DECONGEL®
A PRODUCT OF CBI POLYMERS

TITLE: Surface Decontamination of Asbestos by DeconGel™ 1101

ABSTRACT

Determine the surface decontamination efficacy of DeconGel™ 1101 on linoleum tile, painted drywall and concrete surfaces contaminated with Asbestos fibers (Chrysotile fibers) was performed with Transmission Electron Microscopy (TEM; ASTM Standard Test Method: D6480-05) and Polarized Light Microscopy (PLM; EPA approved method for analysis of asbestos from bulk samples).

HAZARDOUS MATERIALS RELEVANCE

Asbestos is a set of six naturally occurring silicate minerals exploited commercially for their desirable physical properties. They all have in common their long and thin fibrous crystals. The inhalation of asbestos fibers can cause serious illnesses, including malignant lung cancer, mesothelioma, and asbestosis.

HIGHLIGHTS

- Excellent surface decontamination was achieved by applying DeconGel 1101 onto surfaces contaminated with Asbestos. Decontamination efficacies (wt% based on the residual asbestos fibers on the surface of interest) were 99.9+% from painted drywall, linoleum tile and concrete surfaces.
- Both semi-qualitative (tape lift adhesion sampling method followed by EPA approved PLM analysis) and semi-quantitative (ASTM standard test swipe sampling method followed by TEM analysis) methods have been utilized in these evaluations.
- Application of asbestos contamination on the respective substrate and sampling tests were performed in CBI Polymers labs; Analysis of the samples were performed at independent labs (EMSL Analytical, Centennial, CO, and Bureau Veritas North America, Inc., Kennesaw, GA)

RESULTS

Tables 1 and 2 show the decontamination efficacies of DeconGel 1101 against asbestos on painted drywall and linoleum tile as determined by the tape lift adhesion test method and EPA approved PLM analysis method and on linoleum tile and concrete as determined by ASTM 6480-05 swipe sampling test method and TEM analysis respectively .

Table 1. Decontamination efficacies of DeconGel 1101 against Asbestos on painted drywall and linoleum tile as determined by the tape lift adhesion sampling and PLM analysis method.

Tape Lift Sampling Testing (10 cm^2 sample area)		**Formulation**
		DeconGel 1101
Linoleum tile	Before Decon	Trace amounts of chrysotile Asbestos*
	After Decon	None Detected**
	Decon. Efficacy (%)	**100%**
Painted drywall	Before Decon	Trace amounts of chrysotile Asbestos*
	After Decon	None Detected**
	Decon. Efficacy (%)	**100%**

Surface area sampled: 10 cm^2

* Samples for which asbestos is detected under the Polarized Light Microscope at <1%are reported as trace.

** "None Detected" indicates that no asbestos fibers were observed under the Polarized Light Microscope

Table 2. Decontamination efficacies of DeconGel 1101 against Asbestos on linoleum tile and concrete surfaces as determined by ASTM pre-wetted wipe sampling and TEM analysis method.

Swipe Testing Method (100 cm^2 sample area) CONCENTRATION (structures/cm^2)		**Formulation**
		DeconGel 1101
Linoleum tile*	Before Decon	117000000
	After Decon	44900
	Decon. Efficacy (%)	**99.97%**
Concrete	Before Decon	2670000
	After Decon	None Detected (<1970)
	Decon. Efficacy (%)	**100%**

Surface area sampled: 100 cm^2

* High loading of asbestos fibers was used for these evaluations.

NOTES

- Chrysotile, which is the most prevalent type of asbestos, was used in these evaluation studies. Chrysotile is a group of fibrous minerals of the serpentine group that have the nominal composition $Mg_3Si_2O_5(OH)_4$ and have the crystal structure of either clinochrysotile, orthochrysotile, or parachrysotile. Most natural chrysotile deviates little from this nominal composition. Chrysotile may be partially dehydrated or magnesium-leached both in nature and in building materials. In some varieties of chrysotile, minor substitution of silicon by Al^{3+} may occur.
- A method that mimics a scaled-down yet real-world setting where decontamination of facilities contaminated with asbestos takes place after the wetting of the substrate to be decontaminated was followed. During these evaluations the procedure followed includes

contamination of the substrate of interest with a solution containing asbestos fibers (chrysotile) dispersed in water followed by partial evaporation of the excess water and the application of DeconGel 1101 on top of the wet asbestos contamination.

