

*(Headings correspond to those found in the Alaska Department of Natural Resources Exploration Permit Application.)*

## **Part A – GENERAL INFORMATION**

**1.0 APPLICANT INFORMATION** – see application form.

### **2.0 LOCATION OF THE EXPLORATION**

Exact siting of drill hole locations will be dependent upon ongoing field reconnaissance results. No less than 30 days prior to drilling, Linc Energy Operations, Inc. (Linc) will submit exact locations to ADNR for each drill hole.

#### **2.1 Legal Description**

##### **Combined Tyonek and Kenai Underground Coal Gasification (UCG) Exploration License Areas – 107,497 acres**

Tyonek Underground Coal Gasification (UCG) Exploration License Area (25,374.88 ac.)

T.013 N., R.011 W., Seward Meridian

Section 4: All	Section 21: All
Section 5: All	Section 24: All excluding bed of Beluga River
Section 6: All	Section 25: All
Section 7: All	Section 28: All
Section 8: All	Section 29: All Excluding USS3964
Section 9: All	Section 30: All Excluding USS3964
Section 16: All	Section 31: All Excluding USS3964
Section 17: All	Section 32: All Excluding USS3964
Section 18: All	Section 33: All
Section 19: All	Section 36: All
Section 20: All	

T.013 N., R.010 W., Seward Meridian

Section 19: All	Section 30: All
Section 20: All	Section 31: All
Section 21: All	Section 32: All
Section 28: All N $\frac{1}{2}$ , SW $\frac{1}{4}$ , NW $\frac{1}{4}$ SE $\frac{1}{4}$	Section 33: W $\frac{1}{2}$ ; S $\frac{1}{2}$ SE $\frac{1}{4}$
Section 29: All	

T.012 N., R.012 W., Seward Meridian

Section 1: All	
Section 11: All	
Section 12: All	
Section 13: All	
Section 14: All	
Section 21: S $\frac{1}{2}$	
Section 22: SW $\frac{1}{4}$ , the E $\frac{1}{2}$ Excluding USS1865 and the NE $\frac{1}{4}$ NE $\frac{1}{4}$ Lying North of USS1865 and North of the Chuitna River	
Section 23: All Excluding USS1865	
Section 24: All Excluding USS1865 and bed of the Chuitna River	
Section 27: All Excluding USS1865	
Section 28: All	
Section 33: Tracts A, B, C, D	
Section 34: All Excluding USS1865	

Kenai Underground Coal Gasification (UCG) Exploration License Area (82,123 acres)

T.014 N., R.013 W., Seward Meridian

Section 1: That portion within Tract C	Section 23: That portion within Tract C
Section 2: That portion within Tract C	Section 24: That portion within Tract C
Section 3: That portion within Tract C	Section 25: That portion within Tract C
Section 10: That portion within Tract C	Section 26: That portion within Tract C
Section 11: That portion within Tract C	Section 27: That portion within Tract C
Section 12: That portion within Tract C	Section 34: That portion within Tract C
Section 13: That portion within Tract C	Section 35: That portion within Tract C
Section 14: That portion within Tract C	Section 36: That portion within Tract C
Section 15: That portion within Tract C	
Section 22: That portion within Tract C	

T.014 N., R.012 W., Seward Meridian

Section 1: That portion within Tract B  
Section 2: That portion within Tract B  
Section 3: That portion within Tract B  
Section 4: That portion within Tract B  
Section 5: That portion within Tract B  
Section 6: That portion within Tract B  
Section 7: That portion within Tract B  
Section 8: That portion within Tract B  
Section 9: That portion within Tract B  
Section 10: That portion within Tract B  
Section 11: That portion within Tract B  
Section 12: That portion within Tract B  
Section 13: That portion within Tract B  
Section 14: That portion within Tract B  
Section 15: That portion within Tract B  
Section 16: That portion within Tract B

Section 17: That portion within Tract B  
Section 18: That portion within Tract B  
Section 19: That portion within Tract B  
Section 20: That portion within Tract B  
Section 21: That portion within Tract B  
Section 22: That portion within Tract B  
Section 23: That portion within Tract B  
Section 24: That portion within Tract B  
Section 25: That portion within Tract B  
Section 26: That portion within Tract B  
Section 27: That portion within Tract B  
Section 34: That portion within Tract B  
Section 35: That portion within Tract B  
Section 36: That portion within Tract B

T.013 N., R.013 W., Seward Meridian

Section 1: All  
Section 2: All  
Section 3: All  
Section 4: All  
Section 5: All  
Section 6: All  
Section 7: All  
Section 8: All  
Section 9: All  
Section 10: All  
Section 11: All  
Section 12: All  
Section 13: All  
Section 14: All

Section 15: All  
Section 16: All  
Section 17: All  
Section 18: All  
Section 19: All  
Section 20: All  
Section 21: All  
Section 22: N<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>, NW<sup>1</sup>/<sub>4</sub>, NW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>  
Section 29: N<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>  
Section 30: N<sup>1</sup>/<sub>2</sub>, SW<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>  
Section 31: All  
Section 32: SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>,  
W<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>

T.013 N., R.012 W., Seward Meridian

Section 4:	SW <sup>1</sup> / <sub>4</sub>	Section 18:	All
Section 5:	S <sup>1</sup> / <sub>2</sub>	Section 19:	All
Section 6:	All	Section 20:	All
Section 7:	All	Section 21:	All
Section 8:	All	Section 22:	All
Section 9:	All	Section 23:	All
Section 10:	S <sup>1</sup> / <sub>2</sub>	Section 24:	S <sup>1</sup> / <sub>2</sub>
Section 11:	S <sup>1</sup> / <sub>2</sub>	Section 25:	All
Section 12:	SW <sup>1</sup> / <sub>4</sub>	Section 26:	All
Section 13:	NW <sup>1</sup> / <sub>4</sub>	Section 27:	All
Section 14:	All	Section 28:	All
Section 15:	All	Section 34:	All
Section 16:	All	Section 35:	All
Section 17:	All	Section 36:	All

T.008 N., R.011 W., Seward Meridian

Section 20:	S <sup>1</sup> / <sub>2</sub> NE <sup>1</sup> / <sub>4</sub> , SE <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> , W <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub>
Section 23:	Lot 5 and NW <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> , excluding AKSLS15-75; AKSLS75-75
Section 24:	Lot 5
Section 25:	Lot 16
Section 26:	Lots 24 and 29, S <sup>1</sup> / <sub>2</sub> NE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> , N <sup>1</sup> / <sub>2</sub> NE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub>
Section 28:	Lots 11-19 inclusive and N <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> , NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> , NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub>
Section 32:	SW <sup>1</sup> / <sub>4</sub> NW <sup>1</sup> / <sub>4</sub> , NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub>
Section 34:	Lots 17, 20, 22, 35, 36, 37 and E <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> , SE <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> , E <sup>1</sup> / <sub>2</sub> NW <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub> , NW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub>

T.007 N., R.011 W., Seward Meridian

Section 1:	Lot 3	Section 9:	Lots 9 and 10
Section 4:	Lot 9	Section 14:	Lots 3, 5, 6 and E <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub>
Section 6:	Lot 8, NE <sup>1</sup> / <sub>4</sub> SE <sup>1</sup> / <sub>4</sub>	Section 15:	W <sup>1</sup> / <sub>2</sub> Excluding BLM AA008262
Section 7:	Lots 1 and 6		
Section 16:	Lot 3 Excluding BLM AA008238, Lot 10 Excluding BLM AA008297, SE <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> Excluding BLM AA008238, E <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> Excluding BLM A050290, NW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> , N <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> SW <sup>1</sup> / <sub>4</sub> NE <sup>1</sup> / <sub>4</sub> , N <sup>1</sup> / <sub>2</sub> S <sup>1</sup> / <sub>2</sub> NW <sup>1</sup> / <sub>4</sub> , N <sup>1</sup> / <sub>2</sub> S <sup>1</sup> / <sub>2</sub> S <sup>1</sup> / <sub>2</sub> NW <sup>1</sup> / <sub>4</sub>		
Section 19:	Lot 1, S <sup>1</sup> / <sub>2</sub> NE <sup>1</sup> / <sub>4</sub> , E <sup>1</sup> / <sub>2</sub> SW <sup>1</sup> / <sub>4</sub> , SE <sup>1</sup> / <sub>4</sub>		

- Section 20: Lots 1-5 inclusive, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 21: Lots 8, 10, and 12 and W<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 22: Lots 1 and 4
- Section 27: Lots 1, 7, and 8 and NW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>.
- Section 28: Lot 5 and 6 and N<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>
- Section 30: Lots 1-3 inclusive, N<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>, NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>
- Section 31: E<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>
- Section 32: W<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>
- Section 33: E<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>
- Section 34: N<sup>1</sup>/<sub>2</sub>

T.006 N., R.011 W., Seward Meridian

- Section 3: S<sup>1</sup>/<sub>2</sub>S<sup>1</sup>/<sub>2</sub>
- Section 4: S<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 9: E1/SW<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 10: N<sup>1</sup>/<sub>2</sub>, N<sup>1</sup>/<sub>2</sub>S<sup>1</sup>/<sub>2</sub>, SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 15: E<sup>1</sup>/<sub>2</sub>E1/W<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>
- Section 16: W<sup>1</sup>/<sub>2</sub>E<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>, W<sup>1</sup>/<sub>2</sub>, SE<sup>1</sup>/<sub>4</sub>
- Section 17: E<sup>1</sup>/<sub>2</sub>
- Section 20: E<sup>1</sup>/<sub>2</sub>
- Section 21: NW<sup>1</sup>/<sub>4</sub>
- Section 29: NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>
- Section 5: Lots 3 and 4 and SW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub>, S<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>, N<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub>
- Section 6: Lot 3, 6 and 7 and SE<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>SW<sup>1</sup>/<sub>4</sub>, SE<sup>1</sup>/<sub>4</sub>
- Section 7: Lots 1 and 2 and N<sup>1</sup>/<sub>2</sub>NE<sup>1</sup>/<sub>4</sub>, E<sup>1</sup>/<sub>2</sub>NW<sup>1</sup>/<sub>4</sub>

- 2.2** See Application
- 2.3** See Application
- 2.4** See Application
- 2.5** See Application
- 2.6** See Attached Figures

### **3.0 PERIOD OF EXPLORATION**

**3.1** See Application

**3.2** See Application

### **4.0 OWNERSHIP OF SURFACE/SUBSURFACE MINERAL ESTATE**

**4.1** See Application

**4.2** See Application

**4.3** See Application

**4.4** See Application

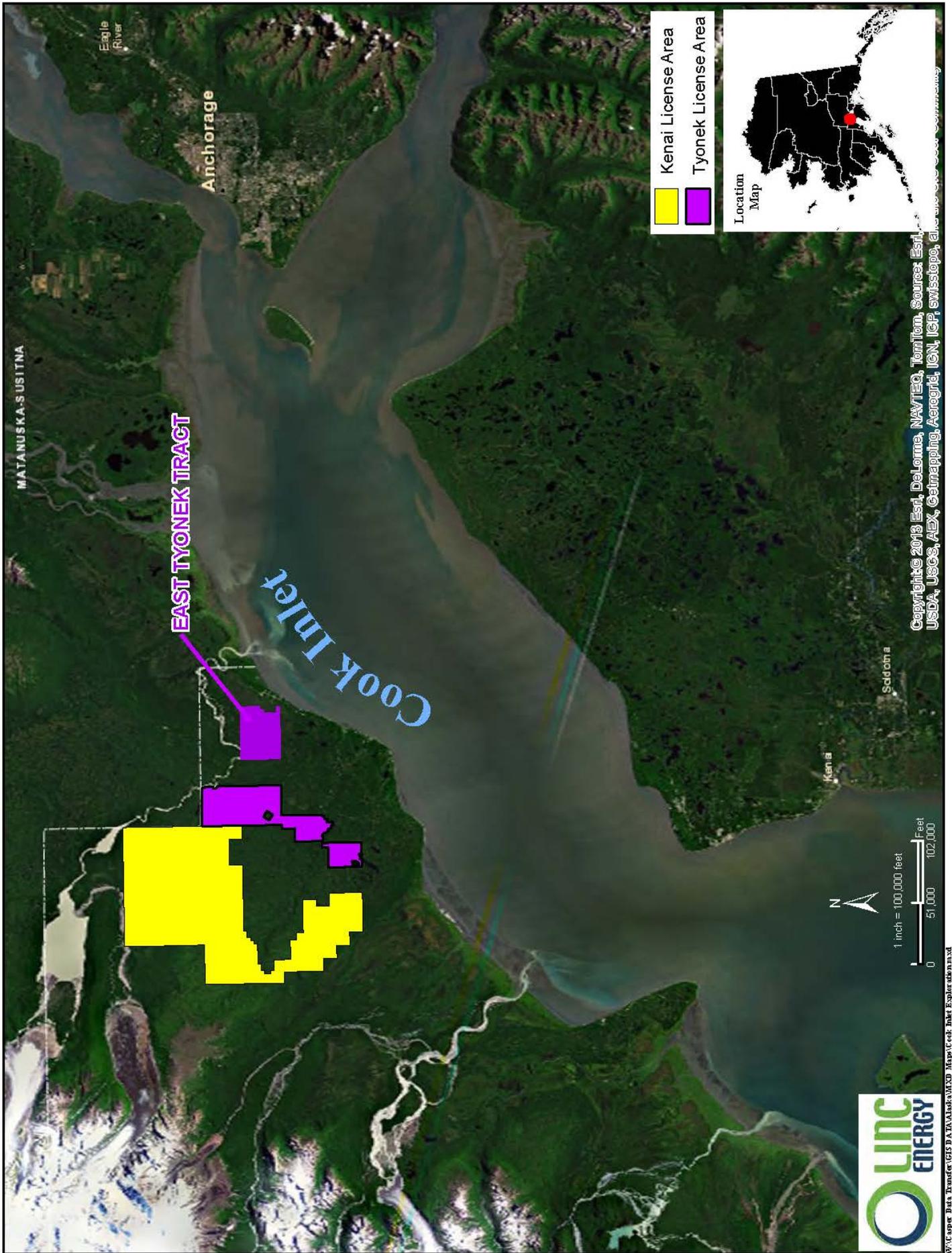
**4.5** See Application

**4.6** Right to Enter

Linc Energy holds Underground Coal Gasification Exploration Licenses MHT No. 9200461 and 9200462 and is authorized to enter upon and explore for lands within its license area in accordance with applicable law. The proposed drilling will be performed by Linc contractors under the direction of Linc employees.

### **5.0 FEES**

**5.1** See Application



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**PROPOSED HOLE LOCATIONS  
EAST TYONEK TRACT**

- TYES0101X
- Proposed hole location
- Water sources
- Interpreted and modeled seismic lines
- Section
- LE AMHT East Tyonek Tract

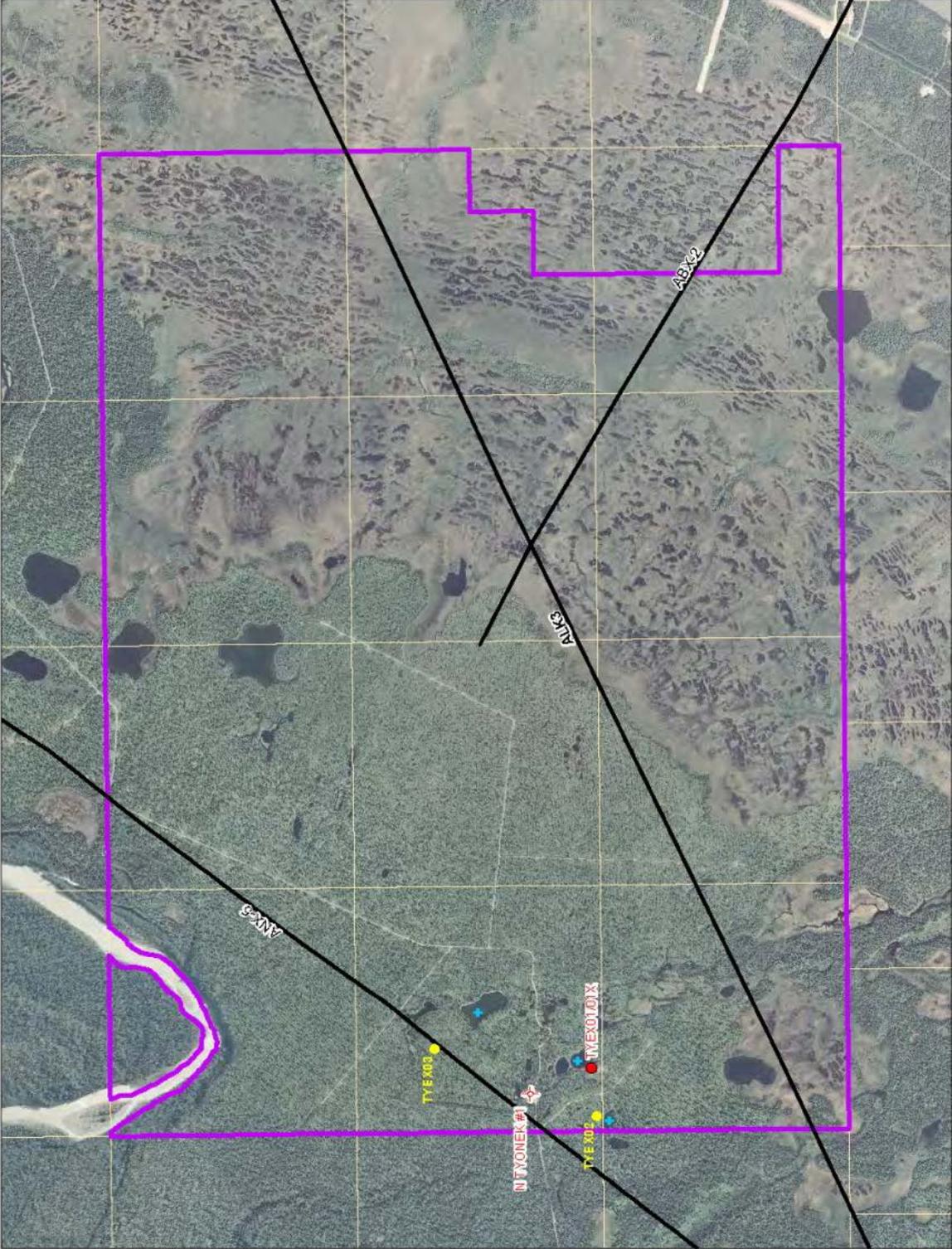
1 in = 2,000 feet

0 2,000 4,000 Feet

**Location Map**

**LMC ENERGY**

Date Created: 6/5/2014 Author: Karuki, N





## **Part B – NOTICE OF INTENT TO EXPLORE**

### **6.0 INTENTION TO EXPLORE**

**6.1** See Application

**6.2** See Application

**6.3** See Application

## **Part C – EXPLORATION PERMIT APPLICATION**

### **7.0 EXPLORATION AREA DESCRIPTION**

#### **7.1 Surface Disturbance:**

Surface disturbances will be limited to core drilling and surface activities associated with small diameter core drilling. These surface activities will include the drill rig pad and staging area.

