

**MATERIAL SAFETY DATA SHEET****Product Trade Name:** **ACFRAC CERAMAX I****Revision Date:** 04-Jan-2011**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Product Trade Name:** ACFRAC CERAMAX I  
**Synonyms:** None  
**Chemical Family:** Metal oxide  
**Application:** Proppant

**Manufacturer/Supplier** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000

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**2. COMPOSITION/INFORMATION ON INGREDIENTS**

| Substances                 | CAS Number | PERCENT  | ACGIH TLV-TWA           | OSHA PEL-TWA                                  |
|----------------------------|------------|----------|-------------------------|-----------------------------------------------|
| Aluminum silicate          | 1302-76-7  | 30 - 60% | Not applicable          | 15 mg/m <sup>3</sup>                          |
| Aluminum oxide             | 1344-28-1  | 30 - 60% | 10 mg/m <sup>3</sup>    | 10 mg/m <sup>3</sup>                          |
| Crystalline silica, quartz | 14808-60-7 | 0 - 1%   | 0.025 mg/m <sup>3</sup> | 10 mg/m <sup>3</sup><br>%SiO <sub>2</sub> + 2 |

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

**3. HAZARDS IDENTIFICATION****Hazard Overview****CAUTION! - ACUTE HEALTH HAZARD**

May cause eye, skin, and respiratory irritation. May cause allergic skin and respiratory reaction.

**DANGER! - CHRONIC HEALTH HAZARD**

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

#### 4. FIRST AID MEASURES

|                    |                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Inhalation         | If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.    |
| Skin               | Wash with soap and water. Get medical attention if irritation persists.                                                                   |
| Eyes               | In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists. |
| Ingestion          | Under normal conditions, first aid procedures are not required.                                                                           |
| Notes to Physician | Not Applicable                                                                                                                            |

#### 5. FIRE FIGHTING MEASURES

|                                         |                |
|-----------------------------------------|----------------|
| Flash Point/Range (F):                  | Not Determined |
| Flash Point/Range (C):                  | Not Determined |
| Flash Point Method:                     | Not Determined |
| Autoignition Temperature (F):           | Not Determined |
| Autoignition Temperature (C):           | Not Determined |
| Flammability Limits in Air - Lower (%): | Not Determined |
| Flammability Limits in Air - Upper (%): | Not Determined |

|                                                |                                                                                                                |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Fire Extinguishing Media                       | Water fog, carbon dioxide, foam, dry chemical.                                                                 |
| Special Exposure Hazards                       | Decomposition in fire may produce toxic gases.                                                                 |
| Special Protective Equipment for Fire-Fighters | Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel. |
| NFPA Ratings:                                  | Health 1, Flammability 0, Reactivity 0                                                                         |
| HMIS Ratings:                                  | Health 1, Flammability 0, Reactivity 0                                                                         |

#### 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment. Avoid creating and breathing dust.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

#### 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

**Storage Information** Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 36 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

|                               |                                                                                                                                                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Engineering Controls</b>   | Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.                                                |
| <b>Respiratory Protection</b> | Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.                                                                                          |
| <b>Hand Protection</b>        | Normal work gloves.                                                                                                                                                                          |
| <b>Skin Protection</b>        | Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing. |
| <b>Eye Protection</b>         | Wear safety glasses or goggles to protect against exposure.                                                                                                                                  |
| <b>Other Precautions</b>      | Eyewash fountains and safety showers must be easily accessible.                                                                                                                              |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

|                                                   |                |
|---------------------------------------------------|----------------|
| <b>Physical State:</b>                            | Solid          |
| <b>Color:</b>                                     | Dark gray      |
| <b>Odor:</b>                                      | Odorless       |
| <b>pH:</b>                                        | Not Determined |
| <b>Specific Gravity @ 20 C (Water=1):</b>         | 2.53           |
| <b>Density @ 20 C (lbs./gallon):</b>              | Not Determined |
| <b>Bulk Density @ 20 C (lbs/ft3):</b>             | Not Determined |
| <b>Boiling Point/Range (F):</b>                   | Not Determined |
| <b>Boiling Point/Range (C):</b>                   | Not Determined |
| <b>Freezing Point/Range (F):</b>                  | Not Determined |
| <b>Freezing Point/Range (C):</b>                  | Not Determined |
| <b>Vapor Pressure @ 20 C (mmHg):</b>              | Not Determined |
| <b>Vapor Density (Air=1):</b>                     | Not Determined |
| <b>Percent Volatiles:</b>                         | 0              |
| <b>Evaporation Rate (Butyl Acetate=1):</b>        | Not Determined |
| <b>Solubility in Water (g/100ml):</b>             | Insoluble      |
| <b>Solubility in Solvents (g/100ml):</b>          | Not Determined |
| <b>VOCs (lbs./gallon):</b>                        | Not Determined |
| <b>Viscosity, Dynamic @ 20 C (centipoise):</b>    | Not Determined |
| <b>Viscosity, Kinematic @ 20 C (centistokes):</b> | Not Determined |
| <b>Partition Coefficient/n-Octanol/Water:</b>     | Not Determined |
| <b>Molecular Weight (g/mole):</b>                 | Not Determined |

