

**Risks Associated with Permitting Exploration Wells
in the Delaware River Basin
to**

**Delaware Riverkeeper Network
and Damascus Citizens for Sustainability**

By

**Glenn C. Miller, Ph.D.
Consulting Environmental Chemist**

November 12, 2010

The following comments are a response to a request for a determination of the risk of chemical contamination from exploration gas wells. In my professional opinion, the chemicals introduced into the environment during exploratory well construction, along with the naturally occurring substances that may be introduced to the surface system via drilling, pose a significant threat to ground and surface waters in the Delaware River Basin. Additionally, the Delaware River Basin Commission's lack of oversight with respect to siting of these wells increases the risk of harm from these wells, an issue that will be further exacerbated should they allowed to be converted to production wells.

1. The 11 wells listed by the Delaware River Basin Commission (DRBC) are not truly exploration wells, since they are not planned to be plugged and capped at the end of the exploratory period. While others have examined this issue in more detail (see S. Harvey's report), it is reasonably clear that these wells are intended to be used for production, should they tap into a sufficient gas reservoir. However, it is apparent that these wells have not undergone the same level of detailed scrutiny that a normal production well would undergo. Normal siting criteria for an exploratory well would include, at a minimum, the following:

- a. Potential for groundwater contamination from leakage or chemical additive release;
- b. Potential for surface water contamination from migration of gases or drilling additives from the exploration well;
- c. Potential for release of odors that could affect nearby residents;
- d. Potential for impacts on a variety of organisms that may suffer adverse effects from activities associated with the exploration wells; and
- e. Impacts on sensitive ecological areas from activities and releases from drilling the wells.

Siting characteristics are critical component of protecting human health and the environment from gas wells, and allowing "exploration" well construction

without the rigorous hard look for the potential for water and air contamination is creating an unnecessary increase in risk.

2. Additives and the quantities of those additives used in drilling of the wells are not specifically indicated, but should be, in order to assess the risk of these wells. Following review of Material Safety Data Sheet (MSDS) data from several of the PaDEP permits for the 11 well sites grandfathered under the Supplemental Executive Director Determination, it is clear that a variety of chemical additives and cement products are used during the exploratory well construction (Exhibit 1). The amount of each of these substances is not reported and certain of these compounds present an uncertain risk. Some of the chemicals of concern include the following:

- a. Halad 344 Cement additive: This appears to be a modified acrylamide copolymer. No indication is present as to the amount of monomer present in the polymer. The monomer is more chemically active (or "available") to interact with other chemicals and organisms (including aquatic animals and people) and very often provides the primary risk for use of polymers. This is a particular concern due to the carcinogenicity of acrylamide. Also not indicated is how the polymer will be used, or the amount of polymer used.
- b. Ethylene glycol monobutyl ether (EGBE) and diethylene glycol monobutyl ether. These are fairly low toxicity to humans, but can still contribute to water quality degradation, simply by adding in organic carbon that will be a source of microbial reactions. EGBE (also known as 2-butoxyethanol) has been identified as a carcinogen in animals for formation of adrenal tumors, but not in humans. Exposure to EGBE can cause irritation of mucous membranes and other respiratory problems including pulmonary edema and coma at high doses. It is used in more limited quantities
- c. HR-601: Modified lignosulfates. These materials are not well chemically characterized and can add also add organic carbon that can adversely affect water quality.
- d. Cellulose derivative: No information is provided on what type of derivative is used. This material is presumably a modification of cellulose (which is not a risk, when unmodified) but no information is presented on what that modification is.
- e. Diesel and motor oil: Both of these materials, when used in wells, can release organics including benzene, toluene, ethylbenzene and xylene to surface and ground waters. Benzene presents the largest cancer risk, in that it is known human carcinogen. The other compounds, although less toxic, are general indicators of fuel contamination, are flammable, and, at high concentrations are central nervous system depressants (Klaassen, et. al., 1996)
- h. Quaternary ammonium compounds: Essentially no information is provided as to which compounds are being used. The toxicity will vary

with the type of compound. All the structural information that is provided with the term “quaternary ammonium compounds” is that the molecule contains a nitrogen bonded to four carbon atoms, but does not provide information sufficient to even speculate on the risks of this class of compounds.

- i. Duratone HT: This additive contains nonylphenol, a compound which is biologically long-lived, slightly bioaccumulative, and is a toxic substance and an endocrine disruptor in aquatic organisms (US EPA, 2010).
3. Gaseous odors from the well sites have been demonstrated, and have the clear potential for release of unknown chemical and unhealthful exposure to chemicals from the wells. Drilling of the Woodland Management Gas Drilling Site near Damascus in September, 2010 (Exhibit 2, statement by Greg Swartz and Tannis Kowalchuk) released a “sulfuric chemical odor.” While the source of this odor was unclear, it may have come from the well, the water stored in the pond, or during emptying of the pond. While a limited set of water samples was analyzed, the source of the odor remains unclear. What is concerning is that there was no serious attempt to determine the source of the odor, or the chemical characterization of the odor. If it was from the well, it could represent a serious source of hydrogen sulfide; if it was from biological reduction of sulfate, it would have required carbon sources to reduce sulfate to sulfide. Yet the analysis of the water (WMP-Tophole), did not show hydrocarbons normally present in gas releases from gas wells (e.g. toluene, xylene, ethyl benzene, etc.). It did, however have a high biological oxygen demand (BOD) of 432 mg/L. The source of this biological reduction equivalent was, however, not clear. Whether it was chemical additives used during drilling or organic chemicals from the produced water was unclear. While the source of the water was not described, the water had characteristics that may have indicated that it was produced water, including elevated salinity as well as elevated barium, strontium and iron. The lack of concern of the regulatory agency was noted in a comment regarding hydrogen sulfide that said that “H₂S is primarily an eye irritant”, while in fact, hydrogen sulfide is highly toxic, and has a toxic LC₅₀ value of 444-585 ppm [ATSDR, 2008]. Gases can come from several sources at these wells, and often contain a variety of odorous materials, including hydrogen sulfide, other sulfides, and a variety of malodorous organic compounds. While odors in a completely cased and sealed well may be minimal, these very volatile compounds often find ways to be emitted to the surface air, most commonly from either inadequately sealed wells, or from transport pathways created from the formation during the well construction. These odors can have a serious impact on the quality of life of surrounding residents, since odors are unpredictable and, in my experience with odors, very difficult to regulate.
4. **Exploration gas wells have not gone through the siting analysis that would have been conducted for production wells.** This involves consideration of the receptors, including surface and groundwater, as well as nearby residents, schools and work places that may be affected by proximity to the wells. Natural

gas is not simply methane, and contains a variety of hydrocarbons and contaminants that may present risks to persons and other organisms exposed to these chemicals. These include benzene and a variety of organic small molecules (toluene, xylenes and other alkyl aromatics, alkanes). These will move more slowly in soil and groundwater systems but ultimately can migrate to surface water systems. Benzene in particular is a known carcinogen, and transport to groundwater systems is a serious problem.

Transport mechanisms will vary with the specific conditions of the gas well. Spills can occur at the site, or from the near surface casing that experiences a failure. Contaminating chemicals, including produced water, or additives used in the drilling process, and these chemicals can then be introduced directly into the near-surface aquifers, or in surface water from runoff. Gas pressure that is released during drilling can push natural gas to the surface when a migration pathway is created. This is likely to also carry a variety of volatile hydrocarbon constituents that exist in the formation. Finally, blowouts, although infrequent, can result in uncontrolled release of contaminated water that will result in degradation of water quality in near surface aquifers, and surface water.

Because exploration wells will not undergo any siting analysis by DRBC, the risks from these wells can potentially be larger than from production wells. As has been argued by others, gas producers will likely seek to convert exploration wells into production wells in the Delaware River Basin if they intercept gas reservoirs that are economic. Drilling additional wells under an exploration permit is unwise, and has an increased potential to affect human health and the environment in the Delaware River Basin.

References:

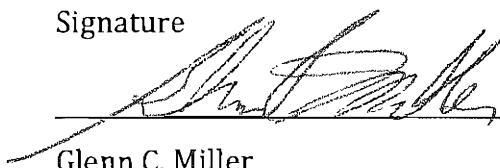
ATSDR [Agency for Toxic Substances and Disease Registry], (2006). "Toxicological Profile for Hydrogen Sulfide" US Public Health Service. US Dept. of Health and Human Services"

Klaassen, C.D. (1996) Casarett and Doull's Toxicology, The Basic Science of Poisons. McGraw Hill, New York.

ATSDR (Agency for Toxic Substances and Disease Registry), (2006). "Toxicological Profile for Hydrogen Sulfide" US Public Health Service. US Dept. of Health and Human Services"

The opinions expressed in this report are stated to a reasonable degree of scientific and professional certainty.