#### **7.2 Map:**

See Figures.

#### **7.3 Area Description:**

**7.3.1 Borough** – Both exploration areas lie within the Kenai Peninsula Borough.

**7.3.2 Land Use** – The Tyonek and a portion of the Kenai License Areas fall within Regions 11D and 11E of the Kenai Area Plan. Near developed areas where the exploration area is located, most of the state-owned parcels have been designated to recognize a variety of uses, including development related to coal, oil, and gas. The exploration area itself is located on Alaska Mental Health Trust Lands. These lands, by law, are managed as private lands for the “sole benefit of the beneficiaries of the AMHT”. Primary use of the land is subsistence. Recreational uses exist but are limited due to access issues.

The remainder of the Kenai License Area lies within Region 5 of the Kenai Area Plan. At this time, there are no exploration drill holes planned for this area.

**7.3.3** Surface Topography – The topography of the Tyonek/Kenai Exploration Area consists of flat to undulating hills and ridges with small streams, ponds and muskegs.

**7.3.4** Access – Access to both Exploration Areas is limited. Proposed exploration activities will make use of existing roads and trails to the extent practicable. Helicopter support will also be utilized.

**7.3.5** Geology – The exploration license areas lie within the confines of the Cook Inlet Basin. The Cook Inlet basin is a northeast trending basin located between the Chugach and Kenai Mountains on the southeast and the Alaska Range and Aleutian volcanic arc to the north and west. Partially filling the basin and exposed on the east and west sides of the basin is a sequence of largely continental Tertiary deposits that attain a thickness of as much as 26,000 feet. Unconsolidated glacial and fluvial Quaternary sediments cap these Tertiary rocks which unconformably overlie Mesozoic basement rocks. The Tertiary sedimentary rocks belonging to the Kenai Group host the coal seams of potential UCG interest, of this group the Tyonek Formation appears to hold the most promise for UCG development. The structural geology of the area is very complex. Several faults are believed to control and displace the coal bearing Tertiary strata in the license area.

**7.3.6** Surface Waters - The portion of the Tyonek license area where the exploration wells are proposed is located within in the Beluga and Chuitna River basins. Surface water resources in the license area include glacial and non-glacial rivers, perennial streams, and a number of lakes and ponds. The Beluga River basin is largely influenced by the Beluga and Chichantna Rivers, which are located north and east of the license area. The Chichantna River flows east, originating as outwash from the Capps Glacier, before turning north and draining into Beluga Lake. The Beluga River flows from Beluga Lake southeast into Lower Beluga Lake and then continues flowing southeast ultimately draining into the north side of Cook Inlet. The section of the Beluga River near the proposed exploration area is characterized with a moderate gradient and steep canyons. Tributaries of the Beluga River within in the license area include Bishop Creek, Scarp Creek, Drill Creek, Coffee Creek and several unnamed creeks. The small tributaries appear to have relatively low gradients with occasional cutbanks ranging to 50 feet high. Available flow information for the Beluga River is limited.

The Chuitna River basin is largely influenced by the Chuitna River and its tributaries. The Chuitna River flows southeast from the headwaters into the north side of Cook Inlet. The Chuitna River is also characterized by sharp canyons with a moderate gradient. A baseline study conducted at the neighboring Chuitna Coal Project provides some data collected from the Chuitna River drainage. According to the 2007 *Hydrologic Component Baseline Study report*, surface water discharge information based on two years of record indicates that downstream of tributary 2005, the Chuitna River has a mean flow of 200 cubic feet per second (cfs) with a daily flow ranging from 27 to 2,940 cfs. The referenced Chuitna River gaging station drains an area of approximately 71 square miles. The gaging station includes the flow from ungaged tributaries including Stream 2005 (which has an approximate 8 square mile drainage area), and an unnamed stream that merges with the Chuitna River in Section 27.

Exact groundwater elevations in the license area are unknown. The shallow groundwater in the proposed exploration areas is anticipated to occur within the top 20 feet of unconsolidated surface material.

The northern section of the Kenai license area is largely positioned in the Chuitna River basin with portions extending south into the Chakachatna River basin. Tributaries of the Chuitna River in the license area include Chuit Creek, Wolverine Fork, Lone Creek and several other unnamed creeks. The southern section of the license area is located in the Chakachatna River basin and is situated northeast of Nicolai Creek, which flows to the southeast and drains into Trading Bay and Cook Inlet.

**7.3.7** Soils – Cryaquand soils and histic soils were both found in poorly drained areas. Sand loams and silty loams were well drained glacial outwash or till soils overlain by differing thicknesses of topsoil. These drier soils with forest growth are found on elevated ridges. Exploration activities will focus on those areas where the better drained soils are anticipated to occur.

## **7.4 Vegetation and Habitat:**

**7.4.1** Vegetation – Forests are predominantly a mixed woodland of spruce and paper birch. Dominant shrubs are highbush cranberry, tall blueberry willow, Sitka alder, early blueberry and white spruce saplings. Understory species include blue joint reed grass, lady fern, willow weed, oak fern, horsetail and bunchberry.

Scrublands are a combination of tall alder and open low scrub bog vegetation types. Dominant understory species include devils club, American red currant, blue-joint reed grass, lady fern and horsetail. The open low muskegs contain sweet gale and dwarf arctic birch, spike rush, blue joint reed grass, crowberry, cloud berry and cinquefoil. Dense mats of sphagnum cover much of the ground.

**7.4.2 Terrestrial Wildlife** – The west side of the Cook Inlet has brown bear, black bear, caribou, moose, sheep, wolf and wolverine. Small furbearers and a wide variety of birds and water fowl live in or migrate through the area on a seasonal basis. Subsistence and sport hunting occur within the area.

**7.4.3 Aquatic Wildlife** –The small lakes, ponds and wetlands in the exploration area a home to grayling, arctic char, northern pike, rainbow trout and both landlocked and sea-going salmon species. During the exploration project a temporary water use permit will be obtained. The pump intakes will be screened to prevent small fish from being entrained into the pumps.

## **7.5 Threatened or Endangered Species:**

No threatened or endangered species reside in the exploration area. Bald eagles and swans are present in the region in the summer and fall. Nests will not be disturbed if encountered.

## **7.6 Cultural and Archaeological Resources:**

Historic sites exist within the Tyonek and Kenai License Exploration Areas, although the majority are on the east side of Cook Inlet where no activity is planned. The Alaska Department of Natural Resources Office of History and Archaeology reviewed the UCG tracts for the License Areas. There are two areas containing known historic sites in the vicinity of the project:

- TYO-00308 within Section 32, T. 13 N, R. 11 W, Seward Meridian
- TYO-00268 within Section 24, T. 12 N, R. 12 W, Seward Meridian

Both of these areas will be avoided. Should a historic or cultural resource be discovered, they will be reported. Should any historic sites be encountered during field work, they will be reported.

Linc Energy recognizes the cultural and historical importance of the proposed permit area to the Chickaloon Native Village and the communities of Beluga and Tyonek. Linc Energy has been in contact with the State Historic Preservation Office during the permitting process and understands the proximity of the known cultural sites. Linc will continue to work with SHPO during operations.

## **8.0 EXPLORATION/RECLAMATION METHODS**

### **8.1 Exploration Area Map and Drill Hole Location Maps:**

The attached figures depict the UCG Exploration License Areas as well as the 2014 proposed drill hole locations.

### **8.2 Project Description:**

**8.2.1 Surface Drilling Program** – The Drilling program in the Tyonek/Kenai license area for this permit period is estimated to be up to a total of 5 site characterization holes with maximum estimated depth of 3500 ftbgs each. At a minimum, one hole will be cored and all associated samples, tests and physical information necessary to evaluate it will be obtained. The Tyonek/Kenai UCG Exploration Area has a total of one drill hole planned for 2014. TYEX02, located in the Tyonek Exploration License Area will be drilled to approximately 3,000 feet. The drilling and coring will be accomplished with a core drilling rig with the capabilities of reaching the previously noted depth and obtain a core with an outside diameter of approximately 2.5 inches.

The main objectives of the TYEX02 core hole are to provide confirmation of the geological structure, provide geotechnical information about the coal seams and surrounding rock, provide gas content and whole coal analysis of the two prospective target coal seams, obtain hydrological characteristics from geophysical logs and perform drill stem tests in and adjacent to the targeted coal seams.

Initial site mobilization is planned to begin August 1, 2014. It is estimated at this time that exploratory drilling will commence on September 1, 2014 and continue as deemed necessary throughout the license area year.

Depending on drilling results and schedule, a second well, TYEX03, could be drilled. TYEX03 is also located within Tyonek East Tract. TYEX03 is planned as a rotary hole.

A summary exploration report outlining the methods and results of the drilling program will be prepared. A file will be created for each hole and will include all data pertinent to the hole.

**8.2.2 Equipment and Equipment Use** – Linc Energy Alaska will utilize the LECR#1, a Buffalo American Recon AR-250 drill rig, to support the exploration effort. The LECR#1 is helicopter portable. This electric over hydraulic drill rig is capable of triple tube core drilling an “H” side core hole (3.77” hole with a 2.5” obtained core) and rotary drilling to a depth of 5,000 ftbgs.

**8.2.3 Access** – Due to the limited number of existing roads in the license areas, a helicopter supported drilling project is planned. However, if existing roads can be used to access drilling sites they will be used. For helicopter supported sites, support services would include air transport for personnel, equipment and fuel; barge services for moving equipment from Anchorage, Kenai or Homer to the west side of Cook Inlet; camp management and support services including miscellaneous rentals including ATV’s, satellite phone, handheld radios, radio base station, light plants and generators.

The East Tyonek Tract acreage has road access into the western side of the tract by the gravel road which was extended across Three Mile Creek in 1973 for oil and gas exploration drilling. The road was subsequently used for timber harvest. The road requires a crossing of Three-mile Creek. A permit was obtained in 2012 for improvements for a temporary crossing from ADFG. This permit will be renewed.

Construction of a 2000 ft. gravel road will be required to access the proposed TYEX03 location. It is expected that construction of the gravel road will be started once the temporary crossing of Three-mile Creek has been completed. Gravel use is authorized by the AMHT under the terms of the lease and will be discussed as part of the Plan of Operations submitted to AMHT in advance of drilling.

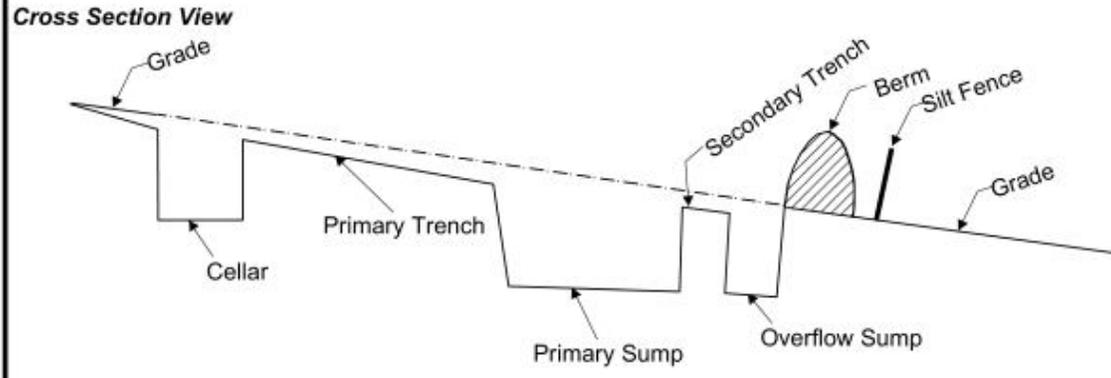
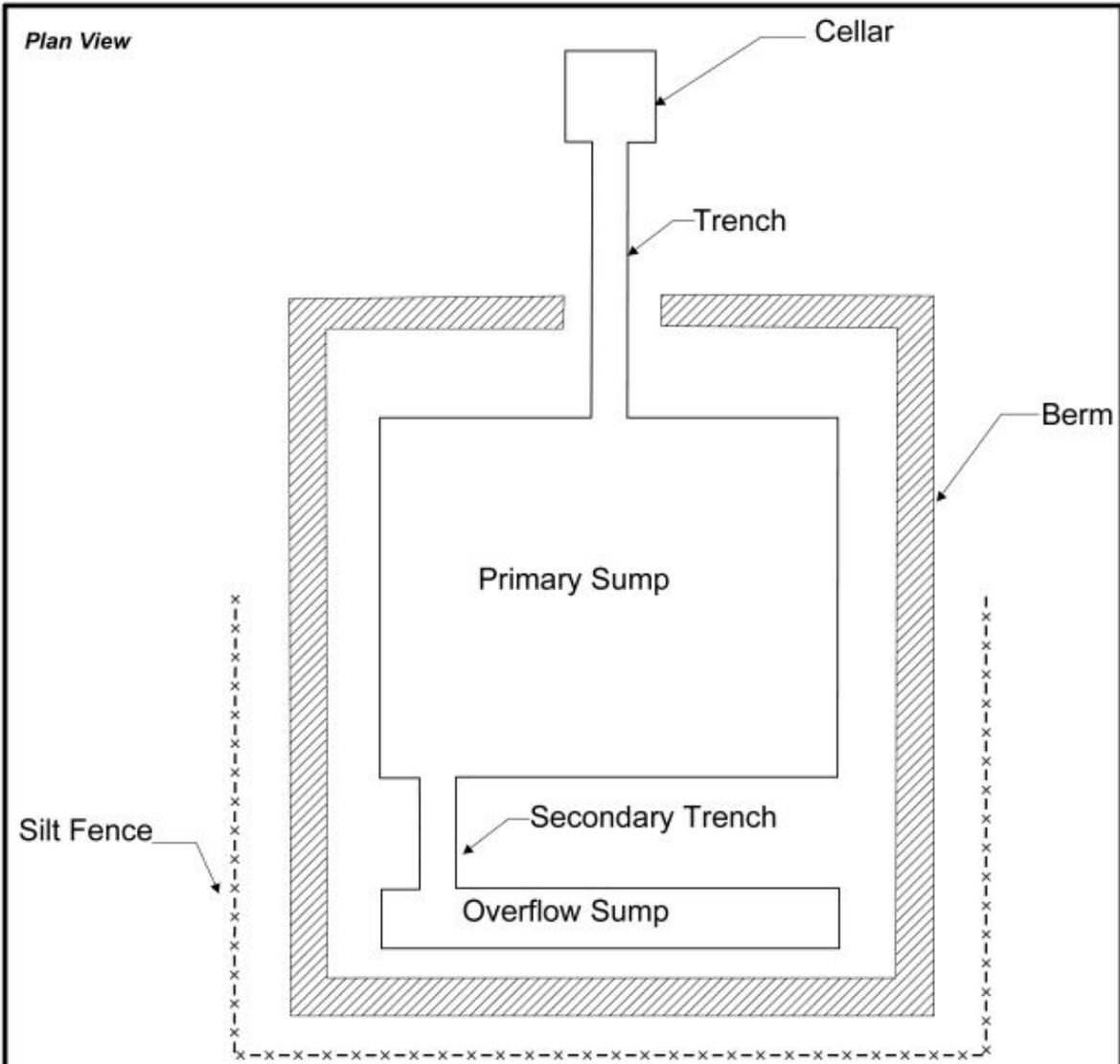
The road will be pioneered in and the slash pile will be placed along the downstream edge of the road to provide a vegetative filter for any potential stormwater runoff. A minimum amount of gravel will be used to provide a trail adequate to bring in exploration equipment.

**8.2.4 Drill Sites** - Drill pad construction will be limited to the smallest possible size necessary to support safe, efficient drilling operations at each location. For helicopter supported sites, a portable excavator may be transported to the site to remove brush and level the ground for a safe work area. It would also be used in excavation of the pit that would contain the drill cuttings and fluids.

During pad construction the topsoil will be retained for future reclamation. The overburden in many of these areas is very porous and should provide ample capacity for infiltration of stormwater. However, to ensure that any runoff does not impact surrounding water bodies, stormwater runoff will be managed through Best Management Practices such as gravel or vegetative filters. See Figure showing typical stormwater BMP.

No acidic or toxic drainage is anticipated from surface runoff from drill cuttings that may be deposited on the surface during drilling.

The drill pad for TYEX02 (approximately 200 ft by 200 ft) was constructed in 2012 under the initial exploration permit period. To limit the risk of delay should a rapid turnaround be required for drilling an additional well in 2014, the drill pad and sump for TYEX03 will also be completed once the Three-mile Creek crossing has been constructed.



**Typical Best Management Practices for Control of Stormwater Down Gradient of Drilling Mud Sumps**



  
 Sheet No.  
 1

**UCG Exploration Well Site Layout**  
 Drawn By: Lela Harrington  
 Checked by: Bartly Kleven  
 Date: 27 June 2012

**8.2.5 General Drilling Operations** - Due to the softness of the Tertiary coal-bearing strata, drilling fluid that would create a mud cake along the annulus of the hole may be needed to assure an open hole suitable for geophysical logging. A calcium nitrate / polymer fresh water base mud system (for only the bottom cored interval of the well) is being proposed in addition to the mud system used in the previous exploration permit. The MSDS for the proposed mud products is attached. The main benefits of this fluid are formation inhibition, fluid density without solids (no barite required), low viscosity for reduced pump pressure and annular spaces. The system would be run once intermediate casing has been set and cemented and coring operations are set to begin (at approximately 2,000 ftbgs). We would then drill out the casing with the fresh water calcium nitrate system and begin coring. The mud would be circulated throughout a closed looped system. If approved, disposal methods are to spread the drill cutting and fluid on the surrounding land as fertilizer to enhance reclamation.

It is estimated that the maximum water usage at the drill site will be up to 20,000 gallons per hole per day and will be obtained from a local source. However, it is expected the average water required each day will be much less – on the order of 4,000 gallons per day. TYEX02 an adjacent kettle pond is the proposed main water source. An alternate water source, located approximately 1500 feet west of the pad will also be permitted. For future drill holes covered by the term of this exploration permit, the water source will be identified prior to mobilization to the field. A temporary water use permit will be obtained for each drill hole location. Proper screening will be employed to inhibit the intake of aquatic species. The water source for TYEX03 is south and east of the proposed drill location.

Numerous types of analyses are required to characterize the coal, overburden and underburden therefore high core recovery of the coal seam is paramount. A double or triple tube core barrel assembly is desirable for generation of the best geotechnical descriptions and samples for geotechnical testing.

