

WATERSTONE ENVIRONMENTAL, INC.

2936 East Coronado Street, Anaheim, CA 92806
714-414-1122 * Fax: 714-414-1166

July 15, 2014

Doug Patteson
Central Valley Regional Water Quality Control Board
1685 E. Street
Fresno, CA 93706

RE: Technical Report to Provide RWQCB-Requested Information Regarding Discharge of Drilling, Completion, and/or Workover Fluids to Land for Wells Drilled after January 1, 2012 to November 15, 2013 or Later at the Dow Chanslor Lease-BreitBurn Operating, L.P.

Dear Mr. Patteson:

Waterstone Environmental, Inc. (Waterstone) submits this Technical Report on behalf of BreitBurn Operating L.P. The purpose of this Technical Report is to respond to an order from the Central Valley Regional Water Quality Control Board (RWQCB) in a May 21, 2014 letter from Pamela C. Creedon, RWQCB Executive Officer to Martha L. Brock of BreitBurn Management Company LLC (RWQCB Letter).

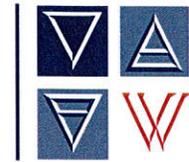
CLARIFICATION

The RWQCB Letter states that it issued BreitBurn a November 15, 2013 RWQCB directive (Previous RWQCB Letter) to submit information about the discharge to land of well drilling fluids (including well completion and/or workover and stimulation fluids) at any BreitBurn wells drilled between January 1, 2012 and November 15, 2013. BreitBurn responded to the Previous RWQCB Letter in a submittal dated February 7, 2014 (BreitBurn Response).

The RWQCB Letter states BreitBurn's Response indicates that during the reporting period BreitBurn: 1) drilled 24 wells on its Dow Chanslor lease, 2) discharged drilling, completion, and stimulation treatment fluids to unlined sumps at all 24 locations and 3) completed wells at 24 locations and performed hydraulic fracturing (frac or fracking) at all the locations.

The 24 wells to which the RWQCB is referring are listed below:

2012	2013	2013
"Dow Chanslor" AAA-6	"Dow Chanslor" L-12	"Dow Chanslor" L-12
"Dow Chanslor" B-5	"Dow Chanslor" L-11A	"Dow Chanslor" L-11A
"Dow Chanslor" BB-6A	"Dow Chanslor" L-9A	"Dow Chanslor" L-9A
"Dow Chanslor" CC-6A	"Dow Chanslor" L-5A	"Dow Chanslor" L-5A
"Dow Chanslor" CCC-5	"Dow Chanslor" JJJ-5	"Dow Chanslor" JJJ-5
"Dow Chanslor" E-6	"Dow Chanslor" J-5A	"Dow Chanslor" J-5A
"Dow Chanslor" F-5	"Dow Chanslor" I-4	"Dow Chanslor" I-4
"Dow Chanslor" GGG-5	"Dow Chanslor" H-6B	"Dow Chanslor" H-6B



However, not all these wells discharged fracking fluids into sumps; therefore, we submit the clarification below.

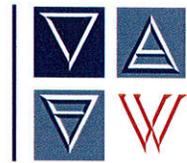
In gathering information to respond to the RWQCB Letter, BreitBurn became aware that the previously submitted spreadsheets for 2012 and 2013 incorrectly indicated that 24 drilling locations discharged fracking fluids into the sumps. However, only 6 of the sumps from these 24 wells actually received treatment fluids. This is because the field pressure was low enough to retain all fracking fluids downhole in the remaining 18 locations. No fracking fluids were discharged at the surface at these 18 locations, therefore, the RWQCB Letter is applicable only to the 6 sumps listed below that received fracking fluids rather than the 24 originally reported.

"Dow Chanslor" H-6B
"Dow Chanslor" I-4
"Dow Chanslor" J-5A
"Dow Chanslor" JJJ-5
"Dow Chanslor" L-12
"Dow Chanslor" L-5A

INFORMATION REQUESTED BY RWQCB

The following items requested in the RWQCB letter are listed below. BreitBurn's response is indicated in *italic font*.

1. A map showing the locations of the wells listed in the submitted spreadsheet and any additional wells.
 - *Please see Figure 1.*
2. The date and time drilling mud was displaced with completion fluid in each well.
 - *This is not applicable as drilling mud was not displaced with completion fluid in any of the wells.*
3. The date, volume, and chemical characteristics of all fluids discharged to each sump from a well, tank, or flow line after drilling mud was displaced with completion fluid in each well.
 - *This is not applicable as drilling mud was not displaced with completion fluid in any of the wells.*
4. Volume and chemical characteristics of each water source used for the hydraulic fracturing process.
 - *This information is provided on Table 1 and Attachment A provides the chemical characteristics of the fresh water source and the produced water.*



5. Volume and trade name of each chemical additive (and Material Safety Data sheets[MSDS]) used for the hydraulic fracturing process
 - *This information is provided on Tables 2 and 3. In addition, the MSDS are included in Attachment B.*
6. A detailed description of the sump closure process and the date the closure process began with the removal of free liquid from each sump.
 - *This information is provided on Table 1.*
7. Discussion of how BreitBurn managed hydraulic fracturing fluids and flowback fluids at each well location.
 - *The process is the same for all of the wells. Typically the wells do not naturally flow after a hydraulic fracture treatment. Therefore, as the well is cleaned out and plugs are retrieved (utilizing a workover rig), the fluid (mix of fresh and produced water) is circulated into a tank to clean the well. After the well is cleaned, it is hooked into the group lines which go through the normal separation and water treatment process. There is no collection or offsite disposal of fluids. All the recirculated fluid goes through the separation and water treatment process and is re-injected in the field in the permitted Class II wells. There were 6 of 24 producing wells that are exceptions since we had positive net-pressure from the last stage fracture that did not bleed off prior to pulling the plugs. For safety, we bled the pressure off by bleeding off fracturing fluid consisting of approximately 10-20 bbls into the sump. The fluid is about 75% freshwater with 25% produced water since the final stage is displaced with the 75/25 mix.*
8. Discussion of how the flow lines are pressure tested prior to and flushed after each fracturing state.
 - *The process is the same for all of the wells. The flow lines are pressure tested to 1000 psi greater than the max casing pressure prior to each frac. At these wells, the lines were tested to 3500 psi. The lines are re-tested any time a connection is broken during times when the flow line is moved to a new location. The flush is staged when the in-line densometer reads 1 pound per gallon. Stages were flushed with a mix of 75% fresh water and 25% produced water to the top perforation.*
9. Discussion of how BreitBurn manages the ultimate disposal of flowback fluids and any fracturing fluid that, because of a delay, cannot be used during the hydraulic fracturing process.
 - *The process is the same for all of the wells. If there is a delay, BreitBurn will typically keep any frac fluid in the frac tanks and pump it on the next stage. There has not been a*



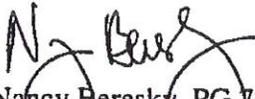
situation yet where the fluid has not been used. If there is remaining frac fluid that cannot be used in the hydraulic fracturing process then it will be transferred into the water treatment system to be injected in the field with the permitted Class II injection wells. If there is any gel residue, breaker would be added and the broken fluid would be transferred in to the water injection system. The same process is done for any flowback fluid as well.

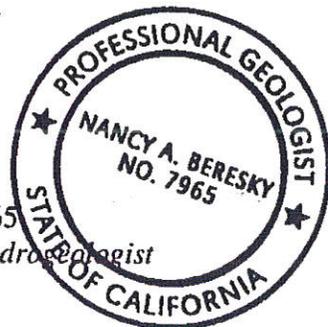
10. Description of fluids removed from each drilling sump during closure and documentation of waste characterization and disposal, including all agency applications, permits, and bills of lading for Baker tanks or vacuum trucks.

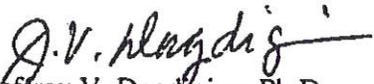
- *The process is the same for all of the wells. Drilling mud, fresh water, produced water and oil were removed from the sump with the company vacuum truck. The oil was placed in the oil sales stock tanks and the fresh water, produced water and water with highly diluted drilling mud were placed into the water disposal tanks for injection into our Class II permitted injection wells. THERE IS NO OFFSITE DISPOSAL OF ANY OF THESE MATERIALS.*

Please call Tina Darjazanie at BreitBurn at 213-225-0251 or Nancy Beresky at 714-414-1122 if you have any questions.

Sincerely,

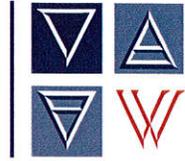

Nancy Beresky, PG 7965
Managing Principal Hydrogeologist




Jeffrey V. Dagdagian, Ph.D.
Managing Principal Environmental Scientist

Attachments: Figure 1
Tables 1, 2, 3
Attachments A, B

Certification Statement Follows:



CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Pursuant to Water Code section 13350, any person who intentionally or negligently violates an order may be liable civilly in an amount which shall not exceed five thousand dollars (\$5,000), but shall not be less than five hundred dollars (\$500) for each day in which the order is violated.

I am an authorized representative of BreitBurn and hereby certify under penalty of perjury in conformance with the laws of the State of California, that the information submitted is true, complete, and accurate:

Martha Brock

Name

Martha Brock, EHS Manager

Printed Name and Title

- SYMBOL LEGEND**
-  EXIST. PRODUCTION WELLS
 -  EXIST. WATER INJECTION WELLS
 -  NEW 2014 PRODUCTION WELLS (SURFACE LOCATIONS)
 -  WELLS WITH Sumps THAT RECEIVED FRACKING FLUIDS (JANUARY 1, 2012 TO PRESENT (JULY 2014))

