrosive liquid. Class D-2A: Material causing other toxic effects (Very toxic). Class D-2B: Material causing other toxic effects (Toxic).

Mexico

Classification

Flammability : ☒3 Health : ☒3 Reactivity : ☒0

16. Other information

Hazardous Material Information System (U.S.A.)

Health : ☒3 ☒* Flammability : ☒3 Physical hazards : ☒0

(*) - Chronic effects

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Health : ☒3 Flammability : ☒3 Instability : ☒0

Date of previous issue : 11/2/2011.

Organization that prepared the MSDS : EHS

☒ Indicates information that has changed from previously issued version.

Disclaimer

16 . Other information

The information contained in this data sheet is based on present scientific and technical knowledge. The purpose of this information is to draw attention to the health and safety aspects concerning the products supplied by PPG, and to recommend precautionary measures for the storage and handling of the products. No warranty or guarantee is given in respect of the properties of the products. No liability can be accepted for any failure to observe the precautionary measures described in this data sheet or for any misuse of the products.

PRODUCT NAME: #ELASTUFF 101 MC BASE MED GRAY

PRODUCT CODE: EF-101-B-G-XX

~~~~ SECTION 1 ~~~~ MANUFACTURER IDENTIFICATION ~~~~

Manufacturer's Name : Quest Construction Products, LLC
 Address : 1465 Pipefitter Street
 : North Charleston, SC 29405
 : INITIAL (FIRST CALL) CHEMTREC (800) 424-9300
 INFORMATION PHONE : (800) 739-5566
 TOLL FREE : BACKUP (800) 541-4383
 DATE PRINTED : 5/15/2012
 DATE REVISED : MAY 2012

~~~~ SECTION 2 ~~~~ HAZARDOUS INGREDIENTS/SARA III INFORMATION ~~~~

Reportable Components	CAS Number	MM HG @ Temp	Weight %
POLYURETHANE PREPOLYMER	39420-98-9		<29
Diphenylmethane Diisocyanate (MDI)	CAS# 101-68-1	<=24%	
OSHA PEL 0.02 PPM CEILING 0.2 (MG/M3) CEILING			
~			
Aluminum Trihydroxide	21645-51-2	N/A N/A	<28
ACGIH TLV: 10mg/m3 Dust			
OSHA PEL: 15mg/m3 Total Dust			
OSHA PEL: 5mg/m3 Respirable Dust			
* Xylol (Xylene mixture)	1330-20-7	5.1 20C	<18
* Xylol contains:			
* Xylene (mixed isomers) CAS# 1330-20-7			
* ACGIH TLV, TWA: 100ppm STEL: 150ppm,			
* OSHA PEL, TWA: 100ppm, STEL: 150ppm. (75%)			
* Ethylbenzene, CAS#100-41-4, ACGIH TLV, TWA: 100ppm, STEL: 125ppm,			
* OSHA PEL, TWA: 100ppm, STEL: 125ppm. (25%).			
* Toluene CAS#108-88-3, (0.6%) ACGIH TLV, TWA: 50ppm (SKIN),			
* OSHA PEL, TWA: 100ppm, STEL: 150ppm. (.3%-1.5%).			
Chlorinated paraffin waxes	63449-39-8	N/A N/A	<16
Good industrial practice suggests observing the ACGIH-OSHA TWA exposure limit for oil mists of 5mg/m3.			
~			
Titanium Dioxide	13463-67-7	N/A N/A	3
ACGIH TLV: 10mg/m3 Dust			
OSHA PEL: 15mg/m3 Total Dust			
OSHA PEL: 5mg/m3 Respirable Dust			
WHMIS: D2A- Toxic material causing other toxic effects.			
Tris(monochloropropyl)phosphate	13674-84-5	UKN UKN	3
No exposure guidelines have been established			
~			
Silica, amorphous, fumed	112945-52-5	N/A N/A	2
Silicon Dioxide (Synthetic) CAS#67762-90-7,			
No OEL's for this specific ingredient, OEL's for Silica CAS# 7631-86-9:			
OSHA PEL: 6mg/m3, ACGIH TLV: 10mg/m3			
~			
*# Antimony Oxide	1309-64-4	N/A N/A	1.1
Antimony Oxide Contains the following:			
Antimony Oxide, CAS#1309-64-4			
Antimony Oxide is a IARC Group IIB listed CARCINOGEN			
ACGIH: 0.5 mg/m3 TWA OSHA PEL: 0.5 mg/m3			
Arsenic, (<0.10%) CAS#7440-38-2			
ACGIH: 0.01mg/m3 TWA , OSHA PEL: 0.01mg/m3			
Lead CAS#7439-92-1, (<0.10%) ACGIH/TWA: 0.05mg/m3 OSHA PEL: 0.05mg/m3			
~			

* Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.

Indicates carcinogenic chemical.

NOTE: If tinted may contain Carbon Black CAS#1333-86-4 AND/OR Crystalline Silica CAS#14808-60-7. If tinted DARK GRAY or BLACK consider these levels to be reportable.