Signature



Glenn C. Miller

Date

11-16-2010

COPY

5500-FM-OG0001A Rev. 11/2007



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Permittee's eFACTS ID 277879	Auth ID 830957
Watershed Name Hollister Creek	Quality HQ

WELL PERMIT

Permittee NEWFIELD APPALACHIA PA LLC	OGO.# OGO-67425	Permit Number 37-127-20017-00	Date Issued 05/27/2010
Address 363 N SAN HOUSTON PKWY E		Farm Name & Well Number WOODLAND MGMT PARTNERS 1 1	Well Serial #
SUITE 2020		Municipality Damascus	County Wayne
HOUSTON, TX 77060-2424		7 1/2' Quadrangle Name Callicoon	Map Section # 7
Phone (281) 847-6031	Project #	Latitude 41-45-57.2000	Longitude -75-6-33.8000
Surf Elev at Site 1193 feet	Anticipated Total Depth 8350 feet	Well Type GS	Offset distances referenced to NE corner of map section. South 9393 feet West 7108 feet

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires 05/27/2011 unless drilling is commenced on or before that date and prosecuted with due diligence.

Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

DEP USE ONLY
AUTH # <u>CNC</u>
Check # <u>1064287</u> Amount \$ <u>1500</u>

1950
200
50
\$1500

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Notes		DEP USE ONLY	
OGO # <u>67425</u>	Objection Date - Do not issue before: <u>5/3/10</u>	Well Permit # <u>127-20017</u>	Special Cond. <u>A B C D E F</u>
Bond # <u>12382</u>	Date Approved: <u>5/11/10</u>	Watershed Name: <u>HOLLISTER CREEK</u>	Designation: <u>(AO) EV</u>
C: <u>4/13/10</u> n: <u>5/3/10</u> s: <u>5/11/10</u>	INV: <u>5-27-10</u>	Please read instructions before you begin filling in this form.	

Applicant (Operator) Name Newfield Appalachia PA LLC	DEP Client ID# 277879	Phone 281-847-6031	FAX 281-847-6160	Check if new address. <input type="checkbox"/>
Mailing Address (Street or PO Box) 363 N. Sam Houston Pkwy E. Suite 2020	City Houston	State TX	Zip +4 77060-2424	Country (if not USA)

(Well) Farm Name Woodland Management Partners	Well # 1-1	Serial #	PERMIT TYPE Check applicable.	TYPE OF WELL Check one.	APPLICATION FEE Check applicable.
County WAYNE	Municipality DAMASCUS	Project # (from DEP)	Application is to: <input checked="" type="checkbox"/> Drill a new well <input type="checkbox"/> Deepen a well <input type="checkbox"/> Redrill a well <input type="checkbox"/> Alter a well <input type="checkbox"/> E&S Control Module <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Gas <input type="checkbox"/> Oil <input type="checkbox"/> Comb. (gas & oil) <input type="checkbox"/> Injection, recovery <input type="checkbox"/> Injection, disposal <input type="checkbox"/> Coalbed Methane <input type="checkbox"/> Gas Storage <input checked="" type="checkbox"/> Other (specify) vertical test well	<input type="checkbox"/> Marcellus Well: Non-Vertical <input type="checkbox"/> Marcellus Well: Vertical <input type="checkbox"/> Non-Marcellus Well: Non-Vertical <input checked="" type="checkbox"/> Non-Marcellus Well: Vertical <input type="checkbox"/> \$200 (Home Use Well) <input type="checkbox"/> \$500 E&S Fee <input type="checkbox"/> \$0 (Rehab orphan) <input checked="" type="checkbox"/> Vertical: Length <u>8350</u> ft. <input type="checkbox"/> Marcellus: Length _____ ft. <input type="checkbox"/> Non-Vertical: Length _____ ft. Total Application Fee \$ <u>1500</u>

COORDINATION WITH REGULATIONS AND OTHER PERMITS

	Yes	No	DEP USE ONLY
1. Will the well be subject to the Oil and Gas Conservation Law? If "No," go to 2).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Date Stamps/Notes
a. If "Yes" to #1, is the well at least 330 feet from outside lease or unit boundary?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Auth <u>830957</u>
b. Does the location fall within an area covered by a spacing order?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Site <u>733315</u>
2. Will the well penetrate a workable coal seam? If "No," include justification and supporting documentation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Cint <u>277879</u>
3. If the well will penetrate a workable coal seam, and the well is a "non-conservation" gas well, does the location comply with the distance requirements of Section 7 of the Coal and Gas Resource Coordination Act? (At least 1,000 feet from all existing wells).	<input type="checkbox"/>	<input type="checkbox"/>	APS <u>717958</u>
a. If "No," is the required exception request attached? (Check here if re-working an existing well: <input type="checkbox"/> N/A)	<input type="checkbox"/>	<input type="checkbox"/>	Acct <u>676721</u>
4. Will the well be drilled at a location where the coal has been removed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PF <u>729777</u>
5. Will the well be drilled through an active (operating or projected) coalmine, or within 1,000 feet of the boundary?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	SF <u>101251</u>
a. If "Yes," print the names of: Mine: _____ Operator: _____			
6. Will the well penetrate or be within 2,000 feet of an active gas storage reservoir boundary?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If Yes, print the names of: Storage Field: _____ Operator: _____			
7. Is the proposed well location within the permitted area of a landfill?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8. Will the well site be within 100 feet (measured horizontally) of a stream, spring or body of water identified on the most current 7 1/2' topographic map?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If "Yes," is a request for a waiver (form 5500-FM-OG0057), and E&S control plan attached?	<input type="checkbox"/>	<input type="checkbox"/>	
9. Will the well site be within 100 feet of a wetland or in a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. Is the well site within 100 feet of a wetland greater than one acre in size?	<input type="checkbox"/>	<input type="checkbox"/>	
If yes, is a waiver request (form 5500-FM-OG0057) and E&S control plan attached?	<input type="checkbox"/>	<input type="checkbox"/>	
10. Will the well be drilled within 200 feet (horizontally) from any existing building or an existing water supply?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If "Yes," is written consent from the owner attached?	<input type="checkbox"/>	<input type="checkbox"/>	
b. If written consent is not attached, is a variance request (form 5500-FM-OG0058) attached?	<input type="checkbox"/>	<input type="checkbox"/>	
11. Will the well be located where it may impact a public resource as outlined in the "Coordination of a Well Location with Public Resources" form 5500-PM-OG0076? If yes, attach a completed copy of the form.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
12. Is the well site in a Special Protection High Quality (HQ) or Exceptional Value (EV) watershed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13. Is this well part of a development where you need an Earth Disturbance Permit for Oil and Gas Activities disturbing more than 5 acres? If yes, attach a completed Erosion Sediment and Stormwater Control Module or list the number and date of the ESCGP-1 Approval.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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 NORTHWEST REGIONAL OFFICE

The person signing this form attests that they have the authority to submit this application on behalf of the applicant, and that the information, including all related submissions, is true and accurate to the best of their knowledge.			
Signature of Person Authorized to Submit Application <u>Donald F. Sleeth</u>	(Print or Type)	Name of Signer: DONALD F. SLEETH	Date 4-6-10
Application Preparer/Contact: BETSY COLLINS		Title: Drilling Manager	
Phone: 412-921-8250			



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #
Woodland Management Partners-Well #1-1
Applicant Name
Newfield Appalachia PA LLC
DEP ID#
277879
APPS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL
Page 2 --- Record of Notification / Written Consent

List the following: surface landowner, all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

Name:	Address:	Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet			Notification			
							Surf Owner With Water	Water Purveyor	Coal Mine Operator	Surf Owner	Return Receipt	Address Affidavit	Written Consent
Donald and Marie Hartnett	841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Woodland Management Partners	308 Egypt Rd. Taffon, PA 18464	X								3/25/10	4/1/10		X
Alfred Cimino	124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X						X
Leon N Clause, Sr.	PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Coal Operator, Owner, or Lessee Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Coal Operator, Owner, or Lessee Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Coal Operator, Owner, or Lessee Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Coal Operator, Owner, or Lessee Date _____

Surface Landowner at proposed location Date _____

Surface Landowner at proposed location Date _____

Gas Storage Operator within 2,000 feet Date _____

Signature below indicates written consent. Check applicable box.