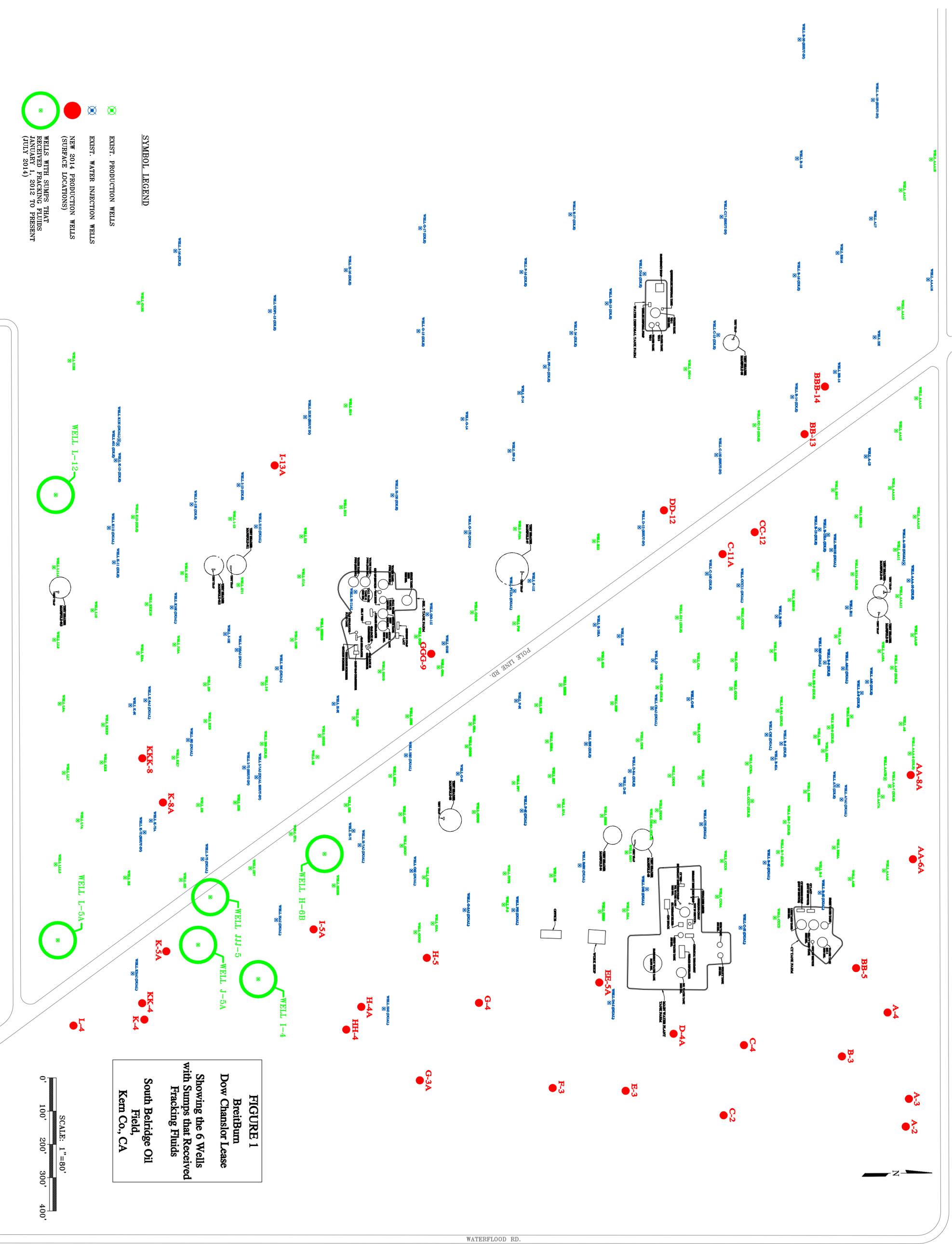
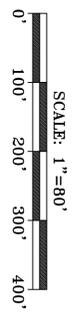


FIGURE 1
 BreitBurn
 Dow Chanslor Lease
 Showing the 6 Wells
 with Sumps that Received
 Fracking Fluids
 South Belridge Oil
 Field,
 Kern Co., CA



WATERFLOOD RD.

TABLE 1
Information Requested by RWQCB from BreitBurn/Dow-Chanslor Lease, South Belridge Oil Field, Kern Co., CA

API No.	Well Name & No.	Year	Type of material discharged into the sump	The date and time drilling mud was displaced with completion fluid in each well		The date, volume, and chemical characteristics of all fluids discharged to each sump from a well, tank, or flow line after drilling mud was displaced with completion fluid in each well			Volume and chemical characteristics of each water source used for the hydraulic fracturing process		Volume and trade name of each chemical additive (and Material Safety Data sheets) used for the hydraulic fracturing process		A detailed description of the sump closure process and the date the closure process began with the removal of free liquid from each sump	
				Date	Time	Date	Volume	Chemical Characteristics	Volume	Chemical Characteristics	Volume	Trade name	Description of the sump closure process	Date
Producing Wells With Sumps that Received Discharge of Fracking Fluids														
0403050883	"Dow Chanslor" H-6B	2013	Hydraulic Fracturing Treatment Fluid	6/2/2013	2:00 PM	Not Applicable	0	Not Applicable	6214 bbls (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.	After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	7/17/2013	
0403050420	"Dow Chanslor" I-4	2013	Hydraulic Fracturing Treatment Fluid	4/29/2013	1:00 PM	Not Applicable	0	Not Applicable	6825 bbls (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.	After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	6/28/2013	
0403050421	"Dow Chanslor" J-5A	2013	Hydraulic Fracturing Treatment Fluid	4/25/2013	2:00 AM	Not Applicable	0	Not Applicable	7183 bbls (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.	After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	6/25/2013	

TABLE 1
Information Requested by RWQCB from BreitBurn/Dow-Chanslor Lease, South Belridge Oil Field, Kern Co., CA

API No.	Well Name & No.	Year	Type of material discharged into the sump	The date and time drilling mud was displaced with completion fluid in each well		The date, volume, and chemical characteristics of all fluids discharged to each sump from a well, tank, or flow line after drilling mud was displaced with completion fluid in each well			Volume and chemical characteristics of each water source used for the hydraulic fracturing process		Volume and trade name of each chemical additive (and Material Safety Data sheets) used for the hydraulic fracturing process		A detailed description of the sump closure process and the date the closure process began with the removal of free liquid from each sump		
				Date	Time	Date	Volume	Chemical Characteristics	Volume	Chemical Characteristics	Volume	Trade name	Description of the sump closure process	Date	
0403050422	"Dow Chanslor" JJJ-5	2013	Hydraulic Fracturing Treatment Fluid	4/21/2013	10:00 PM	Not Applicable	0	Not Applicable	7050 bbls (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.			After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	6/21/2013
0403050426	"Dow Chanslor" L-12	2013	Hydraulic Fracturing Treatment Fluid	4/5/2013	10:00 PM	Not Applicable	0	Not Applicable	6019 bbl (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.			After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	6/14/2013
0403050423	"Dow Chanslor" L-5A	2013	Hydraulic Fracturing Treatment Fluid	4/17/2013	11:00 PM	Not Applicable	0	Not Applicable	5912 bbls (±10-20 bbls in pit)	75% fresh water and 25% produced water (diatomite). See Attachment A for chemical data for fresh and produced water.	See Table 2 for the trade name and chemical substances for each additive. See Table 3 for the volume and trade name used at each well. See Attachment B for Material Safety Data Sheets.			After the removal of free liquids by vacuum truck the liquids are transported to the lease water treatment facility where solids are removed and the cleaned fluid is injected into the permitted Class II disposal wells. The dehydrated drill cutting solids are mixed with fill dirt originally removed from the sump and placed back in the sump to fill it.	6/18/2013

Table 2
Hydrofracturing Treatment Chemical Substances from MSDS

BreitBurn/Dow Chanslor Lease
 South Belridge Oil Field, Kern County, CA

Producer Trade Name	Chemical Family	Substances
Sand-Brown	Sand	Crystalline silica, Quartz
Sand-Premium White	Sand	Crystalline silica, Quartz
SandWedge NT	Blend	Dipropylene glycol monomethyl ether, Heavy aromatic petroleum naphtha
SP Breaker	Oxidant	Sodium Persulfate
BC-140	Blend	Monoethanolamine borate, Ethylene glycol
CAT-3 Activator	Blend	EDTA/Copper chelate
Cla-Web	Blend	Hydroxyalkyl alkylammonium chloride
FDP-S1047-12	Alcohol surfactant blend	Methanol, Sulfonate
FE-1A Acidizing Composition	Organic Acid Anhydride	Acetic anhydride, Acetic acid
GBW-30 Breaker	Polysaccharide	Hemicellulase enzyme
MC B-8642	Not Specified	Glutaraldehyde, Alkyl (C12-16) dimethylbenzylammonium chloride, Ethanol
MC MX 2-2738	Not Specified	Methyl Alcohol, Phosphonic Acid Salt, Acetic Acid
MC MX 2-2822	Not Specified	Methyl Alcohol, Phosphonate of a Diamine, Sodium Salt
MO-67	Hydroxide	Sodium Hydroxide
WG-36 Gelling Agent	Polysaccharide	Contains no hazardous substances

MSDS - Material Safety Data Sheets

TABLE 3

Hydrofracturing Chemicals and Volumes by Well

BreitBurn - Dow Chanslor Lease, Kern Co., CA

Dow Chanslor L-12		
Material name	Units	Volume
BC-140	gal	182.9
FE-1A (2:1)	gal	48.5
MC B-8642	gal	64.6
FDP-S1047-12	gal	239.2
GBW-30(1:1)	gal	169
CLA-Web	gal	121.5
SandWedge NT	gal	101.6
MC MX 2-2738	gal	38.6
MO-67(2:1)	gal	207.2
WG-36	lbs	5,902.90
SAND - STANDARD - 10/40	lbs	614,927.00
SAND - PREMIUM - 20/40	lbs	371,869.00

Dow Chanslor L-5		
Material name	Units	Volume
BC-140	gal	170.00
FE-1A (2:1)	gal	14.00
MC B-8642	gal	55.00
FDP-S1047-12	gal	250.00
GBW-30(1:1)	gal	135.00
CLA-Web	gal	125.00
SandWedge NT	gal	50.00
MC MX 2-2738	gal	48.00
MO-67(2:1)	gal	210.00
WG-36	lbs	5,515.00
SAND - STANDARD - 10/40	lbs	617,776.00
SAND - PREMIUM - 20/40	lbs	370,184.00

Dow Chanslor JJJ-5		
Material name	Units	Volume
BC-140	gal	215
FE-1A (2:1)	gal	21
MC B-8642	gal	98
FDP-S1047-12	gal	280
GBW-30(1:1)	gal	234
CLA-Web	gal	145
SandWedge NT	gal	38
MC MX 2-2822	gal	41
MO-67(2:1)	gal	210
WG-36	lbs	6,390
SAND - STANDARD - 10/40	lbs	619,552
SAND - PREMIUM - 20/40	lbs	354,912

Dow Chanslor J-5A		
Material name	Units	Volume
BC-140	gal	221
FE-1A (2:1)	gal	20
MC B-8642	gal	88
FDP-S1047-12	gal	300
GBW-30(1:1)	gal	251
CLA-Web	gal	135
SandWedge NT	gal	19
MC MX 2-2822	gal	43
MO-67(2:1)	gal	300
WG-36	lbs	6,920
SAND - STANDARD - 10/40	lbs	617,439
SAND - PREMIUM - 20/40	lbs	307,182

Dow Chanslor I-4		
Material name	Units	Volume
BC-140	gal	192.20
FE-1A (2:1)	gal	77.00
MC B-8642	gal	65.70
FDP-S1047-12	gal	251.90
GBW-30(1:1)	gal	188.10
CLA-Web	gal	127.00
SandWedge NT	gal	108.80
MC MX 2-2822	gal	41.60
MO-67(2:1)	gal	221.80
WG-36	lbs	6,152.10
SAND - STANDARD - 10/40	lbs	669,860
SAND - PREMIUM - 20/40	lbs	365,459

Dow Chanslor H-6B		
Material name	Units	Volume
BC-140	gal	221
FE-1A (2:1)	gal	3
MC B-8642	gal	73
FDP-S1047-12	gal	443
GBW-30	lbs	55
CLA-Web	gal	135
SandWedge NT	gal	60
MC MX 2-2822	gal	79
CAT-3 (2:1)	gal	35
MO-67(2:1)	gal	205
SP Breaker	lbs	50
WG-36	lbs	5,075
SAND - STANDARD - 10/40	lbs	605,642
SAND - PREMIUM - 20/40	lbs	373,563

ATTACHMENT A

WEST KERN WATER DISTRICT CONSUMER CONFIDENCE REPORT 2013

Este informe contiene informacion muy importante sobre su agua potable. Traduzcalo o hable con alguien que lo entienda bien. (This report contains important information about your drinking water. Translate it, or speak with someone who understands it.)

