

SEP 25 1990

Construction Products Division

GRACE

To: R. J. Bettacchi
From: J. W. Wolter
cc: A. R. Stringer

Date: September 25, 1990

Subject: Insert for the Libby
Section

While it is paramount to Grace that specific technological data remain proprietary, the following metallurgical information is presented:

- 1) Proven and probable ore reserves as of January 1, 1990 are estimated at 45 million tons.
- 2) Ore grade based on a cut-off of 12% has been determined at 22.9% +65 mesh vermiculite. The ore to waste ratio is 1.0 to 1.27.
- 3) Distribution of vermiculite in the ore is estimated to average as follows:

+8 mesh = 15.3%
-8+20 mesh = 34.7%
-20+65 mesh = 50.0%

- 4) Tremolite content of the ore is estimated at 5 to 7% with the concentrate from the milling circuit showing a weighted average of .27% Tremolite giving a rejection efficiency of 99.5%.

Tremolite content of finished concentrate as shown in the attached MSDS and labeled Exhibit A may contain up to 1% Tremolite by weight. Respirable portion of Tremolite in concentrate is determined at 50 parts per million (PPM).

Grace is familiar with the hypothesis that there are other and potentially economical minerals associated with vermiculite and large ultramafic intrusives. We, however, have not performed extensive geophysical or drilling evaluations to date to make an accurate determination of the likelihood of those occurrences.

Jack Wolter
Jack W. Wolter

JWW/cjc
Attachment
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Z-01210 MATERIAL SAFETY DATA SHEET Page 1 of 7
MSDS PREPARED BY: Environmental Health Dept. Construc in Products Div.
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MSDS Number: Z-01210 000USA Cancels MSDS # Z-83340 Date: 11/08/1988

SECTION I - PRODUCT IDENTIFICATION

Trade Names and Synonyms: VERMICULITE CONCENTRATE/ALL GRADES LIBBY
Chemical Names and Family: Libby, Montana Vermiculite Concentrate;
Magnesium-Aluminosilicate Mineral
Product Use: Various Industrial Uses
Formula: $(\text{Mg}, \text{Ca}, \text{K}, \text{Fe}^{II})_3 \cdot (\text{Si}, \text{Al}, \text{Fe}^{II})_4 \text{O}_{10} (\text{OH})_2 \cdot 4(\text{H}_2\text{O})$
CAS# (Chemical Abstract Service): 01318-00-9

Transportation Hazard Classification

<u>USA Department of Transportation</u>	<u>CANADA Transportation of Dangerous Goods</u>
<u>DOT CLASS:</u> Nonhazardous	<u>TDG CLASS:</u>
<u>DOT ID#:</u> Not Applicable	Nonhazardous
<u>DOT LABEL:</u> Not Applicable	

Surface Freight Classification: Crude Vermiculite Ore

NPCA-HMIS Hazard Index:

- o Health: 1 *
- o Flammability: 0
- o Reactivity: 0
- o Personal Protection: E
(See Section VIII)

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

<u>INGREDIENT</u> (Chemical Name, CAS#, & Common Name)	<u>%</u> By Wt.	<u>TOXICITY DATA LD50, LC50 etc.</u> (See Section IX for Exposure Limits)
Tremolite Asbestos CAS# 14567-73-8	Typically 0.3-1%	No Data

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SECTION III - PHYSICAL DATA/CHEMICAL CHARACTERISTICS

<u>Boiling Point:</u>	Not Applicable	<u>Specific Gravity (H2O = 1)</u>	Not Applicable
<u>Vapour Pressure (mm Hg.)</u>	Not Applicable	<u>% Volatiles</u>	Not Applicable
<u>Vapour Density(AIR = 1)</u>	Not Applicable	<u>Evaporation Rate</u> (Butyl Acetate = 1)	Not Applicable
<u>Solubility in Water:</u>	None	<u>pH</u>	7.0 (In water)
<u>Bulk Density (#/cu. ft):</u>	50-65		

Appearance and Odour: Dark greenish brown to golden brown in color, flake shaped, vegetable oil odour.

Odour Threshold:
Unknown

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

<u>Flash Point:</u>	None	<u>Flammable Limits:</u>	
<u>Method Used:</u>	Not Applicable	LFL N.A.	UFL N.A.

N.F.P.A. Rating: Not Applicable

Extinguishing Media

Not Applicable
Special Fire Fighting Procedures
Not Applicable

Unusual Fire and Explosion Hazards

Vermiculite Concentrate is treated with a dust suppressant which may generate smoke during the expansion process. Vermiculite Concentrate itself is inorganic and will not burn.