This MSDS may be used for other colors and container sizes of this product.

~~~~ SECTION 3 ~~~~ HAZARDS IDENTIFICATION ~~~~

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**Emergency Overview:**

**Potential Health Effects:**

In outside spray, mixing and rolling applications situate workers upwind of operation & provide airflow in a downwind direction so as to carry fumes and residual spray away from workers.

In confined spaces, mechanical exhaust ventilation, with volume and pattern capable of maintaining a fresh air supply or airline respirator, may be necessary. Refer to OSHA standard 29 CFR 1910.94 and/or ACGIH industrial ventilation for guidance about adequate ventilation. Turn off heating and/or air conditioning equipment to prevent contaminating building. When possible spray when building or structure is unoccupied.

**Eyes:**

MAY CAUSE MODERATE IRRITATION. VAPORS WILL IRRITATE EYES.

**Skin:**

May cause allergic reactions. Sensitization may develop after repeated and/or prolonged contact with human skin.

**Ingestion:**

ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS, WHICH CAN BE FATAL. INGESTION CAN RESULT IN IRRITATION OR CHEMICAL BURNS OF THE MOUTH, PHARYNX, ESOPHAGUS AND STOMACH/DIGESTIVE TRACT. INJURY MAY BE SEVERE AND CAUSE DEATH. KEEP PERSON WARM AND QUIET.

**Inhalation:**

Repeated or prolonged exposure to vapors or mists are irritating to the respiratory tract. Inhalation of vapors and mists of isocyanate at concentrations above recommended exposure limits can irritate the mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function. Persons with a preexisting, nonspecific bronchial hyperreactivity can respond to concentrations below the intended recommended exposure level with similar symptoms as well as an asthma attack. Exposure to higher levels may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in the lungs). These effects are usually reversible. Chemical or hypersensitive pneumonitis, with flu-like symptoms (e.g., fever, chills) has also been reported.

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**~~~~ SECTION 4 ~~~~ FIRST AID MEASURES ~~~~**

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**Eyes:**

For eye exposure, irrigate the exposed eyes with copious amounts of tepid water for at least 15 minutes. If the victim is wearing contact lenses, they should be removed, provided such removal does not cause further damage to the eyes. Consult a physician or ophthalmologist immediately.

**Skin:**

Remove product and immediately flush affected area with water for at least 15 minutes. Cover the affected area with a sterile dressing or clean sheeting and consult a physician immediately, except for the most minor, superficial and localized burns. Do not apply greases or ointments. Control shock if present. Discard or launder contaminated clothing before reuse. Contaminated leatherwear should be discarded.

**Ingestion:**

Do not induce vomiting. Give 1 to 2 cups milk or water. If vomiting occurs, keep victim's head below the hips to prevent breathing vomit into the lungs. Consult a physician immediately.

**Inhalation:**

Move to fresh air; administer oxygen by a qualified individual or artificial respiration as needed. Consult a physician immediately. Asthmatic-type symptoms may develop and may be immediate or delayed several hours. Treatment is essentially symptomatic.

**Note to Physician:**

Eyes - Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation frequently. Workplace vapors could produce reversible corneal epithelial edema impairing vision.

Skin- this compound is a potent skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burn.

Ingestion - Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of the compound.

Inhalation- treatment is essentially symptomatic. An individual having a dermal or pulmonary sensitization reaction to this material should be removed from any exposure to Isocyanate. Throughout a symptomatic victim's treatment course, monitor the ECG, chest x-ray, pulse oximetry, peak airflows, arterial blood gases, serum electrolytes, and renal and hepatic function

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**~~~~ SECTION 5 ~~~~ FIRE FIGHTING MEASURES ~~~~**

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**Flammable Properties**

Flash Point: 26.7C

Lower Flammable Limits: 1

Upper Flammable Limit: 7

Auto Ignition Temperature: Not available

**Extinguishing Media:**

Foam, CO2, dry chemical, water fog

**Special Fire Fighting Procedures:**

Isolate fire area and deny unnecessary entry. Move container from fire area if this is possible without hazard. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Personnel engaged in fighting Issocyanate fires must be protected against nitrogen dioxide fumes as well as Issocyanate vapors. Firefighters must wear self-contained breathing apparatus and turnout gear.

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~~~~ SECTION 6 ~~~~ ACCIDENTAL RELEASE MEASURES ~~~~

Small Spill:

Clean up personnel must be equipped with self contained breathing apparatus and butyl rubber protective clothing. Evacuate area of all non-essential personnel. Extinguish all nearby sources of ignition and ventilate area using explosion proof mechanical exhaust ventilation as vapors are heavier than air and are combustible or flammable and may migrate to a source of ignition.

Clear the area of unnecessary personnel. Insure a trained response team is in emergency protective equipment. Prevent further spillage and contain the spill using dikes made of sand, earth or spill pillows. Cover the spill area with a non-combustible absorbant material (e.g., absorbant clay, earth, sand) to absorb as much liquid as possible. Shovel the absorbant into open top containers. Do not fill to the top or cover the containers. Prepare a decontaminating solution as follows:

Option 1: consists of a solution 90% water, 8% concentrated ammonia solution and 2% liquid detergent.

Option 2: consists of a solution 90-95% water, 5-10% sodium carbonate and 0.2-0.5% liquid detergent.

Pour the liquid decontaminant liberally over the remaining spill area and spread with a broom or squeegee to insure contact. Let stand 10-15 minutes @25c(77f), longer at lower temperatures. Then wash down the area with plenty of water. In a well ventilated area, add enough liquid decontaminant solution to the containers with the absorbed spill material to obtain an approximate 10:1 ratio of decontaminate solution to spill material. Mix the liquid-absorbant slurry and let stand for 12-24 hours. Stir periodically, or the liquid-absorbant slurry may solidify. Leave the lids on loosely. After decontamination solution has been in contact with the spilled material for 24-48 hours, and the evolved carbon dioxide has vented away, tighten down the lids and dispose of the mixture in accordance with local, state and federal regulations. Test the area for residual isocyanate vapors before allowing workers to re-enter the area. When safe working conditions have been re-established, remove and decontaminate all equipment used.

Large Spill:

Clear the area of all non-essential personnel. Stay up-wind to avoid breathing vapor. If inside a building, or near HVAC equipment, shut down the HVAC system and ventilate the area as vapors are harmful and flammable or combustible and may migrate to a source of ignition. (if mechanical ventilation equipment is to be used to ventilate the area, use only explosion proof equipment). Prevent access to area.

If transportation spill involved call Chemtrec, (800) 424-9300. If temporary control of isocyanate vapor is required, a blanket of protein foam (available at most fire departments) may be placed over the spill. Large quantities may be pumped into closed but not sealed containers for disposal. Dike spill to prevent entry into sewers, storm drains, surface waters or soil.

Notify the appropriate state, local and federal authorities as well as the material supplier. Insure a trained response team is in appropriate emergency equipment. Prevent further spillage. Contain the spill using sand bags; spill pillows, dirt dikes, etc. It is important that this material not be allowed to enter drains. The reaction with water can be violent and forms an insoluble material, which may cause blockage. If this material does enter drains, flush with ample quantities of water and notify the sewer authority immediately.

For further information see Small Spill.

Solidified spillage:

Where spills have solidified, sandblasting is the preferred removal method, particularly for road spills. Wear special protective clothing for sandblasting, along with self-contained breathing equipment. Contaminated sand must be collected for decontamination and disposal.

~~~~ SECTION 7 ~~~~ HANDLING AND STORAGE ~~~~

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**Handling & Storage:**

Store in a cool, dry, well ventilated area in tightly closed containers to prevent moisture contamination. Unused product remaining in opened containers must be purged with dry nitrogen before resealing to prevent CO2 pressure build-up due to moisture contamination. If moisture or water contamination is suspected, do not reseal. Open sealed drums slowly to release any pressure due to possible CO2 pressure build-up.

**Other Precautions:**

DO NOT PUNCTURE, CUT, GRIND, WELD, BRAZE, SOLDER OR DRILL ON OR NEAR THIS CONTAINER OR OTHERWISE EXPOSE SUCH CONTAINER TO HEAT, FLAME, SPARKS, STATIC ELECTRICAL CHARGES, ELECTRICITY OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND/OR EMIT TOXIC VAPORS RESULTING IN INJURY OR DEATH. CLOSED CONTAINERS MAY EXPLODE DUE TO PRESSURE BUILD-UP IF EXPOSED TO WATER OR MOISTURE OR EXTREME HEAT. CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL RETAIN PRODUCT RESIDUE AND VAPORS. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY CONTAINERS AS IF THEY WERE FULL. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR OR SPRAY MIST. USE ONLY IN A WELL VENTILATED AREA. KEEP OUT OF THE REACH OF CHILDREN.