TESTING FOR PRIMARY STANDARDS	UNITS	CA State Standards MCL	PHG	MCLG	Range of Reporting	WKWD Average*	Typical Source of Contaminant
CLARITY							
Turbidity	NTU	1-5 Units	N/A		0 to 1.2	0.5	Soil runoff
Odor -Threshold		3	N/A		0	0	Naturally-occurring organic material
Color	units	15	N/A		0 to 1.2	0.5	Naturally-occurring organic material
MICROBIOLOGICAL							
Coliform Bacteria	% tests	5%	N/A	0%	N/A	0.0%	Naturally present in the environment
Disinfection	Chlorine Gas/Sodium Hypochlorite						0.30mg/L
DISINFECTANT BY-PRODUCTS							
Total Trihalomethanes	ug/l	80	N/A		N/A	10	By-product of drinking water chlorination
Haloacetic acids	ug/L	60	N/A		N/A	2.8	By-product of drinking water chlorination
Disinfectant Residual	mg/l	4	N/A		0.13 to 0.24	0.17	By-product of drinking water chlorination
INORGANIC CHEMICALS							
Conductivity	umhos	1,600			338 to 588	541.2	Substance that forms iron in water
Chloride	mg/l	500			28 to 95	49.6	Runoff/leaching from natural deposits
Sulfate	mg/l	500			27 to 240	90	Runoff/leaching from natural deposits
Total Dissolved Solids	mg/l	1,000			218 to 560	355	Runoff/leaching from natural deposits
INORGANIC CHEMICALS							
Arsenic	ug/l	10	N/A	N/A	2 to 10	2.10	Erosion of natural deposits
Chromium	mg/l	4			ND to 3	0.3	Erosion of natural deposits
Barium	ug/l	1000			ND to 67	31.0	Erosion of natural deposits
Nitrate (as NO3)	mg/l	45	45		0 to 30	9.2	Runoff and erosion of natural deposits
Fluoride	mg/l	2.0	1		0.04 to 0.3	0.1	Erosion of natural deposits; water additive which promotes strong teeth
Bicarbonate	mg/l	NA			21 to 122	94.5	
ADDITIONAL CONSTITUENTS							
pH	units	NS			7.95 to 8.84	8	
Potassium	mg/l	NS			0 to 0.8	0.5	
Alkalinity	mg/l	NS			26 to 106	78.2	
Hardness	mg/l	200			46.5 to 130	107.2	
Sodium	mg/l	350			40.6 to 110	70.3	
Calcium	mg/l	NS			13.8 to 81	41.3	
Magnesium	mg/l	NS			0.22 to 1.98	1.1	
RADIOLOGICAL							
Gross Alpha	pCi/l	15			0 to 28.4	11.2	Erosion of natural deposits
Uranium	pCi/l	20			0.26 to 19.4	9.1	Erosion of natural deposits

Gross Alpha represents the total of alpha emitters and does not necessarily indicate an MCL violation should the RANGE or AVERAGE be greater than 15. Compliance with the MCL is based on a RAA (running annual average of 4 quarter per source) and the WKWD wells are currently in compliance.

*The average of all data from the system well samples taken in 2013.

ND = Non Detection

NS = No Standard

MCL = The Maximum Contaminant Level (MCL) represents the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the PHGs and MCLGs as is economically and technologically feasible.

DLR = Detection Limit for Reporting purposes; set by the Department of Public Health (DPH)

MCLG = The Maximum Contaminant Level Goal (MCLG) represents the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

mg/l = Milligrams Per Liter (parts per million)

ug/l = Micrograms Per Liter (parts per billion)

pCi/l = Pico Curies Per Liter

pH = Optimal Range for Neutrality is 6.6 - 8.5

umhos = micromhos per centimeter

HARDNESS = The CA Standard of 200 MCL is considered to be medium-hard; 50-100 mg/l is very soft

PRIMARY DRINKING WATER STANDARD: MCLs, specific treatment techniques adopted in lieu of primary MCLs, and monitoring and reporting requirements for MCLs that are specific in regulation.

SOURCE OF SUPPLY: West Kern Water District obtains its water supply from thirteen groundwater wells located within the Kern River hydrologic basin on the western edge of the Kern River Alluvial Fan.

ANALYTICAL MONITORING TIME FRAME: The California Department of Health Services allows West Kern Water District to monitor for some contaminants once per year or less. The concentrations of these contaminants do not change frequently. Some of the District's data, though representative, is more than one year old. Results indicate data from 2012 and 2013.

CONTACT PERSONNEL: Regarding further information or explanation of this report, please call West Kern Water District at (661) 763-3151 and the District's contact person Gary Hamilton.

Address:

Customer: Breit Burn
Attention: Dennis Weese

Lease: Dow Chanslor
Formation:
Salesman: Don Maxwell

CC:

Target Name: Dow Chanslor Main H2O Plant OUT

Sample Point: Dow Chanslor Main H2O Plant OUT

Sample Date: 02/12/2013

Test Date: 03/04/2013

Water Analysis(mg/L)

Calcium	188.4
Magnesium	193.5
Barium	8.448
Strontium	17.7
Sodium(calc.)	11750
Bicarbonate Alkalinity	3.17
Sulfate	44
Chloride	19000
Resistivity	0.2051

Appended Data(mg/L)

CO2	334
H2S	
Iron	2.738
Oxygen	
Manganese	.086

Physical Properties

Ionic Strength(calc.)	0.55
pH(calc.)	3.70
Temperature(°F)	81
Pressure(psia)	580
Density	8.51

Additional Data

Specific Gravity	1.02
Total Dissolved Solids(Mg/L)	31208
Total Hardness(CaCO3 Eq Mg/)	1264

Dew Point	
Lead	
Zinc	

Calcite Calculation Information

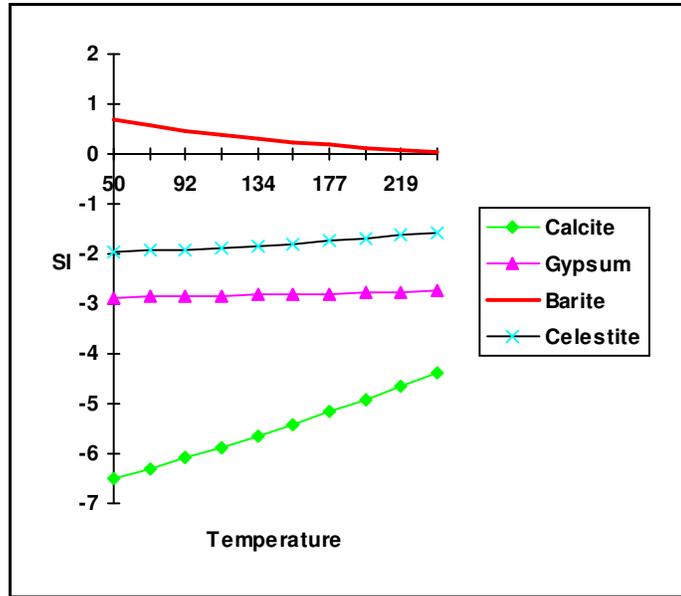
Calculation Method	Value
CO2 in Brine(mg/L)	334

Remarks: H2S(brine) <5, pH-7

SI & PTB Results

Scale Type	SI	PTB
Calcite (Calcium Carbonate)	-6.21	
Gypsum (Calcium Sulfate)	-2.86	
Hemihydrate (Calcium Sulfate)	-2.78	
Anhydrite (Calcium Sulfate)	-3.13	
Barite (Barium Sulfate)	0.53	3.40
Celestite (Strontium Sulfate)	-1.93	

Saturation Indices



Saturation Index Data Points

	50	71	92	113	134	156	177	198	219	240
Calcite	-6.51	-6.30	-6.09	-5.87	-5.64	-5.41	-5.16	-4.91	-4.65	-4.39
Gypsum	-2.87	-2.86	-2.85	-2.84	-2.82	-2.81	-2.79	-2.78	-2.76	-2.74
Barite	0.69	0.58	0.48	0.39	0.31	0.24	0.18	0.13	0.09	0.05
Celestite	-1.96	-1.94	-1.91	-1.87	-1.84	-1.79	-1.74	-1.69	-1.63	-1.57

Lab Tech.:

Address:

Customer: Breit Burn
Attention: Dennis Weese

Lease: Dow Chanslor
Formation:
Salesman: Don Maxwell

CC:

Target Name: Dow Chanslor Bel Waste H2O OUT

Sample Point: Dow Chanslor Bel Waste H2O OUT

Sample Date: 02/12/2013

Test Date: 03/04/2013

Water Analysis(mg/L)

Calcium	192.4
Magnesium	187.2
Barium	8.02
Strontium	17.21
Sodium(calc.)	10460
Bicarbonate Alkalinity	3.29
Sulfate	42
Chloride	17000
Resistivity	0.2293

Appended Data(mg/L)

CO2	352
H2S	
Iron	2.855
Oxygen	
Manganese	.092

Physical Properties

Ionic Strength(calc.)	0.49
pH(calc.)	3.72
Temperature(°F)	80
Pressure(psia)	120
Density	8.49

Additional Data

Specific Gravity	1.02
Total Dissolved Solids(Mg/L)	27913
Total Hardness(CaCO3 Eq Mg/	1248

Dew Point	
Lead	
Zinc	

Calcite Calculation Information

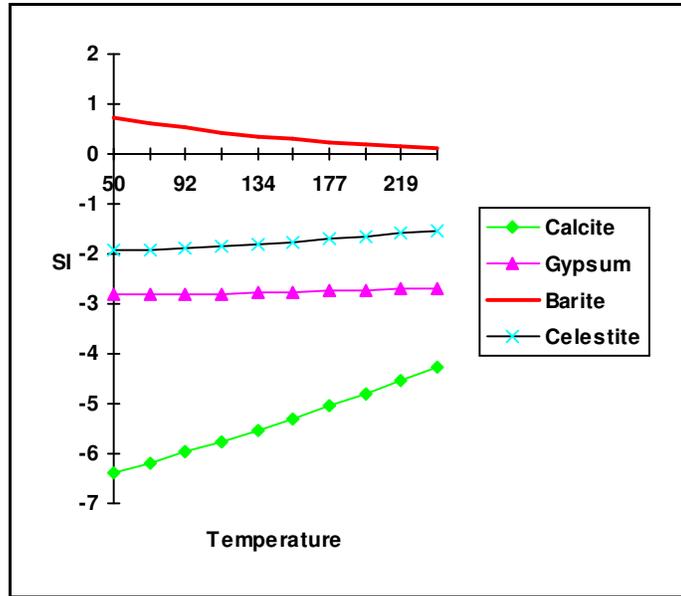
Calculation Method	Value
CO2 in Brine(mg/L)	352

Remarks: H2S(brine) <5, pH-7

SI & PTB Results

Scale Type	SI	PTB
Calcite (Calcium Carbonate)	-6.11	
Gypsum (Calcium Sulfate)	-2.81	
Hemihydrate (Calcium Sulfate)	-2.71	
Anhydrite (Calcium Sulfate)	-3.10	
Barite (Barium Sulfate)	0.58	3.40
Celestite (Strontium Sulfate)	-1.89	

Saturation Indices



Saturation Index Data Points

	50	71	92	113	134	156	177	198	219	240
Calcite	-6.40	-6.20	-5.98	-5.76	-5.53	-5.30	-5.05	-4.80	-4.55	-4.28
Gypsum	-2.82	-2.81	-2.80	-2.79	-2.77	-2.76	-2.74	-2.72	-2.70	-2.68
Barite	0.73	0.62	0.52	0.44	0.36	0.29	0.23	0.18	0.14	0.10
Celestite	-1.93	-1.91	-1.88	-1.84	-1.80	-1.75	-1.70	-1.65	-1.59	-1.52

Lab Tech.:

ATTACHMENT B

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SAND - BROWN**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SAND - BROWN
Synonyms: None
Chemical Family: Sand
Application: Proppant

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

Prepared By Chemical Compliance
 Telephone: 1-580-251-4335
 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview **CAUTION! - ACUTE HEALTH HAZARD**
 May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
 Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

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

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water.

Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media None - does not burn.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	94
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

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

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

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

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SAND - PREMIUM WHITE**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SAND - PREMIUM WHITE
Synonyms: None
Chemical Family: Sand
Application: Proppant

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

Prepared By Chemical Compliance
 Telephone: 1-580-251-4335
 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS
--

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview **CAUTION! - ACUTE HEALTH HAZARD**
 May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
 Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

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

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin	Wash with soap and water.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media None - does not burn.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.63 - 2.67
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	65

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
------------------------------------	----------------------------------

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

Genotoxicity: Not determined
Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined
Persistence/Degradability Not applicable
Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined
Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

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

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SandWedge® NT**

Revision Date: 20-Dec-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SandWedge® NT
Synonyms: None
Chemical Family: Blend
Application: Flow Enhancer
Manufacturer/Supplier: Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Dipropylene glycol monomethyl ether	34590-94-8	30 - 60%	100 ppm (S)	100 ppm (S)
Heavy aromatic petroleum naphtha	64742-94-5	5 - 10%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May be absorbed through the skin. Repeated overexposure may cause liver and kidney effects. Combustible.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	143
Flash Point/Range (C):	62
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 2, Reactivity 0
HMS Ratings: Health 2, Flammability 2, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Wear self-contained breathing apparatus in enclosed areas.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark brown
Odor:	Bland
pH:	7.4-8.8
Specific Gravity @ 20 C (Water=1):	0.963
Density @ 20 C (lbs./gallon):	8.02
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation. May be absorbed through the skin and produce effects similar to those caused by inhalation and/or ingestion.
Eye Contact	Causes severe eye irritation which may damage tissue.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	None known.

Chronic Effects/Carcinogenicity Repeated overexposure may cause liver and kidney effects.

Other Information None known.

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
NA1993, Combustible Liquid, N.O.S., Combustible Liquid, III
(Contains Heavy Aromatic Naphtha, Dipropylene Glycol Ether)

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: Combustible

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372:
Naphthalene//91-20-3
Glycol Ethers//34590-94-8

EPA CERCLA/Superfund Reportable Spill Quantity EPA Reportable Spill Quantity is 168 Gallons based on Naphthalene (CAS: 91-20-3).

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory Product contains one or more components not listed on the inventory.

WHMIS Hazard Class B3 Combustible Liquids
D2B Toxic Materials

16. OTHER INFORMATION

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

Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SP BREAKER**

Revision Date: 10-Mar-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SP BREAKER
Synonyms: None
Chemical Family: Oxidant
Application: Breaker

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium persulfate	7775-27-1	60 - 100%	0.1 mg/m ³	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause allergic skin and respiratory reaction. May cause eye irritation Oxidizer.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

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

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

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Oxidizer. May ignite combustibles. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 1
HMS Ratings: Health 1, Flammability 0, Physical Hazard 1 , PPE: F

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid dust accumulations.

Storage Information Store away from combustibles. Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Localized ventilation should be used to control dust levels.

Respiratory Protection Dust/mist respirator. (N95, P2/P3)

Hand Protection Butyl rubber gloves.

Skin Protection Rubber apron.

Eye Protection Dust proof goggles.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White
Odor:	Odorless
pH:	6
Specific Gravity @ 20 C (Water=1):	2.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	84.3
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	35
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	238.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Avoid contact with readily oxidizable materials.
Incompatibility (Materials to Avoid)	Avoid halogens. Contact with acids. Strong alkalis. Combustible materials.
Hazardous Decomposition Products	Oxides of sulfur. Oxygen. Sulfuric acid.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Symptoms related to exposure	
Acute Toxicity	
Inhalation	May cause allergic respiratory reaction.
Eye Contact	May cause eye irritation
Skin Contact	May cause an allergic skin reaction.
Ingestion	Irritation of the mouth, throat, and stomach.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
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Sodium persulfate	7775-27-1	895 mg/kg (Rat) 1200 mg/kg 930 mg/kg 1000 mg/kg 920 mg/kg	> 10000 mg/kg (Rat)	19.0 mg/L (Rat) 4h
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12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Sodium persulfate	7775-27-1	EC50(72h): 116 mg/L (biomass) (Pseudokirchnerella subcapitata)	LC50(96h): 163 mg/L (Oncorhynchus mykiss)	EC10(18h): 36 mg/L (Pseudomonas putida)	EC50(48h): 133 mg/L (mobility) (Daphnia magna)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations. Bury in a licensed landfill according to federal, state, and local regulations. Substance should NOT be deposited into a sewage facility.

Contaminated Packaging

This bag may contain residue of a hazardous material. Some authorities may regulate such containers as hazardous waste. Dispose of container according to national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1505, Sodium Persulfate , 5.1 , III
NAERG 140

Canadian TDG

Sodium Persulfate , 5.1 , UN1505 , III

ADR

UN1505, Sodium Persulfate , 5.1 , III

Air Transportation**ICAO/IATA**

UN1505, Sodium Persulfate , 5.1 , III

Sea Transportation**IMDG**UN1505, Sodium Persulfate , 5.1 , III
EmS F-A, S-Q**Other Transportation Information**

Labels: Oxidizer

15. REGULATORY INFORMATION**US Regulations**

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BC-140**

Revision Date: 20-Dec-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BC-140
Synonyms: None
Chemical Family: Blend
Application: Crosslinker

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Monoethanolamine borate	26038-87-9	30 - 60%	Not applicable	Not applicable
Ethylene glycol	107-21-1	10 - 30%	100 mg/m ³	50 ppm CEIL

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May cause birth defects. Repeated overexposure may cause liver and kidney effects.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Health 2, Flammability 0, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark green
Odor:	Mild

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	7.28
Specific Gravity @ 20 C (Water=1):	1.17 - 1.2
Density @ 20 C (lbs./gallon):	9.75 - 10.0
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers. Dehydrating agents.
Hazardous Decomposition Products	Toxic fumes. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea. May cause heart, kidney and brain disorders.
Aggravated Medical Conditions	Skin disorders. Eye ailments. Liver and kidney disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause kidney damage. Prolonged or repeated exposure may cause liver, heart, blood and brain damage. Prolonged or repeated exposure may cause reproductive system damage. Prolonged or repeated exposure may cause embryo and fetus toxicity.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Chronic Health Hazard

EPA SARA (313) Chemicals This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372:
Ethylene Glycol//107-21-1

EPA CERCLA/Superfund Reportable Spill Quantity EPA Reportable Spill Quantity is 1674 Gallons based on Ethylene glycol (CAS: 107-21-1).

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

WHMIS Hazard Class D1A Very Toxic Materials
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BC-140**

Revision Date: 20-Dec-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BC-140
Synonyms: None
Chemical Family: Blend
Application: Crosslinker

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Monoethanolamine borate	26038-87-9	30 - 60%	Not applicable	Not applicable
Ethylene glycol	107-21-1	10 - 30%	100 mg/m ³	50 ppm CEIL

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May cause birth defects. Repeated overexposure may cause liver and kidney effects.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Health 2, Flammability 0, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark green
Odor:	Mild

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	7.28
Specific Gravity @ 20 C (Water=1):	1.17 - 1.2
Density @ 20 C (lbs./gallon):	9.75 - 10.0
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers. Dehydrating agents.
Hazardous Decomposition Products	Toxic fumes. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea. May cause heart, kidney and brain disorders.
Aggravated Medical Conditions	Skin disorders. Eye ailments. Liver and kidney disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause kidney damage. Prolonged or repeated exposure may cause liver, heart, blood and brain damage. Prolonged or repeated exposure may cause reproductive system damage. Prolonged or repeated exposure may cause embryo and fetus toxicity.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Chronic Health Hazard

EPA SARA (313) Chemicals This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372:
Ethylene Glycol//107-21-1

EPA CERCLA/Superfund Reportable Spill Quantity EPA Reportable Spill Quantity is 1674 Gallons based on Ethylene glycol (CAS: 107-21-1).

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

WHMIS Hazard Class D1A Very Toxic Materials
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CAT-3 ACTIVATOR**

Revision Date: 17-Mar-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CAT-3 ACTIVATOR
Synonyms: None
Chemical Family: Blend
Application: Activator

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

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
EDTA/Copper chelate	Proprietary	10 - 30%	1 mg/m ³	1 mg/M3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

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

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

Ingestion If swallowed, induce vomiting immediately by giving two glasses of water and sticking fingers down throat; never give anything to an unconscious person. Get medical attention.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined Min: > 185
Flash Point/Range (C):	> 85 Min: > 85
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Ammonia respirator with a dust/mist filter.

Hand Protection Impervious rubber gloves.

Skin Protection Normal work coveralls.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
Color: Clear blue
Odor: Ammonia

pH:	8.5-9.5
Specific Gravity @ 20 C (Water=1):	1.06
Density @ 20 C (lbs./gallon):	8.83
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	20
Freezing Point/Range (C):	- 6.7
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Ammonia. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Symptoms related to exposure	
Acute Toxicity	
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Eye Contact	May cause eye irritation
Skin Contact	May cause skin irritation.
Ingestion	May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
EDTA/Copper chelate	Proprietary	No data available	No data available	No data available

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
EDTA/Copper chelate	Proprietary	No information available	No information available	No information available	No information available

12.2 Persistence and degradability

Not readily biodegradable

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR

Not restricted

Air Transportation

ICAO/IATA

Not restricted

Sea Transportation

IMDG

Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION**US Regulations**

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION**The following sections have been revised since the last issue of this SDS**

Not applicable

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

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **Cla-Web™**

Revision Date: 26-Jul-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: Cla-Web™
Synonyms: None
Chemical Family: Blend
Application: Additive

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Hydroxyalkyl alkylammonium chloride	Proprietary	30 - 60%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory irritation. Potential carcinogen.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention.