SECTION V - REACTIVITY DATA

Stable under normal conditions (yes or no): YES
Conditions or Materials to avoid (which may react or cause instability):
None Known

Hazardous Decomposition or Byproducts:
None Known

Hazardous Polymerization:
Will not occur

Conditions to Avoid:
None Known

SECTION VI - HEALTH HAZARD DATA & TOXICOLOGICAL PROPERTIES

(Include all known acute and chronic effects, signs, and symptoms of exposure and medical conditions generally aggravated by exposure)

Routes of Exposure:**Inhalation:**

Vermiculite dust released in handling, expanding, and subsequent end use may cause symptoms typical of nuisance dusts including coughing, sneezing, and minor respiratory irritation.

The dust may also contain asbestiform tremolite fibers in excess of the limits specified in Section IX of this MSDS. See section below regarding carcinogenicity and long-term health effects.

This material has been treated with a dust suppressant which significantly reduces potential release of airborne fiber. However, airborne fiber is released during expansion.

Skin and Eye:

Direct eye contact may cause minor physical or mechanical irritation. Skin contact not expected to cause any harmful effects.

Ingestion:

Adverse health effects are not expected as a result of ingestion.

Carcinogenicity According to NTP, IARC and OSHA:

Certain operations involving the use and/or expansion of Libby Vermiculite may result in the release of tremolite fibers, a form of asbestos, in excess of the limits specified in Section II of the MSDS. According to NTP, IARC and OSHA 29 CFR § 1910.1001 (Appendix G), asbestos fibers "can cause disabling respiratory disease and various types of disease if the fibers are inhaled." Risk of disease is significantly increased by smoking. Ingestion of fibers has also been associated with increased risk of disease. Diseases associated with asbestos fiber include: Lung Cancer, Asbestosis, Mesothelioma, and cancer of the stomach and colon. "Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of Mesothelioma include shortness of breath and pain in the walls of the chest and/or abdomen."

VII EMERGENCY AND FIRST AID PROCEDURES

If INHALED, get fresh air. If symptoms persist, consult a physician.

In case of contact flush EYES with plenty of water while lifting eyelids and rolling eyes. Do not rub eyes. If irritation, blinking or tearing persist, consult a physician.

Adverse health effects are not expected if SWALLOWED. Consult a physician if symptoms develop.

SECTION VIII - PREVENTIVE & CONTROL MEASURES

Warning Statements:

DANGER!

- ... Contains Asbestos Fibers (up to 1% by weight Tremolite CAS# 14567-73-8).
- ... Avoid creating dust.
- ... Cancer and lung disease hazard.
- ... Inhalation of Vermiculite Concentrate Dust (CAS# 1318-00-9) may cause slight physical irritation of the respiratory tract resulting in coughing or sneezing.
- ... Dust may cause slight physical or mechanical irritation to eyes.
- ... NOTE: This product has been treated with a dust suppressant which significantly reduces potential release of airborne fibers.

Precautionary Measures:

- ... Avoid contact with eyes. (Wear goggles if necessary.)
- ... Avoid inhalation of airborne dust. (See MSDS Section VIII for information regarding respirators and ventilation.)
- ... Equip hoppers with dust covers where applicable.

Respiratory Protection:

A NIOSH Type TC-21C-XXX dust respirator is recommended to control exposure to vermiculite dust within the limits prescribed in Section II of this MSDS. If handling results in exposure to tremolite fiber in excess of the Permissible Exposure Level, respiratory protection must be provided in accordance with 29 CFR 1910.1001, Paragraph (g) - Respiratory Protection.

Ventilation:

- | | |
|----------------|--|
| Local Exhaust: | Recommended |
| Mechanical: | Recommended |
| Special: | Refer to 29 CFR § 1910.1001 (f) Methods of Compliance. |
| Other: | Refer to 29 CFR § 1910.1001 (f) Methods of Compliance. |

Protective Gloves:

Not generally required.

Eye Protection:

Goggles recommended when dust is created.

Other Protective Clothing or Equipment:

Refer to 29 CFR § 1910.1001 (h) Protective Work Clothing and Equipment.

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SECTION VIII - PREVENTIVE & CONTROL MEASURES CONTINUED

Work/Hygenic Practices:

Observe precautions noted above.

Vermiculite is processed from ore mined at the Libby Montana mining operation, where W. R. Grace & Co. maintains high quality standards. The natural geologic formation at Libby contains other mineral components, in addition to vermiculite. One of these is asbestiform tremolite (defined as asbestos by OSHA). Grace's mining and milling process significantly reduces the tremolite content before the vermiculite concentrate is shipped to the expanding plants. However, it may be possible to detect tremolite in the form of respirable fiber in this product at levels of .005% (50 parts per million) dry weight or less.