A Linc Energy Alaska wellsite geologist or representative will be onsite to describe drill cuttings and core during the program. Drill cuttings will be obtained by the drilling contractor at the designated depth interval. The cuttings will be washed, fully described, and a dry sample of the cuttings will be retained for later use. It is possible that chip samples may be collected for overburden geochemical analysis. All cores will be cleaned of drilling fluids and debris, measured, photographed, described both lithologically and geotechnically, labeled, sampled, and placed in heavy mill plastic sleeves and boxed. Core sample selection for geotechnical testing may either be completed by the

geologist and/or a geotechnical engineer. All cores will be retained at a designated area for future testing and reference.

Holes drilled within the Tyonek/Kenai license area will have an AOGCC required diverter system down to 1600 ftbgs. Surface casing will be 7 inch and will be set and cemented to the surface after rotary drilling an 8 ½-inch borehole to approximately 1600 ftbgs. After installation and testing of the BOPE, a nominal 6.25 inch rotary hole will be drilled to approximately 2400 ftbgs and 5 ½-inch casing will be set and cemented to surface. After reinstallation and testing of the BOPE system, the cement plug will be drilled out. Continuous coring will continue down to approximately 3000 ftbgs. Coring is expected to be conducted with PQ size core rods. The PQ core provides a nominal 3 3/8-inch diameter core sample and leaves a nominal 4 ½ -inch borehole diameter. Subsurface drilling conditions may require that the core hole be reduced from PQ to HQ size (nominal 2½-inch).

The information provided in the paragraph above is provided as a courtesy to give the ADNR a general understanding of our drilling as it stands at the time when the application is made. AOGCC drilling permits are required and regulate subsurface drilling details for safe well operations. The ADNR Coal Program will be copied on any permit applications and future amendments.

Smoking will be banned within the perimeter of each drill site and welding will require gas tests prior to and during the work. As a safety precaution, a gas tester will be present on the rig. Gas desorption and analytical testing of the gas is planned for the target coal seams. All Linc personnel and subcontractors working on the drill site will be trained in all health and safety procedures prior to work.

Pending hole conditions, geophysical wireline logging is planned for all holes. A standard coal suite of logs will be run down the entire length of the hole. The typical log suite will likely include gamma, compensated density, caliper and resistivity. Sonic, high resolution density and verticality logs may also be included. It may be necessary to log the hole through the drill pipe therefore the wireline service contractor will need to plan for an additional smaller diameter gamma tool for inner pipe clearance.

A summary exploration report outlining the methods and results of the drilling program will be prepared. A file will be created for each hole and will include all data pertinent to the hole. Under the terms of the AMHT license, data from the borehole is confidential and must have to AMHT's permission to release.

**8.2.6 Drill Hole Plugging and Reclamation** – If a well is not needed, the entire drill hole will be backfilled with cement. By cementing the entire stratigraphic column, all potential interaction of groundwater between formations, either from permeable coal seams, porous sandstones, unconfined surface deposits and/or faults will be eliminated.

None of the Beluga or Tyonek Formation strata have toxic or acid-forming characteristics. This is shown in extensive overburden and coal characteristic studies and water quality sampling conducted in the area by various companies studying the area. Studies at that location also indicate that groundwater aquifers tend to travel along shallow coal-bearing intervals and faults.

Cement used for plugging the wells will weigh a minimum of 10 lbs. per gallon and will be comprised of a typical Portland cement mixed on site within the mud tanks. Cuttings collected during the drilling and present in the mud tanks will be combined with the cement and sent down the wellbore. The cement will be pumped down the well through the drill rods in approximately 5 foot lifts from bottom to top.

Excess cuttings not sent down the drill hole with the cement will be spread over the site prior to topsoil placement. There are no metal-bearing cuttings within the Beluga or Tyonek Formations or in the surficial gravels that might prove to be toxic to vegetation.

After the pad has been determined to be no longer needed for the exploration program the site will be graded to original contour, topsoil will be spread, and the site seeded.

All mud products used on site will be fresh-water based and biodegradable.

**8.2.7 Revegetation** – After the completion of the drill holes, topsoil will be redistributed to the original contour. It is the intention that the drill sites be fully reclaimed at the end of the drilling program unless they are designated for monitoring well conversion. Seeding will take place in the summer months and will be done by hand. The seed mix to be used will be a variation of the seed mix used locally on disturbed coal mine property. It consists of mostly grasses to encourage quick cover and soil amendment until natural reinvasion of local woody species is established.

Due to the small areas disturbed no planting of woody species is proposed.

**8.2.8 Hydrologic Balance Control Measures** - Data collected during the hydrologic characterization of the license area will be used to determine if the site is suitable for UCG development. The hydrologic characterization will begin with a desktop study of available surface hydrologic data. Regional watershed maps (1:250K) along with watershed and discharge information collected from available state, academic and private sources will be evaluated. A desktop study of nearby wells and other available groundwater information will be conducted to evaluate potential groundwater conditions in preparation of exploration activities and to evaluate the site for preliminary characterization. During exploration activities, the groundwater characterization effort will be performed on selected intervals in the borehole with an emphasis on the target coal, immediate overburden and underburden intervals. The characterization will be based on information collected during core-logging, open-hole geophysical logging, drill stem testing, and potential water quality sampling. Following completion of the borehole, an open-hole geophysical logging suite will be run to acquire data from the borehole. The logging types will depend on tool availability and borehole configuration and may include: natural gamma, SP, resistivity, neutron porosity, sonic, PEF, and acoustics. The borehole will be logged from the surface to total depth to determine the lithology, water bearing formations, formation water salinity, porosity and other relevant formation features.

Pending evaluation of the core logs and geophysical logging results, the borehole may be selected for further evaluation of groundwater conditions. Groundwater flow and pressure information may be collected from selected lithologic units. Drill stem testing may be performed by a contractor to acquire data in the selected intervals, including the target coals, overburden and underburden materials, and will include hydraulic conductivity and hydraulic head measurements. Groundwater samples from selected units may be collected and submitted to an analytical laboratory for evaluation if borehole conditions allow.

**Post-Drilling:**

**8.2.9 Removal of Facilities and Equipment** – At the conclusion of exploration drilling, all facilities and equipment will be promptly removed. Demobilization will occur via the same routes and landing areas that were used to bring the equipment in.

### 8.3 Schedule

Exploration efforts are anticipated to commence in August 1, 2014 for the first two drill holes. It is expected that each well will take two months to drill. Reclamation for wells drilled in 2014 will take place in June of 2015.

### 8.4 Quantity of Coal Removed

Only coal associated with the cores will be removed.

### 8.5 Reclamation Costs For 2014

#### DIRECT COSTS

#### DRILL HOLE CLOSURE COSTS

##### Drillhole Closure Costs

Cement = 1.19 CF/bag

0' – 400' PQ –7" diameter 86 bags

1200' – 2400' PQ – 5.5" diameter 53 bags

2400' – 3000' HQ 4.5" diameter 53 bags

(192 bags of cement/hole) (\$16.00/bag) (2holes) = \$ 6,144.00

##### Labor

(16 hours/hole)(\$110/hr./driller+\$75/hr./helper)(2 holes) = \$ 5,920.00

##### Helicopter

Three hour minimum \$ 3,315.00

**Total Drill Hole Closure Cost \$15,379.00**

#### FACILITY REMOVAL

##### Labor

(48 hours/hole)(\$110/hr./driller+\$75/hr./helper (2 helpers)(2 holes) = \$24,960.00

Helicopter: 3 days \$15,000.00

Disposal \$ 2,000.00

**Total Removal Cost \$41,960.00**

**REVEGETATION****Pad**

Grass Seed (1200sf/pad)(2 pads) (4 lb/1000sf)(\$5.32/lb.)	=	\$ 51.07
Labor (2 laborers)(8 hrs total)(\$65.63 /hr.)	=	<u>\$ 1,050.08</u>
<b>Pad Total</b>		<b>\$ 1,101.15</b>

**2000' Road**

Excavator and Operator (\$1500/day)(2 days)	=	\$ 3,000.00
Labor (2 laborers)(8 hrs)(\$65.63/hr)	=	\$ 1,050.08
Grass Seed (2000 ft)(10 ft)(4 lb/1,000 sf)(\$5.32/lb)	=	<u>\$ 425.60</u>
<b>Road Total</b>		<b>\$ 4,475.68</b>

## Helicopter

Three hour minimum		<u>\$ 3,315.00</u>
<b>Total Revegetation Cost</b>		<b>\$ 8,891.83</b>

**TOTAL DIRECT RECLAMATION COSTS** **\$66,230.83**

**INDIRECT COSTS**

<b>Mobilization/Demobilization@10%</b>	<b>\$ 6,623.08</b>
<b>Contingency@10%</b>	<b>\$ 6,623.08</b>
<b>Contractor Profit/Overhead@15%</b>	<b>\$ 9,934.62</b>
<b>Project Management Fee@4%</b>	<b>\$ 2,649.23</b>
<b>Engineering Redesign Fee@ 5%</b>	<b><u>\$ 3,311.59</u></b>
<b>TOTAL INDIRECT COSTS</b>	<b>\$29,141.70</b>

**GRAND TOTAL – 2014 RECLAMATION BOND** **\$95,372.53**

**Part D – EXPLORATION ON LANDS UNSUITABLE  
FOR MINING**

- 9.1 Not applicable
- 9.2 Not applicable
- 9.3 Not applicable

**Part E – APPLICANT NAME AND SIGNATURES**

See Application

**ALASKA DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF MINING LAND & WATER  
COAL EXPLORATION  
Notice of Intent to Explore  
and  
Exploration Application**

New Permit

The Alaska Surface Coal Mining Control and Reclamation Act requires that any person who intends to conduct coal exploration which **will not** substantially disturb the natural land surface complete and file with the Department of Natural Resources a notice of intent to explore. **The completion of Parts A (including submission of the required permit fee), B, D, and E of this form will meet these requirements.** This form must be received at least thirty (30) days prior to commencement of the exploration.

The Act requires that any person who intends to conduct coal exploration which **will** substantially disturb the natural land surface must file a complete application for exploration. **The completion of Parts A (including submission of the required permit fee), C, D, and E of this form will meet the applicant's submission requirements.** The application should be submitted approximately three months prior to the anticipated commencement of exploration.

**Substantial disturbance means an impact on land, water, or air resources by activities such as blasting; mechanical excavation (excluding the use of light, portable field equipment); drilling or enlarging coal or water exploratory holes or wells; and construction of roads, structures, trails, aircraft landing and marine docking areas.**

Please submit one hard copy and one electronic copy of all application materials as specified by the Department.

Reference: Alaska Statute 27.21.200; 11 AAC 90.161 to 11 AAC 90.167.

**PART A: GENERAL INFORMATION      Ref: 11 AAC90.161; 11 AAC 90.163**

- 1.1 Name of Applicant: Linc Energy Operations, Inc.  
     Contact: Bartly Kleven
- 1.2 Address of Applicant: 3000 C Street, Suite 103, Anchorage, AK 99503
- 1.3 Telephone Number: (907) 230-9410
- 1.4 If applicable, provide the following information for the representative who will be present and responsible for the exploration activities.
- 1.5 Name of Representative: Corri Feige
- 1.6 Address of Representative: 3000 C Street, Suite 204, Anchorage, AK 99503
- 1.7 Telephone Number: (907) 868-8660
- 1.8 Email Address: corri.feige@lincenergy.com

**2.0 Location of the Exploration**

- 2.1 Legal Description (attach additional pages as needed):

See Attached - Tyonek/Kenai License Areas

Township	Range	Section	Aliquot Part	Meridian	Acres

Township	Range	Section	Aliquot Part	Meridian	Acres

- 2.2 Number of Acres in Exploration Area: 107,497

- 2.3 Number of Acres of Federal Land (if applicable): N/A
- 2.4 USGS 1:250,000 or 1:63,360 Quadrangle Names: Tyonek
- 2.5 Distance and Direction to Nearest Community (in miles): Seven miles N
- 2.6 Attach map of exploration site and adjacent area.

**3.0 Period of Exploration**

- 3.1 Begin (Month/Day/Year): May 1, 2014
- 3.2 End (Month/Day/Year): May 1, 2016

**4.0 Ownership of Surface/Subsurface Mineral Estate**

If the surface or the mineral estate is owned or leased by someone other than the applicant, answer 4.1 - 4.5, as appropriate (**attach additional pages as needed**).

4.1 Surface Owner

Name: Alaska Mental Health Trust Authority - Trust Land  
Address: 2600 Cordova Street Anchorage, AK 99503  
Telephone Number: (907) 269-7960

4.2 Mineral Estate Owner

Name: Alaska Mental Health Trust Authority - Trust Land  
Address: 2600 Cordova Street Anchorage, AK 99503  
Telephone Number: (907) 269-7960

4.3 Surface Land Leaseholder

Lease #: N/A  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

4.4 Mineral Estate Leaseholder

Lease #: N/A  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

4.5 Adjacent Surface & Mineral Estate Leaseholders

Lease #: N/A  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_

- 4.6 Right to Enter: Provide a statement describing the basis by which the applicant claims the right to enter the land for the purposes of conducting exploration and reclamation, Reference relevant federal, state, and local government prospecting permits or lease documents. Attach copies of supporting documents, as appropriate.

<b>5.0 Fees</b>	<b>Ref: 11 AAC 90.011</b>
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- 5.1 Permit Fee \$500.00 Attach receipt. (Refer to fee schedule below)  
 Exploration - notice of intent \$100  
 Exploration· substantial disturbance \$500 + cost of all public notices

<b>PART B: NOTICE OF INTENT TO EXPLORE</b>	<b>Ref: 11 AAC 90.161</b>
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<b>6.0 Intention to Explore</b>
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- 6.1 Describe intended exploration activities, including major' pieces of equipment and their use.
- 6.2 Will exploration activities substantially disturb the natural surface of the land?  
 YES  NO  
 If yes, proceed to Part C; if no, answer 6.3 and proceed to Part D. (See definition on page 1 of this form.)
- 6.3 Describe practices to be used to protect the environment from adverse impacts resulting from exploration activities.

<b>PART C: EXPLORATION PERMIT APPLICATION</b>	<b>Ref: 11 AAC 90.163; 11 AAC 90.167</b>
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<b>7.0 Exploration Area Description</b>
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- Note: all technical data in this application must be accompanied by:
- 1) names of persons and organizations who gathered and analyzed data;
  - 2) dates of data collections and analysis;
  - 3) description of procedures used; and
  - 4) names, addresses and positions of officials of each agency consulted.
- 7.1 Indicate type(s) of surface disturbance:  blasting.  mechanical excavation  Drilling, altering coal or water exploration holes and wells,  road or trail construction or modification  aircraft landing construction/modification  marine docking facility construction/modification  construction of structures  placement of excavated material or debris on surface  other, specify \_\_\_\_\_
- 7.2 Provide a map of at least a scale of 1:63,360 enlarged 2.5 times (~1:25000), showing the following existing surface features:
- a. existing roads and trails;
  - b. occupied dwellings and other structures;
  - c. pipelines, airfields and marine docking facilities;
  - d. bodies of water; .
  - e. historic, archeological and cultural features;
  - f. topographic and drainage features; and

g. habitats of endangered or threatened species.

- 7.3 Using existing information, briefly describe, with cross references to the map in 7.2, the surface topography, geology, surface waters, predominant land use, and other physical features.
- 7.4 Using existing information, briefly describe, with cross references to the map in 7.2, vegetation cover and important habitats of fish, wildlife and plants.
- 7.5 Does the exploration area include critical habitat of threatened or endangered species; or species such as eagles, migratory birds or other animals protected by state or federal law; or habitats of unusually high value for fish and wildlife?

YES  NO

If yes, describe impact, control measures, management techniques and monitoring methods to be utilized to protect these species and habitats.

- 7.6 Does the exploration area include known archeological resources; or districts, sites, structures or objects listed on the National Register of Historic Places?

YES  NO

If yes, identify and describe, and describe protection measures to be implemented.

## 8.0 Exploration and Reclamation Methods

- 8.1 Provide a map of at least a scale of 1:63,360 enlarged 2.5 times, showing the following exploration and reclamation features (if appropriate, this may be combined with the map required under 7.2):
- a. the area to be disturbed by exploration and reclamation; .
  - b. access routes, including new roads, trails or other transportation facilities to be constructed, and existing facilities to be used or modified;
  - c. proposed excavations and trenches;
  - d. water or coal exploratory holes to be drilled or altered;
  - e. earth or debris disposal areas; f. sediment control measures, such as sediment ponds and structures for diverting overland flow, if required; and
  - g. other exploration or reclamation features.
- 8.2 Provide a description of exploration and reclamation methods and a discussion of how the exploration will comply with the performance standards in 11 AAC 90.167. Cross-referencing the map in 8.1, describe, at a minimum, the following:
- a. types and uses of equipment;
  - b. design, construction, maintenance and removal of any proposed new roads, trails or other transportation facilities;
  - c. alteration and restoration of existing transportation facilities;
  - d. blasting procedures;
  - e. earth or debris disposal;
  - f. backfilling and regrading of all excavations, artificial flat areas, embankments or other disturbed areas to their approximate original contour;
  - g. topsoil removal, storage and redistribution;
  - h. seed mix, application rates, seeding method and other procedures to be implemented in the establishment of a vegetative cover on all disturbed areas;
  - i. procedures for plugging and abandoning exploration holes, boreholes, wells or other exposed underground openings;

- j. procedures and control practices to be implemented to minimize disturbance to the prevailing hydrologic balance, including, if necessary, sedimentation control;
  - k. handling and disposal of known acid-forming or toxic-forming materials, if any; and
  - l. removal of all facilities and equipment.
- 8.3 Provide a time table for each phase of exploration and reclamation including starting and ending date, type of disturbance, area of disturbance, and reclamation measures.
- 8.4 Give an estimate of the quantity of coal to be removed during the exploration. Specify method used to measure quantity.
- 8.5 Give a detailed estimate of the cost of reclamation of all areas to be affected by exploration activities.

**PART D: EXPLORATION ON LANDS UNSUITABLE FOR MINING**  
**Ref: 11 AAC 90.165**

9.1 Does the proposed exploration area include any area previously designated as unsuitable for all or certain types of mining by the Commissioner of Natural Resources?

YES  NO

If yes, respond to 9.2 and 9.3. . .

9.2 Indicate petition name and number: \_\_\_\_\_

9.3 Describe the basis for the designation of the area as unsuitable for mining and why exploration in the area is not incompatible with the values or features which led to the designation of the area.

**PART E:**

The applicant states to the best of his or her knowledge and belief that all statements made in the notice of intent to explore or in the application to explore are true and correct.