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~~~~ SECTION 8 ~~~~ EXPOSURE CONTROLS/PERSONAL PROTECTION ~~~~

Engineering Controls:

Respiratory Protection:

The hazards of both part A and part B will be exhibited when

combined.

Good industrial hygiene practice dictates that when Isocyanate-based coatings are mixed/sprayed and applied, some Type of respiratory protection should be worn.

A properly fitted air-purifying (combination organic vapor and particulate) respirator, proven by test to be effective in isocyanate containing spray/vapors during coating operations, and used in accordance with the recommendations of the manufacturer, can be used when the following conditions are met:

- concentration of vapors is unknown.

- or concentrations exceed those in section II.

- or the airborne Isocyanate (polymeric, oligomeric) concentration exceeds 5mg/m³ Averaged Over 8 Hours) OR 10mg/m³ average over 15 Minutes

- or operations are being performed in confined space.

- and a NIOSH certified end of service life indicator or a change schedule based upon objective information or data is used to ensure that cartridges are replaced before the end of their service life. In addition, pre-filters should be changed whenever breathing resistance increases due to particulate buildup.

if a NIOSH certified end of service life indicator or a change schedule based upon objective information or data cannot be met, then a supplied air respirator must be used.

Monitoring: Refer To Patty's Industrial Hygiene And Toxicology-Volume 1(3rd Edition) Chapter 17 Volume III (First Edition) Chapter 3, for guidance concerning appropriate air sampling strategy to determine airborne concentrations of Isocyanate.

Medical surveillance: Supervision of all employees who handle or come in contact with this product is recommended. This should include pre-employment and periodical medical examinations with respiratory function test (fev, fvc as a minimum). Persons with asthma-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with Isocyanate. Once a person is diagnosed as sensitized to Isocyanate, no further exposure can be permitted

Additional protective measures safety showers and eyewash stations should be readily available to work area. Educate and train employees in safe use of product. Follow all MSDS and label instructions.

Skin Protection:

The use of gloves impermeable to the specific material handled is advised to prevent skin contact and possible irritation. Note that PVA degrades in water.

Eye Protection:

Eye Protection: Safety glasses with side shields recommended.

~~~~ SECTION 9 ~~~~ PHYSICAL AND CHEMICAL PROPERTIES ~~~~

Boiling Range: 138.9C - 2597F@760Hg

Melting Point: N/A

Specific Gravity(H₂O=1): 1.3916
Vapor Density(Air=1): Heavier than air
Vapor Pressure: NO DATA
Evaporation Rate(N-Butyl Acetate=1) : Unknown
Coating V.O.C.: 2.06 lb/gl Coating V.O.C.: 247 g/l
Material V.O.C.: 2.06 lb/gl Material V.O.C.: 247 g/l
Solubility in Water: Insoluble-reacts.
Appearance: Moderately viscous pigmented liquid, various colors.

Odor: Aromatic odor.

pH: N/A

~~~~ SECTION 10       ~~~~ STABILITY & REACTIVITY DATA ~~~~

**Stability:**

Stable

**Conditions To Avoid:**

AVOID HEAT, SPARKS, OPEN FLAME AND OTHER IGNITION SOURCES, EXTREME HEAT CONDITIONS AND WATER CONTACT. REACTION WITH WATER CAN RESULT IN PRESSURE BUILDUP OF THE CONTAINER RESULTING IN RUPTURE OF THE CONTAINER.

**Incompatible Materials:**

Avoid water, alcohol, ammonia, amines, alkalies and acids.  
Some reactions can be violent.

**Hazardous Decomposition Products**

Products of combustion include isocyanate vapor & mist, carbon monoxide, carbon dioxide, hydrogen cyanide, nitrogen oxides and sulfur oxides and unidentified products in fumes and smoke.

**Hazardous Polymerization:**

May occur. Contact with moisture or other materials, which react with isocyanates, may cause polymerization.

~~~~ SECTION 11       ~~~~ TOXICOLOGICAL INFORMATION ~~~~

*Data is for individual components of preparation.

Materials having a known chronic/acute effects on eyes:

Eye irritation-irritating

Materials having a known dermal toxicity.

SKIN IRRITATION- IRRITATING

Materials having a known oral toxicity.

Rat, oral LD50-10,000 mg/kg.

Materials having a known Inhalation hazard:

Rat, 4hr inhalation LC50-aerosol 490mg/m³

Highly toxic

Rat, 4hr inhalation LC50-vapor 11mg/L.

Identified Acute/ Short-term Effects:

EYE IRRITATION AND TEARING. SKIN IRRITATION AND POSSIBLY SENSITIZATION. IRRITANT TO RESPIRATORY PASSAGES. IF SWALLOWED, IRRITATION OR CHEMICAL BURNS TO MOUTH, PHARYNX, ESOPHAGUS AND STOMACH CAN DEVELOP. INJURY MAY BE SEVERE AND CAUSE DEATH.

Identified Carcinogens/Longterm Effects:

RESULTS FROM A LIFETIME INHALATION STUDY IN RATS INDICATE THAT MDI AEROSOL WAS CARCINOGENIC AT 6MG/M³, THE HIGHEST DOSE TESTED.

THIS IS WELL ABOVE THE RECOMMENDED TLV OF 5PPB (0.05 MG/M3). ONLY IRRITATION WAS NOTED AT THE LOWER CONCENTRATION OF 0.2 AND 1 MG/M3. AS A RESULT OF PREVIOUS REPEATED OVER EXPOSURES OR A SINGLE LARGE DOSE, CERTAIN INDIVIDUALS WILL DEVELOP ISOCYANATE SENSITIZATION (CHEMICAL ASTHMA) WHICH WILL CAUSE THEM TO REACT TO A LATER EXPOSURE TO ISOCYANATE AT LEVELS WELL BELOW THE PEL/TLV. THESE SYMPTOMS, WHICH INCLUDE CHEST TIGHTNESS, WHEEZING, COUGH, SHORTNESS OF BREATH, OR ASTHMATIC ATTACK, COULD BE IMMEDIATE OR DELAYED UP TO SEVERAL HOURS AFTER EXPOSURE. SIMILAR TO MANY NON-SPECIFIC ASTHMATIC RESPONSES, THERE ARE REPORTS THAT ONCE SENSITIZED AN INDIVIDUAL CAN EXPERIENCE THESE SYMPTOMS UPON EXPOSURE TO DUST, COLD AIR, OR OTHER IRRITANTS. THIS INCREASED LUNG SENSITIVITY CAN PERSIST FOR WEEKS AND IN SEVERE CASES FOR SEVERAL YEARS. CHRONIC OVEREXPOSURE TO ISOCYANATES HAS ALSO BEEN REPORTED TO CAUSE LUNG DAMAGE, INCLUDING A DECREASE IN LUNG FUNCTION, WHICH MAY BE PERMANENT. SENSITIZATION MAY BE EITHER TEMPORARY OR PERMANENT. PROLONGED CONTACT CAN CAUSE REDDENING, SWELLING, RASH, SCALING, OR BLISTERING. IN THOSE WHO HAVE DEVELOPED A SKIN SENSITIZATION, THESE SYMPTOMS CAN DEVELOP AS A RESULT OF CONTACT WITH VERY SMALL AMOUNTS OF LIQUID MATERIAL, OR EVEN AS A RESULT OF VAPOR-ONLY EXPOSURE.

PROLONGED OR REPEATED EXPOSURE TO HIGH CONCENTRATIONS OF XYLENE MAY CAUSE NEURAL DYSFUNCTION. LABORATORY ANIMALS EXPOSED TO HIGH DOSES OF XYLENE SHOWED EVIDENCE OF EFFECTS IN THE LIVER, KIDNEYS, LUNGS, SPLEEN, HEART AND ADRENALS. RATS EXPOSED DURING PREGNANCY SHOWED EMBRYO/FETOTOXIC EFFECTS. XYLENE HAS ALSO BEEN SUGGESTED TO CAUSE HEARING LOSS.

TITANIUM DIOXIDE HAS RECENTLY BEEN CLASSIFIED BY THE IARC AS A GROUP 2B CARCINOGEN "POSSIBLY CARCINOGENIC TO HUMANS.

Identified Teratogens:

Xylene has been shown to cause birth defects in laboratory animal studies. The relevance of these findings to humans is uncertain.

Identified Reproductive toxins :

NO DATA.

Identified Mutagens:

NO DATA.