Owner of: water supply, or building within 200 feet Date 3/16/10

Address (of above)
Leon N Clause

Owner of: water supply, or building within 200 feet Date _____

Address (of above)

127-20017



Farm Name - Well #
Woodland Management Partners-Well #1-1

Applicant Name
Newfield Appalachia PA LLC

DEP ID#
277879

APIS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL
Page 2 -- Record of Notification / Written Consent

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								Water Purveyor	Coal Mine Operator	Operator	Certified Mail Dates	Return Receipt	Address Affidavit
Donald and Marie Harneit	841A Calicoon Rd. Damascus, PA 18415-3514						X				3/25/10	3/29/10	
Woodland Management Partners	308 Egypt Rd. Taffton, PA 18464	X											X
Alfred Cimino	124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X				3/25/10	4/1/10	
Leon N Clouse, Sr.	PO Box 241 Starbuck, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

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Coal Operator, Owner, or Lessee Date

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Coal Operator, Owner, or Lessee Date

Water Purveyor or Landowner with water supply within 1,000 ft. Date

Coal Operator, Owner, or Lessee Date

Surface Landowner at proposed location
Date: **3/14/2010**

Surface Landowner at proposed location
Date:

Signature below indicates written consent. Check applicable box.

Owner of: water supply, or building within 200 feet Date

Address (of above)

Owner of: water supply, or building within 200 feet Date

Address (of above)

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NORTHWEST REGIONAL OFFICE

WOODLAND MANAGEMENT PARTNERS LP
Date: 3/14/2010
WOODLAND MGT SERVICES INC General
Tollman, J. J. President

127-20017



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program
WELL LOCATION PLAT

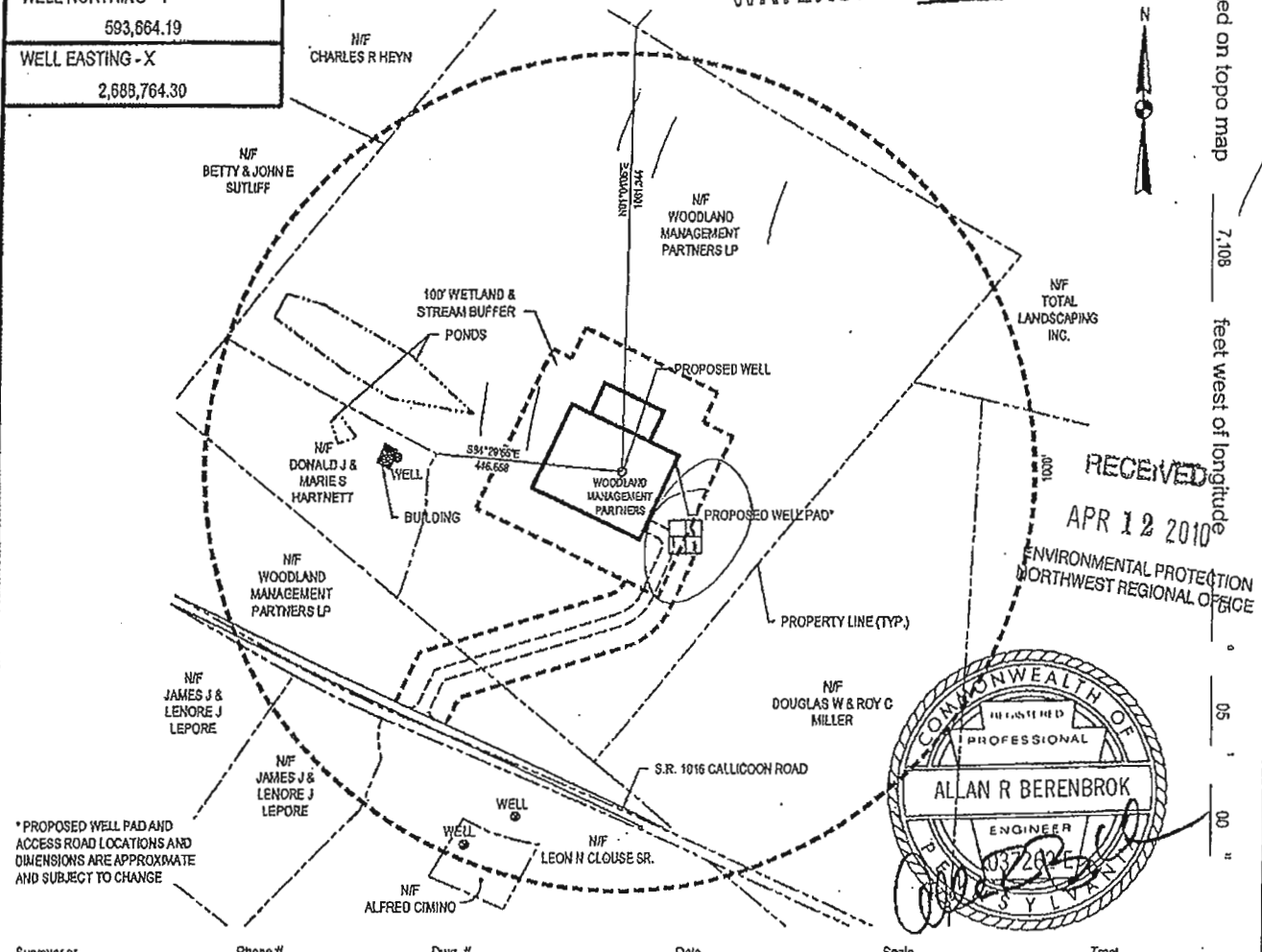
DEP Application Tracking #	G: <i>ju</i>
Permit #	C: <i>5/3/10</i>
Project #	<i>127-20017</i>

<input type="checkbox"/> Denotes location of well on topo map.
True Latitude: NORTH <i>41° 45' 57.2"</i>
True Longitude: WEST <i>75° 06' 33.8"</i>
WELL NORTHING - Y 593,664.19
WELL EASTING - X 2,688,764.30

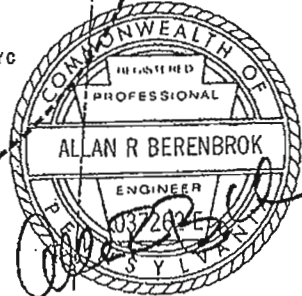
Well is located on topo map 9,393 feet south of latitude 41° 37' 30"

HQ

WATERSHED Hollister Creek



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NORTHWEST REGIONAL OFFICE



Surveyor or Engineer **TETRA TECH** Phone # **(412) 921-8873** Dwg. # **1** Date **4/6/2010** Scale **1" = 400'** Tract Acreage

Lat. & Long Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83		Elevation Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83		Survey Date Jan. 2010
Applicant / Well Operator Name Newfield Appalachia PA LLC		Well (Farm) Name Woodland Management Partners		Well # 1-1
Address 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77080		County - Code Wayne	Municipality Damascus	Well Type Vertical Test
Surface Landowner / Lessor Woodland Management Partners		USGS 7 1/2 Quadrangle Map Name Callicoon, PA		Map Section 7
Target Formation(s) Onondaga		Angle & Course of Deviation (Drilling) N/A		Anticipated Total Depth TVD 8,350 ft.
Donald and Marie Hartnett		N86d 22° 34' W 537'		N/A
Leon N. Clouse Sr.		S16d 46° 23' W 862'		N/A
Alfred Cimino		S22d 36° 51' W 965'		N/A
				N/A

RA: Marcelus Shale Project\Newfield\0279 - Newfield Well\Well Plat\Permit\Drawings\Well Pad Plat Estdb3.dwg PTT BEN.HOPPE 4/22/10 10:54:04 AM



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Permittee's eFACTS ID 277879	Auth ID 830967
Watershed Name Hollister Creek	Quality HQ

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HOUSTON, TX 77060-2424		7 1/2' Quadrangle Name Callicoon	Map Section # 7
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S. Craig John

Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

DEP USE ONLY	
AUTH #	CNC
Check #	1064287
Amount \$	1500

1950
200
50
\$1500

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Notes		DEP USE ONLY	
OGO #	67425	Objection Date - Do not issue before:	Well Permit #
Bond #	12382	5/3/10	127-20017
C: 4/13/10	G: 5/3/10	Date Approved:	Special Cond. A B C D E F
INV: 5-21-10	5/11/10	Roll	Watershed Name: Hollister Creek
			Designation: (HQ) EV

Please read instructions before you begin filling in this form.

