U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, SE
Washington, D.C. 20590

APR 28 2010

Mr. John Hatmaker
Director-Environment, Health & Safety
Tronox, LLC
P.O. Box 268859
Oklahoma City, OK 73126-8859

Ref. No.: 09-0301

Dear Mr. Hatmaker:

This responds to your e-mail regarding classification under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) of "Flameless Ration Heater" (FRH) containing a new formulation for providing hot meals to soldiers in the field, such as meals-ready-to-eat (MRE). Several attachments were included.

According to your letter, the Department of Defense (DOD) transports "Unitized Group Ration-Express" (UGR-E) for providing hot meals to soldiers in the field. This unit is capable of heating a meal that feeds 18 soldiers. The heating element in this unit is a "Flameless Ration Heater" (FRH). Currently, the FRH used in the UGR-E contains magnesium-iron alloy powders that are activated by aqueous sodium chloride to generate sufficient thermal energy to heat the food rations to 140-150°F. The Mg/Fe based FRH generates substantial amounts of flammable gases when tested with distilled water in accordance with the UN Manual of Tests and Criteria, to meet the definition of Packing Group I or II in Class 4, Division 4.3.

Again according to your letter, your client has developed a new formulation for the FRH. This formulation was tested by an accredited laboratory, following the procedures in the UN Manual of Tests and Criteria. The test results indicate that the client's ration heater composition is not a Division 4.3 (Dangerous When Wet) material, and the results from an oxidizer test, UN Test Method O.1, classed the material as a Division 5.1 (Oxidizer), Packing Group III, as defined by the UN/DOT criteria. You state that you understand that in accordance with the requirements in § 173.22 of the HMR, it is the responsibility of the shipper to properly class a hazardous material. You request PHMSA's approval to ship this new material formulation as an unregulated material, given its attached supporting documentation.

Based on the information you provided, it is the opinion of this Office that your client's FRH device containing not more than 70-80% manganese dioxide, 5-18% magnesium, and 2-25% carbon black meets the definition of a Division 5.1 (Oxidizer) material, as detailed by the results of UN Test Method O.1. Your client's FRH is regulated for purposes of transportation in

commerce and must be shipped in conformance with the applicable requirements of the HMR and, therefore, may not be shipped as an unregulated material.

I hope this information is helpful. If we can be of further assistance, please contact us.

Sincerely,

Charles E. Betts
Chief, Standards Development
Office of Hazardous Materials Standards

Engrum
§172.101
§173.22
Shipper's Responsibility
09-0301

Drakeford, Carolyn (PHMSA)

From: INFOCNTR (PHMSA)
Sent: Monday, December 07, 2009 8:31 AM
To: Drakeford, Carolyn (PHMSA)
Subject: FW: Letter of Interpretation Request for Tronox LLC
Attachments: Tronox MSDS IHT US 2 2009 _2_.pdf; 2008Dec3DOT Ox report.pdf; 2009Mar26Stresau report .pdf

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TRONOX

John W. Hatmaker
Director Environment, Health & Safety

405-775-5431
405-823-9628
john.hatmaker@tronox.com

December 4, 2009

E-MAIL

U.S. DOT
PHMSA Office of Hazardous Materials Standards
East Building
1200 New Jersey Avenue, SE.
Washington, DC 20590–0001

Attn: Office of Standards (PHH–10)

Subject:

Request for clarification of Hazardous Material Regulations (HMR) for transportation of a Flameless Ration Heater (FRH) containing a new formulation

Attachments:

1. Material Safety Data Sheet (MSDS)
2. Stresau Laboratory Test Results per UN Manual of Tests and Criteria
3. Stresau Laboratory Test Results per UN Oxidizer Test Method 0.1

The Department of Defense (DOD) transports Unitized Group Ration- Express, UGR-E, for providing hot meals to soldiers in the field. This unit is capable of heating a meal that feeds 18 soldiers. The heating element in this unit is a Flameless Ration Heater, FRH. The present FRH's use magnesium-iron alloy powders that are activated by aqueous sodium chloride to generate sufficient thermal energy to heat the food rations to ~140-150^{0}F. The Mg/Fe based FRH generates substantial amounts of flammable gases when tested with distilled water in accordance with the UN Manual of Tests and Criteria, to meet the definition of Packing Group I or II in class 4, Division 4.3.