Eyes Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200
Flash Point/Range (C):	> 93
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media. Use water spray to cool fire exposed surfaces.

Special Exposure Hazards Closed containers may explode in fire.

Special Protective Equipment for Fire-Fighters Not applicable.

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMS Ratings: Health 2, Flammability 1, Physical Hazard 0 , PPE: X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Avoid breathing mist. Wash hands after use.

Storage Information Store in a cool well ventilated area. Keep container closed when not in use. Store locked up. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Hand Protection Impervious rubber gloves.

Skin Protection Wear impervious protective clothing, including boots, gloves, lab coat, apron, rain jacket, pants or coverall, as appropriate, to prevent skin contact.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Slight Amine
pH:	4-9 (1-10%)
Specific Gravity @ 20 C (Water=1):	1.0841-1.1142
Density @ 20 C (lbs./gallon):	9.16
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	-40
Freezing Point/Range (C):	-40
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	1-20
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Metal oxides.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Symptoms related to exposure

Acute Toxicity

Product Information	Under certain conditions of use, some of the product ingredients may cause the following:
Inhalation	May cause mild respiratory irritation.
Eye Contact	May cause mild eye irritation.
Skin Contact	May cause mild skin irritation.
Ingestion	Irritation of the mouth, throat, and stomach.

Chronic Effects/Carcinogenicity This product contains a potential carcinogen.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Hydroxyalkyl alkylammonium chloride	Proprietary	LD50: 2170 mg/kg (Rat)	LD50: >2000 mg/kg	LC50: > 12.05 mg/L (Rat)

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Hydroxyalkyl alkylammonium chloride	Proprietary	EC50: > 10000 mg/L (Scenedesmus subspicatus)	LC50: 4128 mg/L (Brachydanio rerio)	No information available	Ec50: 164 mg/L (Daphnia magna) NOEC: 0.51 mg/L (Daphnia magna)

12.2 Persistence and degradability

No information available

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging

Follow all applicable national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 2185 Gallons based on Trimethylamine (CAS: 75-50-3).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on the inventory.
WHMIS Hazard Class	D2A Very Toxic Materials D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FDP-S1047-12**

Revision Date: 27-Apr-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name:	FDP-S1047-12
Synonyms:	None
Chemical Family:	Alcohol Surfactant Blend
Application:	Wetting Agent
Manufacturer/Supplier	Halliburton Energy Services, Inc. P.O. Box 1431 Duncan, Oklahoma 73536-0431 Emergency Telephone: (281) 575-5000
Prepared By	Chemical Compliance Telephone: 1-580-251-4335 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS
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Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Methanol	67-56-1	60 - 100%	200 ppm (S)	200 ppm
Sulfonate		5 - 10%	Not applicable	Not applicable
Sulfonate		5 - 10%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview	May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May cause blindness. May be absorbed through the skin. Repeated overexposure may cause liver and kidney effects. Flammable.
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4. FIRST AID MEASURES

Inhalation	If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.
Skin	In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.
Eyes	In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician	The administration of ethanol after ingestion of this compound acts to counter the adverse effects of this material on the liver.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	62
Flash Point/Range (C):	16.7
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam.

Special Exposure Hazards May be ignited by heat, sparks or flames. Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases. Runoff to sewer may cause fire or explosion hazard.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 3, Reactivity 0
HMS Ratings: Health 2, Flammability 3, Physical Hazard 0 , PPE: X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Wear self-contained breathing apparatus in enclosed areas.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Remove ignition sources and work with non-sparking tools. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Wash hands after use. Launder contaminated clothing before reuse. Ground and bond containers when transferring from one container to another. Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Avoid breathing mist.

Storage Information Store away from oxidizers. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Positive pressure self-contained breathing apparatus if methanol is released.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Colorless to amber or brown
Odor:	Alcohol
pH:	5.87 - 7.17
Specific Gravity @ 20 C (Water=1):	0.8661 - 0.8921
Density @ 20 C (lbs./gallon):	7.22 - 7.44
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	0
Freezing Point/Range (C):	-17.8
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong alkalis.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Oxides of sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation. May be absorbed through the skin and contribute to the symptoms listed under ingestion. May cause skin defatting with prolonged exposure.
Eye Contact	May cause severe eye irritation.

Ingestion	May be fatal or cause blindness if swallowed. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Skin disorders. Eye ailments.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause eye, blood, lung, liver, kidney, heart, central nervous system and spleen damage.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Possible risk of impaired fertility. Possible risk of harm to the unborn child.

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1993, Flammable Liquid, N.O.S. (Contains Methanol), 3, II, (16.7 C)
NAERG 128

Canadian TDG

Flammable Liquid, N.O.S.(Contains Methanol), 3, UN1993, II, (16.7 C)

ADR

UN1993,Flammable Liquid, N.O.S.(Contains Methanol), 3, II

Air Transportation

ICAO/IATA

UN1993,Flammable Liquid, N.O.S., 3, II
(Contains Methanol)

Sea Transportation

IMDG

UN1993,Flammable Liquid, N.O.S.(Contains Methanol), 3, II, (16.7 C)
EmS F-E, S-E

Other Transportation Information

Labels: Flammable Liquid

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Methanol//67-56-1
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 1088 Gallons based on Methanol (CAS: 67-56-1).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D1B Toxic Materials D2A Very Toxic Materials D2B Toxic Materials B2 Flammable Liquids

16. OTHER INFORMATION

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

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: FE-1A ACIDIZING COMPOSITION

Revision Date: 10-Dec-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FE-1A ACIDIZING COMPOSITION
Synonyms: None
Chemical Family: Organic acid Anhydride
Application: Additive

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Acetic anhydride	108-24-7	60 - 100%	TWA: 5 ppm	5 ppm
Acetic acid	64-19-7	30 - 60%	TWA: 10 ppm STEL: 15 ppm	10 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory burns. May be harmful if swallowed. Combustible. Reacts violently with water.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse. Destroy or properly dispose of contaminated shoes.

Eyes: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	103
Flash Point/Range (C):	39
Flash Point Method:	PMCC
Autoignition Temperature (F):	630
Autoignition Temperature (C):	332
Flammability Limits in Air - Lower (%):	3
Flammability Limits in Air - Upper (%):	19

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam. Water must not be used with open containers.

Special Exposure Hazards May be ignited by heat, sparks or flames. Closed containers may explode in fire. Decomposition in fire may produce toxic gases. Reaction with water may be highly exothermic.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 2, Reactivity 2
HMIS Ratings: Health 3, Flammability 2, Physical Hazard 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from alkalis. Store away from oxidizers. Store away from water. Keep from heat, sparks, and open flames. Keep container closed when not in use. Store in a cool well ventilated area. Store locked up. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor/acid gas respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber boots. Full protective chemical resistant clothing.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions

Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Pungent acrid
pH:	< 2
Specific Gravity @ 20 C (Water=1):	1.0753
Density @ 20 C (lbs./gallon):	8.962
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	259
Boiling Point/Range (C):	126
Freezing Point/Range (F):	15
Freezing Point/Range (C):	-9
Vapor Pressure @ 20 C (mmHg):	11.7
Vapor Density (Air=1):	3.5
Percent Volatiles:	100
Evaporation Rate (Butyl Acetate=1):	0.97
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame. Do not allow water to get into container because of violent reaction.
Incompatibility (Materials to Avoid)	Strong alkalis. Strong oxidizers. Reacts with water.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Symptoms related to exposure	
Acute Toxicity	
Inhalation	Causes severe respiratory irritation.
Eye Contact	Causes severe eye burns.
Skin Contact	Causes severe burns.
Ingestion	Causes burns of the mouth, throat and stomach.
Chronic Effects/Carcinogenicity	Prolonged, excessive exposure may cause erosion of the teeth.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Acetic anhydride	108-24-7	630 mg/kg (Rat)	4000 mg/kg (Rabbit)	4.2 mg/L (Rat) 4 h 1000 ppm (Rat) 4 h LC100: 1670 mg/m ³ (Rat) 6h
Acetic acid	64-19-7	3310 mg/kg (Rat) 600 mg/kg (Rabbit) 4960 mg/kg (Mouse)	1060 mg/kg (Rabbit)	11.4 mg/L (Rat) 4 h

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Acetic anhydride	108-24-7	EC50(72h): > 1000 mg/L (>300.82 mg/L acetate ion) (growth rate) (Skeletonema costatum) (similar substance)	LC50: 265 mg/L (Leuciscus idus) LC50(96h): > 1000 mg/L (>300.82 mg/L acetate ion) (Oncorhynchus mykiss) (similar substance)	NOEC(16h): 1150 mg/L (Pseudomonas putida) (similar substance)	EC50(48h): 55 mg/L (Daphnia magna) EC50(48h): > 1000 mg/L (>300.82 mg/L acetate ion) (Daphnia magna) (similar substance) NOEC(21d): 31.4 - 37.9 mg/L (Daphnia magna) (reproduction) (similar substance – acetic acid)
Acetic acid	64-19-7	EC50: 90 mg/L (Microcystis aeruginosa) EC50(72h): > 1000 mg/L (>300.82 mg/L – acetate ion) (Skeletonema costatum)	LC50: 79 mg/l (Pimephales promelas) LC50: 75 mg/l (Pimephales promelas) LC50(96h) > 1000 mg/L (>300.82 mg/L – acetate ion) (Oncorhynchus mykiss)	NOEC(16h): 1150 mg/L (Pseudomonas putida)	EC50: 47 mg/l (Daphnia magna) LC50: 32 mg/L (Artemia salina) EC50(48h) > 1000 mg/L (>300.82 mg/L – acetate ion) (Daphnia magna) NOEC(21d): 31.4 - 37.9 mg/L (Daphnia magna) (reproduction)

12.2 Persistence and degradability

Readily biodegradable

Substances	Persistence and Degradability
Acetic anhydride	Readily biodegradable (99% @ 28d)
Acetic acid	Readily biodegradable (>95% @ 28d)

12.3 Bioaccumulative potential

Does not bioaccumulate

Substances	Log Pow
Acetic anhydride	-0.58 BCF 3.16 (Calculated)
Acetic acid	-0.17 BCF 3.16 (Calculated)

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

This mixture contains no substance considered to be persistent, bioaccumulating nor toxic (PBT).

