1. Product and Company Identification

Material name: NMA™ HotPressed™ Carbon Brick

Revision date: 07-04-2011
Version #: 01
MSDS Number: 4011
Product use: Refractory in cupolas/blast/submerged arc furnaces.
Manufacturer/Supplier: Graftech International Holdings Inc.
12900 Snow Road
Parma, Ohio 44130
E-mail: Dave.Mieskowski@graftech.com
+1 216-676-2000
Contact Person: Dave Mieskowski
+1 216-676-2304

Emergency: Emergency Telephone: +1 800-424-9300
& +1 703-527-3887

2. Hazards Identification

Physical state: Solid.
Emergency overview: In its manufactured and shipped state, this product is considered to present low hazard.
Processing may generate hazardous fumes and dusts.

OSHA regulatory status: Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.

Potential health effects

Routes of exposure

- Eyes: Dust in the eyes will cause irritation.
- Skin: Dust may irritate skin. Prolonged skin contact may cause redness, irritation and dry skin. May cause eczema-like skin disorders (dermatitis).
- Inhalation: Dust and fumes generated from the material can enter the body by inhalation. High concentrations of dust and fumes may irritate the throat and respiratory system and cause coughing. Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases. Prolonged and repeated overexposure to dust can lead to pneumoconiosis. Repeated exposure to high concentrations of dust may adversely affect the lungs and increase the risks of developing respiratory cancer.
- Ingestion: Ingestion of dusts generated during working operations may cause nausea and vomiting.

Target organs: Skin. Respiratory tract. Lung.

Chronic effects: Danger of adverse health effects by prolonged exposure. Crystalline silica has been classified by IARC, NTP and ACGIH as a known human carcinogen and suspected human carcinogen respectively. Prolonged and repeated overexposure to dust can lead to benign pneumoconiosis. Prolonged breathing of high levels of crystalline silica can cause silicosis. Also, airborne crystalline silica is possibly carcinogenic to humans. Pre-existing pulmonary disorders, such as emphysema, may possibly be aggravated by prolonged exposure to high concentrations of carbon and/or crystalline silica dust.

Signs and symptoms: Eye contact: Exposed individuals may experience eye tearing, redness, and discomfort. Skin contact: Dry skin.

Potential environmental effects: The product is not expected to be hazardous to the environment.

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthetic graphite</td>
<td>7782-42-5</td>
<td>30-60</td>
</tr>
<tr>
<td>Calcined anthracite</td>
<td>68187-59-7</td>
<td>25-35</td>
</tr>
<tr>
<td>Carbon</td>
<td>7440-44-0</td>
<td>15-35</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>14808-60-7</td>
<td>&lt; 10</td>
</tr>
</tbody>
</table>
4. First Aid Measures

First aid procedures

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Do not rub eye. Remove any contact lenses and open eyes wide apart. Get medical attention.

Skin contact
Remove contaminated clothing. Wash contact areas with soap and water. Get medical attention promptly if symptoms persist or occur after washing.

Inhalation
Move injured person into fresh air and keep person calm under observation. For breathing difficulties, oxygen may be necessary. Get medical attention.

Ingestion
Rinse mouth thoroughly if dust is ingested. Get medical attention if any discomfort continues.

Notes to physician
Treat symptomatically.

5. Fire Fighting Measures

Flammable properties
Thermal decomposition may produce smoke, oxides of carbon and lower molecular weight organic compounds whose composition have not been characterized. Explosive dust mixtures can be formed at concentrations as low as 25 g/m$^3$ when carbon/graphite dusts are milled to less than 50 microns.

Extinguishing media

Suitable extinguishing media
Bulk material is non-combustible. The material may form dust and can accumulate electrostatic charges, which may cause an electrical spark (ignition source). Dust: Extinguish with foam, carbon dioxide, dry powder or water fog.

Unsuitable extinguishing media
None.

Fire fighting equipment/instructions
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Specific methods
Use standard firefighting procedures and consider the hazards of other involved materials. Caution should be exercised when using water or foam as frothing may occur, especially if directed onto containers of hot or burning material.

Hazardous combustion products
Carbon oxides. Unidentified organic compounds.

6. Accidental Release Measures

Personal precautions
Avoid generation and spreading of dust. Avoid inhalation of dust and contact with skin and eyes. Wear suitable protective clothing and gloves. See Section 8 of the MSDS for Personal Protective Equipment.

Environmental precautions
Do not allow material to enter storm or sanitary sewers, groundwater or soil.

Methods for cleaning up
Collect dust using a vacuum cleaner equipped with HEPA filter. If not possible, gently moisten dust with water fog before it is collected with shovel, broom or the like. Collect in approved containers and seal securely. Containers must be labeled. For waste disposal, see section 13 of the MSDS.