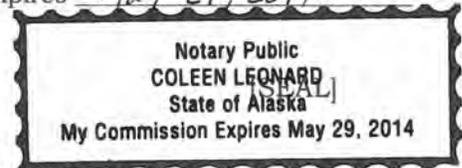
Applicant's Name: Corri A. Feige Title: GM, Clean Energy

Address: 3000 C Street, Suite 204, Anchorage, AK 99503

Applicant's Signature: Corri A. Feige Date: 20 March 14

Subscribed and sworn before me by Corri Feige this the 20<sup>th</sup> day of March, 2014

Notary Public: Coleen Leonard My commission expires May 29, 2014



Note: Attach a copy of power of attorney, or resolution of Board of Directors that grants signature authority)

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# Material Safety Data Sheet

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## *Calcium Nitrate*

### I. PRODUCT AND COMPANY IDENTIFICATION

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**Product Name:** Calcium Nitrate

**Date Revised:** 7/2010

**Chemical Family:** Double salt of calcium nitrate and ammonium nitrate.

**Product Use:** Drilling mud additive

#### **Supplier:**

#### **NOV FluidControl**

4310 N. Sam Houston Parkway E  
Houston, TX 77032  
Office: (713) 482-0500  
Fax: (713) 482-0695  
Company website: [www.nov.com](http://www.nov.com)

#### Emergency Telephone Number:

**CHEMTREC: 1-800-424-9300 or International +1-703-527-3887**

### II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

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#### **Not a Controlled Product**

**Physical State:** Solid

**Emergency overview:** CAUTION! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. Do not ingest. Wash thoroughly after handling.

#### Potential acute health effects:

**Eyes:** Slightly irritating to the eyes

**Skin:** Slightly irritating to the skin

**Inhalation:** Slightly irritating to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

**Ingestion:** Harmful if swallowed

#### Potential chronic health effects

**Chronic effects:** No known significant effects or critical hazards

**Carcinogenic effects:** No known significant effects or critical hazards.

**Mutagenic effects:** No known significant effects or critical hazards.

**Teratogenicity:** No known significant effects or critical hazards.

**Developmental effects:** No known significant effects or critical hazards.

**Fertility effects:** No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

**Inhalation:** Adverse symptoms may include the following: respiratory tract irritation, coughing

**Ingestion:** No specific data.

**Skin:** Adverse symptoms may include the following: irritation, redness

**Eyes:** Adverse symptoms may include the following: irritation, watering, redness

## Calcium Nitrate

## Material Safety Data Sheet

### III. COMPOSITION / INFORMATION ON INGREDIENTS

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<u>Hazardous Components:</u>	<u>CAS Number:</u>	<u>Percent:</u>
No Hazardous ingredients		

**Additions Info:**

Contains plant nutrients

Hydrated Ammonium Calcium Nitrate Double Salt	15245-12-2	
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### IV. FIRST AID MEASURES

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**Eye Contact:** Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

**Skin Contact:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

**Inhalation:** Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Ingestion:** Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Protection of first-aiders:** No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

**Notes to physician:** In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

### V. FIRE FIGHTING MEASURES

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**Flammability of the product:** May be combustible at high temperature

**Extinguishing media**

**Suitable:** Use an extinguishing agent suitable for the surrounding fire.

**Products of combustion:** These products are: nitrogen oxides, metal oxide/oxides

**Fire-fighting media and instructions:** Use water only in flooding quantities to fight the fire. Do NOT use chemical extinguisher or foam or attempt to smother the fire with steam or sand.

**Special protective equipment for fire-fighters:** Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

**Hazardous thermal decomposition products:** These products are: nitrogen oxides (NO, NO<sub>2</sub> etc.)

## Calcium Nitrate

## Material Safety Data Sheet

### VI. ACCIDENTAL RELEASE MEASURES

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**Personal precautions:** No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

**Environmental precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

**Methods for cleaning up:**

**Small Spill:** Material free from contamination can be used for its original purpose. Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

**Large Spill:** Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

### VII. HANDLING & STORAGE

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**Handling:** Avoid creating dusty conditions and prevent wind dispersal. Avoid all possible sources of ignition (spark or flame). Avoid contamination by any source including metals, dust and organic materials.

**Storage:** Store and use away from heat, sparks, open flame or any other ignition source. Avoid contact with combustible materials. Prevent moisture pick-up in handling and storage.

### VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION

---

**Engineering Measures:** Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

**Hygiene Measures:** Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure eyewash facilities are located close to the working environment.

**Personal Protection**

**Eyes:** Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

**Skin:** Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

**Respiratory:** Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

**Hands:** Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

**Personal Protection in Case of a Large Spill:** Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

**Consult local authorities for acceptable exposure limits.**

## Calcium Nitrate

## Material Safety Data Sheet

### IX. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White or Yellowish
Odor:	Odorless
pH:	5 to 7 [Conc. (% w/w): 10%]
Boiling/condensation point:	310 °C (590 °F)
Melting/freezing point:	94 to 98 °C (201,2 to 208,4 °F)
Density (g/cm <sup>3</sup> ):	1 g/cm <sup>3</sup>
Solubility:	Soluble in the following material: cold water

### X. STABILITY & REACTIVITY DATA

**Stability & Reactivity:** Stable under recommended storage and handling conditions.

**Possibility of Hazardous Reactions:** Under normal conditions of storage and use, hazardous reactions will not occur.

**Incompatibility with Various Substances:** Reactive or incompatible with the following materials: combustible materials, acids and alkalis.

**Hazardous Decomposition Products:** Under normal conditions of storage and use, hazardous decomposition products will not be produced.

**Hazardous Thermal Decomposition Products:** These products are: nitrogen oxides (NO, NO<sub>2</sub> etc.)

**Hazardous Polymerization:** Under normal conditions of storage and use, hazardous polymerization will not occur.

### XI. TOXICOLOGICAL INFORMATION

#### Potential acute health effects

**Inhalation:** Slightly irritating to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

**Ingestion:** Harmful if swallowed.

**Skin contact:** Slightly irritating to the skin.

**Eyes:** Slightly irritating to the eyes.

Product/Ingredient Name	Result	Species	Dose	Exposure
Preparation	LD50 Oral	Rat	>2100 mg/kg	-

### XII. ECOLOGICAL INFORMATION

**Environmental effects:** No known significant effects or critical hazards.

#### Aquatic ecotoxicity

Product/Ingredient Name	Test	Result	Species	Exposure
Preparation		Acute LC50 >100	Fish	96 Hours

**Conclusion/Summary:** Not available.

#### Biodegradability

**Conclusion/Summary:** The product does not show any bioaccumulation phenomena.

## Calcium Nitrate

## Material Safety Data Sheet

### XIII. DISPOSAL CONSIDERATIONS

**Waste Disposal:** The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any byproducts should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Consult your local or regional authorities.

Refer to **HANDLING AND STORAGE** and **EXPOSURE CONTROLS/PERSONAL PROTECTION** for additional handling information and protection of individuals.

### XIV. TRANSPORTATION INFORMATION

Regulatory Information	UN Number	Proper Shipping Label	Class	Packing Group	Label	Additional Information
DOT Classification	Not Regulated	—	—	—	—	—
TDG Classification	Not Regulated	—	—	—	—	—
Mexico Classification	Not Regulated	—	—	—	—	—

**Remark:** Not a DOT regulated material. 49 CFR 172.102 Special Provision 34 specifically removes the commercial grade calcium nitrate double salt (calcium nitrate and ammonium nitrate) from the Hazardous Materials Table 49 CFR 172.101.

### XV. REGULATORY INFORMATION

**HCS Classification:**

**U.S. Federal regulations:**

Not Regulated.

United States inventory (TSCA 8b): All components are listed or exempted.

**SARA 302/304/311/312 extremely hazardous substances:** No products were found.

**SARA 302/304 emergency planning and notification:** No products were found.

**SARA 302/304/311/312 hazardous chemicals:** No products were found.

**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** No products were found.

**Clean Water Act (CWA) 307:** No products were found.

**Clean Water Act (CWA) 311:** No products were found.

**Clean Air Act (CAA) 112 accidental release prevention:** No products were found.

**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.

**Calcium Nitrate**

**Material Safety Data Sheet**

**REGULATORY INFORMATION CONTINUED**

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Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs):	Not listed
Clean Air Act Section 602 Class I Substances:	Not listed
Clean Air Act Section 602 Class II Substances:	Not listed
DEA List I Chemicals (Precursor Chemicals):	Not listed
DEA List II Chemicals (Essential Chemicals):	Not listed

**State Regulations:**

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Connecticut Carcinogen Reporting: None of the components are listed.  
Connecticut Hazardous Material Survey: None of the components are listed.

Florida substances: None of the components are listed.

Illinois Chemical Safety Act: None of the components are listed.  
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.

Louisiana Reporting: None of the components are listed.  
Louisiana Spill: None of the components are listed.

Massachusetts Spill: None of the components are listed.  
Massachusetts Substances: None of the components are listed.

Michigan Critical Material: None of the components are listed.

Minnesota Hazardous Substances: None of the components are listed.

New Jersey Hazardous Substances: None of the components are listed.  
New Jersey Spill: None of the components are listed.  
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.

New York Acutely Hazardous Substances: None of the components are listed.  
New York Toxic Chemical Release Reporting: None of the components are listed.

Pennsylvania RTK Hazardous Substances: None of the components are listed.

Rhode Island Hazardous Substances: None of the components are listed.

United States Inventory (TSCA 8b): All components are listed or exempted.

**Calcium Nitrate**

**Material Safety Data Sheet**

**XVI. OTHER INFORMATION**

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National Fire Protection  
Association (U.S.A.)



**References:**

European Chemical Bureau, Annex 1 EU Directive 67/548/EEC  
National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare,  
Reports and Memoranda  
Registry of Toxic Effects of Chemical Substances  
Atrion International Inc. 4777 Levy Street, St Laurent, Quebec HAR 2P9, Canada

**DISCLAIMER:**

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## SAFETY DATA SHEET SODIUM HYDROXIDE SOLID

### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

#### 1.1. Product identifier

**Product name** SODIUM HYDROXIDE SOLID  
**Synonyms, Trade Names** CAUSTIC SODA, SODIUM HYDROXIDE PRILLS

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Identified uses** pH modifier.

#### 1.3. Details of the supplier of the safety data sheet

**Supplier** M-I Drilling Fluids UK Limited  
C/O Schlumberger  
Enterprise Drive  
Westhill Industrial Estate  
Westhill, AB32 6TQ  
Scotland UK  
**Contact Person** MISDS@slb.com

#### 1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. Classification of the substance or mixture

**Classification (EC 1272/2008)**  
Physical and Chemical Hazards Met. Corr. 1 - H290  
Human health Skin Corr. 1A - H314  
Environment Not classified.  
**Classification (67/548/EEC)** C;R35.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

#### 2.2. Label elements

**Contains** SODIUM HYDROXIDE

**Label In Accordance With (EC) No. 1272/2008**



**Signal Word** Danger

#### **Hazard Statements**

H290 May be corrosive to metals.  
H314 Causes severe skin burns and eye damage.

#### **Precautionary Statements**

P260 Do not breathe dust.  
P280 Wear protective clothing, gloves, eye and face protection.  
P301+330+331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.  
P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**SODIUM HYDROXIDE SOLID**

<p><b>Supplementary Precautionary Statements</b></p> <p>P501</p> <p>P234</p> <p>P264</p> <p>P321</p> <p>P303+361+353</p> <p>P304+340</p> <p>P310</p> <p>P363</p> <p>P390</p> <p>P405</p> <p>P406</p>	<p>Dispose of contents/container in accordance with local regulations.</p> <p>Keep only in original container.</p> <p>Wash contaminated skin thoroughly after handling.</p> <p>Specific treatment (see medical advice on this label).</p> <p>IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.</p> <p>IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.</p> <p>Immediately call a POISON CENTER or doctor/physician.</p> <p>Wash contaminated clothing before reuse.</p> <p>Absorb spillage to prevent material damage.</p> <p>Store locked up.</p> <p>Store in corrosive resistant/... container with a resistant inner liner.</p>
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**2.3. Other hazards**

Not Classified as PBT/vPvB by current EU criteria.

<b>SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS</b>
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**3.1. Substances**

<b>SODIUM HYDROXIDE</b>	<b>60-100%</b>
<b>CAS-No.: 1310-73-2</b>	<b>EC No.: 215-185-5</b>
Classification (EC 1272/2008) Met. Corr. 1 - H290 Skin Corr. 1A - H314	Classification (67/548/EEC) C;R35

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

**Composition Comments**

The data shown is in accordance with the latest EC Directives.

<b>SECTION 4: FIRST AID MEASURES</b>
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**4.1. Description of first aid measures****General information**

Seek medical attention for all burns, regardless how minor they may seem.

**Inhalation**

Move the exposed person to fresh air at once. Provide fresh air, warmth and rest, preferably in a comfortable upright sitting position. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

**Ingestion**

Do not induce vomiting. Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately!

**Skin contact**

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention immediately!

**Eye contact**

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention immediately. Continue to rinse.

**4.2. Most important symptoms and effects, both acute and delayed****General information**

The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For further information, please refer to section 11.

**4.3. Indication of any immediate medical attention and special treatment needed**

Treat Symptomatically.

<b>SECTION 5: FIREFIGHTING MEASURES</b>
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**5.1. Extinguishing media**

**SODIUM HYDROXIDE SOLID****Extinguishing media**

Water spray, foam, dry powder or carbon dioxide.

**Unsuitable extinguishing media**

Do not use water jet as an extinguisher, as this will spread the fire.

**5.2. Special hazards arising from the substance or mixture****Hazardous combustion products**

When heated, toxic and corrosive vapours/gases may be formed.

**Unusual Fire & Explosion Hazards**

High concentrations of dust may form explosive mixture with air.

**5.3. Advice for firefighters****Special Fire Fighting Procedures**

Containers close to fire should be removed immediately or cooled with water.

**Protective equipment for fire-fighters**

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

**SECTION 6: ACCIDENTAL RELEASE MEASURES****6.1. Personal precautions, protective equipment and emergency procedures**

Wear protective clothing as described in Section 8 of this safety data sheet.

**6.2. Environmental precautions**

Do not allow to enter drains, sewers or watercourses.

**6.3. Methods and material for containment and cleaning up**

Avoid generation and spreading of dust. Shovel into dry containers. Cover and move the containers. Flush the area with water. This material and its container must be disposed of as hazardous waste.

**6.4. Reference to other sections**

For waste disposal, see section 13.

**SECTION 7: HANDLING AND STORAGE****7.1. Precautions for safe handling**

Avoid inhalation of dust and contact with skin and eyes. Avoid handling which leads to dust formation. Never add water directly to this product - may cause vigorous reaction/boiling. Always dilute by carefully pouring the product into the water.

**7.2. Conditions for safe storage, including any incompatibilities**

Store in tightly closed original container in a dry, cool and well-ventilated place. Unsuitable containers: metals.

**Storage Class**

Corrosive storage.

**7.3. Specific end use(s)**

The identified uses for this product are detailed in Section 1.2.

**Usage Description**

Do not add water directly to the product. It may cause a violent reaction.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION****8.1. Control parameters**

Name	STD	TWA - 8 Hrs	STEL - 15 Min	Notes
SODIUM HYDROXIDE	WEL		2 mg/m <sup>3</sup>	

WEL = Workplace Exposure Limit.

**SODIUM HYDROXIDE (CAS: 1310-73-2)****DNEL**

Inhalation.

Long Term

Local Effects

1 mg/m<sup>3</sup>

**8.2. Exposure controls**

**SODIUM HYDROXIDE SOLID****Protective equipment****Process conditions**

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Engineering measures**

Provide adequate general and local exhaust ventilation.

**Respiratory equipment**

Use respiratory equipment with particle filter, type P2.

**Hand protection**

Use protective gloves made of: Impermeable material. Butyl rubber. Polyvinyl chloride (PVC). Neoprene.

**Eye protection**

Wear tight-fitting goggles or face shield.

**Other Protection**

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

**Hygiene measures**

Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash hands after handling. Use appropriate skin cream to prevent drying of skin. Promptly remove any clothing that becomes wet or contaminated.

**Skin protection**

Wear apron or protective clothing in case of contact.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES****9.1. Information on basic physical and chemical properties**

<b><u>Appearance</u></b>	Pellets
<b><u>Colour</u></b>	White.
<b><u>Odour</u></b>	Odourless.
<b><u>Solubility</u></b>	Completely soluble in water
<b><u>Initial boiling point and boiling range</u></b>	1390°C 760 mm Hg
<b><u>(°C)</u></b>	
<b><u>Melting point (°C)</u></b>	318°C
<b><u>Relative density</u></b>	2.13 g/cm <sup>3</sup> @ 25°C
<b><u>Bulk Density</u></b>	1.1 - 1.25 g/cm <sup>3</sup>
<b><u>Vapour pressure</u></b>	3.5 h Pa @ 800°C
<b><u>pH-Value, Diluted Solution</u></b>	14.0 @ 5%
<b><u>Solubility Value (G/100G H<sub>2</sub>O@20°C)</u></b>	50.0

**9.2. Other information**

<b><u>Mol. Weight</u></b>	49.99 g/mol
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**SECTION 10: STABILITY AND REACTIVITY****10.1. Reactivity**

No specific reactivity hazards associated with this product.

**10.2. Chemical stability**

Stable under normal temperature conditions and recommended use.

**10.3. Possibility of hazardous reactions**

Not known.

**10.4. Conditions to avoid**

Water, moisture. Do not add water directly to the product. It may cause a violent reaction.

**SODIUM HYDROXIDE SOLID****10.5. Incompatible materials****Materials To Avoid**

Avoid contact with: Acids. Metals.

**10.6. Hazardous decomposition products**

When heated, toxic and corrosive vapours/gases may be formed.

**SECTION 11: TOXICOLOGICAL INFORMATION****11.1. Information on toxicological effects****Toxicological information**

Causes severe skin burns and eye damage.

**Acute toxicity:****Acute Toxicity (Dermal LD50)**

1350 mg/kg Rabbit

**Aspiration hazard:**

Not anticipated to present an aspiration hazard based on chemical structure.

**Inhalation**

Dust may irritate respiratory system or lungs.

**Ingestion**

Corrosive. Even small amounts may cause serious damage. May irritate and cause stomach pain, vomiting and diarrhoea.

**Skin contact**

Causes severe burns.

**Eye contact**

Risk of serious damage to eyes.

**SECTION 12: ECOLOGICAL INFORMATION****Ecotoxicity**

Contact M-I SWACO's QHSE Department for ecological information at M-ISWACOenv@slb.com. The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

**12.1. Toxicity****Acute Toxicity - Fish**

LC50 96 hours 45.4 mg/l Onchorhynchus mykiss (Rainbow trout)

**12.2. Persistence and degradability****Degradability**

There are no data on the degradability of this product.

**12.3. Bioaccumulative potential****Bioaccumulative potential**

The product does not contain any substances expected to be bioaccumulating.