Tronox is entering a business arrangement with a client that has successfully developed a new formulation for the FRH. This formulation was tested by an accredited laboratory, Stresau Laboratory Inc., following the procedures in the UN Manual of Tests and Criteria. These results show that our client's ration heater composition is not a Division 4.3 Dangerous When Wet Material. A copy of the Stresau report is attached with this document along with the MSDS for this new formulation. Additionally, the results from a DOT Oxidizer test also performed by Stresau Laboratory (See attachment 3 above) yielded a Packing Group III classification for this material.

We understand as described in sec 173.22 of HMR: CFR Parts 171-180, that it is the obligation of the shipper to properly classify a material. Given the supporting documentations attached, we request your approval for shipping this new material formulation as unregulated under HMR.

If there are any questions concerning our request, please let us know to allow us to provide additional details and clarifications.

Sincerely,

John Hatmaker
Director-Environment, Health & Safety
Tronox, LLC
P.O. Box 268859
Oklahoma City, OK 73126-8859

cc: S. Haigh
J. Howard

JWH

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If you are not the intended recipient of this e-mail message, any use, distribution or copying of the message is prohibited.
Please let me know immediately by return e-mail if you have received this message by mistake, then delete the e-mail message.
Thank you.

TRONOX

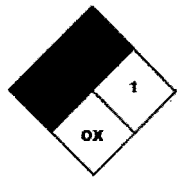
Material Safety Data Sheet (US)

1. Identification

Product Name: **Tronox® IHT**
Chemical Name: Manganese dioxide, magnesium, and carbon black mixture
Product Use: Flameless Ration Heater (FRH)
Manufacturer: Tronox LLC.
Address: 3301 NW 150th Street
Oklahoma City, OK 73134 (US)
www.tronox.com

Emergency Telephone Number: 1-405-775-5000 (24-hours)
US: CHEMTREC Emergency Number: 1-800-424-9300

2. Hazards Identification



Hazard Statements: Caution!

Precautionary Statements

Prevention:	Inhaling dust can cause irritation to respiratory tract and may lead to "metal fume fever", a flu-like condition.	It is not likely that dust will be generated when. used as intended however if dust is generated ensure effective ventilation. Avoid creating or breathing dust.
	This product is abrasive to the eyes and skin.	Wear suitable protective gloves and clothing. Wash thoroughly after handling. Do not eat drink or smoke in work area.
Response:	Oxidizer, will undergo thermite ignition at temperatures around 650°C increasing intensity of a fire involving other materials.	Use class-D agents or other suitable agent for Magnesium fires throughout containment.

Storage: Store in a cool dry place separate from organic materials and other oxidizers.

Disposal: Not regulated.

3. Composition/ Information on Ingredients

Component	CAS Number	Weight %
Manganese Dioxide	1313-13-9	70-80
Magnesium	7439-95-4	5-18
Carbon Black	1333-86-4	2-25

See section 11 of this document for toxicological information.

4. First Aid Measures

Eye: May cause mild mechanical irritation.

Skin: May cause mild mechanical irritation. Wash affected areas with plenty of water, and soap if available, for several minutes. Remove and clean contaminated clothing and shoes. Seek medical attention if irritation develops or persists.

Inhalation: Remove from area to fresh air. Seek medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion: Give 3-4 glasses of water, but DO NOT induce vomiting. If vomiting occurs, give fluids again. Get medical attention to determine whether vomiting or evacuation of stomach is necessary. Do not give anything by mouth to an unconscious or convulsing person

Note to physician: Chemical of exposure is manganese. Acute exposure can result in metal fume fever. Chronic exposure to dust can lead to manganism, a disease of the central nervous system, characterized by psychic neurologic disorders. Eye, skin, and respiratory diseases or disorders could be aggravated by repeated or prolonged exposure to the dust or fume from this substance. Iron deficiency may increase susceptibility to metal poisoning.