7. Handling and Storage

Handling
Use work methods which minimize dust production. If dust or fumes are generated during use, use local exhaust in combination with general ventilation as necessary to remove fumes/dust from the workers' breathing zone and to ensure exposures do not exceed applicable limits. Care should be taken to seal electrical circuits and switches that may be affected. Dusts should not be emitted to the atmosphere where they may settle on and cause shorting of outside electrical equipment. Do not breathe fumes and dusts. Avoid contact with skin and eyes. Wear appropriate personal protective equipment. Keep the workplace clean. Observe good industrial hygiene practices.

Storage
Keep away from heat, spark, open flames and other sources of ignition. Store away from incompatible materials.

8. Exposure Controls / Personal Protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>TWA</td>
<td>10 mg/m$^3$</td>
<td>Inhalable particles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 mg/m$^3$</td>
<td>Respirable fraction.</td>
</tr>
</tbody>
</table>
### ACGIH

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>3 mg/m³</td>
<td>Respirable particles.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td>0.025 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### U.S. - OSHA

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>PEL</td>
<td>15 mg/m³</td>
<td>Total dust.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>2.4 mppcf</td>
<td>Respirable.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td>0.3 mg/m³</td>
<td>Total dust.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>PEL</td>
<td>5 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>15 mg/m³</td>
<td>Total dust.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 mppcf</td>
<td></td>
</tr>
</tbody>
</table>

### Canada - Alberta

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>TWA</td>
<td>3 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>Total</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>0.025 mg/m³</td>
<td>Respirable particles.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Canada - British Columbia

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>TWA</td>
<td>3 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>Total dust.</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>0.025 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Canada - Ontario

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>INHALABLE PARTICULATE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 mg/m³</td>
<td>RESPIRABLE PARTICULATE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1 mg/m³</td>
<td>Respirable fraction.</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Canada. Quebec OELS. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon (7440-44-0)</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable dust.</td>
</tr>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>Respirable dust.</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>2 mg/m³</td>
<td>Respirable dust.</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mexico. Occupational Exposure Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystalline silica (quartz)</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
</tr>
<tr>
<td>(14808-60-7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthetic graphite</td>
<td>TWA</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>(7782-42-5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Engineering controls

Provide adequate general and local exhaust ventilation. Mechanical ventilation or local exhaust ventilation is required. Provide explosion-proof ventilation for high dust concentrations. Observe occupational exposure limits and minimize the risk of inhalation of dust and fumes. Provide access to washing facilities including soap, skin cleanser and fatty cream.

Personal protective equipment

Eye / face protection

Wear safety glasses with side shields (or goggles).

Skin protection

Wear suitable protective gloves to prevent cuts and abrasions. Suitable gloves can be recommended by the glove supplier. Wear appropriate clothing to prevent repeated or prolonged skin contact.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Use a NIOSH–approved respirator if there is a potential for exposure to dust exceeding exposure limits (See 29 CRF 1910.134, respiratory protection standard). Seek advice from supervisor on the company's respiratory protection standards.

General hygiene considerations

Do not eat, drink or smoke when using the product. Routinely wash work clothing and protective equipment to remove contaminants. Always observe national occupational health and hygiene requirements including requirements for medical surveillance.

9. Physical & Chemical Properties

Appearance

Not available.

Color

Black.

Odor

Odorless.

Odor threshold

Not available.

Physical state

Solid.

Form

Solid.

pH

Not applicable.

Melting point

> 5000 °F (> 2760 °C)

Freezing point

Not applicable.

Boiling point

Not applicable.

Flash point

Not applicable.

Evaporation rate

Not applicable.

Flammability limits in air, upper, % by volume

Not applicable.

Flammability limits in air, lower, % by volume

Not applicable.

Vapor pressure

Not applicable.

Vapor density

Not applicable.

Specific gravity

Not applicable

Solubility (water)

Insoluble.

Partition coefficient (n-octanol/water)

No data available.

Auto-ignition temperature

Not applicable.

Decomposition temperature

662 °F (350 °C) (In oxidizing atmosphere)

Bulk density

1.5 - 2 g/cm³

10. Chemical Stability & Reactivity Information

Chemical stability

Material is stable under normal conditions.
Conditions to avoid
Dust is combustible, avoid sources of ignition and strong oxidizing agents. This product should not be used in oxidizing atmosphere.

Incompatible materials
Strong oxidizing agents. Strong reducing agents.

Hazardous decomposition products
Carbon oxides. Unidentified organic compounds.

Possibility of hazardous reactions
Will not occur.