**12.4. Mobility in soil****Mobility:**

Completely soluble in water

**12.5. Results of PBT and vPvB assessment**

This product does not contain any PBT or vPvB substances.

**12.6. Other adverse effects**

None known.

**SODIUM HYDROXIDE SOLID****SECTION 13: DISPOSAL CONSIDERATIONS****13.1. Waste treatment methods**

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as hazardous waste.

**Waste Class**

The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 06 02 04

**SECTION 14: TRANSPORT INFORMATION****14.1. UN number**

<b>UN No. (ADR/RID/ADN)</b>	1823
<b>UN No. (IMDG)</b>	1823
<b>UN No. (ICAO)</b>	1823

**14.2. UN proper shipping name**

**Proper Shipping Name** SODIUM HYDROXIDE, SOLID

**14.3. Transport hazard class(es)**

<b>ADR/RID/ADN Class</b>	8
<b>ADR/RID/ADN Class</b>	Class 8: Corrosive substances.
<b>IMDG Class</b>	8
<b>ICAO Class/Division</b>	8

**Transport Labels****14.4. Packing group**

<b>ADR/RID/ADN Packing group</b>	II
<b>IMDG Packing group</b>	II
<b>ICAO Packing group</b>	II

**14.5. Environmental hazards****Environmentally Hazardous Substance/Marine Pollutant**

No.

**14.6. Special precautions for user**

<b>EMS</b>	F-A, S-B
<b>Emergency Action Code</b>	2W
<b>Hazard No. (ADR)</b>	80

**14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable. Ship Types are stored in 14.0 General to assign search all phrases

**SECTION 15: REGULATORY INFORMATION****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

**SODIUM HYDROXIDE SOLID****Uk Regulatory References**

Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended) Workplace Exposure Limits EH40.

**EU Legislation**

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

**Water hazard classification**

WGK 1

**15.2. Chemical Safety Assessment****International Chemical Inventories**

Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Australia (AICS), Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Phillipines (PICCS), United States (TSCA).

**SECTION 16: OTHER INFORMATION****Information Sources**

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

**Revision Comments**

The following sections have been revised: 7

<b><u>Issued By</u></b>	Sarah Malone
<b><u>Revision Date</u></b>	17.07.2013
<b><u>Revision</u></b>	6
<b><u>Supersedes date</u></b>	27.05.2013
<b><u>SDS No.</u></b>	11233
<b><u>Signature</u></b>	Sandra McWilliam

**Risk Phrases In Full**

R35 Causes severe burns.

**Hazard Statements In Full**

H290 May be corrosive to metals.

H314 Causes severe skin burns and eye damage.

## Disclaimer

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.



## SECTION 4: FIRST AID MEASURES

### 4.1. Description of first aid measures

Inhalation.

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion

Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin Contact

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye Contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

### 4.2. Most important symptoms and effects, both acute and delayed

Inhalation.

Irritation of nose, throat and airway.

Ingestion

May cause discomfort if swallowed.

Skin Contact

Prolonged skin contact may cause redness and irritation.

Eye Contact

May cause temporary eye irritation.

### 4.3. Indication of any immediate medical attention and special treatment needed

Get medical attention if any discomfort continues.

## SECTION 5: FIREFIGHTING MEASURES

### 5.1. Extinguishing media

Extinguishing Media

Water spray, foam, dry powder or carbon dioxide.

### 5.2. Special hazards arising from the substance or mixture

Hazardous Combustion Products

When heated, vapours/gases hazardous to health may be formed.

Unusual Fire & Explosion Hazards

High concentrations of dust may form explosive mixture with air.

### 5.3. Advice for firefighters

Special Fire Fighting Procedures

Containers close to fire should be removed immediately or cooled with water.

Protective Measures In Fire

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

### 6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

### 6.3. Methods and material for containment and cleaning up

Avoid generation and spreading of dust. Shovel into dry containers. Cover and move the containers. Flush the area with water. In case of spills, beware of slippery floors and surfaces.

### 6.4. Reference to other sections

Wear protective clothing as described in Section 8 of this safety data sheet.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for safe handling

**GELEX**

Avoid inhalation of dust and contact with skin and eyes. Avoid handling which leads to dust formation.

**7.2. Conditions for safe storage, including any incompatibilities**

Store in tightly closed original container in a dry, cool and well-ventilated place.

**7.3. Specific end use(s)**

The identified uses for this product are detailed in Section 1.2.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1. Control parameters**

Ingredient Comments

NUI = Nuisance dust, WEL TWA 4mg/m<sup>3</sup> Respirable Dust, 10 mg/m<sup>3</sup> Total Dust.

**8.2. Exposure controls**

Protective Equipment



Engineering Measures

Provide adequate general and local exhaust ventilation.

Respiratory Equipment

No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists. Dust filter P2 (for fine dust).

Hand Protection

For prolonged or repeated skin contact use suitable protective gloves. PVC or rubber gloves are recommended.

Eye Protection

Wear approved chemical safety goggles where eye exposure is reasonably probable.

Other Protection

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**9.1. Information on basic physical and chemical properties**

Appearance	Beads
Colour	White
Odour	Mild
Solubility	Soluble in water.
Relative Density	0.8 sg
Bulk Density	~ 630 kg/m <sup>3</sup>
pH-Value, Diluted Solution	6.5 @ 1%

**9.2. Other information**

Not relevant.

## SECTION 10: STABILITY AND REACTIVITY

**10.1. Reactivity**

There are no known reactivity hazards associated with this product.

**10.2. Chemical stability**

Stable under normal temperature conditions and recommended use.

**10.3. Possibility of hazardous reactions**

Not known.

**10.4. Conditions to avoid**

Avoid wet and humid conditions.

**10.5. Incompatible materials**

Materials To Avoid

Avoid contact with strong oxidisers.

**10.6. Hazardous decomposition products**

When heated, vapours/gases hazardous to health may be formed.

**SECTION 11: TOXICOLOGICAL INFORMATION****11.1. Information on toxicological effects**

Acute Toxicity (Oral LD50) > 2000 mg/kg Rat

Inhalation

Dust may irritate respiratory system or lungs.

Ingestion.

May cause discomfort if swallowed.

Skin Contact

Prolonged and frequent contact may cause redness and irritation.

Eye Contact

Particles in the eyes may cause irritation and smarting.

Route of entry

No route of entry noted.

Target Organs

No specific target organs noted.

**SECTION 12: ECOLOGICAL INFORMATION**

Ecotoxicity:

Contact M-I SWACO's QHSE Department for ecological information at env@miswaco.com.

**12.1. Toxicity**

Acute Fish Toxicity

Not considered toxic to fish.

Acute Toxicity - Fish LC50 96 hours 357 mg/l Brachydanio rerio (Zebra Fish)

Acute Toxicity - Aquatic EC50 48 hours 212 mg/l Daphnia magna

Invertebrates

Acute Toxicity - Aquatic Plants EC50 72 hours > 1000 mg/l

**12.2. Persistence and degradability**

Degradability:

The product is not readily biodegradable.

**12.3. Bioaccumulative potential**

Bioaccumulative Potential:

No data available on bioaccumulation.

**12.4. Mobility in soil**

Mobility:

The product is soluble in water.

**12.5. Results of PBT and vPvB assessment**

Not Classified as PBT/vPvB by current EU criteria.

**12.6. Other adverse effects**

None known.

**SECTION 13: DISPOSAL CONSIDERATIONS****13.1. Waste treatment methods**

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

**SECTION 14: TRANSPORT INFORMATION**

General The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

**14.1. UN number**

Not applicable.

## GELEX

**14.2 UN Proper shipping name**

Not applicable.

**14.3 Transport hazard class(es)**

Not applicable.

**14.4. Packing group**

Not applicable.

**14.5. Environmental hazards**

Environmentally Hazardous Substance/Marine Pollutant

No.

**14.6. Special precautions for user**

Not applicable.

**14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable.

**SECTION 15: REGULATORY INFORMATION****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

Uk Regulatory References

Chemicals (Hazard Information &amp; Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended) Workplace Exposure Limits EH40.

EU Legislation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

**15.2. Chemical Safety Assessment**

International Chemical Inventories

Contact REACH@miswaco.com for REACH information. Complies with the following national/regional chemical inventory requirements: AICS, DSL / NDSL, IECSC, EINECS / ELINCS, NZIoC, TSCA,

**SECTION 16: OTHER INFORMATION**

General Information

HMIS Health -1 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

Information Sources

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments

General revision. Compiled or revised by Sandra McWilliam

Issued By	Bill Cameron
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Revision Date	15-02-11
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Revision	4
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Supersedes Date	26-04-07
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SDS No.	11171
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Risk Phrases In Full

NC	Not classified.
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Hazard Statements In Full

## Disclaimer

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.

**MATERIAL SAFETY DATA SHEET**

MSDS No. 10618

Trade Name MAX GEL†

Revision date 20/Dec/2013

**1. Chemical product and company identification**

**Trade Name** MAX GEL†  
**Chemical Family** Mixture  
**Use of the substance/preparation** Drilling fluid additive.  
**Supplied by** M-I L.L.C.  
P.O. Box 42842  
Houston, TX 77242  
www.miswaco.slb.com  
**Telephone Number** 281-561-1509  
**Emergency Telephone (24 hr.)** 281-561-1600  
**Prepared by** Chemical Regulatory Compliance (CRC):  
**Version** 8

**HMIS health rating**

**Health** 1\*      **Flammability** 0      **Physical hazard** 0      **PPE** E

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

**2. Hazards identification**

**Emergency Overview:** CAUTION. Long term inhalation of particulates may cause lung damage. Cancer hazard. Contains crystalline silica which may cause cancer.

**Canadian Classification**

**UN PIN No** Not regulated.      **WHMIS Hazard Class** D2A

**Physical state** Solid      **Color** Tan to Grey      **Odor** Odorless

**Potential Health Effects**

**Acute Effects**

**Eye contact** May cause mechanical irritation.  
**Skin contact** Long term contact can cause skin dryness.  
**Inhalation** Dust may be irritating to the respiratory tract. Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may developed.  
**Ingestion** May cause gastric distress, nausea and vomiting if ingested.

**Chronic toxicity:**

**Principle routes of exposure** See Section 11 - Toxicological Information.  
**Target Organs/Medical Conditions Aggravated by Overexposure** Dermal (skin) contact. Eyes. Inhalation.  
Eyes. Skin. Respiratory system. Blood. Kidney.

### 3. Composition/information on ingredients

Component	CAS-No	Weight % - range	Comments
Bentonite	1302-78-9	60 - 100	No comments.
Silica, crystalline, quartz	14808-60-7	5 - 10	No comments.
Silica, crystalline, Tridymite	15468-32-3	0.1 - 1	No comments.

**Composition Comments** Component LD50 and LC50 values are provided in Section 11, if available.

### 4. First aid measures

<b>Eye contact</b>	Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.
<b>Skin contact</b>	Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.
<b>Inhalation</b>	Move person to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
<b>Ingestion</b>	Dilute with 2 - 3 glasses of water or milk, if conscious. If signs of irritation or toxicity occur seek medical attention. Never give anything by mouth to an unconscious person.
<b>General notes</b>	Persons seeking medical attention should carry a copy of this MSDS with them.
<b>Notes to physician</b>	Treat symptomatically.

### 5. Fire fighting measures

#### Flammable properties

<b>Flash Point</b>	Does not flash
<b>Flammability Limits in Air</b>	
<b>Lower</b>	No information available
<b>Upper</b>	NA
<b>Autoignition Temperature °F (°C)</b>	NA
<b>Explosion data - sensitivity to mechanical impact</b>	N/A
<b>Explosion data - sensitivity to static discharge</b>	If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.
<b>Flammability Class</b>	NA
<b>Extinguishing Media</b>	Use extinguishing media appropriate for surrounding fire. This material is not combustible.

#### Protection Of Fire-Fighters

**Special Fire-Fighting Procedures** Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Keep water run off out of sewers and waterways.

**Hazardous combustion products** Oxides of carbon.

**Conditions of Flammability** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties** N/D

## 6. Accidental release measures

<b>Personal precautions</b>	Use personal protective equipment identified in Section 8.
<b>Spill procedures</b>	Wet product may create a slipping hazard. Contain spilled material. Evacuate the spill area with the exception of the spill response team. Do not allow spilled material to enter sewers, storm drains or surface waters. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.
<b>Environmental precautions</b>	Waste must be disposed of in accordance with federal, state and local laws.

## 7. Handling and storage

<b>Handling</b>	Put on appropriate personal protective equipment. Use only in a well ventilated area. Avoid contact with skin and eyes. Avoid generating or breathing dust. Product is slippery if wet. Wash thoroughly after handling.
<b>Storage</b>	Store in a well-ventilated place. Keep container tightly closed. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

## 8. Exposure controls/personal protection

### Exposure Limits (TLV & PEL - 8H TWA):

Component	CAS-No	Weight % - range	ACGIH TLV	OSHA PEL	Other	Notes
Bentonite	1302-78-9	60 - 100	None	None	None	(1)
Silica, crystalline, quartz	14808-60-7	5 - 10	0.025 mg/m <sup>3</sup>	see Table Z-3	50 mg/m <sup>3</sup> IDLH (NIOSH)	(R)
Silica, crystalline, Tridymite	15468-32-3	0.1 - 1	0.025 mg/m <sup>3</sup>	see Table Z-3	0.05 mg/m <sup>3</sup> TWA (respirable dust)	(R)

**Engineering Controls** Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

### Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Eye/Face Protection** Dust resistant safety goggles.

**Skin Protection** Nitrile. Wear appropriate clothing to prevent repeated or prolonged skin contact. Chemical resistant gloves recommended for prolonged or repeated contact. Use protective gloves made of: Neoprene.

**Respiratory Protection**

All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

**General Hygiene Considerations** Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

## 9. Physical and chemical properties

<b>Color</b>	Tan to Grey
<b>Odor</b>	Odorless
<b>Physical state</b>	Solid
<b>pH</b>	7 (1% solution)
<b>Specific Gravity (H<sub>2</sub>O = 1)</b>	2.3 - 2.65 at 68F (20C)
<b>Density (lb/gal)</b>	Not Determined
<b>Solubility (water)</b>	Insoluble
<b>Melting/freezing point</b>	Not Determined
<b>Flash Point</b>	Does not flash
<b>Boiling point/range</b>	ND
<b>Pour point</b>	Not Determined
<b>Viscosity</b>	Not Determined
<b>Vapor pressure</b>	NA
<b>Vapor Density (Air=1)</b>	NA
<b>Evaporation rate</b>	NA
<b>Octanol/Water Partition Coefficient</b>	Not Determined
<b>Odor Threshold(s)</b>	ND
<b>VOCs (lbs/gallon)</b>	Not Determined

## 10. Stability and reactivity

<b>Chemical stability</b>	Stable
<b>Conditions to avoid</b>	None known.
<b>Materials to avoid</b>	ND.
<b>Conditions of Reactivity</b>	See Conditions and Materials to Avoid, if applicable.
<b>Hazardous decomposition products</b>	For thermal decomposition products, see Section 5.
<b>Hazardous polymerization</b>	Will not occur

## 11. Toxicological information

**Acute Exposure Effects, Irritation and Sensitization** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects** N/D

**Component Toxicological Data** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

Component	Target organ effects	LD50 / LC50
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Bentonite	N/A	> 5000 mg/kg (Oral LD50; Rat)
Silica, crystalline, quartz	eyes, respiratory system	= 500 mg/kg (Oral LD50; Rat)
Silica, crystalline, Tridymite	eyes, respiratory system	N/A

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Bentonite	N/A	N/A	N/A	N/A
Silica, crystalline, quartz	Group 1; Monograph 100C [in preparation] Group 1; Monograph 68 [1997] Monograph 100C [in preparation] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997]	A2 Suspected Human Carcinogen	Present	Listed
Silica, crystalline, Tridymite	Group 1; Monograph 68 [1997] Monograph 68 [1997] (listed under Crystalline silica)	N/A	Present	N/A

Component	Component Toxicological Summary
Bentonite	No information available
Silica, crystalline, quartz	Crystalline silica is the most widely occurring of all minerals. The most common form of silica is sand. The International Agency for Research on Cancer (IARC) has designated crystalline silica in the form of quartz or cristobalite a Group 1 (carcinogenic to humans). This designation was based on an increased risk of lung cancer among crystalline silica exposed workers. IARC did note that carcinogenicity of crystalline silica in humans was not detected in all industrial circumstances studied. Further, carcinogenicity of crystalline silica may be dependent on inherent characteristics of the crystalline silica or external factors affecting its biological activity or distribution of polymorphs. (IARC Vol. 68, 1997, p. 41). The National Toxicology Program (NTP) classifies crystalline silica as "reasonably anticipated to cause cancer in humans" (6th Annual Report on Carcinogens, 1991). Long term inhalation of crystalline silica can also result in the lung disease, silicosis. Symptoms of this disease include coughing and shortness of breath. (NJ HSFS, January 1996)
Silica, crystalline, Tridymite	No information available

**Product Toxicological Information** Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

## 12. Ecological information

**Ecotoxicology** Component ecotoxicity data are listed below. If no data are listed, none were found in the component review.

**Product Ecotoxicity Data** Contact M-I Environmental Affairs Department for available product ecotoxicity data.

**Biodegradation** N/D  
**Bioaccumulation** N/D

**Component ecotoxicity data are listed below. If no data are listed, none were found in the company review.**

**Bentonite**  
**Freshwater fish species data** 19000 mg/L LC50 (Oncorhynchus mykiss) = 96 h  
 8.0 - 19.0 g/L LC50 (Salmo gairdneri) = 96 h

## 13. Disposal considerations

**Waste Classification** N/D

**Waste Management** Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act ( RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

**Disposal Method** Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

## 14. Transport information

### DOT

**Proper Shipping Description**

Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

**Canada TDG Shipping Description**

Not regulated

**UN PIN No**

Not regulated.

**IMDG shipping description.**

Not regulated.

**ICAO/IATA Shipping Description**

Not regulated.

Not regulated.

## 15. Regulatory information

### U.S. Federal and State Regulations

**SARA 311/312 Hazard Categories** Delayed (chronic) health hazard.

### **SARA 302/304, 313, CERCLA RQ, California Proposition 65**

Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

Component	SARA 302 / TPQs	SARA 313	CERCLA RQ
Bentonite	N/A	N/A	N/A
Silica, crystalline, quartz	N/A	N/A	N/A
Silica, crystalline, Tridymite	N/A	N/A	N/A

**State Comments** Proposition 65: This product contains chemical(s) considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 to cause cancer and/or reproductive toxicity. See table under U.S. Federal and State Regulations for the specific chemicals.