~~~~~ SECTION 12 ~~~~~ ECOLOGICAL INFORMATION ~~~~~

**Ecotoxicological effects on plants and animals:**

DAPHNIA MAGNA, 24 HR LC50->5000 MG/L.  
PRACTICALLY NONTOXIC  
ZEBRA FISH, STATIC 24 HR LC50->500 MG/L.  
PRACTICALLY NONTOXIC  
TOXICITY TO BACTERIA->100MG/L  
PRACTICALLY NONTOXIC.

**Chemical Fate :**

In outside spray, mixing and rolling applications situate workers upwind of operation & provide airflow in a downwind direction so as to carry fumes and residual spray away from workers. Local exhaust ventilation recommended if generating vapor, dust or mist. Turn off heating and/or air conditioning equipment to prevent

contaminating building.

If exhaust ventilation is not adequate, use MSHA or NIOSH approved respirator. Refer to OSHA standard 29 CFR 1910.94 for guidelines.

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~~~~ SECTION 13 ~~~~ DISPOSAL CONSIDERATIONS ~~~~

Instructions:

Dispose of unused product or contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures. Incineration is acceptable and the preferred method of disposal, however; nitrogen oxide emissions controls may be required to meet specifications. Chemical and biological degradation is possible.

~~~~ SECTION 14 ~~~~ TRANSPORT INFORMATION ~~~~

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**Shipping Information:**

U.S. DOT TRANSPORT INFORMATION      49 CFR 172.101  
PROPER SHIPPING NAME: PAINT  
DOT DESCRIPTION: UN 1263    Class: 3    Packing Group III

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~~~~ SECTION 15 ~~~~ REGULATORY INFORMATION ~~~~

(Not meant to be all inclusive-selected regulations represented)

US Regulations:

Status Of Substances Lists:

The Concentrations Shown In Section II Are Maximum Ceiling Levels (Weight %) to be used for calculations for regulations. A reportable quantity is a quantity of a hazardous substance that triggers reporting requirements under the Comprehensive Environmental Response Compensation And Liability Act (CERCLA).

If a spill of a substance exceeds it's reportable quantity (RQ) in CFR 302.3, Table 40 302.4 Appendix A & 302.4 Appendix B, the release must be reported to The National Response Center At (800) 424-8802, The State Emergency Response Commission (SERC), And community emergency coordinators likely to be affected.

Components present that could require reporting under the statute are:

Xylene CAS# 1330-20-1 RQ: 100 lbs

Ethylbenzene CAS# 100-41-4 RQ: 1,000 lbs

SEE SECTION II FOR PERCENTAGES

*TOXIC: NOT REPORTABLE IN QUANTITIES LESS THAN 1%

#CARCINOGEN: NOT REPORTABLE IN QUANTITIES LESS THAN .1%

ANTIMONY OXIDE CAS#1309-64-4 RQ 5000 #

Superfund Amendments And Reauthorization Act Of 1986 (SARA) Title III Requires emergency planning based on the Threshold Quantities (TPQ'S) and release reporting based on Reportable Quantities (RQ'S) In 40 CFR 355 Appendix A&B Extremely Hazardous Substances. The emergency planning and release requirements of 40 CFR 355 apply to any facility at which there is present any amount of any extremely hazardous substance (EHS) equal to or in excess of it's Threshold Planning Quantity (TPQ).

Components present that could require reporting under the statute are:

Xylene CAS#1330-20-7

De minimis Concentration (%): 1.0
Reporting Threshold: Standard

Ethylbenzene CAS# 100-41-4
De minimis Concentration: 1.0%
Reporting Threshold: Standard

EPCRA 40 CFR 372(Section 313) Requires EPA and the States to annually collect data on releases of certain toxic materials from industrial facilities, and make the data available to the public in the Toxics Release Inventory(TRI). This information must be included in all MSDS'S that are copied and distributed or compiled for this material. Reporting Threshold: Standard: A facility must report if it manufactures (including imports) or processes 25,000 pounds or more or otherwise uses 10,000 pounds or more of a listed toxic chemical during the calendar year.

Components present that could require reporting under the statute are:

See Section II

The components of this product are listed or excluded from listing on the US Toxic Substance Control Act (TSCA) chemical substance inventory. Mixtures shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it has a component in concentrations of 0.1 percent or greater. The remaining percentage of unspecified ingredients, if any, are not contained in above DeMinimis concentrations and/or are believed to be non-hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200), and may consist of pigments, fillers, defoamers, wetting agents, resins, dryers, anti-bacterial agents, water and/or solvents in varying concentrations.

International Regulations:

Canadian WHMIS:

This Product Contains the following in recordable amounts:

Titanium Dioxide CAS#13463-67-7

WHMIS Classification: D2A