11. Toxicological Information

Acute effects
Prolonged skin contact may cause redness, irritation and dry skin. Ingestion of dusts generated during working operations may cause nausea and vomiting. High concentrations of carbon, graphite, quartz (crystalline silica) and/or coal dusts may be irritating to eyes, skin, mucous membranes and respiratory tract.

Local effects
Dust in the eyes will cause irritation. Dust may irritate skin. High concentrations of dust may irritate throat and respiratory system and cause coughing.

Sensitization
May cause eczema-like skin disorders (dermatitis).

Chronic effects
Repeated exposure to high concentrations of dust may adversely affect the lungs and increase the risks of developing respiratory cancer. Frequent inhalation of fume/dust over a long period of time increases the risk of developing lung diseases. Pre-existing pulmonary disorders, such as emphysema, may possibly be aggravated by prolonged exposure to high concentrations of graphite, carbon and/or crystalline silica dusts.

Carcinogenicity
Crystalline silica: Overexposure to the respirable dust of crystalline silica (quartz or cristobalite, less than or equal to 5 microns in size) may lead to silicosis in humans, which is a progressive and irreversible lung disease.

ACGIH Carcinogens
Crystalline silica (quartz) (CAS 14808-60-7) A2 Suspected human carcinogen.

IARC Monographs. Overall Evaluation of Carcinogenicity
Crystalline silica (quartz) (CAS 14808-60-7) 1 Carcinogenic to humans.

US NTP Report on Carcinogens: Known carcinogen
Crystalline silica (quartz) (CAS 14808-60-7) Known carcinogen.

Mutagenicity
No data available.

Reproductive effects
No data available.

Symptoms and target organs
Eye contact: Exposed individuals may experience eye tearing, redness, and discomfort. Skin contact: Dry skin.

Further information
No data available.

12. Ecological Information

Ecotoxicity
The product is not expected to be hazardous to the environment.

Persistence and degradability
The degradability of the product has not been stated.

Bioaccumulation / Accumulation
No data available on bioaccumulation.

Partition coefficient (n-octanol/water)
No data available.

Mobility in environmental media
Not relevant, due to the form of the product.

13. Disposal Considerations

Waste codes
Not regulated.

Disposal instructions
Dispose of waste and residues in accordance with local authority requirements. Waste must be kept in sealed and labeled containers. Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal. Recover and reclaim or recycle, if practical.

Waste from residues / unused products
Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Contaminated packaging
Dispose product packaging in accordance with local authority requirements taking into account characteristics of the packaging material.
14. Transport Information

DOT
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

TDG
Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)
None

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance (40 CFR 355, Appendix A)
No

Section 311/312 (40 CFR 370)
Yes

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)
Not controlled

Canadian regulations
This product has been classified according to the hazard criteria of the Canadian Controlled Products Regulations, Section 33, and the MSDS contains all required information.

WHMIS status
Controlled

WHMIS classification
D2A - Other Toxic Effects-VERY TOXIC

WHMIS labeling

Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>No</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>No</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A “Yes” indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

**US - California Hazardous Substances (Director's): Listed substance**
- Carbon (CAS 7440-44-0) Listed.
- Synthetic graphite (CAS 7782-42-5) Listed.

**US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**
- Crystalline silica (quartz) (CAS 14808-60-7) Listed.

**US - California Proposition 65 - CRT: Listed date/Carcinogenic substance**
- Crystalline silica (quartz) (CAS 14808-60-7) Listed: October 1, 1988 Carcinogenic.

**US - Massachusetts RTK - Substance: Listed substance**
- Crystalline silica (quartz) (CAS 14808-60-7) Listed.
- Synthetic graphite (CAS 7782-42-5) Listed.

**US - New Jersey RTK - Substances: Listed substance**
- Carbon (CAS 7440-44-0) Listed.
- Crystalline silica (quartz) (CAS 14808-60-7) Listed.
- Synthetic graphite (CAS 7782-42-5) Listed.

**US - Pennsylvania RTK - Hazardous Substances: Listed substance**
- Crystalline silica (quartz) (CAS 14808-60-7) Listed.
- Synthetic graphite (CAS 7782-42-5) Listed.

**Mexico regulations**
Under some use conditions, this material may be considered to be hazardous in accordance with Mexican regulations.

### 16. Other Information

**Further information**
HMIS® is a registered trade and service mark of the NPCA.
F - Safety Glasses, Gloves, Apron, Dust Respirator
GRAFTech International Holdings Inc. advises the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, users should notify their employees, agents and contractors of the information on this MSDS and any product hazards and safety information.

**HMIS® ratings**
- Health: 1*
- Flammability: 1
- Physical hazard: 0
- Personal protection: F

**NFPA ratings**
- Health: 1
- Flammability: 1
- Instability: 0

**Disclaimer**
This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

**Issue date**
07-04-2011