On June 20, 1986, the United States Occupational Safety and Health Administration (OSHA) established new, more stringent, regulations regarding occupational exposure to airborne asbestos fibers including tremolite (29 CFR § 1910.1001). OSHA regulations include a permissible exposure level (PEL) of 0.2 fibers/cc (8 hr. time weighted average), a 30 minute excursion limit of 1 fiber/cc (effective Oct. 14, 1988) and an action level of 0.1 fibers/cc (8 hr. time weighted average).

In accordance with paragraph (j) (4) (i) of the regulation, this product has been modified by the addition of water as a binder to assure that "during any reasonable foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentration of fibers ... in excess of the action level and/or excursion limit will be released."

Grace has collected, and is continuing to collect, objective data in a variety of end use applications which, to date, demonstrates that the addition of water to vermiculite can control the airborne fiber concentrations below the action level and/or excursion limit. OSHA will allow employers to use such objective data as provided in paragraph (d) (2) (iii) to show that their employees will not be exposed above the action level and/or excursion limit as a result of using this product. Subsequent provisions of the regulation do not apply where it has been determined that exposures are below these levels as indicated by the objective data collected by Grace. Further information regarding this objective data is available upon request.

SECTION IX - HAZARDOUS INGREDIENTS EXPOSURE LIMITS - U.S. Only

INGREDIENT:	Exposure Limits		
	OSHA	ACGIH	OTHER
ASBESTIFORM TREMOLITE	0.2 fiber/cc 8hr.TWA	2.0 fibers/cc TWA	----
CAS# 14567-73-8	0.1 fiber/cc (Action Limit)		
	1.0 30 Min.Exc.		
RESPIRABLE DUST*	PEL/TWA: 5 mg/m ³	----	----
TOTAL DUST*	PEL/TWA: 15 mg/m ³	TLV/TWA: 10 mg/m ³	----

SECTION X - SPILL & DISPOSAL INFORMATION - U.S. Only

Libby Vermiculite concentrate may contain up to 1.0% tremolite asbestos which is a hazardous substance according to Section 307 of the Clean Air Act. Spills of asbestos equal to or greater than 1.0 lb. are reportable. Therefore, spills of concentrate equal to or greater than the Reportable Quantity (R.Q. = 100 lbs.) must be reported to the National Response Center immediately at 800-424-8802.

If spilled, observe the handling procedures recommended above to avoid creating dust when cleaning up material. Remove spilled material for disposal or recycling.

According to US EPA (40 CFR § 261.3), waste of this product is not defined as hazardous. Dispose of a waste in accordance with federal, state and local regulations.

SECTION XI - GOVERNMENT REPORTING INFORMATION - U. S. OnlySARA Title III Reporting InformationTier I & II Hazard Categories:DELAYED-CHRONIC
IMMEDIATE-ACUTEContains Extremely Hazardous-SARA III Section 302 Ingredient: NOComments:Contains Toxic Chemical Release-SARA III Section 313 Ingredient: YESComments: Contains up to 1% Tremolite CAS# 14567-73-8 which appears as
Asbestos CAS# 1332-21-4 on the 313 List.Other Government Reporting Requirements:

This product contains a substance known to the state of California
to cause cancer.

Asbestos is listed as both an environmental and a special hazard in
Pennsylvania.

Non-Hazardous Ingredient Disclosure:

Vegetable oil dust suppressant

"THE DATA INCLUDED HEREIN ARE PRESENTED ACCORDING TO W. R. GRACE & CO.-CONN'S PRACTICES CURRENT AT THE TIME OF PREPARATION HEREOF, ARE MADE AVAILABLE SOLELY FOR THE CONSIDERATION, INVESTIGATION AND VERIFICATION OF THE ORIGINAL RECIPIENTS HEREOF AND DO NOT CONSTITUTE A REPRESENTATION OR WARRANTY FOR WHICH GRACE ASSUMES LEGAL RESPONSIBILITY. IT IS THE RESPONSIBILITY OF A RECIPIENT OF THIS DATA TO REMAIN CURRENTLY INFORMED ON CHEMICAL HAZARD INFORMATION, TO DESIGN AND UPDATE ITS OWN PROGRAM AND TO COMPLY WITH ALL NATIONAL, FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS APPLICABLE TO SAFETY, OCCUPATIONAL HEALTH, RIGHT-TO-KNOW AND ENVIRONMENTAL PROTECTION."