**Silica, crystalline, quartz**

**California Proposition 65** carcinogen

### International Chemical Inventories

U.S. TSCA - Components are listed or exempt from listing.  
China Inventory - Components are listed or exempt from listing.  
European Union EINECS/ELINCS - Components are listed or exempt from listing.  
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.  
Australia AICS - Components are listed or exempt from listing.  
Canada DSL - Components are listed or exempt from listing.  
Korea TCCL ECL - Contains a component that is not listed.  
New Zealand - Components are listed or exempt from listing.  
Philippine PICCS - Components are listed or exempt from listing.  
Japan METI ENCS - Components are listed or exempt from listing.

**Canadian Classification**

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class** D2A

**16. Other information**

**The following sections have been revised** 1, 2, 3, 8, 16.

**N/A - Not Applicable, N/D - Not Determined.**

†A mark of M-I L.L.C.

**Disclaimer**

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**SAFETY DATA SHEET  
PLATINUM PAC\* (ALL GRADES)**

**SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING**

**1.1. Product identifier**

**Product name** PLATINUM PAC\* (ALL GRADES)  
**Synonyms, Trade Names** PLATINUM PAC\*, PLATINUM PAC UL\*

**1.2. Relevant identified uses of the substance or mixture and uses advised against**

**Identified uses** Oil well drilling fluid additive.

**1.3. Details of the supplier of the safety data sheet**

**Supplier** M-I SWACO  
A Schlumberger Company  
Woodlands Drive,  
Kirkhill Industrial Estate,  
Dyce, Aberdeen AB21 0GW.  
Scotland UK  
T = +44 (0)1224-246600  
F = +44 (0)1224-246699  
E-mail = MBXMSDS-EH@miswaco.slb.com

**1.4. Emergency telephone number**

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

**SECTION 2: HAZARDS IDENTIFICATION**

**2.1. Classification of the substance or mixture**

**Classification (1999/45/EEC)** Not classified.

**2.2. Label elements**

**Risk Phrases** NC Not classified.  
**Safety Phrases** NC Not classified.

**2.3. Other hazards**

Not Classified as PBT/vPvB by current EU criteria.

**SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS**

**3.2. Mixtures**

POLYANIONIC CELLULOSE	60-100%
Classification (EC 1272/2008) Not classified.	Classification (67/548/EEC) Not classified.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

**Composition Comments**

The data shown is in accordance with the latest EC Directives.

**SECTION 4: FIRST AID MEASURES**

**PLATINUM PAC\* (ALL GRADES)****4.1. Description of first aid measures****Inhalation**

Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

**Ingestion**

Do not induce vomiting. Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

**Skin contact**

Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

**Eye contact**

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

**4.2. Most important symptoms and effects, both acute and delayed****Inhalation.**

Irritation of nose, throat and airway.

**Ingestion**

May cause discomfort if swallowed.

**Skin contact**

Prolonged skin contact may cause redness and irritation.

**Eye contact**

May cause temporary eye irritation.

**4.3. Indication of any immediate medical attention and special treatment needed**

Get medical attention if any discomfort continues.

**SECTION 5: FIREFIGHTING MEASURES****5.1. Extinguishing media****Extinguishing media**

Use fire-extinguishing media appropriate for surrounding materials.

**5.2. Special hazards arising from the substance or mixture****Hazardous combustion products**

When heated, vapours/gases hazardous to health may be formed.

**Unusual Fire & Explosion Hazards**

High concentrations of dust may form explosive mixture with air.

**5.3. Advice for firefighters****Special Fire Fighting Procedures**

Containers close to fire should be removed immediately or cooled with water.

**Protective equipment for fire-fighters**

Self contained breathing apparatus and full protective clothing must be worn in case of fire.

**SECTION 6: ACCIDENTAL RELEASE MEASURES****6.1. Personal precautions, protective equipment and emergency procedures**

Wear protective clothing as described in Section 8 of this safety data sheet.

**6.2. Environmental precautions**

Do not allow to enter drains, sewers or watercourses.

**6.3. Methods and material for containment and cleaning up**

Avoid generation and spreading of dust. Remove spillage with vacuum cleaner. If not possible, collect spillage with shovel, broom or the like. Ensure that waste and contaminated materials are collected and removed from the work area as soon as possible in a suitably labelled container. Product becomes slippery when wet.

**6.4. Reference to other sections**

Wear protective clothing as described in Section 8 of this safety data sheet.

**SECTION 7: HANDLING AND STORAGE****7.1. Precautions for safe handling**

Avoid inhalation of dust and contact with skin and eyes. Avoid handling which leads to dust formation.

**PLATINUM PAC\* (ALL GRADES)****7.2. Conditions for safe storage, including any incompatibilities**

Store in tightly closed original container in a dry, cool and well-ventilated place.

**7.3. Specific end use(s)**

The identified uses for this product are detailed in Section 1.2.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION****8.1. Control parameters****Ingredient Comments**

NUI = Nuisance dust, WEL TWA 4mg/m<sup>3</sup> Respirable Dust, 10 mg/m<sup>3</sup> Total Dust.

**8.2. Exposure controls****Protective equipment****Process conditions**

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Engineering measures**

Provide adequate general and local exhaust ventilation.

**Respiratory equipment**

In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter (type P2).

**Hand protection**

For prolonged or repeated skin contact use suitable protective gloves. Use protective gloves made of: Nitrile. or Neoprene.

**Eye protection**

Wear approved chemical safety goggles where eye exposure is reasonably probable.

**Other Protection**

Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES****9.1. Information on basic physical and chemical properties**

<b><u>Appearance</u></b>	Solid
<b><u>Colour</u></b>	White to yellow
<b><u>Odour</u></b>	Odourless.
<b><u>Solubility</u></b>	Soluble in water.
<b><u>Relative density</u></b>	0.3-0.5 sg
<b><u>Bulk Density</u></b>	300-900 kg/m <sup>3</sup>
<b><u>pH-Value, Diluted Solution</u></b>	6.0-8.5 @ 1%

**9.2. Other information**

Not relevant

**SECTION 10: STABILITY AND REACTIVITY****10.1. Reactivity**

There are no known reactivity hazards associated with this product.

**10.2. Chemical stability**

Stable under normal temperature conditions and recommended use.

**10.3. Possibility of hazardous reactions**

Not known.

**10.4. Conditions to avoid**

**PLATINUM PAC\* (ALL GRADES)**

Avoid heat, flames and other sources of ignition. Avoid contact with water.

**10.5. Incompatible materials****Materials To Avoid**

Avoid contact with: Strong oxidising substances.

**10.6. Hazardous decomposition products**

When heated, vapours/gases hazardous to health may be formed.

**SECTION 11: TOXICOLOGICAL INFORMATION****11.1. Information on toxicological effects****Aspiration hazard:**

Not anticipated to present an aspiration hazard based on chemical structure.

**Inhalation**

Dust may irritate respiratory system or lungs.

**Ingestion**

May cause discomfort if swallowed.

**Skin contact**

Prolonged and frequent contact may cause redness and irritation.

**Eye contact**

Particles in the eyes may cause irritation and smarting.

**Route of entry**

No route of entry noted.

**Target Organs**

No specific target organs noted

**SECTION 12: ECOLOGICAL INFORMATION****Ecotoxicity**

Contact M-I SWACO's QHSE Department for ecological information at [env@miswaco.slb.com](mailto:env@miswaco.slb.com).

**12.1. Toxicity****Acute Fish Toxicity**

Not considered toxic to fish.

**12.2. Persistence and degradability****Degradability**

There are no data on the degradability of this product.

**12.3. Bioaccumulative potential****Bioaccumulative potential**

No data available on bioaccumulation.

**12.4. Mobility in soil****Mobility:**

The product is soluble in water.

**12.5. Results of PBT and vPvB assessment**

Not Classified as PBT/vPvB by current EU criteria.

**12.6. Other adverse effects**

None known.

**PLATINUM PAC\* (ALL GRADES)****SECTION 13: DISPOSAL CONSIDERATIONS****13.1. Waste treatment methods**

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

**SECTION 14: TRANSPORT INFORMATION****General**

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

**14.1. UN number**

Not applicable.

**14.2. UN proper shipping name**

Not applicable.

**14.3. Transport hazard class(es)**

Not applicable.

**14.4. Packing group**

Not applicable.

**14.5. Environmental hazards****Environmentally Hazardous Substance/Marine Pollutant**

No.

**14.6. Special precautions for user**

Not applicable.

**14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable.

**SECTION 15: REGULATORY INFORMATION****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****Uk Regulatory References**

Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended) Workplace Exposure Limits EH40.

**EU Legislation**

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

**Water hazard classification**

WGK 1

**15.2. Chemical Safety Assessment****International Chemical Inventories**

Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Australia (AICS), Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Phillipines (PICCS), United States (TSCA).

**SECTION 16: OTHER INFORMATION****Abbreviations and acronyms used in the safety data sheet**

\*a mark of M-I L.L.C.

**General information**

HMIS Health -1 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

**Information Sources**

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau -ESIS (European Chemical Substances Information).

**Revision Comments**

General revision. Compiled or revised by Sarah Malone

**PLATINUM PAC\* (ALL GRADES)**

<b><u>Issued By</u></b>	Bill Cameron
<b><u>Revision Date</u></b>	15-Jun-12
<b><u>Revision</u></b>	1
<b><u>Supersedes date</u></b>	13-May-12
<b><u>SDS No.</u></b>	12588
<b><u>Risk Phrases In Full</u></b>	
NC	Not classified.

## Disclaimer

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to the product or to the data herein is made or incurred hereunder.



## MATERIAL SAFETY DATA SHEET

MSDS No. 10068

Trade Name: POLY-PLUS\* RD

Revision Date: 06/08/2012

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Trade Name:** POLY-PLUS\* RD

**Chemical Family:** Acrylamide polymer.  
**Product Use:** Drilling fluid additive.

**Supplied by:** M-I L.L.C.  
P.O. Box 42842  
Houston, TX 77242  
www.miswaco.slb.com

**Telephone Number:** 281-561-1511  
**Emergency Telephone (24 hr.):** 281-561-1600  
**Prepared by:** Product Safety Group

**Revision No.** 6

#### HMIS Rating

**Health:** 1                      **Flammability:** 1                      **Physical Hazard:** 0                      **PPE:** E

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

### 2. HAZARDS IDENTIFICATION

**Emergency Overview:** Caution! May cause mechanical irritation of eyes, skin and respiratory tract. Long term inhalation of particulates may cause lung damage.

#### Canadian Classification:

**UN PIN No:** Not regulated.

**WHMIS Class:** Not a controlled product.

**Physical State:** Powder                      **Color:** White                      **Odor:** Odorless

#### Potential Health Effects:

##### Acute Effects

**Eye Contact:** May cause mechanical irritation  
**Skin Contact:** May cause mechanical irritation.  
**Inhalation:** May cause mechanical irritation.  
**Ingestion:** May cause gastric distress, nausea and vomiting if ingested.

#### Acute Effects Note:

This product may release ammonia or amines when heated or exposed to high pH. Ammonia is a severe eye, skin and respiratory irritant. Ammonia has a very strong odor and can be detected at levels as low as 5 ppm. Many amines are also eye, skin and respiratory irritants.

**Carcinogenicity & Chronic Effects:** See Section 11 - Toxicological Information.

**Routes of Exposure:** Eyes. Dermal (skin) contact. Inhalation.

**Target Organs/Medical Conditions:** Eyes. Skin. Respiratory System.

**Aggravated by Overexposure:**

# MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS\* RD

MSDS No. 10068

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Anionic acrylamide copolymer		60 - 100	No comments.

**Composition Comments:** Component LD50 and LC50 values are provided in Section 11, if available.

## 4. FIRST AID MEASURES

**Eye Contact:** Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

**Skin Contact:** Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

**Inhalation:** Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Ingestion:** Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.

**General notes:** Persons seeking medical attention should carry a copy of this MSDS with them.

## 5. FIRE FIGHTING MEASURES

### Flammable Properties

**Flash Point: F (C):** NA

**Flammable Limits in Air - Lower (%):** ND

**Flammable Limits in Air - Upper (%):** ND

**Autoignition Temperature: F (C):** ND

**Explosion Data - Sensitivity to Mechanical Impact:** NA

**Explosion Data - Sensitivity to Static Discharge:** If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.

**Flammability Class:** NA

**Extinguishing Media:** Use extinguishing media appropriate for surrounding fire.

### Protection Of Fire-Fighters:

**Special Fire-Fighting Procedures:** Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

**Hazardous Combustion Products:** Ammonia or amines. Oxides of: Carbon. Nitrogen.

**Conditions of Flammability:** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties:** Particulate may accumulate static electricity. Dusts at sufficient concentrations can form explosive mixtures with air.

# MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS\* RD

MSDS No. 10068

Revision Date: 06/08/2012

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## 6. ACCIDENTAL RELEASE MEASURES

- Personal Precautions:** Use personal protective equipment identified in Section 8.
- Spill Procedures:** Evacuate the spill area with the exception of the spill response team. Wet product may create a slipping hazard. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.
- Environmental Precautions:** Waste must be disposed of in accordance with federal, state and local laws.

## 7. HANDLING AND STORAGE

- Handling:** Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Product is slippery if wet. Use only with adequate ventilation. Wash thoroughly after handling.
- Storage:** Store in dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure Limits (TLV & PEL - 8H TWA):

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Anionic acrylamide copolymer		60 - 100	NA	NA	NA	(1) (6)

### Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m<sup>3</sup> (Inhalable); 3 mg/m<sup>3</sup> (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m<sup>3</sup> (Total); 5 mg/m<sup>3</sup> (Respirable).

(6) Ammonia or amines may be released when this component is heated or exposed to high pH. The recommended exposure limits for ammonia are ACGIH TLV 25 ppm and OSHA PEL 50 ppm. No general recommended exposure limit is available for amines. A NIOSH/MSHA approved respirator with ammonia/methylamine cartridges should be used to protect against ammonia or amine inhalation exposure.

**Engineering Controls:** Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

### Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Eye/Face Protection:** Dust resistant safety goggles.

**Skin Protection:** Not normally necessary. If needed to minimize irritation: Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear chemical resistant gloves such as: Nitrile. Neoprene.

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Trade Name: POLY-PLUS\* RD

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**Respiratory Protection:** All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

**General Hygiene Considerations:** Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Color:</b>	White
<b>Odor:</b>	Odorless
<b>Physical State:</b>	Powder
<b>pH:</b>	4 - 9 at 5 g/l
<b>Specific Gravity (H<sub>2</sub>O = 1):</b>	1.25 - 1.40 at 68F (20C)
<b>Bulk Density:</b>	40 - 46 lb/ft <sup>3</sup> (641 - 737 kg/m <sup>3</sup> )
<b>Solubility (Water):</b>	Soluble
<b>Melting/Freezing Point:</b>	ND
<b>Boiling Point:</b>	ND
<b>Vapor Pressure:</b>	NA
<b>Vapor Density (Air=1):</b>	NA
<b>Evaporation Rate:</b>	NA
<b>Octanol/Water Partition Coefficient:</b>	ND
<b>Odor Threshold(s):</b>	ND

## 10. STABILITY AND REACTIVITY

<b>Chemical Stability:</b>	Stable
<b>Conditions to Avoid:</b>	Heat. Moisture.
<b>Materials to Avoid:</b>	Oxidizers.
<b>Conditions of Reactivity:</b>	See Conditions and Materials to Avoid, if applicable.
<b>Hazardous Decomposition Products:</b>	For thermal decomposition products, see Section 5.
<b>Hazardous Polymerization</b>	Will not occur

## 11. TOXICOLOGICAL INFORMATION

**Acute Exposure Effects, Irritation and Sensitization:** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects:** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects:** ND

**Component Toxicological Data:** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

# MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS\* RD

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**Product Toxicological Information:** Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

This product may contain trace amounts of acrylamide (< 0.1%). Acrylamide (CAS 79-06-1) has been classified by the International Agency for Research on Cancer (IARC) as a Group 2A carcinogen (probably carcinogenic to humans) and a suspect carcinogen by the National Toxicology Program (NTP). (LOLI). Acrylamide is included on the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) list of substances "known to cause cancer".

## 12. ECOLOGICAL INFORMATION

**Component Ecotoxicity Data:** Component ecotoxicity data are listed below. If no data are listed, none were found in the component review.

**Product Ecotoxicity Data:** Contact M-I Environmental Affairs Department for available product ecotoxicity data.

**Biodegradation:** ND

**Bioaccumulation:** ND

## 13. DISPOSAL CONSIDERATIONS

**Waste Classification:** ND

**Waste Management:** Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act ( RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

**Disposal Method:** Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

## 14. TRANSPORT INFORMATION

**U.S. DOT**

**Shipping Description:**

Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

**Canada TDG Shipping Description:**

Not regulated.

**UN PIN No:**

Not regulated.

**IMDG Shipping Description:**

Not regulated.

**ICAO/IATA Shipping Description:**

Not regulated.

## 15. REGULATORY INFORMATION

### U.S. Federal and State Regulations

**SARA 311/312 Hazard Categories:** Not a SARA 311/312 hazard.

# MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS\* RD

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**SARA 302/304, 313; CERCLA RQ, California Proposition 65:** Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

## International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.  
Canada DSL - Components are listed or exempt from listing.  
China Inventory - Components are listed or exempt from listing.  
European Union EINECS/ELINCS - Components are listed or exempt from listing.  
Japan METI ENCS - Components are listed or exempt from listing.  
Korea TCCL ECL - Components are listed or exempt from listing.  
New Zealand - Contains a component that may only be used under a group standard.  
Philippine PICCS - Components are listed or exempt from listing.  
U.S. TSCA - Components are listed or exempt from listing.  
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

## Canadian Classification:

Controlled Products Regulations Statement: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Class:** Not a controlled product.

## 16. OTHER INFORMATION

The following sections have been revised: 1, 9, 16, 15, Format changes.

**NA - Not Applicable, ND - Not Determined.**

\*A mark of M-I L.L.C.

### **Disclaimer:**

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.



## MATERIAL SAFETY DATA SHEET

MSDS No. 13793

Trade Name: POWERVIS\* L

Revision Date: 05/14/2012

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Trade Name:** POWERVIS\* L  
**Chemical Family:** Mixture  
**Product Use:** Completion fluid additive. Viscosifier.  
**Supplied by:** M-I L.L.C.  
P.O. Box 42842  
Houston, TX 77242  
www.miswaco.slb.com  
**Telephone Number:** 281-561-1509  
**Emergency Telephone (24 hr.):** 281-561-1600  
**Prepared by:** Product Safety Group  
**Revision No.** 1

**HMIS Rating**  
**Health:** 1      **Flammability:** 2      **Physical Hazard:** 0      **PPE:** J

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

### 2. HAZARDS IDENTIFICATION

**Emergency Overview:** Caution! Combustible liquid and vapor. May cause eye irritation. May be harmful if absorbed through skin.

