World Leading Manufacturer of Concrete Lifting Equipment, Training, and Material.

ENVIRONMENTAL IMPACT OF HMI POLYURETHANE FOAM

ENVIRONMENTAL IMPACT OF HMI POLYURETHANE FOAM

HMI is the ONLY company that makes polyurethane foam for concrete raising from recycled material. HMI manufactures an environmentally friendly, dual component polyurethane foam for raising and stabilizing concrete. Our patented materials (U.S. Provisional Patent Application No. 61/583,295) are made from recycled components, making it the "greenest" polyurethane foam on the market. Available in 2, 4, 5 and 6 lbs. per cubic foot density (free spray). HMI has developed this revolutionary new foam that is setting new standards in polyurethane foam quality. ASTM tested, this recycled material is the best foam available for raising and stabilizing concrete.

Biobased

Most polyurethane raw materials are petroleum based, meaning they are made using our limited oil resource. There has been a large push to use raw materials that can be replenished, or Biobased materials, instead of oil. HMI has embraced this "greener" option and uses biobased materials that are not only good for the environment, but actually enhance the foam properties. In addition to recycled materials, biobased components make the foam even "greener".

HMI RR201 & RR401G foams have been certified by USDA for their biobased content

Each foam is specifically designed for applications such as lifting, high density lifting, stabilization, and undersealing. Formulating with recycled foam, offers the advantage of using super charged raw materials that have already been quality foam. Recycled foam provides benefits like fast tack free time and a high compressive strength skin that avoids concrete adhesion and adds strength. Fast and aggressive expansion for lifting concrete, along with a 15 minute final cure time, allows for slab manipulation while adjusting for the perfect lift.

The following items will demonstrate how safe HMI foams are and their environmental impact.

-HMI Bio-preferred Summary
-Hydrofoam Leaching Study
-RR600 Leaching Study
-Cured SDS

FAST FACTS ON HMI FOAM

Uses Non-Ozone Depleting Blowing Agents

- VOC Exempt
- US EPA SNAP Listed

Saves Our Natural Resources

- Made with Biobased and/or Recycled Material
- Reduces Landfill Waste – compared to ripping out and replacing concrete
- Lasts a Lifetime

Non-Toxic and Non-Hazardous

- Cured Foam is Fully Inert
- Does Not Leach into Groundwater

DID YOU KNOW?

HMI does not use Toxic Chemicals

Major toxic chemicals, often associated with some types of polyurethanes, such as some blowing agents, formaldehyde, benzene and toluene **are NOT used in HMI foams**.
Most of what is warned against on the Internet pertains to these chemicals.

As Safe as the Cushions you sit on!

The foam we install in the ground is like the foam you sleep on in your mattress and sit on in your couch. Instead of it being built in a factory, we make the foam directly under the slab. Instead of being light and fluffy it is firm and strong.

Directly from the EPA

The EPA states that cured polyurethane is fine unless burned or ground into a fine dust..which will likely never happen with being installed under concrete slabs.

HMI BIO PREFERRED FOAMS

HMI RR201
May 2016-Earns USDA Certified Biobased Product Certification and Label

HMI RR 201= Certified 26%

Product Application
RR 201B is part of a dual-component system which is injected under concrete. The liquid materials react to create polyurethane foam. Expansion of the material compresses loose soils and raises concrete. RR 201B is the ideal polyurethane resin for residential concrete lifting.

Unique Feature
RR 201B was developed to have a fast reaction time and less spread. This offers more control when lifting slabs of concrete. Designed to mimic the speed of the traditional hydraulic mudjacking process, this is the first HMI foam specifically for residential polyurethane concrete raising. Formulated with recycled foam and biobased materials offers the advantage of using super charged raw materials that have already been quality foam. Recycled foam provides benefits like fast tact free time and high compressive strength skin that avoids concrete adhesion and adds strength. Fast and aggressive expansion for lifting concrete along with a 15 minute final cure time allows for slab manipulation while adjusting for the perfect lift.

HMI BIO PREFERRED FOAMS

HMI 401G
May 2016-Earns USDA Certified Biobased Product Certification and Label

HMI RR 401G=Certified 46%

Product Application
RR 401GB is part of a dual component system which is injected under concrete. The liquid materials react to create polyurethane foam. Expansion of the material compresses loose soils and raises concrete. It was developed for residential, commercial and D.O.T. contractors who are lifting and leveling concrete slabs even when a void is filled with water.