WHMIS Health Effects Criteria Met by this Chemical:

Very toxic material causing other toxic effects

Canadian Environmental Protection Act (CEPA):

NONE KNOWN

EINECS:

ALL OF THE COMPONENTS OF THIS PRODUCT ARE LISTED IN THE EINECS INVENTORY OR ARE EXEMPT FROM NOTIFICATION REQUIREMENTS. (THE EINECS NUMBER FOR QUARTZ: 231-545-4).

State Regulations:

California:

California Proposition 65: The following Statement is made in order to comply with The California Safe Drinking Water and Toxic Enforcement Act of 1986

"WARNING: This product contains the chemical(s) appearing below known to the State of California to:

A: Cause Cancer

TITANIUM DIOXIDE (AIRBORNE, UNBOUND PARTICLES OF RESPIRABLE SIZE)

Ethylbenzene CAS# 100-41-4 Proposition 65 Code:C
ANTIMONY OXIDE CAS#1309-64-4

*If tinted contains Carbon Black: CAS#1333-86-4 and may also contain trace amounts of Crystalline Silica: CAS#14808-60-7

B: Cause Birth Defects or other Reproductive Harm :

Toluene CAS#108-88-3 this substance is listed as having developmental toxicity.

In addition to the above named chemical(s) (if any), this product may contain trace amounts of chemicals, known to the State of California, to cause Cancer or Birth Defects and other Reproductive Harm

Delaware:

Toluene CAS# 108-88-3 DRQ: 1,000.
Xylene CAS#1330-20-7 DRQ 100

Ethylbenzene CAS# 100-41-4 DRQ: 1,000.
Listed on the Delaware Air Quality Management List:
ANTIMONY OXIDE CAS#1309-64-4 DRQ 1000#

Florida:

TOLUENE CAS#108-88-3 LISTED AS TOXIC
XYLENE CAS # 1330-20-1 LISTED AS TOXIC
ETHYLBENZENE CAS#100-41-4 LISTED AS TOXIC
Listed as Toxic:
Antimony Oxide CAS#1309-64-4

Idaho:

Toluene CAS# 108-88-3
Idaho Air Pollutant List:
Title 585--AAC: 18.75 Title 586--AAAC: --
Title 585--EL: 25 Title 586--EL: --
Title 585--OEL: 375 Title 586--OEF: --
Xylene (Mixed Isomers) CAS# 1330-20-7
Idaho Air Pollutant List:
Title 585--AAC: -- Title 586--AAAC: --
Title 585--EL: -- Title 586--EL: --
Title 585--OEL: -- Title 586--OEF: --
Ethyl Benzene CAS# 100-41-4
Idaho Air Pollutant List:
Title 585--AAC: 21.75 Title 586--AAAC: --
Title 585--EL: 29 Title 586--EL: --
Title 585--OEL: 435 Title 586--OEF: --

Massachusetts:

Toluene CAS#108-88-3 Substance Codes: 2, 4, 5, 6, F7, F8, F9
Xylene CAS #1330-20-7 Substance Codes: 2, 4, F8, F9

Ethylbenzene CAS#100-41-4 Substance Codes: 2, 4, 5, 6, F7, F8, F9

Titanium Dioxide CAS#13463-67-7 SUBSTANCE CODES: 4

ANTIMONY OXIDE CAS#1309-64-4 SUBSTANCE CODES: 2, 4, F8, F9

Michigan:

Toluene CAS#108-88-3 Report: -- Class: --

Michigan Critical Material:

Xylene (mixed isomers) CAS# 1330-20-7

Note: -- CMR#: 44 Parameter #: 01330-20-7 AUP: 100

Minnesota:

Toluene CAS# 108-88-3 Codes: ANO Ratings: 8.64 Status:
Air Pollutant Title III, TRI, Water Pollutant

Xylene CAS#1330-20-7

Codes: ANO

Ratings: 8.77

Status: Air pollutant Title III, TRI

Ethylbenzene CAS# 100-41-4

Codes: AO

Ratings: 8.95

Status: Air Pollutant Title III, TRI, Water Pollutant.

Titanium Dioxide CAS#13463-67-7

Listed In The Minnesota Hazardous Substances List:

Codes: A

Hazards: --

Carcinogen? IARC GROUP 2B

ANTIMONY OXIDE CAS#1309-64-4

LISTED IN THE MINNESOTA HAZARDOUS SUBSTANCES LIST:

CODES: A

HAZARDS: --

CARNINOGEN? YES

New Jersey:

Toluene CAS#108-88-3 DOT#: 1294 Substance#: 1866, TPQ:--

Xylene CAS#1330-20-1

DOT#: 1307

Substance#: 2014

TPQ --

EHS:

Ethylbenzene CAS#100-41-4 DOT#: 1175, Substance#: 0851 TPQ: --

New York:

Toluene CAS#108-88-3 RQ (air): 1000, RQ (land/water): 1

Xylene CAS# 1330-20-1

RQ air: 1000

RQ land/water: 1

Ethylbenzene CAS#100-41-4 RQ (air): 1000, RQ (land/water): 1

ANTIMONY OXIDE CAS#1309-64-4 RQ--AIR 1000, RQ--LAND 100

Pennsylvania:

Toluene CAS#108-88-3 CODE:E

Xylene CAS#1330-20-1 CODE:E

Ethylbenzene CAS#100-41-4 CODE:E

Titanium Dioxide CAS#13463-67-7 CODE:--

ANTIMONY OXIDE CAS#1309-64-4 CODE:E

Washington:

Toluene CAS#108-88-3

Washington air contaminant: ppm mg/m3

TWA 100 375

STEL 150 560

Ceiling --- ---

Skin: --

Xylene CAS# 1330-20-1

Washington Air Contaminant: ppm mg/m3

TWA 100 435

STEL 150 655

Ceiling --- ---

Skin: ---

Ethylbenzene CAS#100-41-4

Washington air contaminant: ppm mg/m3

TWA 100 435

STEL 125 545

Ceiling --- ---

Skin: ---

Titanium Dioxide(Total Dust) CAS#13463-67-7

Washington Air Contaminant: ppm mg/Cubic Meter

TWA UNK 10

STEL UNK UNK

CEILING UNK UNK

SKIN:UNK

Wisconsin:

NONE KNOWN

West VirginiaThe following is on the West Virginia Toxic Air Pollutant
List:

Titanium Dioxide CAS#13463-67-7

~~~~ SECTION 16 ~~~~ OTHER INFORMATION ~~~~

HMIS® III**Health** : 3***Flammability** : 3**Physical Hazard** : 1

*Following Health rating Indicates Chronic/Carcinogenic Effects

HMIS® III Personal Protection : K

This rating is for the product as it is packaged. This rating will need to be adjusted by the user based on conditions of use.