Applicant (Operator) Name Newfield Appalachia PA LLC	DEP Client ID# 277879	Phone 281-847-6031	FAX 281-847-6160	Check if new address. <input type="checkbox"/>
Mailing Address (Street or PO Box) 363 N. Sam Houston Pkwy E. Suite 2020	City Houston	State TX	Zip +4 77060-2424	Country (if not USA)

(Well) Farm Name Woodland Management Partners	Well # 1-1	Serial #	PERMIT TYPE Check applicable.	TYPE OF WELL Check one.	APPLICATION FEE Check applicable.
County WAYNE	Municipality DAMASCUS	Project # (from DEP)	Application is to: <input checked="" type="checkbox"/> Drill a new well <input type="checkbox"/> Deepen a well <input type="checkbox"/> Redrill a well <input type="checkbox"/> Alter a well <input type="checkbox"/> E&S Control Module <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Gas <input type="checkbox"/> Oil <input type="checkbox"/> Comb. (gas & oil) <input type="checkbox"/> Injection, recovery <input type="checkbox"/> Injection, disposal <input type="checkbox"/> Coalbed Methane <input type="checkbox"/> Gas Storage <input checked="" type="checkbox"/> Other (specify) vertical test well	<input type="checkbox"/> Marcellus Well: Non-Vertical <input type="checkbox"/> Marcellus Well: Vertical <input type="checkbox"/> Non-Marcellus Well: Non-Vertical <input checked="" type="checkbox"/> Non-Marcellus Well: Vertical <input type="checkbox"/> \$200 (Home Use Well) <input type="checkbox"/> \$500 E&S Fee <input type="checkbox"/> \$ 0 (Rehab orphan) <input checked="" type="checkbox"/> Vertical: Length 8350 ft. <input type="checkbox"/> Marcellus: Length _____ ft. <input type="checkbox"/> Non-Vertical: Length _____ ft. Total Application Fee \$ 1500

COORDINATION WITH REGULATIONS AND OTHER PERMITS	Yes	No	DEP USE ONLY
1. Will the well be subject to the Oil and Gas Conservation Law? If "No," go to 2).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Date Stamps/Notes
a. If "Yes" to #1, is the well at least 330 feet from outside lease or unit boundary?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Auth 830957
b. Does the location fall within an area covered by a spacing order?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Site 73335
2. Will the well penetrate a workable coal seam? If "No," include justification and supporting documentation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Cmt 271879
3. If the well will penetrate a workable coal seam, and the well is a "non-conservation" gas well, does the location comply with the distance requirements of Section 7 of the Coal and Gas Resource Coordination Act? (At least 1,000 feet from all existing wells).	<input type="checkbox"/>	<input type="checkbox"/>	APS 71958
a. If "No," is the required exception request attached? (Check here if re-working an existing well: <input type="checkbox"/> N/A)	<input type="checkbox"/>	<input type="checkbox"/>	Acct 676721
4. Will the well be drilled at a location where the coal has been removed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PF 729777
5. Will the well be drilled through an active (operating or projected) coalmine, or within 1,000 feet of the boundary?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	SF 101201
a. If "Yes," print the names of: Mine: _____ Operator: _____			
6. Will the well penetrate or be within 2,000 feet of an active gas storage reservoir boundary?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If Yes, print the names of: Storage Field: _____ Operator: _____			
7. Is the proposed well location within the permitted area of a landfill?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8. Will the well site be within 100 feet (measured horizontally) of a stream, spring or body of water identified on the most current 7 1/2' topographic map?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If "Yes," is a request for a waiver (form 5500-FM-OG0057), and E&S control plan attached?	<input type="checkbox"/>	<input type="checkbox"/>	
9. Will the well site be within 100 feet of a wetland or in a wetland?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. Is the well site within 100 feet of a wetland greater than one acre in size?	<input type="checkbox"/>	<input type="checkbox"/>	
If yes, is a waiver request (form 5500-FM-OG0057) and E&S control plan attached?	<input type="checkbox"/>	<input type="checkbox"/>	
10. Will the well be drilled within 200 feet (horizontally) from any existing building or an existing water supply?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. If "Yes," is written consent from the owner attached?	<input type="checkbox"/>	<input type="checkbox"/>	
b. If written consent is not attached, is a variance request (form 5500-FM-OG0058) attached?	<input type="checkbox"/>	<input type="checkbox"/>	
11. Will the well be located where it may impact a public resource as outlined in the "Coordination of a Well Location with Public Resources" form 5500-PM-OG0078? If yes, attach a completed copy of the form.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
12. Is the well site in a Special Protection High Quality (HQ) or Exceptional Value (EV) watershed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13. Is this well part of a development where you need an Earth Disturbance Permit for Oil and Gas Activities disturbing more than 5 acres? If yes, attach a completed Erosion Sediment and Stormwater Control Module or list the number and date of the ESCGP-1 Approval.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

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ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Signature of Applicant	The person signing this form attests that they have the authority to submit this application on behalf of the applicant, and that the information, including all related submissions, is true and accurate to the best of their knowledge.		
Signature of Person Authorized to Submit Application <i>Donald F. Sleeth</i>	(Print or Type)	Name of Signer: DONALD F. SLEETH	Date 4-6-10
Application Preparer/Contact: BETSY COLLINS		Title: Drilling Manager	Phone: 412-921-8250



Farm Name - Well #
Woodland Management Partners-Well #1-1
Applicant Name
Newfield Appalachia PA LLC
DEP ID#
277879
DEP USE ONLY
APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL
Page 2 --- Record of Notification / Written Consent

Name:	Address:	Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet			Notification			
							Surf Owner	Water Purveyor	Coal Mine Operator	Certified Mail Dates	Return Receipt	Address Affidavit	Written Consent
Donald and Marie Hartnett	841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Woodland Management Partners	308 Egypt Rd. Taffon, PA 18464	X											X
Alfred Cimino	124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X			3/25/10	4/1/10		
Leon N Clouse, Sr.	PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Water Purveyor or Landowner with water supply within 1,000 ft. Date _____

Surface Landowner at proposed location Date _____

Surface Landowner at proposed location Date _____

Coal Operator, Owner, or Lessee Date _____

Coal Operator, Owner, or Lessee Date _____

Coal Operator, Owner, or Lessee Date _____

Coal Operator, Owner, or Lessee Date _____

Coal Operator within 1,000 feet of proposed location Date _____

Gas Storage Operator within 2,000 feet Date _____

Signature below indicates written consent. Check applicable box.

Owner of: water supply, or building within 200 feet Date _____

Address (of above) _____

Signature: *Leon N Clouse* Date: 3/6/10

Owner of: water supply, or building within 200 feet Date _____

Address (of above) _____

127-20017



Farm Name - Well #
Woodland Management Partners-Well #1-1

Applicant Name
Newfield Appalachia PA LLC

DEP ID#
277879

APPS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL
Page 2 --- Record of Notification / Written Consent

List the following: surface landowner, all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator; if within 2000 feet, all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes "X" which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

Name	Address	Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet				Notification			
							Surf Owner With Water	Water Purveyor	Coal Mine Operator	Coal Mine Operator	Certified Mail Dates	Return Receipt	Address Affidavit	Written Consent
Donald and Marie Hartnett	841A Calicoon Rd. Damasous, PA 18415-3514						X				3/25/10	3/29/10		
Woodland Management Partners	308 Egypt Rd. Tatton, PA 18464	X												X
Alfred Cimino	124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X				3/25/10	4/1/10		X
Leon N Clouse, Sr.	PO Box 241 Stanhope, NJ 07874-0241						X							X
Name:	Address:													
Name:	Address:													
Name:	Address:													

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Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

<input type="checkbox"/> Water Purveyor or <input type="checkbox"/> Landowner with water supply within 1,000 ft.	Date	Coal <input type="checkbox"/> Operator, <input type="checkbox"/> Owner, or <input type="checkbox"/> Lessee	Date
<input type="checkbox"/> Water Purveyor or <input type="checkbox"/> Landowner with water supply within 1,000 ft.	Date	Coal <input type="checkbox"/> Operator, <input type="checkbox"/> Owner, or <input type="checkbox"/> Lessee	Date
<input type="checkbox"/> Water Purveyor or <input type="checkbox"/> Landowner with water supply within 1,000 ft.	Date	Coal <input type="checkbox"/> Operator, <input type="checkbox"/> Owner, or <input type="checkbox"/> Lessee	Date
<input type="checkbox"/> Water Purveyor or <input type="checkbox"/> Landowner with water supply within 1,000 ft.	Date	Coal <input type="checkbox"/> Operator, <input type="checkbox"/> Owner, or <input type="checkbox"/> Lessee	Date
<input type="checkbox"/> Surface Landowner at proposed location	Date	Coal Operator within 1,000 feet of proposed location	Date
<input type="checkbox"/> Surface Landowner at proposed location	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: <input type="checkbox"/> water supply, or <input type="checkbox"/> building within 200 feet	Date
Address (of above)	
Owner of: <input type="checkbox"/> water supply, or <input type="checkbox"/> building within 200 feet	Date
Address (of above)	

Surface Landowner at proposed location
WOODLAND MANAGEMENT PARTNERS LP 3/4/2010
Surface Landowner at proposed location
WOODLAND MANAGEMENT PARTNERS LP General
Donald M. Hartnett, President