Unique Feature
RR 401GB has hydro-insensitive qualities that make it ideal for use in wet conditions. RR 401G uses gas as a blowing agent instead of water, allowing the presence of water in the soil to not affect the foam reaction, cure time or performance. HMI has developed this revolutionary new foam that is setting new standards in polyurethane foam quality. ASTM tested, this is the best foam available for raising and stabilizing concrete. Formulated with recycled foam and biobased materials offers the advantage of using super charged raw materials that have already been quality foam. Recycled foam provides benefits like fast tact free time and high compressive strength skin that avoids concrete adhesion and adds strength. Fast and aggressive expansion for lifting concrete along with a 15 minute final cure time to allow for slab manipulation while adjusting for the perfect lift.

"We are honored to have been awarded the USDA Biobased Certification and Product Label," said Jeff Cvetezar, HMI President. "The certified biobased content along with the high percentage of recycled content in our polyurethane products show that HMI is not only dedicated to producing the highest quality product on the market, but also is committed to environmental responsibility."

All biobased amount claims are verified by independent labs and monitored by the USDA. Consumers may feel secure in the accuracy of the biobased amount and be empowered in making better informed purchasing decisions.

"We are proud that Hydraulic Mudpumps, Inc. (HMI) has earned the USDA Certified Biobased Product Label," said Ron Buckhalt, USDA BioPreferred Program Manager. "Biobased products add value to renewable agriculture commodities, create jobs in rural communities and help our nation decrease its reliance on foreign-sourced and non-renewable petroleum."

HMI HydroFoam 402 Leaching Study

IDENTIFYING POTENTIAL ENVIRONMENTAL HAZARDS ASSOCIATED WITH THE LONG TERM USE OF HYDROFOAM 402 POLYURETHANE FOAM

INTRODUCTION

Upon the release of HydroFoam 402 (HF 402), a new type of hydro-insensitive geotechnical polyurethane foam especially for use in wet environments, HMI has sought to determine any environmental hazards that may be caused by the application and long term use of this foam. The following test was performed to characterize the leaching behavior of HF 402. The term "leaching" refers to the extraction of constituents from a certain material to a liquid. More specifically, the test determines the possibility that HF 402 could contribute any hazardous substances to its surrounding environment over time.

EXPERIMENTAL

An extensive solid waste characterization was done to identify long term disposal hazards associated with HF 402. A Toxicity Characteristic Leaching Procedure (TCLP) was followed in an effort to simulate the possible leaching that HF 402 would undergo if disposed of in a landfill. Accelerated aging and landfill conditions were simulated by crushing the sample and tumbling it for 18 hours in a acidic/basic solution.

The testing protocol used was the EPA's SW846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", in accordance with the Resource Conservation and Recovery Act (RCRA). The strict testing procedure and protocol were selected for this study as a simulated landfill environment would represent the worst possible conditions HF 402 could encounter in its typical geotechnical applications. The following table shows the results from the third party TCLP testing.

Review Chart on Reverse Side

DISCUSSION

Zinc was the only analyte in this test that was detected. However, the "detected" concentration was assigned a "J" data qualifier. The "J" data qualifier signifies that the concentration is so low that the result is considered to be an estimate. The concentration was between the MDL and RL thresholds, meaning that zinc is likely present, although its concentration is below what the method/instrument can accurately measure. The estimated concentration (0.025 mg/L) is many times lower than the typical zinc concentration found in most soils. Due to the natural amount of zinc within soil and the lack of an EPA regulatory level given for this analyte, the zinc concentration found in the TCLP extract is not a concern.

Of the analytes tested in which the EPA has set a regulatory concentration level, none were of detectable concentration. This not only verifies that HF 402 is a non-hazardous material, but an environmentally safe choice of material to use when water is present.

t concentration that a laboratory may report with a set amount of accuracy and precision during routine laboratory conditions
MDL – Method Detection Limit - a statistical calculation determined by the RL. It is usually much lower than the RL and often signifies whether or not an analyte is present
EPA Regulatory Level – The minimum concentration of an analyte detected within the TCLP extract for a material to be considered as hazardous