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them & determine the suitability & completeness of information from all sources to assure proper use & disposal of these materials & the safety & health of employees & customers



Material Safety Data Sheet

EMERGENCY CONTACTS

Spills, leaks, fire or exposure call Chemtrec: (800) 424-9300

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

| | | | | |
|---------------|-----------------------------------------------------|---------------|---------------------|---|
| Product Name: | Poly-Sil 2500 High Solids Series Volatile Compliant | HMIS® Rating: | Health | 2 |
| Product Use: | Silicone Roof Coating | | Flammability | 1 |
| Company: | COATING & FOAM SOLUTIONS, LLC | | Reactivity | 0 |
| | 1100 Cottonwood Ave. Suite 300 | | Personal Protection | X |
| | Hartland, WI 53029 | | | |
| | (888) 284-7488 | | | |

0= Minimal 1=Slight 2=Moderate 3=Serious 4=Severe

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

| Reportable components | CAS number | Vapor Pressure
Mm Hg @ TEMP | Weight
Percent (+/-2%) |
|------------------------------------------------------------------------------|------------|--------------------------------|---------------------------|
| Crystalline Silica | 14808-60-7 | N/A | 31 |
| OSHA PEL: 0.1 mg/M3 (as respirable dust only - not in liquid product state) | | | |
| ACGIH PEL: 0.1 mg/M3 (as respirable dust only - not in liquid product state) | | | |

SECTION 3 – HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Health Hazards: Irritating to eyes, respiratory system and skin. Common irritation symptoms- headache, nausea, nose and throat irritation-may result from overexposure.

Appearance: Viscous Liquid

Odor: Slight sweet odor

Read the entire MSDS for a more thorough assessment to the hazard information on this product.

SECTION 4 – FIRST AID MEASURES

General: In case of accident or if you feel unwell, seek medical advice IMMEDIATELY. (Show the label where possible.)

Eye contact: In case of contact, flush eyes with large amounts of running water for at least 15 min. Hold eyelids apart to ensure rinsing of the entire surface of the eye and lids with water. Get medical attention.

Skin Contact: Remove as much of the material as possible using mechanical/waterless methods before washing with water. Seek medical attention for any burns or irritation resulting from contact with cure by-products.

Inhalation: If inhaled, remove to fresh air and provide oxygen if breathing is difficult. Give artificial respiration if not breathing. Get medical attention.

Ingestion: Never give an unconscious person anything to drink. If unconscious, treat for shock. Notify a physician or the nearest poison control center immediately. If conscious, have the person rinse his mouth with cold water. Do not attempt to induce vomiting (vomiting may occur naturally, but should be avoided if possible). If unconscious and vomiting, turn the person to his side to avoid choking.

SECTION 5 – FIRE-FIGHTING MEASURES

Fire and Explosion Hazards: This product is not considered combustible and is not fire hazard. It will not support combustion but may decompose under fire conditions to give off toxic materials. Do not pour, spill or store near heat, spark sources or open flame.

Extinguishing Media: Use foam, dry chemical, CO₂, or water.

Fire Fighting Procedures: As appropriate for surrounding materials/equipment. If electrical equipment is involved, the use of foam should be avoided. Use water spray to cool non-involved containers.

Fire Fighting Protective Equipment: Wear self-contained breathing apparatus with a full-face piece operated in the positive pressure demand mode and full protective clothing (Bunker Gear) when fighting fires.

Flash Point: >290°F

Method Used: (COC) ASTM D-92

Flammable Limits In Air by Volume (Lower): N/A

Flammable Limits In Air by Volume (Upper): N/A

Rate of Burning: N/A

Explosive Power: N/A

Sensitivity to Static Discharge: N/A

Combustion Products: Carbon monoxide, carbon dioxide, nitrogen oxides

SECTION 6 – ACCIDENTAL RELEASE MEASURES

For major spills call CHEMTREC (800-424-9300).

Spills, Leaks, or Releases: Ventilate area. Absorb spill with absorbent material such as sawdust, vermiculite or sand, and place in a closed container. In case of large spill, dike the area to prevent this material from entering water systems or sewers. (See section 12: Disposal Considerations)

SECTION 7 – HANDLING AND STORAGE

Handling: Avoid breathing aerosols, spray mists and heated vapors. Avoid prolonged or repeated skin contact. (See Section 8—Exposure Control for details).

Storage Requirements: Keep containers properly sealed when stored indoors, in a cool well-ventilated area. Keep contents away from moisture. Keep away from heat, sparks and open flame. As standard practice never use welding or cutting torch on or near any container (even empty) as an explosion may occur. Care should be taken to prevent moisture condensation in the container.

Storage Temperature: Avoid storage above 100°F.

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

PREVENTATIVE MEASURES:

Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Work / Hygienic Practices: Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before reuse. Shower after work, using plenty of soap and water. Open containers of food and beverages should be kept away from areas where the product is used or stored. Eating, drinking, smoking and application of cosmetics should be prohibited in areas where the product is being used.

Engineering Controls: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s). General ventilation is recommended. Additional local exhaust ventilation is recommended where vapors, mists, or aerosols may be released.

Personal Protective Equipment:

Eye Protection: Wear protective eyeglasses or chemical safety goggles, per OSHA eye and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protection devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Skin Protection: Wear chemical resistant gloves. Wear protective clothing to prevent skin contact. Keep exposed skin area to a minimum. Eye wash station and safety shower should be available.

Respiratory Protection: If exposure can exceed the PEL/TLV, use only NIOSH/MSHA approved air purifying or supplied air respirator operated in a positive pressure mode per the NIOSH/OSHA occupational health guidelines for chemical hazards. If it is possible to generate significant levels of vapors or mists, a NIOSH approved or equivalent respirator is recommended.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: (Color - White, Lt Grey, Dark Grey, Tan) Viscous Liquid

Odor: Slight sweet odor.

Flash Point: >290°F

Method Used: (COC) ASTM D-92

Vapor Pressure (mm Hg at 20°C): Not Determined

Vapor Density (Air=1): Heavier than air

Boiling Point: 310 - 385°F

Melting Point: Not Determined

Solubility (Water): Negligible

Specific Gravity: (H₂O=1) 1.30

Evaporation Rate: Slower than ether

VOC: < 10 Grams/Liter (ASTM D-3960) EPA Method 24

SECTION 10 – STABILITY AND REACTIVITY

Hazardous Decomposition or Byproducts: By high heat or fire: Carbon Monoxide, Oxides of Nitrogen and various hydrocarbon fragments.

Chemical Stability: This is a stable product.

Conditions to Avoid: Keep away from heat, sparks, or flames

Incompatibility with other Substances: Avoid strong oxidizing agents, concentrated nitric and sulfuric acids, halogen, and molten sulfur.

Hazardous Polymerization: Will not occur

SECTION 11 – TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS:

No significant exposure to any ingredient is thought to occur during use in which the ingredients are bound to other materials in the liquid state as in paints and coatings.

Inhalation: Short-term inhalation toxicity is low. Breathing small amounts during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful.

Symptoms are more likely seen at air concentrations exceeding the recommended exposure limits. Symptoms of exposure may include: Irritation (nose, throat, and respiratory tract), metallic taste in mouth, impaired coordination, confusion, CNS depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, and unconsciousness).