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations. Incineration recommended in approved incinerator according to federal, state, and local regulations. Substance should NOT be deposited into a sewage facility.
Contaminated Packaging	Follow all applicable national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN2920, Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8 , (3) , II , (39.4 C)
NAERG 132

Canadian TDG

Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8 , (3) , UN2920 , II , (39.4 C)

ADR

UN2920, Corrosive Liquid, Flammable, N.O.S (Contains Acetic Anhydride, Acetic Acid) , 8 , (3) , II

Air Transportation

ICAO/IATA

UN2920, Corrosive Liquid, Flammable, N.O.S , 8 , (3) , II (Contains Acetic Anhydride, Acetic Acid)

Sea Transportation

IMDG

UN2920, Corrosive Liquid, Flammable, N.O.S (Contains Acetic Anhydride, Acetic Acid) , 8 , (3) , II , (39.4 C)
EmS F-E, S-C

Other Transportation Information

Labels: Corrosive
Flammable Liquid

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 1409 Gallons based on Acetic acid (CAS: 64-19-7).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001 Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.
Canadian Regulations	
Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	B3 Combustible Liquids E Corrosive Material

16. OTHER INFORMATION

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

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

MATERIAL SAFETY DATA SHEET

Product Trade Name: **GBW-30 BREAKER**

Revision Date: 24-Apr-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: GBW-30 BREAKER
Synonyms: None
Chemical Family: Polysaccharide
Application: Breaker

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hemicellulase enzyme	9012-54-8	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation. May cause allergic respiratory reaction. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

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

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

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Min: > 200
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.125
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMS Ratings: Health 1, Flammability 1, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White
Odor:	Odorless
pH:	7
Specific Gravity @ 20 C (Water=1):	1.5
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	42
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
<u>Symptoms related to exposure</u>	
Inhalation	May cause mild respiratory irritation. May cause allergic respiratory reaction.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.

Other Information None known.

Toxicity Tests

Oral Toxicity: LD50: 29700 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: TLM96: > 3300 ppm (Crangon crangon)

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

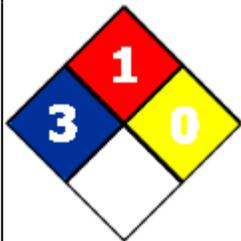
For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

Material Safety Data Sheet

NFPA	HMIS
	

Issuing Date 29-Nov-2004 Revision Date 20-Jul-2011 Revision Number 5

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **MC B-8642**

Product Code MC B-8642

UN-No 2922

Recommended Use Biocidal product.

Manufactured by: Multi-Chem Group LLC
 2905 Southwest Blvd
 San Angelo, TX 76904
 Phone: 1 325 223 6200

Emergency Telephone Number 1 800 535 5053
 +1 352 323 3500 (Outside United States)

2. HAZARDS IDENTIFICATION

Emergency Overview			
Corrosive			
The product causes burns of eyes, skin and mucous membranes			
Harmful by inhalation, in contact with skin and if swallowed			
May cause sensitization by skin contact			
Harmful: may cause lung damage if swallowed			
Appearance	Clear to Slightly Hazy, Light Amber to Dark Amber	Physical State	Liquid
		Odor	Fruity

Potential Health Effects
Principle Routes of Exposure Eye contact, Skin contact, Inhalation, Ingestion.

Acute Toxicity
Eyes Irritating to eyes. May cause burns. Corrosive to the eyes and may cause severe damage including blindness.

Skin	Irritating to skin. May cause burns. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.
Inhalation	Irritating to respiratory system. Exposure to mists may cause severe irritation or burns to the upper respiratory tract. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination. May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Ingestion	Harmful if swallowed. Can burn mouth, throat, and stomach. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Potential for aspiration if swallowed. May cause lung damage if swallowed.

Chronic Effects

Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitization of susceptible persons. Repeated skin contact may result in absorption of amounts which could cause death.

Aggravated Medical Conditions Skin disorders. Neurological disorders. Preexisting eye disorders. Respiratory disorders.

Environmental Hazard See Section 12 for additional Ecological Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula Mixture

Chemical Name	CAS-No	Weight %
Glutaraldehyde	111-30-8	30-60
Alkyl (C12-16) dimethylbenzylammonium chloride	68424-85-1	5-10
Ethanol	64-17-5	0.1-1

4. FIRST AID MEASURES

General Advice	Get medical attention immediately if symptoms occur.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek immediate medical attention/advice.
Skin Contact	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Seek immediate medical attention/advice.
Inhalation	Move to fresh air in case of accidental inhalation of vapors. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention immediately if symptoms occur.
Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth. Get medical attention.
Notes to Physician	Probable mucosal damage may contraindicate the use of gastric lavage. If burn is present, treat as any thermal burn, after decontamination. Glutaraldehyde may cause burns that require extended irrigation. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants and antitussives may be of help. Glutaraldehyde may transiently worsen reversible airways obstruction including asthma or reactive airways disease. Treat bronchospasm with inhaled beta-2 agonist and oral or parenteral corticosteroids. Inhalation of vapors may result in skin sensitization. In sensitized individuals, reexposure to very small amounts of vapor, mist, or liquid may cause a severe allergic skin reaction. If burn is present, treat as any thermal burn, after decontamination.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not flammable.
Flash Point	> 93.3 °C / > 200 °F

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Foam. Dry powder.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.
Hazardous Combustion Products	Carbon oxides
Explosion Data	
Sensitivity to Mechanical Impact	Not sensitive
Sensitivity to Static Discharge	Not sensitive

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

NFPA	Health Hazard 3	Flammability 1	Stability 0	Physical and Chemical Hazards -
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6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Use personal protective equipment. Avoid contact with the skin and the eyes. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Only trained and properly protected personnel must be involved in clean-up operations.
Methods for Containment	Dike far ahead of liquid spill for later disposal.
Methods for Cleaning Up	Small spills can be flushed with large quantities of water. Collect large spills for disposal. It may also be possible to decontaminate spilled material by careful application of aqueous sodium hydroxide or sodium bisulfite. Depending on conditions, considerable heat and fumes can be liberated by the decontamination reaction.
Other Information	Avoid discharge to environment as material may be harmful to the aquatic environment.

7. HANDLING AND STORAGE

Handling	Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Avoid breathing vapors or mists. Ensure adequate ventilation. Take precautionary measures against static discharges. Remove all sources of ignition.
Storage	Keep containers tightly closed in a cool, well-ventilated place. Do not store this product in contact with aluminum, mild steel, carbon steel, iron, copper, brass, or other copper alloys. Rapid corrosion of these metals may result from contact with this product.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Glutaraldehyde 111-30-8		(vacated) Ceiling: 0.2 ppm (vacated) Ceiling: 0.8 mg/m ³	Ceiling: 0.2 ppm Ceiling: 0.8 mg/m ³
Alkyl (C12-16) dimethylbenzylammonium chloride 68424-85-1			
Ethanol 64-17-5		TWA: 1000 ppm TWA: 1900 mg/m ³ (vacated) TWA: 1000 ppm (vacated) TWA: 1900 mg/m ³	IDLH: 3300 ppm TWA: 1000 ppm TWA: 1900 mg/m ³

Chemical Name	Alberta	British Columbia	Saskatchewan
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Glutaraldehyde 111-30-8	Ceiling: 0.05 ppm Ceiling: 0.2 mg/m ³	Ceiling: 0.05 ppm	Ceiling: 0.2 ppm Ceiling: 0.82 mg/m ³
Alkyl (C12-16) dimethylbenzylammonium chloride 68424-85-1			
Ethanol 64-17-5	TWA: 1000 ppm TWA: 1880 mg/m ³	TWA: 1000 ppm	TWA: 1000 ppm TWA: 1880 mg/m ³ STEL: 1250 ppm STEL: 2350 mg/m ³

Engineering Measures

Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment**Eye/Face Protection**

Safety glasses with side-shields. If splashes are likely to occur, wear: Goggles.
Face-shield.

Skin and Body Protection

Wear protective gloves/clothing.

Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations

Hygiene Measures

Remove and wash contaminated clothing before re-use. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear to Slightly Hazy Light Amber to Dark Amber	Odor	Fruity
Physical State	Liquid	pH	3.1-4.5
Flash Point	> 93.3 °C / > 200 °F	Autoignition Temperature	No data available
Boiling Point/Range	100.5 °C / 213 °F	Pour Point	-14 °C / 7 °F
Explosion Limits	No data available	Flammability Limits in Air	No data available
Specific Gravity	1.0828-1.1078	Solubility	Soluble in water
Evaporation Rate	No data available	Vapor Pressure	No data available
Vapor Density	0.8	Density	9.03-9.24 lbs/gal
Partition Coefficient (n-octanol/water)	-0.333	Viscosity	No data available

10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions
Incompatible Products	Strong acids. Strong bases. Strong oxidizing agents. Reactive metals. Ammonia. Amines.
Conditions to Avoid	Excessive heat.
Hazardous Decomposition Products	Carbon oxides.
Hazardous Polymerization	None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity**Product Information****Irritation**

Causes severe irritation and or burns.

LD50 Oral:	243-422 mg/kg (rat)
LD50 Dermal:	1460->2,200 mg/kg (rabbit)
LC50 Inhalation:	> 12.6 mg/L (rat) (vapor)

Component Information

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Glutaraldehyde	66 mg/kg (Rat)	560 µL/kg (Rabbit) 2000 mg/kg (Rat)	0.1 mg/L (Rat) 4 h
Alkyl (C12-16) dimethylbenzylammonium chloride	426 mg/kg (Rat)		
Ethanol	1501 mg/kg (Rat)		124.7 mg/L (Rat) 4 h

Chronic Toxicity**Chronic Toxicity**

Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitization of susceptible persons. Repeated skin contact may result in absorption of amounts which could cause death.

Carcinogenicity

Ethanol has been shown to be carcinogenic in long-term studies only when consumed as alcoholic beverage.

Chemical Name	ACGIH	IARC	NTP	OSHA
Ethanol		Group 1	Known	X

Sensitization

May cause sensitization by inhalation. May cause sensitization by skin contact.

Teratogenic Effects

Contains a known or suspected teratogen

Target Organ Effects

Respiratory system, Eyes, Skin, Central nervous system (CNS).

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated. This product is expected to be toxic to aquatic organisms.

Toxicity to Fish

LC50 (Oncorhynchus mykiss): 6.8 mg/L 96hr (static)

Daphnia Magna (Water Flea)

EC50: 0.71 mg/L (static)

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Glutaraldehyde	EC50 = 0.61 mg/L 72 h EC50 = 0.84 mg/L 96 h	LC50= 13 mg/L Lepomis macrochirus 96 h	EC50 = 13.3 mg/L 17 h EC50 = 76.0 mg/L 5 min	EC50 = 14 mg/L 48 h
Ethanol		LC50= 12900 mg/L Oncorhynchus mykiss 96 h LC50= 14.2 mg/L Pimephales promelas 96 h	EC50 = 34634 mg/L 30 min EC50 = 35470 mg/L 5 min	EC50 = 10800 mg/L 24 h EC50 = 9268 mg/L 48 h

Persistence and Degradability

Product is expected to be biodegradable.

Chemical Name	Log Pow
Glutaraldehyde	= 0.22 25 °C OECD Guideline 107
Ethanol	-0.32

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method

Should not be released into the environment. Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of in accordance with local regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste Status
Glutaraldehyde	Toxic
Ethanol	Toxic; Ignitable

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name Corrosive, Toxic, N.O.S. (Contains Glutaraldehyde, Alkyl dimethyl benzyl ammonium chloride)
Hazard Class 8
Subsidiary Class 6.1
UN-No 2922
Packing Group II

IATA

UN-No 2922
Proper Shipping Name Corrosive, Toxic, N.O.S. (Contains Glutaraldehyde, Alkyl dimethyl benzyl ammonium chloride)
Hazard Class 8
Subsidiary Class 6.1
Packing Group II

IMDG/IMO

Proper Shipping Name Corrosive, Toxic, N.O.S. (Contains Glutaraldehyde, Alkyl dimethyl benzyl ammonium chloride)
Hazard Class 8
Subsidiary Class 6.1
UN-No 2922
Packing Group II
Marine Pollutant Product is a marine pollutant according to the criteria set by IMDG/IMO

TDG

Not approved for transport in Canada

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Glutaraldehyde 111-30-8 (30-60)	Present	X	X	2-509	X	KE-27969	X	X
Alkyl (C12-16) dimethylbenzylammonium chloride 68424-85-1 (5-10)	Present	X	X	-	X	KE-29999	X	X
Ethanol 64-17-5 (0.1-1)	Present	X	X	2-202	X	KE-13217	X	X

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product contains the following HAPs: .