Table 1: Leaching results of HF 402 polyurethane foam by TCLP

Method 8260B - Volatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Benzene	mg/L	<0.010	0.010	0.020	0.5
Carbon tetrachloride	mg/L	<0.010	0.010	0.020	0.5
Chlorobenzene	mg/L	<0.010	0.010	0.020	100.0
Chloroform	mg/L	<0.020	0.020	0.040	6.0
1,2-Dichloroethane	mg/L	<0.010	0.010	0.020	0.5
1,1-Dichloroethene	mg/L	<0.010	0.010	0.020	0.7
Methyl Ethyl Ketone	mg/L	<0.050	0.050	0.10	200.0
Tetrachloroethene	mg/L	<0.010	0.010	0.020	0.7
Trichloroethene	mg/L	<0.010	0.010	0.020	0.5
Vinyl chloride	mg/L	<0.010	0.010	0.020	0.2

Method 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
1,4-Dichlorobenzene	mg/L	<0.020	0.020	0.020	7.5
2,4-Dinitrotoluene	mg/L	<0.010	0.010	0.010	0.1
Hexachlorobenzene	mg/L	<0.0050	0.0050	0.0050	0.1
Hexachlorobutadiene	mg/L	<0.050	0.050	0.050	0.5
Hexachloroethane	mg/L	<0.050	0.050	0.050	3.0
2-Methylphenol	mg/L	<0.020	0.020	0.020	
3 & 4 Methylphenol	mg/L	<0.020	0.020	0.020	
Nitrobenzene	mg/L	<0.010	0.010	0.010	2.0
Pentachlorophenol	mg/L	<0.20	0.20	0.20	100.0
Pyridine	mg/L	<0.20	0.20	0.20	5.0
2,4,5-Trichlorophenol	mg/L	<0.10	0.10	0.10	400.0
2,4,6-Trichlorophenol	mg/L	<0.050	0.050	0.050	2.0

Method: 6010B - Metals (ICP) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Arsenic	mg/L	<0.010	0.010	0.050	5.0
Barium	mg/L	<0.050	0.050	0.50	100.0
Cadmium	mg/L	<0.0020	0.0020	0.0050	1.0
Chromium	mg/L	<0.010	0.010	0.025	5.0
Copper	mg/L	<0.010	0.010	0.025	
Lead	mg/L	<0.0075	0.0075	0.050	5.0
Nickel	mg/L	<0.010	0.010	0.025	
Selenium	mg/L	<0.020	0.020	0.050	1.0
Silver	mg/L	<0.010	0.010	0.025	5.0
Zinc	mg/L	0.025	0.020	0.10	

HMI RR600 LEACHING STUDY

IDENTIFYING POTENTIAL ENVIRONMENTAL HAZARDS ASSOCIATED WITH THE LONG TERM USE OF RR 600 SOIL STABILIZER

INTRODUCTION

RR 600 Soil Stabilizer is a single-component, low-viscosity liquid designed to bind loose soils. Once cured, the product becomes a highly crosslinked polymer that forms an inert, solid mass with the soil. RR 600 is often used to improve soil load-bearing capacity and also for erosion control. Due to the potential use of this product in a variety of natural environments, HMI has sought to determine any environmental hazards that may be caused by the application and long term use of this product. The following test was performed to characterize the leaching behavior of RR 600. The term "leaching" refers to the extraction of constituents from a certain material to a liquid. More specifically, the test determines the possibility that RR 600 could contribute any hazardous substances to its surrounding environment over time.

EXPERIMENTAL

An extensive solid waste characterization was done to identify long term disposal hazards associated with RR 600. A Toxicity Characteristic Leaching Procedure (TCLP) was followed in an effort to simulate the possible leaching that the cured product would undergo if disposed of in a landfill. A sample consisting of sand fully stabilized by RR 600 was made and sent to the lab. Accelerated aging and landfill conditions were simulated by crushing the sample and tumbling it for 18 hours in a acidic/basic solution.
The testing protocol used was the EPA's SW846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", in accordance with the Resource Conservation and Recovery Act (RCRA). The strict testing procedure and protocol were selected for this study as a simulated landfill environment would represent the worst possible conditions RR 600 could encounter in its typical geotechnical applications. The table on the reverse side shows the results from the third party TCLP testing

DISCUSSION

Of all of the analytes tested for in this study, only four were detected. Two of the analytes detected, Barium and Nickel, were detected at concentrations that were reported with a "J" data qualifier. The "J" data qualifier signifies that the concentration is so low that the result is considered to be an estimate. The concentration was between the MDL and RL thresholds, meaning that Barium and Nickel are likely present, although the concentrations are below what the method/instrument can accurately measure. Copper and Zinc were also discovered in the TCLP extract, but also at very low concentrations (under 1 mg/L). All four metals detected are commonly found in soils and are likely to have leached from the sand, and not the RR 600. Nevertheless, the concentrations of the detected analytes do not pose any environmental concerns. Copper, Nickel, and Zinc to not have a EPA regulatory level for TCLP, and the level set for Barium is almost 1300 times higher than the concentration found in this study.
Due to the natural occurrence of the detected analytes in soils, and the very low concentration in regard to EPA regulatory levels (or lack thereof), this product has been determined to be a non-hazardous material and an environmentally safe choice of material to use for soil stabilization.