127-20017



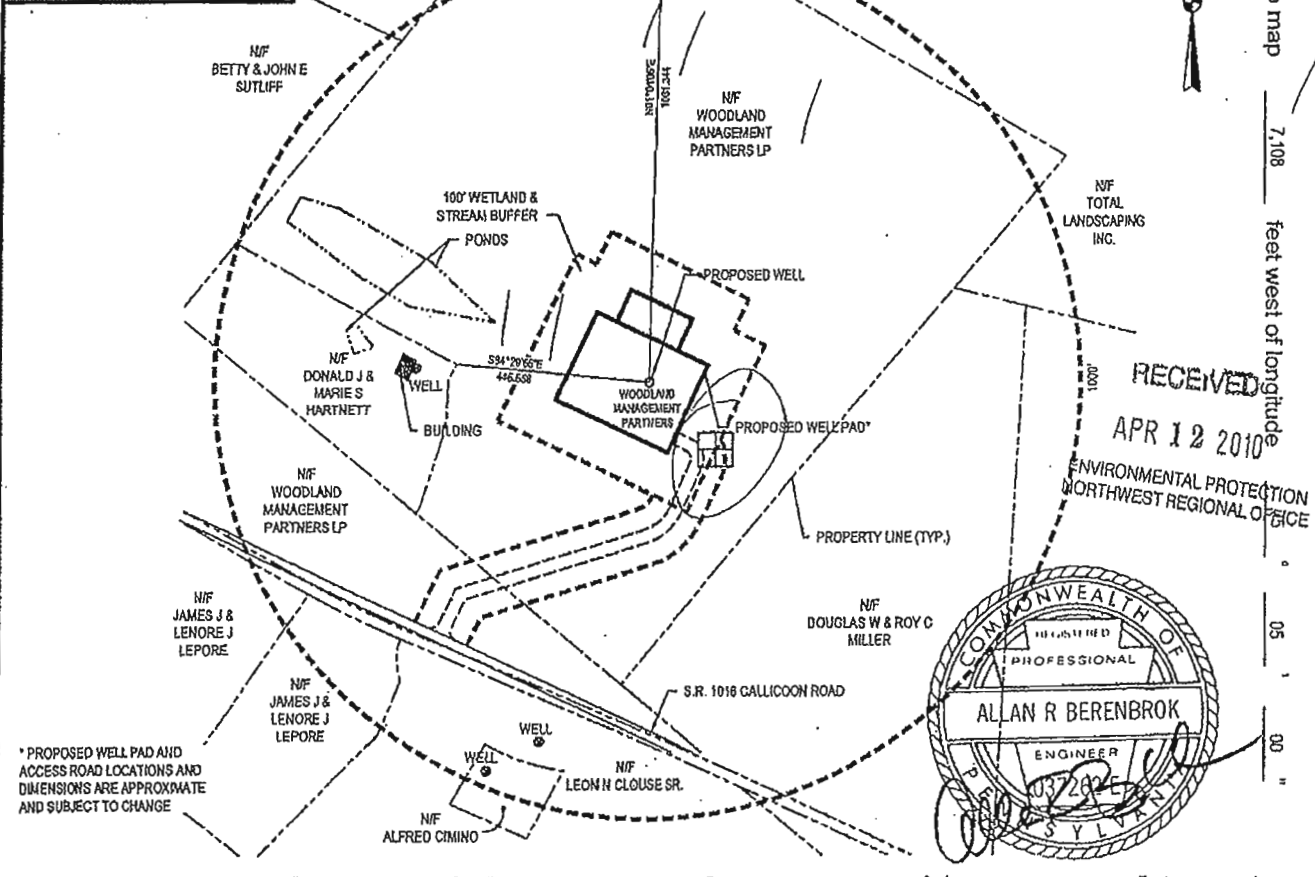
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program
WELL LOCATION PLAT

DEP Application Tracking #	G: <i>ju</i>
Permit #	<i>5/3/10</i>
Project #	<i>127-20017</i>

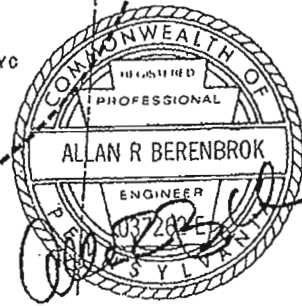
<input type="checkbox"/> Denotes location of well on topo map.
True Latitude: NORTH 41° 45' 57.2"
True Longitude: WEST 75° 06' 33.8"
WELL NORTHING - Y 593,664.19
WELL EASTING - X 2,688,764.30

Well is located on topo map 9,393 feet south of latitude 41° 37' 30"

HQ
WATERSHED *HOLLISTER CREEK*



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NORTHWEST REGIONAL OFFICE



Surveyor or Engineer: **TETRA TECH** Phone # **(412) 921-8873** Dwg. # **1** Date **4/6/2010** Scale **1" = 400'** Tract Acreage

Lat. & Long Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83	Elevation Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83	Survey Date Jan. 2010
Applicant / Well Operator Name Newfield Appalachia PA LLC	Well (Farm) Name Woodland Management Partners	Well # 1-1
Address 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060	County - Code Wayne	Municipality Damascus
Surface Landowner / Lessor Woodland Management Partners	USGS 71/2 Quadrangle Map Name Callicoon, PA	Map Section 7
Target Formation(s) Onondaga	Angle & Course of Deviation (Drilling) N/A	Anticipated Total Depth TVD 8,350 ft.
Donald and Marie Hartnett	N86d 22' 34"W 537'	N/A
Leon N. Clouse Sr.	S16d 46' 23"W 862'	N/A
Alfred Cimino	S22d 36' 51"W 965'	N/A
		N/A

R:\Hazardous State Projects\Newfield\Plat Permits\Permit Drawings\Map Well Pad Plat Exhibit A.dwg PRT BERENBROS 4/12/2010 10:54:04 AM

PERMIT NO.

04043824

ORGANIZATION

046

DATE ISSUED

051010

PERMIT FEES

25.00

ACCOUNT NO.

COUNTY

53

TOWNSHIP/BORO

206



HIGHWAY OCCUPANCY PERMIT

PERMITTEE

WOODLAND MANAGEMENT PARTNERS LP

ADDRESS

308 EGYPT ROAD

POST OFFICE

TAFTON

PA

ZIP CODE

18454-

COUNTY

WAYNE

TOWNSHIP/BORO

DAMASCUS

BOND/AGREEMENT NUMBER

DESCRIPTION

512

1

STATE ROUTE NO.

1016

SEGMENT(S)

0090 0090

OFFSET TO OFFSET

0470 0470

ALL WORK UNDER THIS PERMIT MAY BE STARTED ON

05/10/10

AND SHALL BE COMPLETED ON OR BEFORE

05/10/11

Immediately upon completion of the work, Permittee shall notify the permit office where application was made. Subject to all the conditions, restrictions, and regulations prescribed by the Pennsylvania Department of Transportation, (see in particular 67 Pa. Code, Chapter 203/212, 441 and 459) and subject to the plans, special conditions, or restrictions herein set forth or attached hereto. This permit shall be located at the work site and shall be available for inspection by any police officer or department representative.

DESCRIPTION

2

STATE ROUTE NO.

SEGMENT(S)

OFFSET TO OFFSET

DESCRIPTION OF WORK

INSTALL MINIMUM USE DRIVEWAY WITH DRAINAGE FACILITIES AT SR 1016 SEG 0090 OFFSET 0470 TO SEG 0090 OFFSET 0470 THIS PERMIT AUTHORIZES WORK ONLY IN DEPARTMENT HIGHWAY RIGHT OF WAY.

IT IS THE PERMITTEE'S RESPONSIBILITY TO KEEP VEGETATION TRIMMED IN ORDER TO MAINTAIN MINIMUM SIGHT DISTANCE. NO OBJECTS MAY BE PLACED WITHIN THE LINE OF SIGHT. SHOULDERS MUST BE RESTORED IN ACCORDANCE WITH APPROPRIATE SECTION OF PUB. 408 AND ROADWAY CONSTRUCTION STANDARD RC-25.

SURFACE DRAINAGE MAY NOT BE DIRECTED ONTO STATE HIGHWAY RIGHT OF WAY.

PERMITTEE MUST MAINTAIN ACCESS FROM THE PAVEMENT EDGE TO AT LEAST 20 FEET OUTSIDE THE HIGHWAY RIGHT OF WAY. ALL DISTURBED AREAS OUTSIDE THE PAVEMENT OR SHOULDER SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL TO THAT WHICH EXISTED BEFORE THE START OF WORK.

MINIMUM WORK ZONE TRAFFIC CONTROL TO BE IN ACCORDANCE WITH PUB. 213, FIGURE(S): 5, 7, & 10A. SEE PUB 212 FOR ADDITIONAL DETAILS.