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Glutaraldehyde	111-30-8	30-60		Group IV		

CERCLA**U.S. State Regulations****California Proposition 65**

This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Ethanol	64-17-5	Developmental

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Glutaraldehyde	X	X	X		X
Ethanol	X	X	X		X

International Regulations

Mexico - Grade No information available.

Chemical Name	Carcinogen Status	Exposure Limits
Ethanol		Mexico: TWA= 1000 ppm Mexico: TWA= 1900 mg/m ³

Canada**WHMIS Hazard Class**

Not determined

16. OTHER INFORMATION

Prepared By	Amanda Burwell
Issuing Date	11/29/04
Revision Date	20-Jul-2011
Reason for Revision	(M)SDS sections updated. 1. 2. 9.

Disclaimer

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Inhalation	Inhalation of vapors in high concentration may cause irritation of respiratory system. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination.
Ingestion	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May cause additional affects as listed under "Inhalation". Ingestion of this product may cause blindness due to the presence of methanol.

Chronic Effects

Prolonged exposure may cause chronic effects

Aggravated Medical Conditions Skin disorders. Preexisting eye disorders. Respiratory disorders. Central nervous system.

Environmental Hazard See Section 12 for additional Ecological Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula Mixture

Chemical Name	CAS-No	Weight %
Methyl alcohol	67-56-1	10-30
Phosphonic Acid Salt	Proprietary	10-30
Acetic acid	64-19-7	1-5

4. FIRST AID MEASURES

General Advice	Get medical attention immediately if symptoms occur.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek immediate medical attention/advice.
Skin Contact	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Seek immediate medical attention/advice.
Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth. Get medical attention.
Notes to Physician	Gastric lavage or emesis should be performed as soon as possible to minimize absorption, and is recommended within 4 hours of ingestion. Ethanol may be given intravenously to prevent build up of toxic metabolites and increase hepatic elimination of methanol. Intravenous folic acid may also assist in reducing the toxic effects of methanol metabolites. Visual disturbances and metabolic acidosis may occur and dialysis, preferably hemodialysis may be employed to treat these complications.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Flammable.
Flash Point	32.8 °C / 91 °F
Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Foam. Dry powder.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.
Hazardous Combustion Products	Carbon oxides, Nitrogen oxides (NOx), Phosphine Gas.
Explosion Data	

Sensitivity to Mechanical Impact
Sensitivity to Static Discharge

Not sensitive
 May be ignited by heat, sparks or flames.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

NFPA **Health Hazard** 2 **Flammability** 3 **Stability** 0 **Physical and Chemical Hazards** -

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

Use personal protective equipment. Avoid contact with the skin and the eyes. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Methods for Containment

Dike far ahead of liquid spill for later disposal.

Methods for Cleaning Up

Soak up with inert absorbent material. Pick up and transfer to properly labeled containers. Ground and bond containers when transferring material. Use clean non-sparking tools to collect absorbed material.

7. HANDLING AND STORAGE

Handling

Wear personal protective equipment. Avoid contact with skin and eyes. Ensure adequate ventilation. Take precautionary measures against static discharges. Remove all sources of ignition.

Storage

Keep containers tightly closed in a cool, well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methyl alcohol 67-56-1	= 250 ppm STEL TWA: 200 ppm	TWA: 260 mg/m ³ TWA: 200 ppm	IDLH: 6000 ppm TWA: 260 mg/m ³ TWA: 200 ppm STEL: 325 mg/m ³ STEL: 250 ppm
Phosphonic Acid Salt			
Acetic acid 64-19-7	= 15 ppm STEL TWA: 10 ppm	TWA: 10 ppm TWA: 25 mg/m ³ (vacated) TWA: 10 ppm (vacated) TWA: 25 mg/m ³	IDLH: 50 ppm TWA: 25 mg/m ³ TWA: 10 ppm STEL: 15 ppm STEL: 37 mg/m ³

Chemical Name	Alberta	British Columbia	Saskatchewan
Methyl alcohol 67-56-1	STEL: 328 mg/m ³ STEL: 250 ppm TWA: 262 mg/m ³ TWA: 200 ppm	STEL: 250 ppm TWA: 200 ppm	TWA: 262 mg/m ³ TWA: 200 ppm STEL: 328 mg/m ³ STEL: 250 ppm
Phosphonic Acid Salt			
Acetic acid 64-19-7	STEL: 15 ppm STEL: 37 mg/m ³ TWA: 10 ppm TWA: 25 mg/m ³	STEL: 15 ppm TWA: 10 ppm	TWA: 25 mg/m ³ TWA: 10 ppm STEL: 15 ppm STEL: 37 mg/m ³

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection

Safety glasses with side-shields. If splashes are likely to occur, wear:. Goggles. Face-shield.

Skin and Body Protection

Wear protective gloves/clothing.

Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations

Hygiene Measures

Remove and wash contaminated clothing before re-use. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear to Slightly Hazy Light Amber to Dark Amber	Odor	Pungent
Physical State	Liquid	pH	5.14-6.14
Flash Point	32.8 °C / 91 °F	Autoignition Temperature	No data available
Boiling Point/Range	No data available	Pour Point	-40 °C / -40 °F
Explosion Limits	No data available	Flammability Limits in Air	No data available
Specific Gravity	1.0336 - 1.0586	Solubility	Soluble in water
Evaporation Rate	No data available	Vapor Pressure	No data available
Vapor Density	No data available	Density	8.62-8.83 lbs/gal

10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions
Incompatible Products	Strong oxidizing agents. Strong acids. Strong bases.
Conditions to Avoid	Excessive heat.
Hazardous Decomposition Products	Carbon oxides. Nitrogen oxides (NOx). Phosphine gas.
Hazardous Polymerization	None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Product Information The product itself has not been tested.

Irritation Irritating to eyes, respiratory system and skin.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methyl alcohol	5628 mg/kg (Rat)	15800 mg/kg (Rabbit)	64000 ppm (Rat) 4 h 83.2 mg/L (Rat) 4 h
Acetic acid	3310 mg/kg (Rat)	1060 mg/kg (Rabbit)	11.4 mg/L (Rat) 1 h

Chronic Toxicity

Chronic Toxicity Prolonged exposure may cause chronic effects.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Teratogenic Effects Possible risk of harm to the unborn child

Target Organ Effects Eyes, Skin, Respiratory system, Central nervous system (CNS).

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Methyl alcohol		LC50= 13200 mg/L Oncorhynchus mykiss 96 h LC50= 28100 mg/L Pimephales promelas 96 h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	
Acetic acid		LC50= 75 mg/L Lepomis macrochirus 96 h LC50= 88 mg/L Pimephales promelas 96 h	EC50 = 8.8 mg/L 15 min EC50 = 8.8 mg/L 25 min EC50 = 8.8 mg/L 5 min	EC50 = 95 mg/L 24 h

Chemical Name	Log Pow
Methyl alcohol	= -0.77
Acetic acid	= -0.31 20 °C

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of in accordance with local regulations

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste Status
Methyl alcohol	Toxic; Ignitable
Acetic acid	Toxic; Corrosive; Ignitable

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol and Acetic Acid)
Hazard Class 3
UN-No 1993
Packing Group III
ERG Code 128

IATA

UN-No 1993
Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol and Acetic Acid)
Hazard Class 3
Packing Group III

IMDG/IMO

Proper Shipping Name	Flammable Liquids, N.O.S. (Contains Methanol and Acetic Acid)
Hazard Class	3
UN-No	1993
Packing Group	III

TDG

Not approved for transport in Canada

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Methyl alcohol 67-56-1 (10-30)	Present	X	X	2-201	X	KE-23193	X	X
Phosphonic Acid Salt (10-30)	XU	-	-	-	-	-	-	-
Acetic acid 64-19-7 (1-5)	Present	X	X	2-688	X	KE-00013	X	X

U.S. Federal Regulations**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Methyl alcohol	67-56-1	10-30	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Acetic acid 64-19-7 (1-5)	5000 lb			X

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPS) (see 40 CFR 61)

This product contains the following substances which are listed hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act:

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl alcohol	67-56-1	10-30	Present	Group IV		
Acetic acid	64-19-7	1-5		Group II		

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Methyl alcohol	5000 lb	
Acetic acid	5000 lb	

U.S. State Regulations**California Proposition 65**

This product does not contain any Proposition 65 chemicals

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl alcohol	X	X	X	X	X
Acetic acid	X	X	X		X

International Regulations**Mexico - Grade** No information available.

Chemical Name	Carcinogen Status	Exposure Limits
Methyl alcohol		Mexico: TWA= 260 mg/m ³ Mexico: TWA= 200 ppm
Acetic acid		Mexico: TWA= 25 mg/m ³ Mexico: TWA= 10 ppm

Canada**WHMIS Hazard Class**

Not determined

Chemical Name	NPRI
Methyl alcohol	X

16. OTHER INFORMATION

Prepared By Amanda Burwell**Issuing Date** 11/21/2011**Revision Date** 21-Nov-2011**Reason for Revision** Not applicable.**Disclaimer**

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Product Name

MC MX 2-2822

NFPA		HMIS							
		<table border="1"> <tr> <td>HEALTH</td> <td>2</td> </tr> <tr> <td>FLAMMABILITY</td> <td>3</td> </tr> <tr> <td>REACTIVITY</td> <td>0</td> </tr> </table>		HEALTH	2	FLAMMABILITY	3	REACTIVITY	0
HEALTH	2								
FLAMMABILITY	3								
REACTIVITY	0								
Issuing Date	05-Dec-2011	Revision Date	05-Jun-2013						
		Revision Number	5						

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name MC MX 2-2822

UN-No 1993

Recommended Use Scale Inhibitor.

Manufactured by: Multi-Chem Group LLC
2905 Southwest Blvd
San Angelo, TX 76904
Phone: 1 325 223 6200

Emergency Telephone Number 1 800 535 5053
+1 352 323 3500 (Outside United States)
613 996 6666 or *666 on a cell phone (Inside Canada Only)

2. HAZARDS IDENTIFICATION

Emergency Overview			
Flammable Liquid			
Irritating to eyes, respiratory system and skin			
Harmful by inhalation, in contact with skin and if swallowed			
Appearance	Clear to Slightly Hazy, Light Amber to Dark Amber	Physical State:	Liquid
		Odor	Mild

Potential Health Effects

Principle Routes of Exposure Eye contact, Skin contact, Inhalation, Ingestion.