5. Fire Fighting Measures

Material will undergo thermite ignition at temperatures around 650°C increasing the intensity of a fire involving other materials. Evacuate all unnecessary people upwind from the fire and smoke. Move containers from area if it can be done without risk. Cool fire-exposed containers with water from side.

Extinguishing Media: Use class-D agents or other suitable agent for magnesium fires throughout containment.
Fire Fighting Equipment: Wear a NIOSH-approved, positive-pressure self-contained breathing apparatus and full protective gear.

6. Accidental Release Measures

Wear appropriate Personal Protective Equipment. Avoid breathing dust. Avoid contact with eyes, skin and clothing. Prevent spread of material and keep dust level down as much as possible. Take up mechanically.

On Land: Shovel up or vacuum up using a vacuum cleaner with an efficient filter. Dispose of all contaminants according to federal, state, and local regulations.

In Water: Recover as much as practical and dispose of waste at an industrial waste site.

7. Handling and Storage

Handling: Use with ventilation that will keep any dust concentration below the exposure limits. Keep container closed. Do not allow dust or powder to accumulate on equipment or building surfaces.

Storage: Store in a cool dry place separate from organic materials and other oxidizers.

8. Exposure Controls/ Personal Protection

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

COMPONENT	OSHA PEL		ACGIH TLV	
	TWA	STEL	TWA	STEL
Manganese compounds, as Mn	5 mg/m^3	N/E	0.2 mg/m^3	N/E
Magnesium, as magnesium oxide	15 mg/m^3	N/E	10 mg/m^3	N/E
Carbon Black	3.5 mg/m^3	N/E	3.5 mg/m^3	N/E

Engineering Controls: Provide local exhaust ventilation system to meet exposure limits.

Personal Protective Equipment (PPE)
Standard precautionary measures should be observed for the handling of chemicals.

Hand and Skin Protection: Wear suitable protective gloves and clothing.

Eye Protection: Wear safety glasses with side shields or vented safety goggles. Have eyewash stations available where eye contact can occur.

Respiratory Protection: When handling observe usual precautionary measures to avoid dust formation. In operations where exposure limits are exceeded use an approved respirator selected by a technically qualified person for the specific work conditions.

General: Do not eat drink or smoke in work area. Practice good personal hygiene after using this material.

9. Physical and Chemical Properties

State:	Solid (powder)
Color:	Black/ grey
Odor:	None
Melting Point °C:	650
Bulk Density, lb/cu. Ft:	84.7
Specific Gravity @ 20 °C:	5
Water Solubility:	Insoluble
pH:	N/A

10. Stability and Reactivity

Stable at ordinary temperatures and pressures but may undergo thermite ignition at temperatures around 650°C. Material will react with water to generate heat if added and maintained at a specific stoichiometric ratio but will not explode or ignite.

Incompatibilities: Organic materials, combustible materials, and strong oxidizers.

Hazardous Decomposition Products: When subjected to intense heat, temperature above 535 °C, it will release oxygen which would increase the intensity of a fire.

Conditions to avoid: Incompatible materials and intense heat.

11. Toxicological Information

FOR UGR-E:
Oral Toxicity: Independent laboratory evaluations conducted is accordance with 49 CFR 173.132 Department of Transportation testing procedures to determine acute oral toxicity characteristics found a zero mortality rate in rats at a dosing level of 300mg/kg after 14 days.

Dermal Toxicity: Independent laboratory evaluations conducted is accordance with 49 CFR 173.132 Department of Transportation testing procedures to determine acute dermal toxicity characteristics found a zero mortality rate in rabbits at a dosing level of 1000mg/kg after 14 days. However, some specimens did experience redness and irritation to the skin at area of contact.