DRAINAGE INSTALLED BY THIS PERMIT IS THE RESPONSIBILITY OF THE PERMITTEE TO CONTINUALLY MAINTAIN OR REPLACE. DEPARTMENT MUST BE NOTIFIED IN WRITING UPON COMPLETION OF WORK.

DESCRIPTION

3

STATE ROUTE NO.

SEGMENT(S)

OFFSET TO OFFSET

TOWNSHIP/BORO

4

DESCRIPTION

STATE ROUTE NO.

SEGMENT(S)

OFFSET TO OFFSET

THIS PERMIT IS NOT VALID UNTIL SIGNED BY THE DISTRICT ENGINEER OR HIS AUTHORIZED REPRESENTATIVE

Acknowledgement of Completion

Permitted work has been completed.

Date _____ By _____

ALLEN D. BIEHLER, P.E.

Secretary of Transportation

GEORGE ROBERTS, P.E., D.E.

District Executive



APPLICATION FOR MINIMUM USE DRIVEWAY
 A Minimum Use Driveway Is A Residential Or Other Driveway Which Is
 Expected To Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T)

APPL. NO. **075293**

SEE PUBLICATION 312 GUIDE

APPLICANT/PROPERTY OWNER <i>WOODLAND MANAGEMENT PARTNERS, LP</i>		
ADDRESS <i>308 Egypt Road</i>		
POST OFFICE <i>TRIFTON PA</i>	ZIP CODE <i>18464</i>	
PHONE <i>570-857-1072</i>	FEE <i>25.00</i>	CHECK NO. <i>5049</i>

LOCATION OF PROPOSED DRIVEWAY

County Wayne *63*

Township/Boro Damascus *206*

Route No. S.S. 1016 (Calliegon Rd)

Name of Nearest Intersection Little Kaminuk Creek

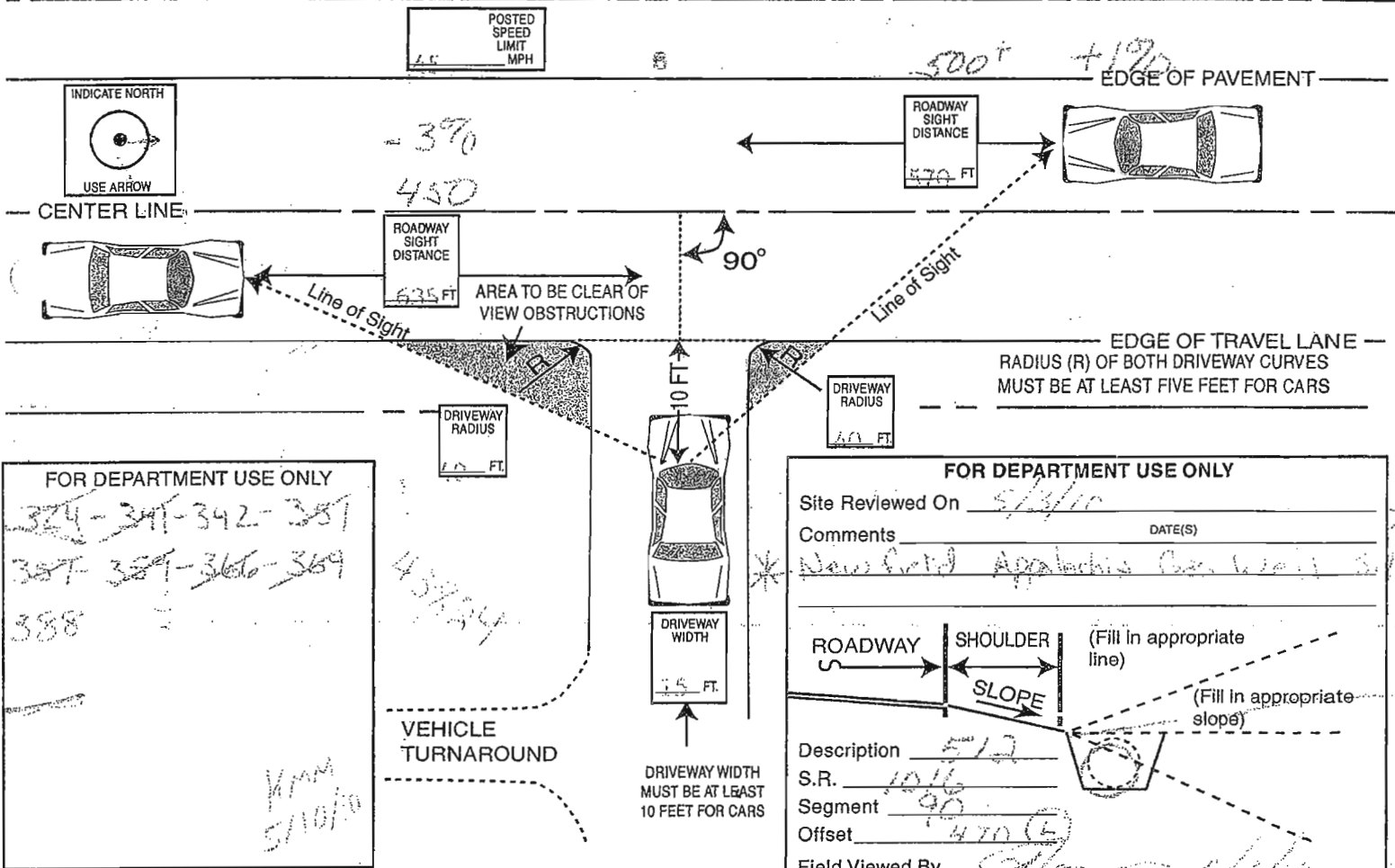
Distance to Nearest Intersection in Feet 3520 ft.

APPLICATION IS MADE TO

- CONSTRUCT A NEW DRIVEWAY ALTER AN EXISTING DRIVEWAY

DATE WORK SCHEDULED TO BEGIN May 15, 2010

DATE WORK SCHEDULED TO BE COMPLETED August 31, 2010



Is any portion of the property reserved for a person with a disability or a severely disabled veteran? YES NO

Under and subject to all the conditions, restrictions and regulations prescribed by the Pennsylvania Department of Transportation and the issued Permit, Form M-945P.

The applicant certifies that all statements contained herein are true and correct.

By **X** [Signature] 4/17/2010
 SIGNATURE(S) DATE

ROADWAY USE AND
MAINTENANCE AGREEMENT

AND NOW THIS 21 day of June, 2010, it is agreed by and between Damascus Township, Wayne County, Pennsylvania, by and through its Board of Supervisors and New Field Explorations, a duly formed corporation with its principal place of residence at 363 Sam Houston, Houston, TX, (jointly "the Parties") to enter into this agreement regarding the use and maintenance of township roadways necessary for transportation and travel of equipment and personnel to and from oil and gas wells on various leaseholds within the Township;

WHEREAS, Damascus Township, (Hereinafter reference to as the "Township") has control and jurisdiction of various Township owned roadways with its boundaries; and

WHEREAS, the Newfield (Hereinafter referred to as the "Operator"), is the owner of certain oil and gas leaseholds in Wayne County, Pennsylvania; and

WHEREAS, the Township and Operator are desirous of entering into a formal agreement for the use of Township roadways for the purposes of providing ingress, regress and egress to various leaseholds for which excess traffic and equipment transportation is necessary for the development of said oil and gas wells on said leaseholds, and

WHEREAS, the Township and Operator are desirous of addressing the excess road maintenance costs and expenditures necessary for and incurring from construction, drilling and completion stages of gas and oil operations utilizing said Township roadways.

NOW THEREFORE, in consideration of a faithful performance of each party of mutual covenants and promises hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged as follows:

1. The Operator agrees to identify those Township roads or portions of roads to be used by its vehicles and equipment prior to the commencement of operations.

2. After receiving from the Operator a list of such roads, the Parties agree to inspect the pertinent roadways promptly to determine the road structure, its condition and the existence of any buried utility lines, and to depict any surface characteristics. Operator will prepare a pre-use road inspection report documenting the road conditions and characteristics.
3. The Operator agrees to restore any affected roadways to a condition equal or better than the pre-use condition of said road(s) within 180 days of the conclusion of Operator's use, weather permitting; provided that Operator's liability shall be limited to only that portion of the cost of repair and restoration which exceeds normal and routine maintenance, costs, and which is caused by the Operator's vehicles and equipment.
4. In the event that the pre-use condition of any roadway requires or warrants repaving or improvements prior to use, the Operator shall be liable for such improvements only to the extent that the parties agree that such improvements would reduce damage caused by the Operator's use, and agree on ratably sharing the costs of such improvements.
5. In the event that the Township incurs additional costs associated with maintenance of said roadway as a direct result of the Operator's activities (including those of their agents, employees and contractors), including dust suppression needed during peak activity periods, the Township will provide prior notice of such additional maintenance needed, and if possible, obtain a cost estimate, and deliver the same to the Operator. Operator will only be liable for such maintenance costs to the extent that the parties agree that such maintenance is necessary and that the parties shall share the costs.
6. The Operator agrees to reimburse the Township for reasonable additional costs agreed upon in a reasonable and prompt period of time, but not to exceed forty-five (45) days.
7. Upon completion of all improvements called for in the final inspection report, the Operator shall submit a certification of the improvements made to the Township, and such certification shall be deemed approved unless the Township gives

written notice of objections to the certification within ten days of receipt of the certification.