TABLE DEFINITIONS

RL – Reporting Limit - lowest concentration that a laboratory may report with a set amount of accuracy and precision during routine laboratory conditions

MDL – Method Detection Limit - a statistical calculation determined by the RL. It is usually much lower than the RL and often signifies whether or not an analyte is present

EPA Regulatory Level – The minimum concentration of an analyte detected within the TCLP extract for a material to be considered as hazardous

RESULTS

Table 1: Leaching results of RR 600 Soil Stabilizer by TCLP

Method 8260B - Volatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Benzene	mg/L	<0.010	0.010	0.020	0.5
Carbon tetrachloride	mg/L	<0.010	0.010	0.020	0.5
Chlorobenzene	mg/L	<0.010	0.010	0.020	100.0
Chloroform	mg/L	<0.020	0.020	0.040	6.0
1,2-Dichloroethane	mg/L	<0.010	0.010	0.020	0.5
1,1-Dichloroethene	mg/L	<0.010	0.010	0.020	0.7
Methyl Ethyl Ketone	mg/L	<0.050	0.050	0.10	200.0
Tetrachloroethene	mg/L	<0.010	0.010	0.020	0.7
Trichloroethene	mg/L	<0.010	0.010	0.020	0.5
Vinyl chloride	mg/L	<0.010	0.010	0.020	0.2

Method 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
1,4-Dichlorobenzene	mg/L	<0.020	0.020	0.020	7.5
2,4-Dinitrotoluene	mg/L	<0.010	0.010	0.010	0.1
Hexachlorobenzene	mg/L	<0.0050	0.0050	0.0050	0.1
Hexachlorobutadiene	mg/L	<0.050	0.050	0.050	0.5
Hexachloroethane	mg/L	<0.050	0.050	0.050	3.0
2-Methylphenol	mg/L	<0.020	0.020	0.020	
3 & 4 Methylphenol	mg/L	<0.020	0.020	0.020	
Nitrobenzene	mg/L	<0.010	0.010	0.010	2.0
Pentachlorophenol	mg/L	<0.20	0.20	0.20	100.0
Pyridine	mg/L	<0.20	0.20	0.20	5.0
2,4,5-Trichlorophenol	mg/L	<0.10	0.10	0.10	400.0
2,4,6-Trichlorophenol	mg/L	<0.050	0.050	0.050	2.0

Method: 6010B - Metals (ICP) - TCLP					
Analyte	**Unit**	**Result**	**MDL**	**RL**	**EPA Regulatory Level**
Arsenic	mg/L	<0.010	0.010	0.050	5.0
Barium	mg/L	0.078	0.050	0.50	100.0
Cadmium	mg/L	<0.0020	0.0020	0.0050	1.0
Chromium	mg/L	<0.010	0.010	0.025	5.0
Copper	mg/L	0.049	0.010	0.025	
Lead	mg/L	<0.0075	0.0075	0.050	5.0
Nickel	mg/L	0.012	0.010	0.025	
Selenium	mg/L	<0.020	0.020	0.050	1.0
Silver	mg/L	<0.010	0.010	0.025	5.0
Zinc	mg/L	0.58	0.020	0.10	

HMI Cured Polyurethane Safety Summary

Health Effects

- Polyurethane foam consists of fully reacted polymers and are considered non-hazardous per OSHA 29 CFR1910.1200
- The primary adverse health effects of cured polyurethane are related to dust generated by sanding, grinding or cutting the cured foam. Similar to saw dust, or other fine powders, dust from polyurethane foam may irritate respiratory organs, eyes, and skin. Protective gloves, eye protection, and a dust mask should be worn when fabricating or cutting polyurethane foam.
- Not listed as a carcinogen (NTA, IARC, OSHA)

Ecological Information

- Not a marine pollutant
- Does not bioaccumulate
- No mobility within soil

Disposal

- Can be disposed of as ordinary industrial waste in compliance with local, state and federal regulations

Please consult Cured Polyurethane Foam SDS for complete safety information.