Carbon black, a component of this mixture has been classified by the IARC to be "possibly carcinogenic to humans" (Category 2B). However, OSHA lists carbon black as non-carcinogenic.

For manganese dioxide: RTECS OP0350000

Oral LD50 (rat)	>3,478 mg/kg
Inhalation TCLo (mouse)	49 mg/m3/7 H (75D pre/1-18D preg)
Inhalation TCLo (rat)	1,800 □g/m3/24 H/35D-C
Intravenous LDLo (rabbit)	45 mg/kg
Intratracheal LDLo (rat)	50 mg/kg
Subcutaneous LD50 (mouse)	422 mg/kg

For magnesium metal and magnesium oxide:

No LD50/LC50 information available relating to normal routes of occupational exposure.

For carbon black: RTECS FF5800000

Oral LD50 (rat) .....>15,400 mg/kg
Dermal LD50 (rabbit).....>3000 mg/kg

12. Ecological Information

None available

13. Disposal Considerations

Examine possibilities for re-utilization.

United States RCRA Waste Code: Not regulated. Dispose of in approved industrial waste landfill. Observe all applicable federal, state, and local regulations.

14. Transportation Information

United States: Not regulated

15. Regulatory Information

United States

OSHA Hazard Communication Standard (29 CFR 1910.1200): Manganese compounds, Hazardous
Safe Drinking Water Act- Secondary Maximum Contaminant Levels: Manganese, 0.05mg/L
SARA Extremely Hazardous Substances (40 CFR 355): N/A
SARA Hazard Category (40 CFR 370): Acute, Chronic, Fire
SARA Toxic Chemicals (40 CFR 372): Manganese, 92%
Workplace Hazardous Materials Information System (CPR Section 33): Controlled Product; Class D2B
Inventory Status: This material meets requirements described in 40 CFR CH. 1710.3 for categorization as a mixture. Individual components of this mixture are listed on the US TSCA Chemical Substance Inventory and the Canadian Domestic Substances List.
Toxic Substance Control Act- No specific regulations apply
CERCLA/SUPERFUND (40 CFR 117, 302): Listed, release reporting is not required

State Regulations

California Hazardous Substance List; Manganese compounds, magnesium, and Carbon black
California OELs, Airborne Contaminants, Manganese compounds (0.2mg/m^3), carbon black (3.5mg/ m^3)
California Proposition 65; Carbon black
Connecticut Hazardous Material Survey; Magnesium
Illinois Toxic Substances Disclosure to Employees and Chemical Safety Acts; Manganese compounds and carbon black
Indiana Occupational Health and Safety Standard; manganese compounds and carbon black
Kentucky Occupational Health and Safety Standard; manganese compounds and carbon black
Louisiana Spill Reporting; Manganese compounds RQ 100lb into atmosphere
Massachusetts Right to Know Substance List; Magnesium and carbon black
Minnesota Hazardous Substance List; Manganese Compounds and carbon black
North Carolina Exposure Limits for Air Contaminants; Manganese compounds and carbon black
New Jersey Right to Know Lists, Manganese compounds Substance No. 1157, carbon black Substance No. 0342
Oregon Rules for Air Contaminants; Manganese compounds (0.5mg/m^3 ceiling limit), carbon black (3.5mg/ m^3)
Pennsylvania Right to Know Hazardous Substance; Magnesium and carbon black
Rhode Island Hazardous Substance List; Manganese and magnesium and carbon black
Texas Effects Screening Levels; Manganese dust (2µg/m^3), carbon black (3.5mg/ m^3)

16. Other Information

HMIS Rating

Health	1 (Chronic)
Flammability	1
Physical Hazards	2
Personal Protection:	

This document was prepared based on current knowledge and experience for the purpose of communicating Health, Safety, and Environmental information related to the proper handling of this product. This document does not imply any guarantee of product composition, properties, or performance. This safety data sheet replaces all previous information.

United States Material Safety Data Sheet
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Authored by: MSDS Authoring Team