- ASTM method D 6480-05, is a standardized procedure used to sample and analyze asbestos fibers where pre-wetted wipes are utilized to sample asbestos from surfaces. This method provides an estimate of the concentration of asbestos reported as the number of asbestos structures per unit area of sampled surface.
- Pre-wetted wipers (Model: TX1084 QuanSat with Vectra Quantex from ITW Texwipe, NJ) wetted with 70% isopropanol and 30% deionized water (sealed-border at the edges) were used for the swipe sample tests.
- Tape lift sampling method is a semi-qualitative quick and reliable sampling test method for analysis and monitoring of asbestos contamination. Analysis of the amount of asbestos that has been sampled with this type of sampling method is performed with polarized light microscopy which is an EPA approved method for analysis of asbestos structures in bulk samples (EPA/600/R-93/116).
- Clear (transparent) 3M Scotch tape type was utilized for the tape lift adhesion sampling method. Before and after decon tape lift samples were sent to an independent lab for analysis of the number of asbestos structures per unit area by polarized light microscopy (PLM).

CALCULATIONS

Decontamination Efficacy (Swipe Testing Method) =
[(Concentration (structures/cm^2) of Swipe Control) – (Concentration (structures/cm^2) of Residual Swipe)/ Concentration (structures/cm^2) of Swipe Control] x 100%

MATERIALS AND METHODS

Asbestos solution

Asbestos fibers (Chrysotile, SPI Supplies / Structure Probe, Inc, West Chester, PA) were dispersed in Deionized Water (DI, ≥17MOhm) utilizing a mixer. 0.0971 g of Asbestos fibers were dispersed in 89.3 g of DI water (0.1 wt%).

Application of Asbestos solution on the substrates

Dispersed asbestos fibers in water were applied on top of the surface of interest on a predetermined spot (10cm^2 surface area for the tape lift sample tests; 100cm^2 surface area for the swipe sample tests) and were let to dry up to semi-wet (dampened state) before DeconGel 1101 was applied.

Polarized Light Microscopy (PLM, Analytical Method for Asbestos in Bulk Samples)

Use of EPA/600/R-93/116 satisfies applicable requirements of the USEPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Sample", EPA-600/M4-82-020, December 1982, published as Appendix E to Subpart E of 40CFR763. Bulk samples analyzed by New York State methods follow stratified point counting methods (198.1) or Method 198.6 for PLM non-friable organically bound materials (NYSDOH Lab Code 11645). Percentages are visual estimations of asbestos >10:1 aspect ratio. The reliable limit of quantification of the method is 1%, although asbestos may be qualitatively detected at concentrations less than 1%. Samples

for which asbestos is detected at <1% are reported as trace, "<1%". "None Detected" indicates that no asbestos fibers were observed.

Sample and Analysis Methods

Tape lift adhesion sampling followed by PLM analysis (semi qualitative test)
1g of asbestos solution (0.1wt% of asbestos in DI H_2O) was applied on top of the linoleum tiles (10cm^2 surface area sampled). 1g of asbestos solution (0.1wt% of asbestos in DI H_2O) was applied on top of painted drywall panels (10cm^2 surface area for the swipe sample tests). Linoleum tile panels and painted drywall were sampled before and after decon with Scotch tape. Scotch tape samples were put into tightly sealed pre-labeled plastic containers (free of dust) and sent to Bureau Veritas North America, Inc. Labs (Kennesaw, GA) for analysis by PLM according to an EPA approved method for analysis of asbestos in bulk samples (EPA/600/R-93/116 satisfies applicable requirements of the USEPA's "Interim Method for the Determination of Asbestos in Bulk Insulation Sample", EPA-600/M4-82-020, December 1982, published as Appendix E to Subpart E of 40CFR763).