**Canadian Classification:**  
**UN PIN No:** Not regulated.      **WHMIS Class:** B3 D2B

**Physical State:** Slurry Liquid      **Color:** White to tan      **Odor:** Ether.

**Potential Health Effects:**  
**Acute Effects**

**Eye Contact:** May irritate eyes.  
**Skin Contact:** May be harmful if absorbed through skin. Not expected to cause skin irritation under anticipated workplace exposures.  
**Inhalation:** Not expected to be an inhalation hazard under anticipated workplace exposures. Overexposure to vapors and mists which may be released at high temperatures may cause central nervous system (CNS) effects and respiratory tract irritation.  
**Ingestion:** May cause gastric distress, nausea and vomiting if ingested. Aspiration can be a hazard if this material is swallowed.

**Carcinogenicity & Chronic Effects:** See Section 11 - Toxicological Information.

**Routes of Exposure:** Eyes. Dermal (skin) contact. Dermal (skin) absorption. Inhalation.

**Target Organs/Medical Conditions:** Eyes. Skin. Respiratory System. Central Nervous System (CNS).

**Aggravated by Overexposure:**

# MATERIAL SAFETY DATA SHEET

Trade Name: **POWERVIS\* L**

MSDS No. 13793

Revision Date: 05/14/2012

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Dipropylene glycol methyl ether	34590-94-8	60 - 100	No comments.
Biopolymer		10 - 30	No comments.

**Composition Comments:** Component LD50 and LC50 values are provided in Section 11, if available.

## 4. FIRST AID MEASURES

**Eye Contact:** Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

**Skin Contact:** Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

**Inhalation:** Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Ingestion:** Do not induce vomiting. Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. Get immediate medical attention.

**General notes:** Persons seeking medical attention should carry a copy of this MSDS with them.

**Notes To Physician:** Aspiration may cause severe lung damage. Evacuate stomach in a way which avoids aspiration.

## 5. FIRE FIGHTING MEASURES

### Flammable Properties

**Flash Point: F (C):** 144F (62C)  
**Flash Point Method:** PMCC  
**Flammable Limits in Air - Lower (%):** ND  
**Flammable Limits in Air - Upper (%):** ND  
**Autoignition Temperature: F (C):** ND  
**Explosion Data - Sensitivity to Mechanical Impact:** NA  
**Explosion Data - Sensitivity to Static Discharge:** If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.

**Flammability Class:** IIIA  
**Extinguishing Media:** Water fog, carbon dioxide, foam, dry chemical.

### Protection Of Fire-Fighters:

**Special Fire-Fighting Procedures:** Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways. Note that flammable vapors may form an ignitable mixture with air. Vapors may travel considerable distances and flash back if ignited.

**Hazardous Combustion Products:** Oxides of: Carbon.

# MATERIAL SAFETY DATA SHEET

Trade Name: **POWERVIS\* L**

MSDS No. 13793

Revision Date: 05/14/2012

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**Conditions of Flammability:** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties:** ND

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions:** Use personal protective equipment identified in Section 8.

**Spill Procedures:** Evacuate the spill area with the exception of the spill response team. Keep personnel removed and upwind of spill. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Shut off leak if it can be done safely. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Absorb in vermiculite, dry sand or earth. Place into containers for disposal. Note that flammable/combustible vapors may form an ignitable mixture with air. Vapors may travel considerable distances from spill and flash back, if ignited.

**Environmental Precautions:** Waste must be disposed of in accordance with federal, state and local laws. In the U.S., for products with reportable quantity (RQ) components - if the RQ is exceeded, report to National Spill Response Office at 1 800 424 8802.

## 7. HANDLING AND STORAGE

**Handling:** Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid breathing vapors or spray mists. Use only in a well ventilated area. Ground and bond containers when transferring material. Wash thoroughly after handling.

**Storage:** Store in dry, well-ventilated area. Keep container closed. Keep away from heat, sparks and flames. Store away from incompatibles.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Exposure Limits (TLV & PEL - 8H TWA):**

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Dipropylene glycol methyl ether	34590-94-8	60 - 100	100 ppm	100 ppm	150 ppm STEL (NIOSH)	Skin.
Biopolymer		10 - 30	NA	NA	NA	(1)

### Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m<sup>3</sup> (Inhalable); 3 mg/m<sup>3</sup> (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m<sup>3</sup> (Total); 5 mg/m<sup>3</sup> (Respirable).

Skin - Potential for cutaneous absorption.

**Engineering Controls:** Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

### Personal Protection Equipment

# MATERIAL SAFETY DATA SHEET

Trade Name: **POWERVIS\* L**

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All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Eye/Face Protection:** Wear chemical safety goggles.

**Skin Protection:** Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear chemical resistant gloves such as nitrile or neoprene.

**Respiratory Protection:** All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne mist/aerosol of this product, use an organic vapor cartridge with a P-95 pre-filter attached. In work environments containing oil mist/aerosol, use an organic vapor cartridge with a P-95 pre-filter attached.

If exposed to vapors from this product, use a NIOSH/MSHA-approved respirator with an organic vapor cartridge.

**General Hygiene Considerations:** Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Color:** White to tan  
**Odor:** Ether.  
**Physical State:** Slurry Liquid  
**pH:** 7.0 (1% solution)  
**Specific Gravity (H<sub>2</sub>O = 1):** 1.1  
**Solubility (Water):** Soluble  
**Flash Point: F (C):** 144F (62C)  
**Melting/Freezing Point:** <-100F (-73C)  
**Boiling Point:** >300F (149C)  
**Vapor Pressure:** 0.4 mm Hg at 77F (25C)  
**Vapor Density (Air=1):** 5.1  
**Evaporation Rate:** ND  
**Octanol/Water Partition Coefficient:** ND  
**Odor Threshold(s):** ND

## 10. STABILITY AND REACTIVITY

**Chemical Stability:** Stable  
**Conditions to Avoid:** Keep away from heat, sparks and flame.  
**Materials to Avoid:** Oxidizers.  
**Conditions of Reactivity:** See Conditions and Materials to Avoid, if applicable.  
**Hazardous Decomposition Products:** For thermal decomposition products, see Section 5.  
**Hazardous Polymerization:** Will not occur

## 11. TOXICOLOGICAL INFORMATION

# MATERIAL SAFETY DATA SHEET

Trade Name: **POWERVIS\* L**

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**Acute Exposure Effects, Irritation and Sensitization:** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects:** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects:** ND

**Component Toxicological Data:** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

Ingredient	CAS No.	Acute Data
Dipropylene glycol methyl ether	34590-94-8	Oral LD50 5.4 g/kg (rat); Dermal LD50 5.1 g/kg (rabbit); Inhalation LC50 >400 ppm/7H (rat)
Biopolymer		Oral LD50: >5000 mg/kg (rat); Inhalation LC50: >5 mg/l/4H (rat)

**Product Toxicological Information:** No toxicological data is available for this product.

## 12. ECOLOGICAL INFORMATION

**Component Ecotoxicity Data:** Component ecotoxicity data are listed below. If no data are listed, none were found in the component review.

Ingredient	CAS No.	Data
Dipropylene glycol methyl ether	34590-94-8	LC50 96H: 10,000 mg/l (fathead minnow); EC50 48H: 5000 mg/l (Daphnia)
Biopolymer		LC50 96H: >100 mg/l (rainbow trout); EC50 72H: >100 mg/l (Scenedesmus subspicatus); EC50 48H: >100 mg/l (Daphnia magna); Aerobic Aqueous Medium 28D: 95% degradation

**Product Ecotoxicity Data:** Contact M-I Environmental Affairs Department for available product ecotoxicity data.

**Biodegradation:** ND

**Bioaccumulation:** ND

## 13. DISPOSAL CONSIDERATIONS

**Waste Classification:** ND

**Waste Management:** Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

**Disposal Method:** Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

## 14. TRANSPORT INFORMATION

**U.S. DOT  
Shipping Description:**

Not regulated under TDG, IMDG, ICAO/IATA. Not regulated for U.S. ground transport in non-bulk containers (<119 gallons). When shipped in U.S. in bulk containers, NA1993, Combustible liquid, n.o.s. (contains glycol ether), PG III.

# MATERIAL SAFETY DATA SHEET

Trade Name: **POWERVIS\* L**

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Canada TDG Shipping Description:	Not regulated.
UN PIN No:	Not regulated.
IMDG Shipping Description:	Not regulated.
ICAO/IATA Shipping Description:	Not regulated.

## 15. REGULATORY INFORMATION

### U.S. Federal and State Regulations

**SARA 311/312 Hazard Categories:** Immediate (acute) health hazard.

**SARA 302/304, 313; CERCLA RQ, California Proposition 65:** Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

### International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.  
Canada DSL - Components are listed or exempt from listing.  
China Inventory - Contains a component that is not listed.  
European Union EINECS/ELINCS - Components are listed or exempt from listing.  
Japan METI ENCS - Contains a component that is not listed.  
Korea TCCL ECL - Components are listed or exempt from listing.  
New Zealand - Components are listed or exempt from listing.  
Philippine PICCS - Contains a component that is not listed.  
U.S. TSCA - Components are listed or exempt from listing.  
U.S. TSCA - Diutan gum is subject to TSCA 12(b) export notification requirements.

### Canadian Classification:

Controlled Products Regulations Statement: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Class:** B3 D2B

## 16. OTHER INFORMATION

The following sections have been revised: 1, 15, 16.

**NA - Not Applicable, ND - Not Determined.**

\*A mark of M-I L.L.C.

### **Disclaimer:**

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.

**MATERIAL SAFETY DATA SHEET**

**MSDS No.** 12003

**Trade Name** RINGFREE<sup>†</sup>

**Revision date** 27/Dec/2013

**1. Chemical product and company identification**

**Trade Name** RINGFREE<sup>†</sup>  
**Chemical Family** Mixture  
**Supplied by** M-I L.L.C.  
P.O. Box 42842  
Houston, TX 77242  
www.miswaco.slb.com  
**Telephone Number** 281-561-1511  
**Emergency Telephone (24 hr.)** 281-561-1600  
**Prepared by** Chemical Regulatory Compliance (CRC): Mike McDowell  
**Version** 7

**HMIS health rating**

**Health** 0      **Flammability** 1      **Physical hazard** 0      **PPE** B

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

**2. Hazards identification**

**Emergency Overview:** Occupational exposure not expected to present a health or physical hazard. Prolonged exposure, however, may cause eye, skin and respiratory irritation.

**Canadian Classification**

**UN PIN No** Not regulated.      **WHMIS Hazard Class** Not a controlled product.

**Physical state** Liquid      **Color** Light yellow      **Odor** Mild

**Potential Health Effects**

**Acute Effects**

**Eye contact** Not expected to irritate eyes. Prolonged contact, however, may cause irritation.

**Skin contact** Not expected to irritate skin. Prolonged contact, however, may cause irritation.

**Inhalation** Not expected to be an inhalation hazard. Prolonged inhalation of vapors or mists, however, may cause irritation.

**Ingestion** May cause gastric distress, nausea and vomiting if ingested.

**Chronic toxicity:**

See Section 11 - Toxicological Information.

**Principle routes of exposure**

Dermal (skin) contact. Eyes. Inhalation.

**Target Organs/Medical**

None expected from occupational exposure.

**Conditions Aggravated by Overexposure**

**3. Composition/information on ingredients**

**Composition Comments**

No hazardous components are present at  $\geq 1\%$  or 0.1% for carcinogens or the Canadian Ingredient Disclosure List level.

## 4. First aid measures

<b>Eye contact</b>	Promptly wash eyes with lots of water while lifting eye lids. Get medical attention if any discomfort continues.
<b>Skin contact</b>	Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.
<b>Inhalation</b>	Move person to fresh air. If signs of irritation or toxicity occur seek medical attention.
<b>Ingestion</b>	Dilute with 2 - 3 glasses of water or milk, if conscious. If signs of irritation or toxicity occur seek medical attention. Never give anything by mouth to an unconscious person.
<b>General notes</b>	Persons seeking medical attention should carry a copy of this MSDS with them.
<b>Notes to physician</b>	Treat symptomatically.

## 5. Fire fighting measures

**Flammable properties**

<b>Flash Point</b>	Not Determined
<b>Flammability Limits in Air</b>	
<b>Lower</b>	No information available
<b>Upper</b>	No information available
<b>Autoignition Temperature °F (°C)</b>	N/D
<b>Explosion data - sensitivity to mechanical impact</b>	N/A
<b>Explosion data - sensitivity to static discharge</b>	If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.
<b>Flammability Class</b>	NA
<b>Extinguishing Media</b>	Foam. Water mist. Carbon dioxide. Dry chemical.

**Protection Of Fire-Fighters**

**Special Fire-Fighting Procedures** Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Keep water run off out of sewers and waterways.

**Hazardous combustion products** Oxides of: Carbon.

**Conditions of Flammability** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties** N/D

## 6. Accidental release measures

**Personal precautions**

Use personal protective equipment identified in Section 8.

**Spill procedures**

Contain spilled material. Absorb in vermiculite, dry sand or earth. If released into the environment, take all reasonable measures to repair, remedy and confine the effects of the substance. Remediate, manage, remove or otherwise dispose of the substance in accordance with applicable laws and regulations. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Place into containers for disposal. Shut off leak if it can be done safely.

**Environmental precautions**

In the U.S., for products with reportable quantity (RQ) components - if the RQ is exceeded, report to National Spill Response Office at 1 800 424 8802. Waste must be disposed of in accordance with federal, state and local laws.

## 7. Handling and storage

**Handling**

Put on appropriate personal protective equipment. Use only in a well ventilated area. Avoid contact with skin and eyes. Avoid breathing vapors or spray mists. Wash thoroughly after handling.

**Storage**

Store in a well-ventilated place. Keep container tightly closed. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

## 8. Exposure controls/personal protection

**Exposure Limits (TLV & PEL - 8H TWA):**

**Engineering Controls** Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

**Personal Protection Equipment**

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Eye/Face Protection**

Safety glasses with side-shields

**Skin Protection**

Wear appropriate clothing to prevent repeated or prolonged skin contact.

**Respiratory Protection**

All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne mist/aerosol of this product, use at least a NIOSH-approved N95 half-mask disposable or re-usable particulate respirator. In work environments containing oil mist/aerosol, use at least a NIOSH-approved P95 half-mask disposable or reuseable particulate respirator.

If exposed to vapors from this product use a NIOSH/MSHA-approved respirator with an Organic Vapor cartridge.

**General Hygiene Considerations** Wash promptly with soap and water if skin becomes contaminated. Change work clothing daily if there is any possibility of contamination.

## 9. Physical and chemical properties

Color	Light yellow
Odor	Mild
Physical state	Liquid
pH	6 - 8 (neat)
Specific Gravity (H <sub>2</sub> O = 1)	1.27
Density (lb/gal)	10.6
Solubility (water)	Soluble
Melting/freezing point	Not Determined
Boiling point/range	194 - 212F (90 - 100C)
Pour point	Not Determined
Viscosity	100 - 500 cPs
Vapor pressure	Not Determined
Vapor Density (Air=1)	Not Determined
Evaporation rate	Not Determined
Octanol/Water Partition Coefficient	Not Determined
Odor Threshold(s)	Not Determined
VOCs (lbs/gallon)	Not Determined

## 10. Stability and reactivity

Chemical stability	Stable
Conditions to avoid	None anticipated
Materials to avoid	Contact with oxidizing agents.
Conditions of Reactivity	See Conditions and Materials to Avoid, if applicable.
Hazardous decomposition products	For thermal decomposition products, see Section 5.
Hazardous polymerization	Will not occur

## 11. Toxicological information

**Acute Exposure Effects, Irritation and Sensitization** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects** N/D

**Component Toxicological Data** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

**Product Toxicological Information** No toxicological data is available for this product.

## 12. Ecological information

Ecotoxicology	No information available
Product Ecotoxicity Data	Contact M-I Environmental Affairs Department for available product ecotoxicity data.
Biodegradation	N/D
Bioaccumulation	N/D

Component ecotoxicity data are listed below. If no data are listed, none were found in the company review.

### 13. Disposal considerations

<b>Waste Classification</b>	This product does not meet the criteria of a hazardous waste if discarded in its purchased form.
<b>Waste Management</b>	Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act ( RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.
<b>Disposal Method</b>	Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

### 14. Transport information

**DOT**

**Proper Shipping Description**

Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

**Canada TDG Shipping Description**

Not regulated.

**UN PIN No**

Not regulated.

**IMDG shipping description.**

Not regulated.

**ICAO/IATA Shipping Description**

Not regulated.

### 15. Regulatory information

**U.S. Federal and State Regulations**

**SARA 311/312 Hazard Categories**

Not a SARA 311/312 hazard.

**SARA 302/304, 313, CERCLA RQ, California Proposition 65**

Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

**International Chemical Inventories**

U.S. TSCA - Components are listed or exempt from listing.

China Inventory - Components are listed or exempt from listing.

European Union EINECS/ELINCS - Components are listed or exempt from listing.

Korea TCCL ECL - Components are listed or exempt from listing.

U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Australia AICS - Components are listed or exempt from listing.

Canada DSL - Components are listed or exempt from listing.

New Zealand - Components are listed or exempt from listing.

Philippine PICCS - Components are listed or exempt from listing.

Japan METI ENCS - Components are listed or exempt from listing.

**Canadian Classification**

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class** Not a controlled product.

## 16. Other information

The following sections have been revised 1, 2, 3, 4, 6, 7, 8, 11, 12, 16.

**N/A - Not Applicable, N/D - Not Determined.**

†A mark of M-I L.L.C.

### Disclaimer

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## MATERIAL SAFETY DATA SHEET

MSDS No. 10337

Trade Name: SAFE-CARB\*

Revision Date: 11/15/2011

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Trade Name:** SAFE-CARB\*

**Chemical Family:** Mixture

**Product Use:** Completion fluid additive. Bridging and weighting agent. MSDS covers all grades.

**Supplied by:** M-I L.L.C.  
P.O. Box 42842  
Houston, TX 77242  
www.miswaco.slb.com

**Telephone Number:** 281-561-1509

**Emergency Telephone (24 hr.):** 281-561-1600

**Prepared by:** Product Safety Group

**Revision No.** 5

#### HMIS Rating

**Health:** 1\*      **Flammability:** 0      **Physical Hazard:** 0      **PPE:** E

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

### 2. HAZARDS IDENTIFICATION

**Emergency Overview:** Caution! May cause mechanical irritation of eyes, skin and respiratory tract. Long term inhalation of particulates may cause lung damage. Cancer hazard. Contains crystalline silica which may cause cancer.