8. Upon conclusion of the drilling activities anticipated by this Agreement, both parties will promptly inspect the roadways utilized and make a determination as to what, if any, improvements or maintenance need to be performed by the Operator to discharge the obligations required by this Agreement. This final report then shall be deemed to be a complete list of improvements needed to discharge this Agreement, binding upon all parties.
9. In the event that future drilling activities occur utilizing the same or part of a Township roadway(s) previously improved by virtue of this agreement, then the future contemplated activities shall cause the provisions of this agreement to resume as if said roadway(s) were being initially contemplated, with a new pre-use road inspection report, and such follow up requirements as previously herein set forth.
10. The Operator shall be given the option of having any agreed upon repair work performed by a contractor of its choice.
11. This Agreement is entered into in lieu of the Township incurring the cost and inconvenience of implementing a state compliant road bonding system and shall survive any future creation of any such system as to the Operator and remain the operative relationship between the Township and the Operator until terminated by the mutual agreement of the Township and the Operator.
12. This agreement shall be binding upon the successors and assigns of the parties hereto and shall be deemed to be a covenant running with the roads described above. This agreement shall not be transferred or assigned by the Operator without the consent in writing of the Township, which consent will not be unreasonably withheld.

IN WITNESS WHEREOF, this instrument has been executed by the undersigned the
Production Manager, this 21 day of June, 2010.

TOWNSHIP:

Damascus Township Supervisors

By: [Signature]

By: [Signature]

By: [Signature]

OPERATOR:

Newfield Exploration

(Company Name)

By: [Signature]

Company Representative



DAMASCUS TOWNSHIP, WAYNE COUNTY, PA.

ROAD INSPECTION REPORT

PRINT NAME: _____ DATE: _____

SIGN: _____ COMPANY: _____

PRE-INSPECTION

POST INSPECTION

VIDEO RECORD: YES

NO

ROAD CONDITION: _____

ROAD SURFACE: ACP \ ASBC \ CRUDE \ GRAVEL:

DRAINAGE [CENTERLINE, CULVERTS, APPROACHES]:

SIGNAGE: _____

EXISTING DUST CONTROL: YES

NO: _____

OTHER FACTORS EFFECTING THE ROADWAY: _____

WILL THE COMPANY PROVIDE A GRADER TO MAINTAIN THE DRIVING SURFACE? YES OR NO

COMMENTS: _____

**PREPAREDNESS, PREVENTION,
AND CONTINGENCY PLAN
WAYNE COUNTY FIELD
WAYNE COUNTY, PENNSYLVANIA**

Prepared for:

NEWFIELD APPALACHIA PA LLC
363 N. Sam Houston Pkwy E., Suite 2020
Houston, TX 77060



Prepared by:

TETRA TECH NUS INC
116 N. Washington Avenue
Scranton, PA 18503



May 2010

TABLE OF CONTENTS

	<u>Page</u>
Table of Contents	i
1.0 DESCRIPTION OF FACILITY	1
1.1 DESCRIPTION OF THE INDUSTRIAL OR COMMERCIAL ACTIVITY	1
1.2 DESCRIPTION OF EXISTING EMERGENCY RESPONSE PLANS	1
1.3 MATERIAL AND WASTE INVENTORY	2
1.4 POLLUTION INCIDENT HISTORY	2
1.5 IMPLEMENTATION SCHEDULE FOR PLAN ELEMENTS NOT CURRENTLY IN PLACE	2
1.6 PURPOSE AND IMPLEMENTATION OF PPC PLAN	2
1.7 PLAN REVISIONS	3
2.0 IMPLEMENTATION OF PPC PLAN	4
2.1 ORGANIZATIONAL STRUCTURE OF FACILITY FOR IMPLEMENTATION	4
2.2 LIST OF EMERGENCY COORDINATORS	5
2.3 DUTIES AND RESPONSIBILITIES OF THE EMERGENCY COORDINATOR	5
2.4 CHAIN OF COMMAND	8
2.5 DISTRIBUTION OF THIS PPC PLAN	9
3.0 SPILL AND LEAK PREVENTION AND RESPONSE	10
3.1 PRE-RELEASE PLANNING	10
3.2 MATERIAL COMPATIBILITY	11
3.3 INSPECTIONS AND MONITORING PROGRAM	11
3.4 PREVENTIVE MAINTENANCE	12
3.5 HOUSEKEEPING PROGRAM	12
3.6 SECURITY	12
3.7 EXTERNAL FACTOR PLANNING	13
3.8 EMPLOYEE TRAINING PROGRAM	13
4.0 COUNTERMEASURES	15
4.1 COUNTERMEASURES TO BE UNDERTAKEN BY FACILITY	15
4.1.1 Spill Clean-Up Procedures - General	15
4.1.2 Spill Clean-Up Procedures - Specific	15
4.1.3 Fire or Explosion	16
4.2 COUNTERMEASURES TO BE UNDERTAKEN BY CONTRACTORS	16
4.3 INTERNAL AND EXTERNAL COMMUNICATIONS AND ALARM SYSTEM	16
4.4 EVACUATION PLAN	17
4.5 EMERGENCY EQUIPMENT AVAILABLE FOR RESPONSE	17
5.0 EMERGENCY SPILL CONTROL NETWORK	19
5.1 ARRANGEMENTS WITH LOCAL EMERGENCY RESPONSE AGENCIES AND HOSPITALS	19
5.2 NOTIFICATION LISTS	20
6.0 WASTE DISPOSAL PRACTICES	22
7.0 STORMWATER MANAGEMENT PRACTICES	23
8.0 SEDIMENT AND EROSION PREVENTION	25

LIST OF APPENDICES

Appendix A Inspection Forms

Appendix B Site-Specific Figures

Figure 1 Well Field Map

Figure 2 7.5 Minute USGS Topographic Map

Figure 3 Site Plan

Appendix C Tables

Table 1 List of Materials & Wastes

Table 2 Inspection and Monitoring Activities

Table 3 Agency Notification List

Table 4 List of On-Site Emergency Response Equipment

Table 5 Chain of Command

Appendix D Reporting Form

Appendix E MSDS Sheets

1.0 DESCRIPTION OF FACILITY

1.1 DESCRIPTION OF THE INDUSTRIAL OR COMMERCIAL ACTIVITY

Newfield Appalachia PA LLC (Newfield) is a natural gas exploration company with operations planned for Wayne County, Pennsylvania. Operations will involve natural gas exploration of the Marcellus Shale formation, which will include site preparation, drilling, and well development and production activities. Wastes generated during these activities will be typical for gas drilling operations and will include drill cuttings, produced water, drilling and frac fluids, waste oil, municipal waste and trash. No hazardous waste is expected to be generated at the Newfield sites.

Newfield is currently in the exploratory phase of operations, which will require construction activities for new natural gas well pads and access roads.

This Prevention, Preparedness and Control (PPC) Plan applies to all well sites in Wayne County, Pa.

The attached map (Figure 1) in Appendix B shows the area covered under this PPC Plan. Figure 2 is the required 7.5 topographic map of the specific well site. The proposed Site Plan (Figure 3) shows the site layout, the well site boundaries, material storage areas, waste storage areas, dike drains and drainage that leads away from the well site, and the entrances and exits to the well site.

During the different stages of site preparation, construction, drilling, well development and production, the site will store various fuels, oils and chemicals on-site. A chemical and container inventory for the specific well site is located in Table 1 of Appendix C.

1.2 DESCRIPTION OF EXISTING EMERGENCY RESPONSE PLANS

This is a new facility and this plan has been prepared prior to construction of the well pad. There are no previous emergency response plans.

A separate Spill Prevention Control and Countermeasure (SPCC) Plan will be prepared for each facility meeting the requirements defined in 40 CFR§112.

1.3 MATERIAL AND WASTE INVENTORY

Information in this section is used to evaluate the prevention, containment, mitigation, cleanup, and disposal measures which would be used in the event of a spill, discharge, explosion, or fire. Oils, chemicals and other hazardous materials anticipated to be used and stored at the facility during site preparation and construction, drilling, well development and production are listed in Table 1.