Acute toxicity

EYES Irritating to eyes.

Skin Irritating to skin. Prolonged skin contact may defat the skin and produce dermatitis. May be absorbed through the skin in harmful amounts.

Inhalation Inhalation of vapors in high concentration may cause irritation of respiratory system. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination.

Ingestion	Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May cause additional effects as listed under "Inhalation". Ingestion of this product may cause blindness due to the presence of methanol.
Chronic Effects	Prolonged exposure may cause chronic effects.
Aggravated Medical Conditions	Skin disorders. Preexisting eye disorders. Neurological disorders. Respiratory disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula Mixture

Chemical name	CAS No	Weight-%
Methyl alcohol	67-56-1	10-30
Phosphonate of a Diamine, Sodium Salt	8913	10-30

Claim for Exemption Filed May 15, 2013. Registry Number:8913.

4. FIRST AID MEASURES

General Advice	Get medical attention immediately if symptoms occur.
Eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek immediate medical attention/advice.
Skin contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Seek immediate medical attention/advice.
Ingestion	Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Rinse mouth. Following ingestion, onset of symptoms may be delayed by 12-24 hours. Admission to hospital should be the first priority even if symptoms are absent.
Note to physicians	Gastric lavage or emesis should be performed as soon as possible to minimize absorption, and is recommended within 4 hours of ingestion. Ethanol may be given intravenously to prevent build up of toxic metabolites and increase hepatic elimination of methanol. Intravenous folic acid may also assist in reducing the toxic effects of methanol metabolites. Visual disturbances and metabolic acidosis may occur and dialysis, preferably hemodialysis may be employed to treat these complications.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Flammable liquid.
Flash Point	28.0 °C / 82.4 °F
Suitable extinguishing media	Water spray. Foam. Dry powder. Carbon dioxide (CO ₂).
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.
Hazardous Combustion Products	Carbon oxides, Nitrogen oxides (NO _x), Phosphorus oxides.
Explosion Data	
Sensitivity to Mechanical Impact	Not sensitive.
Sensitivity to Static Discharge	May be ignited by heat, sparks or flames.

Specific Hazards Arising from the Chemical

Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA	Health Hazard 2	Flammability 3	stability 0	Physical and Chemical Hazards -
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6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Provide adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.
Methods for Containment	Dike far ahead of liquid spill for later disposal. Prevent further leakage or spillage if safe to do so.
Methods for Cleaning Up	Soak up with inert absorbent material. Pick up and transfer to properly labeled containers. Ground and bond containers when transferring material. Use clean non-sparking tools to collect absorbed material.

7. HANDLING AND STORAGE

Handling	Wear personal protective equipment. Avoid inhalation, contact with eyes, skin and clothing. Provide adequate ventilation. Take precautionary measures against static discharges. Remove all sources of ignition.
Storage	Keep containers tightly closed in a cool, well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methyl alcohol 67-56-1	= 250 ppm STEL TWA: 200 ppm	TWA: 260 mg/m ³ TWA: 200 ppm	IDLH: 6000 ppm TWA: 260 mg/m ³ TWA: 200 ppm STEL: 325 mg/m ³ STEL: 250 ppm
Chemical name	Alberta	British Columbia	Saskatchewan
Methyl alcohol 67-56-1	STEL: 328 mg/m ³ STEL: 250 ppm TWA: 262 mg/m ³ TWA: 200 ppm	STEL: 250 ppm TWA: 200 ppm	TWA: 262 mg/m ³ TWA: 200 ppm STEL: 328 mg/m ³ STEL: 250 ppm

Engineering controls Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

- Eye/Face Protection** Wear safety glasses with side shields (or goggles). If splashes are likely to occur: Goggles. Face-shield.
- Skin and Body Protection** Wear protective gloves/clothing.

Respiratory Protection

If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General hygiene considerations

Remove and wash contaminated clothing before re-use. Wash hands before breaks and immediately after handling the products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear to Slightly Hazy Light Amber to Dark Amber	Odor	Mild
Physical State:	Liquid		
PH	4.92-5.92		
Flash Point	28.0 °C / 82.4 °F	Autoignition Temperature	No data available
Boiling point / boiling range	No data available	Pour point	-40 °C / -40 °F
		Flammability Limits in Air	No data available
Explosion data	No data available		
Specific Gravity	1.0388-1.0638	Solubility in other solvents	Soluble in water
Evaporation Rate	No data available	Vapor pressure	No data available
Vapor Density	No data available	Density	8.66-8.87 lbs/gal

10. STABILITY AND REACTIVITY

stability	Stable under recommended storage conditions.
Incompatible Materials	Strong oxidizing agents. Strong acids. Strong bases.
Conditions to Avoid	Heat, flames and sparks.
Hazardous Decomposition Products	Carbon oxides. Nitrogen oxides (NOx). Phosphorous oxides.
Hazardous polymerization	None under normal processing.

11. TOXICOLOGICAL INFORMATION**Acute toxicity**

Product Information The product itself has not been tested.

Irritation Irritating to eyes, respiratory system and skin.

Component Information

Chemical name	Oral LD50	Dermal LD50	LC50 Inhalation
Methyl alcohol	5628 mg/kg (Rat)	15800 mg/kg (Rabbit)	64000 ppm (Rat) 4 h 83.2 mg/L (Rat) 4 h

Chronic (long-term) toxicity

Chronic (long-term) toxicity Prolonged exposure may cause chronic effects.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Teratogenic Effects Possible risk of harm to the unborn child

Target Organ Effects Eyes, Skin, Respiratory system, Central nervous system (CNS).

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Chemical name	Toxic to Algae	Toxic to Fish	Toxicity to Microorganisms	Toxicity to daphnia and other aquatic invertebrates
Methyl alcohol		LC50= 13200 mg/L Oncorhynchus mykiss 96 h LC50= 28100 mg/L Pimephales promelas 96 h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	
Chemical name		Log Pow		
Methyl alcohol		= -0.77		

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of in accordance with local regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical name	California Hazardous Waste Status
Methyl alcohol	Toxic; Ignitable

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol)
Hazard Class 3
UN-No 1993
Packing Group III
ERG Code 128

IATA

UN-No 1993
Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol)
Hazard Class 3
Packing Group III

IMDG/IMO

Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol)
Hazard Class 3
UN-No 1993
Packing Group III

TDG

Proper Shipping Name Flammable Liquids, N.O.S. (Contains Methanol)
Hazard Class 3
UN-No 1993
Packing Group III

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS

Methyl alcohol 67-56-1 (10-30)	Present	X	X	2-201	X	KE-23193	X	X
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U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical name	CAS No	Weight-%	SARA 313 - Threshold Values %
Methyl alcohol	67-56-1	10-30	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	yes
Chronic Health Hazard	no
Fire Hazard	yes
Sudden Release of Pressure Hazard	no
Reactive Hazard	no

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product contains the following substances which are listed hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act:

Chemical name	CAS No	Weight-%	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl alcohol	67-56-1	10-30	Present	Group IV		

CERCLA

Chemical name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Methyl alcohol	5000 lb	

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl alcohol	X	X	X	X	X

International Regulations

Mexico - Grade No information available

Chemical name	Carcinogen Status	Exposure Limits
Methyl alcohol		Mexico: TWA= 260 mg/m ³ Mexico: TWA= 200 ppm

Canada

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

WHMIS Hazard Class

- B2 Flammable liquid
- D2A Very toxic materials
- D2B Toxic materials



Chemical name	NPRI
Methyl alcohol	X

16. OTHER INFORMATION

Prepared By

Amanda Burwell

Issuing Date	12/05/2011
Revision Date	05-Jun-2013
Reason for Revision	(M)SDS sections updated. 3. 16.

Disclaimer

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

MATERIAL SAFETY DATA SHEET

Product Trade Name: **MO-67**

Revision Date: 17-Mar-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: MO-67
Synonyms: None
Chemical Family: Hydroxide
Application: Additive

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

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium hydroxide	1310-73-2	10 - 30%	2 mg/m ³	2 mg/M3

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory burns. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards May form explosive mixtures with strong acids.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 0, Reactivity 1
HMS Ratings: Health 3, Flammability 0, Reactivity 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from acids. Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Impervious rubber gloves. Neoprene gloves. Nitrile gloves. Polyvinyl alcohol gloves.

Skin Protection Full protective chemical resistant clothing.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Odorless
pH:	14
Specific Gravity @ 20 C (Water=1):	1.27
Density @ 20 C (lbs./gallon):	10.62
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	234
Boiling Point/Range (C):	112
Freezing Point/Range (F):	7
Freezing Point/Range (C):	-14
Vapor Pressure @ 20 C (mmHg):	110
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids. Amphoteric metals such as aluminum, magnesium, lead, tin, or zinc.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Symptoms related to exposure

Acute Toxicity

Inhalation	Causes severe respiratory irritation.
Eye Contact	Causes severe eye burns.
Skin Contact	Causes severe burns.
Ingestion	Causes burns of the mouth, throat and stomach.

Chronic Effects/Carcinogenicity Prolonged, excessive exposure may cause erosion of the teeth.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium hydroxide	1310-73-2	No data available	1350 mg/kg (Rabbit)	No data available

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Sodium hydroxide	1310-73-2	No information available	LC50: 45.4 mg/l (Oncorhynchus mykiss)	No information available	EC50(48 h): 40.4 mg/L (Ceriodaphnia sp.)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1824, Sodium Hydroxide Solution , 8 , II
NAERG 154

Canadian TDG

Sodium Hydroxide Solution , 8 , UN1824 , II

ADR

UN1824, Sodium Hydroxide Solution , 8 , II

Air Transportation

ICAO/IATA

UN1824, Sodium Hydroxide Solution , 8 , II

Sea Transportation

IMDG

UN1824, Sodium Hydroxide Solution , 8 , II
EmS F-A, S-B

Other Transportation Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Reactive Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Sodium Hydroxide//1310-73-2
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 376 Gallons based on Sodium hydroxide (CAS: 1310-73-2).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.
Canadian Regulations	
Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	E Corrosive Material

16. OTHER INFORMATION

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

Not applicable

Additional information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WG-36 GELLING AGENT**

Revision Date: 07-Oct-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WG-36 GELLING AGENT

Synonyms: None

Chemical Family: Polysaccharide

Application: Gelling Agent

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

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause mild eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

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

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

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined Min: > 200
Flash Point/Range (C):	Not Determined Min: > 93
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Off white
Odor:	Bean
pH:	6.5-7.5
Specific Gravity @ 20 C (Water=1):	1.42 -1.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Symptoms related to exposure

Acute Toxicity

Inhalation	May cause respiratory irritation. May cause allergic respiratory reaction.
Eye Contact	May cause eye irritation.
Skin Contact	None known.
Ingestion	None known

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
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Contains no hazardous substances	Mixture	No data available	No data available	No data available
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12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Contains no hazardous substances	Mixture	No information available	No information available	No information available	No information available

12.2 Persistence and degradability

Readily biodegradable

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR

Not restricted

Air Transportation

ICAO/IATA

Not restricted

Sea Transportation

IMDG

Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

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

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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