Skin Contact: Exposure causes skin irritation. Prolonged or repeated exposure may dry the skin. Symptoms may include redness, burning, drying and cracking. Skin absorption is possible, but harmful effects are not expected from this route of exposure under normal conditions of handling and use.

Eye Contact: Exposure to liquid or vapor causes eye irritation. Symptoms may include stinging, tearing, and swelling.

Ingestion: Single dose or oral toxicity is low. Swallowing small amounts during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

Symptoms may include: Gastrointestinal irritation (nausea, vomiting, and diarrhea) and possible liver damage. This material can enter the lungs during swallowing or vomiting and cause lung inflammation and/or damage.

Medical Conditions Generally Aggravated by Exposure: May aggravate pre-existing respiratory and skin disorders.

Chronic Effects: Prolonged or repeated skin contact may cause dryness, defatting, and dermatitis.

Carcinogenicity: The ingredients of this product are known to the state of California to be carcinogenic. The ingredients of this product are not classified as carcinogenic by ACGIH or IARC, not regulated as carcinogens by OSHA, and not listed as carcinogens by NTP. No significant exposure to any ingredient is thought to occur during the use in which the ingredients are bound to other materials in the liquid state as in paints and coatings.

Mutagenicity: There is no substantial evidence of mutagenic potential.

SECTION 12 – DISPOSAL CONSIDERATIONS

This product has been tested and found to have a flash point above 290°F. If discarded in liquid form, this product may be treated as hazardous waste based on the characteristic of ignitability as defined under the federal RCRA regulations (40 CFR 261).

For further, information contact your state or local solid waste agency or the United States Environmental Protection Agency's RCRA hotline (1-800-434-9300 or 202-382-3000). Chemical waste, even small quantities should never be poured down drains, sewers or waterways. Empty containers should be decontaminated and either passed to an approved drum recycler or destroyed.

SECTION 13 – TRANSPORT INFORMATION

DOT: Roof Coating, Not Regulated.

Transportation Emergency Telephone Number: 1-800-424-9300 (CHEMTREC)

SECTION 14 – REGULATORY INFORMATION

OSHA: Not Regulated

TSCA (Toxic Substances Control Act) Regulations: This material or its components are listed on the TSCA Chemical Substance Inventory and is in compliance with all applicable rules and orders. One or more of the components may be exempt from listing on the TSCA Inventory.

SARA: This material does not contain any substances in the list of Toxic Chemicals subject to Section 313 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III), in excess of the applicable de minimis concentrations as specified in Section 372.38 (a).

State Right to Know Information

The following chemicals are specifically listed by individual states; other specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

MA right to know Extraordinarily Hazardous Substance List:

| <u>Reportable Component</u> | <u>CAS No</u> | <u>Weight % (\pm 2%)</u> |
|-----------------------------|---------------|--------------------------------------------------------|
| Crystalline Silica | 14808-60-7 | 31 (as respirable dust only, not while in liquid form) |

California Proposition 65: Warning: This product contains chemicals known to the state of California to be Carcinogenic.

| <u>Reportable Component</u> | <u>CAS No</u> | <u>Weight % (\pm 2%)</u> |
|-----------------------------|---------------|--------------------------------------------------------|
| Crystalline Silica | 14808-60-7 | 31 (as respirable dust only, not while in liquid form) |

SECTION 15 – OTHER INFORMATION

Glossary: ACGIH- American Conference of Governmental Industrial Hygienist
IARC- International Agency for Research on Cancer
MSHA- Mine Safety and Health Administration
NIOSH- National Institute for Occupational Safety and Health
NTP- National Toxicology Program
OSHA- Occupational Safety and Health Administration

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End of Data Sheet

MATERIAL SAFETY DATA SHEET

SECTION I - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : SYNCRYLAC - VARNISH CLEAR Y478
IDENTIFICATION NUMBER: T-185478J DATE PRINTED: 05/15/13
PRODUCT USE/CLASS :

SUPPLIER: Seagrave Coatings Corporation
209 N. MICHIGAN AVE
KENILWORTH NJ 07033
MANUFACTURER: Seagrave Coatings Corporation
209 N. MICHIGAN AVE
KENILWORTH NJ 07033

Emergency Telephone: 800-424-9300
24 Hour Emergency Hotline
Emergency Telephone: 800-424-9300
24 Hour Emergency Hotline

PREPARER: Hp, PHONE: 201-933-1000, PREPARE DATE: 10/15/12

SECTION II - COMPOSITION/INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS NUMBER | WY. PERCENT OCCUPATIONAL EXPOSURE LIMITS | | | | |
|-------------------|------------|------------------------------------------|---------|----------|---------|-------------|
| | | IS LESS THAN | TLV-TWA | TLV-STEL | PEL-TWA | PEL-CEILING |
| TOCUSH | 108-93-3 | 85.0 % | 100 ppm | 160 ppm | | YES |
| ACRYLIC COPOLYMER | N/A | 15.0 % | N.E. | N.E. | N.E. | NO |
| N-BUTYL ACETATE | 123-86-4 | 8.0 % | 120 ppm | 200 ppm | | YES |

(See Section 13 for abbreviation legend)

SECTION III - PHYSICAL DATA

BOILING RANGE : 231 - 259 F VAPOR DENSITY : is heavier than air
ODOR : CHARACTERISTIC SPECIFIC GRAVITY: 0.9021
APPEARANCE : LIQUID EVAPORATION RATE: Is faster than Butyl
SOLUBILITY IN H2O : Acetate
VOLATILE BY WEIGHT: 85.3% VOLATILE BY VOL.: 88.4%
VOCS, lbs/gal : 6.41 VOCS, grams/ltr : 768

(See Section XI for abbreviation legend)

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 45 F LOWER EXPLOSIVE LIMIT: 1.2 %
(SETAFLASH CLOSED CUP) UPPER EXPLOSIVE LIMIT: 7.6 %

EXTINGUISHING MEDIA: CO2 DRY CHEMICAL FOAM

(Continued on Page 2)

Product: T-185478J

Preparation Date: 10/15/12

Page 2

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

UNUSUAL FIRE AND EXPLOSION HAZARDS: KEEP CONTAINERS TIGHTLY CLOSED. VAPORS MAY MIGRATE TO IGNITION SOURCE AND CAUSE FLASH FIRE. ISOLATE FROM HEAT, SPARKS, ELECTRICAL EQUIPMENT, APPLIANCES, PILOT LIGHTS, FLAMES AND OTHER SOURCES OF IGNITION. FLAMMABLE LIQUID AND VAPOR. KEEP AWAY FROM HEAT, SPARKS AND FLAME. VAPORS MAY CAUSE FLASH FIRE. CLOSE CONTAINER AFTER EACH USE.

SPECIAL FIREFIGHTING PROCEDURES: USE NIOSH/MSHA APPROVED GAS MASK FOR FIRE FIGHTING PERSONNEL. WATER MAY BE USED TO COOL CONTAINERS. IF WATER IS USED FOG NOZZLES ARE PREFERRED.