#### Canadian Classification:

**UN PIN No:** Not regulated.

**WHMIS Class:** D2A

**Physical State:** Powder      **Color:** White      **Odor:** Odorless

#### Potential Health Effects:

##### Acute Effects

**Eye Contact:** May cause mechanical irritation

**Skin Contact:** May cause mechanical irritation.

**Inhalation:** May cause mechanical irritation.

**Ingestion:** May cause gastric distress, nausea and vomiting if ingested.

**Carcinogenicity & Chronic Effects:** See Section 11 - Toxicological Information.

**Routes of Exposure:** Eyes. Dermal (skin) contact. Inhalation.

**Target Organs/Medical Conditions:** Eyes. Skin. Respiratory System.

**Aggravated by Overexposure:**

# MATERIAL SAFETY DATA SHEET

Trade Name: **SAFE-CARB\***

MSDS No. 10337

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## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Calcium carbonate	471-34-1	60-100	CAS 1317-65-3 also applies.
Silica, crystalline, quartz	14808-60-7	1-5	No comments.

**Composition Comments:** Component LD50 and LC50 values are provided in Section 11, if available.

## 4. FIRST AID MEASURES

**Eye Contact:** Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

**Skin Contact:** Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

**Inhalation:** Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Ingestion:** Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.

**General notes:** Persons seeking medical attention should carry a copy of this MSDS with them.

## 5. FIRE FIGHTING MEASURES

### Flammable Properties

**Flash Point: F (C):** NA

**Flammable Limits in Air - Lower (%):** NA

**Flammable Limits in Air - Upper (%):** NA

**Autoignition Temperature: F (C):** NA

**Explosion Data - Sensitivity to Mechanical Impact:** NA

**Explosion Data - Sensitivity to Static Discharge:** If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.

**Flammability Class:** NA

**Extinguishing Media:** Use extinguishing media appropriate for surrounding fire.

### Protection Of Fire-Fighters:

**Special Fire-Fighting Procedures:** Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

**Hazardous Combustion Products:** Oxides of: Carbon. Calcium.

**Conditions of Flammability:** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties:** ND

# MATERIAL SAFETY DATA SHEET

Trade Name: **SAFE-CARB\***

MSDS No. 10337

Revision Date: 11/15/2011

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## 6. ACCIDENTAL RELEASE MEASURES

- Personal Precautions:** Use personal protective equipment identified in Section 8.
- Spill Procedures:** Evacuate the spill area with the exception of the spill response team. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.
- Environmental Precautions:** Waste must be disposed of in accordance with federal, state and local laws.

## 7. HANDLING AND STORAGE

- Handling:** Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Use only in a well ventilated area. Wash thoroughly after handling.
- Storage:** Store in dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure Limits (TLV & PEL - 8H TWA):

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Calcium carbonate	471-34-1	60-100	NA	NA	10 mg/m <sup>3</sup> (total dust), 5 mg/m <sup>3</sup> (respirable dust) (NIOSH)	(1)
Silica, crystalline, quartz	14808-60-7	1-5	0.025 mg/m <sup>3</sup>	see Table Z-3	50 mg/m <sup>3</sup> IDLH (NIOSH)	(R)

### Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m<sup>3</sup> (Inhalable); 3 mg/m<sup>3</sup> (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m<sup>3</sup> (Total); 5 mg/m<sup>3</sup> (Respirable).

(R) Respirable fraction.

Table Z-3: PEL for Mineral Dusts containing crystalline silica are 10 mg/m<sup>3</sup> / (%SiO<sub>2</sub>+2) for quartz and 1/2 the calculated quartz value for cristobalite and tridymite. 29 CFR 1910.1000.

**Engineering Controls:** Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

### Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazards present and the risk of exposure to those hazards. The PPE recommendations below are based on our assessment of the chemical hazards associated with this product. The risk of exposure and need for respiratory protection will vary from workplace to workplace and should be assessed by the user.

**Eye/Face Protection:** Dust resistant safety goggles.

# MATERIAL SAFETY DATA SHEET

Trade Name: **SAFE-CARB\***

MSDS No. 10337

Revision Date: 11/15/2011

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**Skin Protection:** Wear appropriate clothing to prevent repeated or prolonged skin contact. Chemical resistant gloves recommended for prolonged or repeated contact. Use protective gloves made of: Nitrile. Neoprene.

**Respiratory Protection:** All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

**General Hygiene Considerations:** Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Color:</b>	White
<b>Odor:</b>	Odorless
<b>Physical State:</b>	Powder
<b>pH:</b>	ND
<b>Specific Gravity (H<sub>2</sub>O = 1):</b>	2.7 - 2.8
<b>Solubility (Water):</b>	Slightly.
<b>Melting/Freezing Point:</b>	ND
<b>Boiling Point:</b>	ND
<b>Vapor Pressure:</b>	NA
<b>Vapor Density (Air=1):</b>	NA
<b>Evaporation Rate:</b>	NA
<b>Octanol/Water Partition Coefficient:</b>	ND
<b>Odor Threshold(s):</b>	ND

## 10. STABILITY AND REACTIVITY

<b>Chemical Stability:</b>	Stable
<b>Conditions to Avoid:</b>	Keep away from heat, sparks and flame.
<b>Materials to Avoid:</b>	Acids, Aluminum, aluminum alloys. Mercury. Hydrogen. Fluorine. Magnesium. Silicon. Ammonium salts. Aluminum sulfate.
<b>Conditions of Reactivity:</b>	See Conditions and Materials to Avoid, if applicable.
<b>Hazardous Decomposition Products:</b>	For thermal decomposition products, see Section 5.
<b>Hazardous Polymerization</b>	Will not occur

## 11. TOXICOLOGICAL INFORMATION

**Acute Exposure Effects, Irritation and Sensitization:** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects:** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects:** ND

**Component Toxicological Data:** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

# MATERIAL SAFETY DATA SHEET

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Ingredient	CAS No.	Acute Data
Calcium carbonate	471-34-1	Oral LD50: 6450 mg/kg (rat)

Ingredient	Component Toxicological Summary
Silica, crystalline, quartz	Crystalline silica is the most widely occurring of all minerals. The most common form of silica is sand. The International Agency for Research on Cancer (IARC) has designated crystalline silica in the form of quartz or cristobalite a Group 1 (carcinogenic to humans). This designation was based on an increased risk of lung cancer among crystalline silica exposed workers. IARC did note that carcinogenicity of crystalline silica in humans was not detected in all industrial circumstances studied. Further, carcinogenicity of crystalline silica may be dependent on inherent characteristics of the crystalline silica or external factors affecting its biological activity or distribution of polymorphs. (IARC Vol. 68, 1997, p. 41). The National Toxicology Program (NTP) classifies crystalline silica as "reasonably anticipated to cause cancer in humans" (6th Annual Report on Carcinogens, 1991). Long term inhalation of crystalline silica can also result in the lung disease, silicosis. Symptoms of this disease include coughing and shortness of breath. (NJ HSFS, January 1996)

**Product Toxicological Information:** Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

## 12. ECOLOGICAL INFORMATION

**Component Ecotoxicity Data:** Component ecotoxicity data are listed below. If no data are listed, none were found in the component review.

Ingredient	CAS No.	Data
Calcium carbonate	471-34-1	LC50 48H static: 56 g/l (Gambusia affinis (western mosquito fish))

**Product Ecotoxicity Data:** Contact M-I Environmental Affairs Department for available product ecotoxicity data.  
**Biodegradation:** ND  
**Bioaccumulation:** ND

## 13. DISPOSAL CONSIDERATIONS

**Waste Classification:** ND

**Waste Management:** Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

**Disposal Method:** Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

## 14. TRANSPORT INFORMATION

# MATERIAL SAFETY DATA SHEET

Trade Name: **SAFE-CARB\***

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**Shipping Description:** Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.  
**Canada TDG Shipping Description:** Not regulated.  
**UN PIN No:** Not regulated.  
**IMDG Shipping Description:** Not regulated.  
**ICAO/IATA Shipping Description:** Not regulated.

## 15. REGULATORY INFORMATION

### U.S. Federal and State Regulations

**SARA 311/312 Hazard Categories:** Delayed (chronic) health hazard.

**SARA 302/304, 313; CERCLA RQ, California Proposition 65:** Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

Ingredient	SARA 302 / TPQs	SARA 313	CERCLA RQ	CA 65 Cancer	CA 65 Dev. Tox.	CA 65 Repro. F	CA 65 Repro. M
Silica, crystalline, quartz	---	---	---	X	---	---	---

**State Comments:** Proposition 65: This product contains chemical(s) considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 to cause cancer and/or reproductive toxicity. See table under U.S. Federal and State Regulations for the specific chemicals.

### International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.  
Canada DSL - Components are listed or exempt from listing.  
China Inventory - Components are listed or exempt from listing.  
European Union EINECS/ELINCS - Components are listed or exempt from listing.  
Japan METI ENCS - Components are listed or exempt from listing.  
Korea TCCL ECL - Components are listed or exempt from listing.  
New Zealand - Components are listed or exempt from listing.  
Philippine PICCS - Components are listed or exempt from listing.  
U.S. TSCA - Components are listed or exempt from listing.  
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

### Canadian Classification:

Controlled Products Regulations Statement: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Class:** D2A

## 16. OTHER INFORMATION

The following sections have been revised: 1, 5, 15, 16. Format changes.

**NA - Not Applicable, ND - Not Determined.**

\*A mark of M-I L.L.C.

# MATERIAL SAFETY DATA SHEET

Trade Name: **SAFE-CARB\***

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## **Disclaimer:**

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.



## MATERIAL SAFETY DATA SHEET

MSDS No. 140427

Trade Name SODA ASH

Revision date 24/Jul/2013

### 1. Chemical product and company identification

**Trade Name** SODA ASH

**Chemical Family** Inorganic Salt  
**Use of the substance/preparation** Additive in oilfield applications

**Supplied by** M-I L.L.C.  
P.O.Box 42842  
Houston, TX 77242  
www.miswaco.slb.com

**Telephone Number** 281-561-1509  
**Emergency Telephone (24 hr.)** 281-561-1600  
**Prepared by** Product Safety Group , Mike McDowell

**Version** 0

#### HMIS health rating

**Health** 2      **Flammability** 0      **Physical hazard** 0      **PPE** X

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. \*Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

### 2. Hazards identification

**Emergency Overview** Warning! Causes severe eye irritation. May cause skin and respiratory tract irritation.

#### Canadian Classification

**UN PIN No** Not regulated.      **WHMIS Hazard Class** D2B

**Physical State** Granules Powder      **Color** White      **Odor** Odorless

#### Potential Health Effects

##### Acute Effects

**Eye contact** May cause severe eye irritation.  
**Skin contact** Not expected to irritate skin. Prolonged contact, however, may cause irritation.  
**Inhalation** Dust may be irritating to the respiratory tract.  
**Ingestion** May cause severe irritation of the mouth, throat, and stomach. May cause gastric distress, nausea and vomiting if ingested.

**Carcinogenicity and chronic effects** See Section 11 - Toxicological Information.

**Principle routes of exposure** Inhalation. Dermal (skin) contact. Eyes.

**Target Organs/Medical Conditions Aggravated by Overexposure**

Inhalation. Dermal (skin) contact. Eyes.

### 3. Composition/information on ingredients

Component	CAS-No	Weight % - range	Comments:
Sodium carbonate	497-19-8	60 - 100	No comments.

#### Composition Comments

Component LD50 and LC50 values are provided in Section 11, if available.

### 4. First aid measures

#### Eye contact

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

#### Skin contact

Wash with soap and water. Get medical attention if irritation persists.

#### Inhalation

Move the exposed person to fresh air at once. If irritation persists or signs of toxicity occur, seek medical attention.

#### Ingestion

Rinse mouth with water many times. Never give anything by mouth to an unconscious person. If irritation persists or signs of toxicity occur, seek medical attention.

#### General notes

Persons seeking medical attention should carry a copy of this MSDS with them.

#### Notes to physician

Treat symptomatically.

### 5. Fire fighting measures

#### Flammable properties

##### Flash Point

Not flammable

##### Flammability Limits in Air

##### Lower

No information available

##### Upper

No information available

##### Autoignition Temperature F (C)

N/D

##### Explosion data - sensitivity to mechanical impact

NA

##### Explosion data - sensitivity to static discharge

If applicable, information is provided in Section 5 Special Fire-Fighting Procedures, Other Flammable Properties and Section 6 Spill Procedures.

##### Flammability Class

NA

##### Extinguishing Media

Use extinguishing media appropriate for surrounding fire.

#### Protection Of Fire-Fighters

**Special Fire-Fighting Procedures** Wear approved positive-pressure self-contained breathing apparatus and protective clothing. Cool fire-exposed containers using water spray.

**Hazardous combustion products** None known

**Conditions of Flammability** Products are classified as flammable/combustible based on flash point as defined in the Health Canada Controlled Products Regulations, U.S. Occupational Health and Safety Administration Hazard Communication Standard and transportation regulations. See Sections 1, 2, 5, 14 and 15 for flammable/combustible classification information. Flammable/combustible materials may ignite and burn if exposed to a flame or other sources of ignition.

**Other Flammable Properties** N/D

## 6. Accidental release measures

<b>Personal precautions</b>	Use personal protective equipment identified in Section 8.
<b>Spill procedures</b>	Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.
<b>Environmental precautions</b>	As local regulations may vary; all waste must be disposed/recycled/reclaimed in accordance with federal, state, and local environmental control regulations.

## 7. Handling and storage

<b>Handling</b>	Avoid contact with eyes, skin and clothing. Avoid generating or breathing dust. Use only with adequate ventilation. Wash thoroughly after handling.
<b>Storage</b>	Store in a well-ventilated place. Keep container tightly closed Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

## 8. Exposure controls/personal protection

### Exposure Limits (TLV & PEL - 8H TWA):

Component	CAS-No	Weight % - range	ACGIH TLV	OSHA PEL	Other	Notes
Sodium carbonate	497-19-8	60 - 100	None	-	NA	none

**Kit components**  
Not determined.

**Engineering Controls** Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

### Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Eye/Face Protection** Dust resistant safety goggles.

**Skin Protection** Wear chemical resistant gloves such as: Neoprene. Natural rubber. Wear appropriate clothing to prevent repeated or prolonged skin contact.

**Respiratory Protection**

If exposed to particulates/aerosols:  
 Use at least a NIOSH-approved N95 half-mask disposable particulate respirator.  
 In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or reuseable particulate respirator.  
 If exposed to organic vapors:  
 Use a NIOSH/MSHA-approved organic vapor respirator. CCROV: CCR with organic vapor cartridge. A NIOSH/MSHA approved respirator with ammonia/methylamine cartridges should be used to protect against ammonia or amine inhalation exposure.

**General Hygiene Considerations** Work clothes should be washed separately at the end of each work day.  
 Disposable clothing should be discarded, if contaminated with product.

## 9. Physical and chemical properties

<b>Color</b>	White
<b>Odor</b>	Odorless
<b>Physical State</b>	Granules Powder
<b>pH</b>	11.16
<b>Specific Gravity (H<sub>2</sub>O = 1)</b>	2.53
<b>Density (lb/gal)</b>	ND
<b>Solubility (Water)</b>	Soluble
<b>Melting/Freezing Point</b>	1564°F / 851°C
<b>Flash Point</b>	Not flammable
<b>Boiling Point</b>	ND
<b>Pour point</b>	Not determined
<b>Viscosity</b>	Not determined.
<b>Vapor pressure</b>	Not determined
<b>Vapor Density (Air=1)</b>	Not determined
<b>Evaporation rate</b>	Not determined
<b>Octanol/Water Partition Coefficient</b>	Not determined
<b>Odor Threshold(s)</b>	Not determined
<b>VOCs (lbs/gallon)</b>	Not determined
<b>Decomposition temperature</b>	>752°F / >400°C

## 10. Stability and reactivity

<b>Chemical stability</b>	Stable
<b>Conditions to avoid</b>	Dispersion of dust.
<b>Materials to avoid</b>	Aluminum powder. Moisture.
<b>Conditions of Reactivity</b>	See Conditions and Materials to Avoid, if applicable.
<b>Hazardous decomposition products</b>	For thermal decomposition products, see Section 5.
<b>Hazardous polymerization</b>	Will not occur

## 11. Toxicological information

**Acute Exposure Effects, Irritation and Sensitization** See Section 2.

**Chronic, Carcinogenicity, Reproductive Toxicity, Teratogenicity, Embryotoxicity, Mutagenicity Effects** See Component Toxicological Summary and Product Toxicological Information, if available.

**Synergistic Products/Effects** ND

**SODA ASH**

MSDS No. 140427

Revision date 24/Jul/2013

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**Component Toxicological Data** Any adverse component toxicological effects and acute toxicity values (LD50s, LC50s) are listed below. If no effects or acute values are listed for components, no such data were identified.

Component	Target organ effects	LD50 / LC50
Sodium carbonate	N/A	= 4090 mg/kg (Oral LD50; Rat) = 2210 mg/kg (Dermal LD50; Mouse)

Component	IARC Group 1 or 2	ACGIH - Carcinogens	OSHA listed carcinogens	NTP
Sodium carbonate	N/A	N/A	N/A	N/A

Component	Component Toxicological Summary
Sodium carbonate	No information available

**Product Toxicological Information** No toxicological data is available for this product.

## 12. Ecological information

**Ecotoxicology** No information available

**Product Ecotoxicity Data** Contact M-I Environmental Affairs Department for available product ecotoxicity data.

**Biodegradation** ND

**Bioaccumulation** ND

**Component level data** No data available

**Sodium carbonate**

**Freshwater algae** 242 mg/L EC50 (Nitzschia) = 120 h

**Freshwater fish species data** 310 - 1220 mg/L LC50 (Pimephales promelas) = 96 h  
300 mg/L LC50 (Lepomis macrochirus) = 96 h

**Water flea data** 265 mg/L EC50 (Daphnia magna) = 48 h

## 13. Disposal considerations

**Waste Classification** ND

**Waste Management**

Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act ( RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

**Disposal Method**

Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

## 14. Transport information

**DOT**

**Proper Shipping Description**

Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

**Canada TDG Shipping Description**

Not regulated.

IMDG shipping description.  
ICAO/IATA Shipping Description

Not regulated.  
Not regulated.

## 15. Regulatory information

### U.S. Federal and State Regulations

**SARA 311/312 Hazard Categories** Immediate (acute) health hazard.

### **SARA 302/304, 313; CERCLA RQ, California Proposition 65**

Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

Component	SARA 313	CERCLA RQ
Sodium carbonate	NA	NA

### International Chemical Inventories

Australia AICS - Components are listed or exempt from listing  
 Canada DSL - Components are listed or exempt from listing  
 China Inventory - Components are listed or exempt from listing  
 European Union EINECS/ELINCS - Components are listed or exempt from listing  
 Japan METI ENCS - Components are listed or exempt from listing  
 Korea TCCL ECL - Components are listed or exempt from listing  
 New Zealand - Components are listed or exempt from listing  
 Philippine PICCS - Components are listed or exempt from listing  
 U.S. TSCA - Components are listed or exempt from listing.

### Canadian Classification

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class** D2B

## 16. Other information

The following sections have been revised: New

**N/A - Not Applicable, N/D - Not Determined.**

### **Disclaimer**

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