Swipe sampling with pre-wetted wipes (ASTM standard method) followed by TEM analysis (semi quantitative test)
5.52g of asbestos solution (0.1wt% of asbestos in DI H_2O) was applied on top of the concrete panels (100cm^2 surface area for the swipe sample tests). 10g of asbestos solution (0.1wt% of asbestos in DI H_2O) was applied on top of the linoleum tile panels (100cm^2 surface area for the swipe sample tests). Concrete and linoleum tile panels were sampled before and after decon with a pre-wetted wipe (containing 70% Isopropanol/30% Water) according to ASTM 6480-05. Sample wipes were put into tightly sealed pre-labeled plastic containers (free of dust) and sent to EMSL labs for analysis by TEM according to the ASTM standard test method 6480-05 “Standard Test Method for Wipe Sampling of Surfaces, Indirect Preparation, and Analysis for Asbestos Structure Number Concentration by Transmission Electron Microscopy”.

Analytical Instrumentation
Polarized Light Microscopy (PLM, work performed at Bureau Veritas North America, Inc., Kennesaw, GA 30144) was used as the method of analysis of the tape lift adhesion samples (EPA approved method for analysis of asbestos in bulk samples).

Transmission Electron Microscopy (TEM, EMSL Analytical, Centennial, CO) was used as the method of analysis of the swipe samples (ASTM standard test method for sampling and analysis of asbestos contamination on a surface).

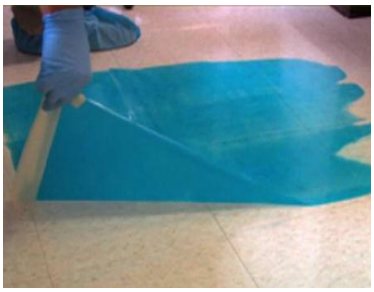
APPLICATION INSTRUCTIONS FOR END-USERS
Pre-wet the surface that is suspected to be contaminated with asbestos. Use product directly as is from container. DO NOT DILUTE. Masking or painters tape can be applied along one edge of the area that is to be decontaminated to aid creating a peeled edge to grip for peeling the dried film. Apply DeconGel using a paint brush, a trowel, a handheld sprayer, or an industrial grade sprayer (use DeconGel 1120 or 1121 for spray application).

The thickness of the gel and the number of coats is dictated by the surface to be decontaminated. Coating thickness required for good peel characteristics varies with substrate and generally increases with substrate porosity. It is recommended that first time customers test DeconGel on a small sample area to confirm the required film thickness and dry time for their specific application. If the film is difficult to peel, please apply an additional coat. A razor blade is useful to start the peel. Lay the blade nearly flat and fillet the edge of the film to create a tab that can be pulled. For surfaces that the gel adheres to well, such as concrete, 12" – 24" strips can be cut in the film resulting in less force being required to peel the film.

- Let DeconGel dry for 24 hours

Dry time will vary depending on humidity, temperature, air flow and thickness of the DeconGel. This can take from as little time as an hour for thin coats in a dry environment with plenty of airflow, to overnight or longer if thicker coats are applied in humid environments. Dry times exceeding 24 hours may sometimes be required for good peel performance on bare concrete, wood and other highly porous substrates and substrates with deep cracks or grooves. However, 18-24 hours is often sufficient dry time on good quality concrete. It is recommended that users test a small area to determine drying time prior to applying DeconGel for an entire job. Supplemental heat or air circulation will accelerate DeconGel's drying time for any job.

- Peel DeconGel off the surface by starting from one of the edges



When dry, the product locks the contaminants into a polymer matrix. The film containing the encapsulated contamination can then be peeled. DeconGel peels from most non-porous and porous hard surfaces if the dried film is thick enough. If the film is difficult to peel, add another coat, let dry, and peel. In most cases the DeconGel will come off in a single sheet but for odd shaped surfaces you may be required to score DeconGel in order to peel it off.

- Dispose of the dried DeconGel in accordance with the local, state and Federal disposal regulations of the contaminant/substance you are removing. DeconGel itself has no special disposal restrictions.

For questions about DeconGel or to place an order, visit our website at www.decongel.com or contact us at:

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