## 10. STABILITY AND REACTIVITY

|                                             |                                                                                                                                                                                                                                   |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Stability Data:</b>                      | Stable                                                                                                                                                                                                                            |
| <b>Hazardous Polymerization:</b>            | Will Not Occur                                                                                                                                                                                                                    |
| <b>Conditions to Avoid</b>                  | None anticipated                                                                                                                                                                                                                  |
| <b>Incompatibility (Materials to Avoid)</b> | None known.                                                                                                                                                                                                                       |
| <b>Hazardous Decomposition Products</b>     | Carbon monoxide and carbon dioxide. Aldehydes. Phenol. Hydrogen cyanide. Ammonia. Benzo(A)pyrene. Other organic materials. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C). |
| <b>Additional Guidelines</b>                | Not Applicable                                                                                                                                                                                                                    |

## 11. TOXICOLOGICAL INFORMATION

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Principle Route of Exposure</b>     | Eye or skin contact, inhalation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Inhalation</b>                      | <p>May cause allergic respiratory reaction. Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).</p> <p>Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Skin Contact</b>                    | May cause mechanical skin irritation. May cause an allergic skin reaction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Eye Contact</b>                     | May cause eye irritation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Ingestion</b>                       | None known                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Aggravated Medical Conditions</b>   | Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Chronic Effects/Carcinogenicity</b> | <p>Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.</p> <p>Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).</p> <p>There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.</p> |
| <b>Other Information</b>               | For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Toxicity Tests</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Oral Toxicity:</b>                  | Not determined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Dermal Toxicity:</b>                | Not determined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Inhalation Toxicity:</b>            | Not determined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                               |                                                                                           |
|-----------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Primary Irritation Effect:</b>             | Not determined                                                                            |
| <b>Carcinogenicity</b>                        | Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997). |
| <b>Genotoxicity:</b>                          | Not determined                                                                            |
| <b>Reproductive / Developmental Toxicity:</b> | Not determined                                                                            |

## 12. ECOLOGICAL INFORMATION

|                                  |                |
|----------------------------------|----------------|
| <b>Mobility (Water/Soil/Air)</b> | Not determined |
| <b>Persistence/Degradability</b> | Not determined |
| <b>Bio-accumulation</b>          | Not determined |

### Ecotoxicological Information

|                                    |                |
|------------------------------------|----------------|
| <b>Acute Fish Toxicity:</b>        | Not determined |
| <b>Acute Crustaceans Toxicity:</b> | Not determined |
| <b>Acute Algae Toxicity:</b>       | Not determined |
| <b>Chemical Fate Information</b>   | Not determined |
| <b>Other Information</b>           | Not applicable |

## 13. DISPOSAL CONSIDERATIONS

|                               |                                                                                 |
|-------------------------------|---------------------------------------------------------------------------------|
| <b>Disposal Method</b>        | Bury in a licensed landfill according to federal, state, and local regulations. |
| <b>Contaminated Packaging</b> | Follow all applicable national or local regulations.                            |

## 14. TRANSPORT INFORMATION

### Land Transportation

**DOT**  
Not restricted

**Canadian TDG**  
Not restricted

**ADR**  
Not restricted

### Air Transportation

**ICAO/IATA**  
Not restricted

### Sea Transportation

**IMDG**  
Not restricted

## Other Shipping Information

Labels: None

## 15. REGULATORY INFORMATION

### US Regulations

|                                                   |                                                                                                                                                                                                |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| US TSCA Inventory                                 | All components listed on inventory or are exempt.                                                                                                                                              |
| EPA SARA Title III Extremely Hazardous Substances | Not applicable                                                                                                                                                                                 |
| EPA SARA (311,312) Hazard Class                   | Acute Health Hazard<br>Chronic Health Hazard                                                                                                                                                   |
| EPA SARA (313) Chemicals                          | This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372:<br>Aluminum Oxide//1344-28-1 |
| EPA CERCLA/Superfund Reportable Spill Quantity    | Not applicable.                                                                                                                                                                                |
| EPA RCRA Hazardous Waste Classification           | If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.                                                                                       |
| California Proposition 65                         | The California Proposition 65 regulations apply to this product.                                                                                                                               |
| MA Right-to-Know Law                              | One or more components listed.                                                                                                                                                                 |
| NJ Right-to-Know Law                              | One or more components listed.                                                                                                                                                                 |
| PA Right-to-Know Law                              | One or more components listed.                                                                                                                                                                 |

### Canadian Regulations

|                        |                                                |
|------------------------|------------------------------------------------|
| Canadian DSL Inventory | All components listed on inventory.            |
| WHMIS Hazard Class     | D2A Very Toxic Materials<br>Crystalline silica |

## 16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

|                        |                                                                                                                                                                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Additional Information | For additional information on the use of this product, contact your local Halliburton representative.<br><br>For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335. |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Disclaimer Statement**

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**\*\*\*END OF MSDS\*\*\***