SECTION V - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE: BREATHING OF HIGH VAPOR CONCENTRATIONS MAY PRODUCE MARCOSIS. LIQUID MAY CAUSE MINOR SKIN IRRITATION AND DEFINITE EYE IRRITATION. HARMFUL IF INHALED. MAY AFFECT THE BRAIN OR NERVOUS SYSTEM CAUSING DIZZINESS, HEADACHE OR NAUSEA. CAUSES NOSE AND THROAT IRRITATION. CAUSES EYE IRRITATION. CAUSES SKIN IRRITATION. REPEATED & PROLONGED OVEREXPOSURE TO SOLVENTS COULD CAUSE PERMANENT BRAIN & NERVOUS SYSTEM DAMAGE. INTENTION MISUSE BY DELIBERATELY CONCENTRATING & INHALING CONTENTS MAY BE HARMFUL OR FATAL.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: No Information.

EMERGENCY AND FIRST AID PROCEDURES: INHALATION: REMOVE TO FRESH AIR, RESTORE BREATHING. CONSULT A PHYSICIAN. SKIN CONTACT: FLUSH WITH WATER. EYE CONTACT: FLUSH IMMEDIATELY WITH LARGE AMOUNTS OF WATER. CONSULT A PHYSICIAN. FIRST AID: IN CASE OF EYE CONTACT, FLUSH IMMEDIATELY WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND GET IMMEDIATE MEDICAL ATTENTION; FOR SKIN WASH THOROUGHLY WITH SOAP AND WATER. IF AFFECTED BY INHALATION OF VAPORS OR SPRAY MIST, REMOVE TO FRESH AIR. IF SWALLOWED, GET MEDICAL ATTENTION IMMEDIATELY.

PRIMARY ROUTE(S) OF ENTRY: SKIN CONTACT INHALATION INGESTION

SECTION VI - REACTIVITY DATA

HAZARDOUS DECOMPOSITION PRODUCTS: COMBUSTION WILL PRODUCE CARBON DIOXIDE AND PROBABLY CARBON MONOXIDE.

CONDITIONS TO AVOID: EXCESSIVE HEAT, SPARKS, OR OPEN FLAME.

INCOMPATIBILITY: STRONG OXIDIZING AGENTS

HAZARDOUS POLYMERIZATION: Will not occur under normal conditions.

STABILITY: This product is stable under normal storage conditions.

(Continued on Page 3)

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: IN CASE OF SPILLAGE ABSORB WITH INERT MATERIAL AND DISPOSE OF IN ACCORDANCE WITH APPLICABLE REGULATIONS OF E.P.A. AND OTHER LOCAL, STATE, AND FEDERAL AUTHORITIES.

WASTE DISPOSAL METHOD: PLACE IN CLOSED CONTAINERS. DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VIII - SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION: NIOSH/OSHA APPROVED RESPIRATOR TYPES SUITABLE FOR MATERIALS IN SECTION II RECOMMENDED. APPROVED CHEMICAL/MECHANICAL FILTERS RECOMMENDED WHEN VENTILATION IS RESTRICTED. DO NOT BREATHE (DUST, VAPORS OR SPRAY MIST). WEAR APPROPRIATE, RESPIRATOR (NIOSH/MSHA APPROVED) DURING & AFTER APPLICATION UNLESS AIR MONITORING RECORDS VAPOR/MIST LEVELS BELOW APPLICABLE LIMITS. FOLLOW RESPIRATOR MANUFACTURER DIRECTIONS FOR USE.

VENTILATION: SUFFICIENT VENTILATION, IN VOLUME AND PATTERN, SHOULD BE PROVIDED TO KEEP AIR CONTAMINATION BELOW CURRENT APPLICABLE OSHA PERMISSIBLE EXPOSURE LIMIT OR ACGIH'S TLV LIMIT. USE WITH ADEQUATE VENTILATION.

PROTECTIVE GLOVES: RECOMMENDED FOR PROLONGED OR REPEATED CONTACT. CHEMICAL RESISTANT PLASTIC OR RUBBER.

EYE PROTECTION: CHEMICAL GOGGLES WITH SIDE SHIELDS OR FACE SHIELD RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT: AS REQUIRED TO AVOID WETTING CLOTHING. USE PROTECTIVE CREAMS WHERE SKIN CONTACT IS LIKELY. REMOVE AND WASH CONTAMINATED CLOTHING BEFORE REUSE. EYE BATH AND SAFETY SHOWER.

HYGIENIC PRACTICES: AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. WASH THOROUGHLY AFTER HANDLING.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: STORE AWAY FROM HEAT, SPARKS AND OPEN FLAME. AVOID PROLONGED SKIN CONTACT. DO NOT BREATHE SPRAY MIST. STORE IN A COOL DRY AREA WITH VENTILATION SUITABLE FOR STORING MATERIALS SHOWN IN SECTION II.

OTHER PRECAUTIONS: GROUND CONTAINERS WHILE POURING. AVOID SPONTANEOUS COMBUSTION OF CONTAMINATED RAGS OR OTHER ORGANIC MATERIALS. EMPTY CONTAINERS MAY RETAIN HAZARDOUS PROPERTIES AND CAN BE DANGEROUS.

(Continued on Page 4)

SECTION X - HMIS RATINGS

HMIS RATINGS - HEALTH: 2 FLAMMABILITY: 3 REACTIVITY: 0

SECTION XI - OTHER REGULATIONS

SARA SECTION 313:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

| CHEMICAL NAME | CAS NUMBER | WT/WT % IS LESS THAN |
|---------------|------------|----------------------|
| TOLUENE | 108-88-3 | 85.0 % |

U.S. STATE REGULATIONS: AS FOLLOWS -

NEW JERSEY RIGHT-TO-KNOW:

The following materials are non-hazardous, but are among the top five components in this product:

| CHEMICAL NAME | CAS NUMBER |
|----------------------------------------------------------------|------------|
| No non-hazardous materials are among the top five ingredients. | |

PENNSYLVANIA RIGHT-TO-KNOW:

The following non-hazardous ingredients are present in the product at greater than 3%:

| CHEMICAL NAME | CAS NUMBER |
|--------------------------------------------------------------|------------|
| No non-hazardous ingredients are present at greater than 3%. | |

CALIFORNIA PROPOSITION 65:

WARNING: The chemical(s) noted below and contained in this product, are known to the state of California to cause cancer, birth defects or other reproductive harm:

| CHEMICAL NAME | CAS NUMBER |
|----------------------------------------------------|------------|
| No Proposition 65 chemicals exist in this product. | |

PREVIOUS MSDS REVISION DATE: 08/04/11

LEGEND: N.A. - Not Applicable, N.E. - Not Established,
N.D. - Not Determined

The information contained on this MSDS is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

<END OF MSDS>