MSDS's will be maintained onsite for chemicals and compounds used at the facility in accordance with the Occupational Safety and Health Administration (OSHA) worker right-to-know requirements, as appropriate.

1.4 POLLUTION INCIDENT HISTORY

Newfield has not had any reportable incidents for this facility.

1.5 IMPLEMENTATION SCHEDULE FOR PLAN ELEMENTS NOT CURRENTLY IN PLACE

All plan elements are in place.

1.6 PURPOSE AND IMPLEMENTATION OF PPC PLAN

Newfield has developed and will implement this PPC Plan for effective action to minimize and abate hazards to human health and the environment from fire, explosion, and emission or discharge of pollutants to air, soil, surface water or groundwater. This plan was prepared to satisfy the requirements set forth in 25 PA Code Section 78.

The Drilling Manager serves as the Primary Emergency Coordinator and is responsible for the preparation and implementation of the PPC Plan. The PPC Plan has been prepared and implemented in general accordance with Pennsylvania Department of Environmental Protection (PADEP) guidelines, and will be submitted to PADEP for approval at such time as the PADEP may prescribe.

This PPC Plan identifies and describes any arrangements with police departments, fire departments, hospitals, contractors, and state, county, and local emergency response teams to coordinate emergency services.

The PPC Plan lists names, addresses and phone numbers of all persons identified to act as Emergency Coordinator. One person is named as the Primary Emergency Coordinator and others are listed in the order in which they will assume responsibility as alternates. The PPC Plan also includes a list of emergency equipment at the facility, the location and a physical description of emergency equipment, and a brief outline of emergency equipment capabilities.

1.7 PLAN REVISIONS

This PPC Plan will be reviewed and amended, annually, or whenever:

- Applicable PADEP regulations are revised;
- The plan fails in an emergency;
- The list of Emergency Coordinators changes;
- The list of emergency equipment changes; and
- Construction, operation, maintenance, or other circumstances change in a manner that materially increases the potential for fires, explosions, or releases of toxic or hazardous constituents; or which changes the response necessary in an emergency.

2.0 IMPLEMENTATION OF PPC PLAN

2.1 ORGANIZATIONAL STRUCTURE OF FACILITY FOR IMPLEMENTATION

The Drilling Manager has been designated as the Primary Emergency Coordinator. The Primary Emergency Coordinator is responsible for the following:

- Coordination of spill cleanup activities;
- Notification of appropriate authorities; and
- Tank and chemical storage area inspections.

The Drilling Manager has administrative responsibility for updating, maintaining, and implementing this PPC Plan. Specifically, these responsibilities include:

- Identification of materials and wastes handled during site operation (inventory);
- Identification of potential spill sources (risk assessment);
- Establishment of spill reporting procedures;
- Coordination of the visual inspection program;
- Review of past incidents, spills, and countermeasures employed;
- Coordination and implementation of the PPC Plan goals;
- Training/educational programs and updates;
- Ensuring periodic review of the PPC Plan for adequacy and appropriateness;
- Administration and institution of appropriate changes at regular intervals;
- Review of new construction and process changes relative to the PPC Plan;
- Evaluation of PPC Plan effectiveness prior to, during and subsequent to its implementation; and
- Instituting improvements to the PPC Plan.

The Production Manager is designated as Secondary Emergency Coordinator, and, in the absence of the Drilling Manager, will assume the role of emergency coordinator for emergencies. The Secondary Emergency Coordinator will report directly to the Primary Emergency Coordinator in matters regarding this plan, and can assist with implementing the above-listed items.

2.2 LIST OF EMERGENCY COORDINATORS

As required by 25 PA Code 265.55, there will be at least one employee, either on the construction site or on call, with the responsibility for coordinating emergency response measures. The Primary and Secondary Emergency Coordinators will be thoroughly familiar with this PPC Plan, site operations and activities, the location and characteristics of materials and wastes, the location of the facility's records, and the layout of the facility. The Emergency Coordinators have the authority to commit the resources necessary to carry out the PPC Plan and for coordinating emergency response measures. In the event of a spill or release, one of the Emergency Coordinators will be immediately notified. The following individuals have been designated to act as Emergency Coordinators:

Primary Emergency Coordinator

Name: Don Sleeth
Title: Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Secondary Emergency Coordinator

Name: Jack Cochran
Title: Production Manager
Office: 814-437-2344
Cell: 814-671-1557

2.3 DUTIES AND RESPONSIBILITIES OF THE EMERGENCY COORDINATOR

As required by 25 PA Code 265.56 and the PPC Plan Guidance Documents, whenever there is an imminent or actual emergency situation, the Emergency Coordinator or his designee must immediately:

1. Notify all facility personnel.
2. Notify appropriate state or local agencies with designated response roles and contracted emergency response companies if additional assistance is required.
3. Identify the problem. Is it a physical emergency such as a fire, explosion, or spill? Is it a natural disaster such as a flood, tornado, or other severe weather? Is it a social emergency such as a bomb threat, riot, or vandalism?

4. Assess the health or environmental hazards and how this problem or condition will affect employees or its affect on the surrounding community.
5. Take all reasonable measures to stabilize the situation. The Emergency Coordinator will take all reasonable measures to ensure that the fire, explosion, emission, or discharge does not reoccur or spread to other materials at the site. These measures can include, when appropriate, stopping operations, collecting and containing released materials or wastes, and removing or isolating containers.

Whenever there is an emission, discharge, fire, or explosion, the Emergency Coordinator or his designee must immediately attempt to identify the character, exact source, amount, and aerial extent of emitted or discharged materials. He/she may do this by observation, by review of facility records or manifests, and, if necessary, by instrumental and chemical analysis. Concurrently, the Emergency Coordinator or his designee must assess possible hazards to human health or the environment that may result from emission, discharge, fire, or explosion. This assessment must consider both direct and indirect effects of the emission, discharge, fire, or explosion.

If the Emergency Coordinator determines that the facility has had an emission, discharge, fire, or explosion which would threaten human health or the environment (beyond the limits of the site) and if evacuation of local areas may be advisable, he/she must immediately notify the applicable local authorities (police, fire, etc.); he/she must also immediately notify the PADEP by telephone at (800) 541-2050 (24-hour number), PADEP Northeast Region at (570) 826-2511 (24-hrs), the National Response Center at (800) 424-8802, Wayne County Emergency Management Agency (EMA) at (570) 253-1622, and the Pennsylvania Emergency Management Agency at (717) 651-2001, and report the following information:

- Name of the person reporting the incident;
- Name and location of the facility;
- Telephone number where the person reporting the spill can be reached;
- Date, time, and location of the incident;
- A brief description of the incident, nature of the materials involved, extent of any injuries, and possible hazards to human health or the environment;
- The estimated quantity of the materials spilled; and
- The extent of contamination of land, water, or air, if known.

If spills or discharges of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance in greater than reportable quantities has occurred, the Emergency Coordinator must notify DEP at (800) 541-2050 and the National Response Center at (800) 424-8802 and report the above information. For an offsite release (spill or discharge) of a reportable quantity of a CERCLA hazardous substance or a Superfund Amendments and Reauthorization Act Extremely Hazardous Substance, the Emergency Coordinator must immediately notify the National Response Center at (800) 424-8802 and report the above information.

If a release occurs from a storage tank which enters a water supply or which threatens the water supply of downstream users, the Emergency Coordinator must immediately notify the Wayne County EMA (570) 253-1622, the Pennsylvania Emergency Management Agency at (717) 651-2001, and DEP at (800) 541-2050. If appropriate, the Emergency Coordinator may assist the Emergency Management Agencies in notifying the downstream water users. The priorities for notification will be by closest proximity to the release site.

During an emergency, the Emergency Coordinator will take all reasonable measures necessary to ensure that fire, explosion, emission, or discharge do not occur, recur, or spread to other materials at the facility. These shall include, where applicable, stopping facility operations, collecting and containing released materials, and removing or isolating containers. If the facility stops operations in response to a fire, explosion, emission, or discharge, the Emergency Coordinator must ensure that adequate monitoring is conducted for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment whenever this is appropriate.

The Emergency Coordinator will oversee and direct facility personnel in the performance of their responsibilities for addressing the emergency situation. Immediately following an emergency, the Emergency Coordinator (with PADEP approval) must provide for treating, storing, or disposing residues, contaminated soil, etc., from an emission, discharge, fire, or explosion at the construction site. The Emergency Coordinator must ensure that in the affected areas of the facility, no material incompatible with the emitted or discharged residues is processed, stored, treated, or disposed until cleanup procedures are completed and that all emergency equipment utilized in implementation of the PPC Plan is cleaned and fit for its intended use before operations are resumed. Newfield will notify PADEP and the appropriate State or local

authorities that the facility is in compliance before operations are resumed in the affected areas of the facility. Newfield will note the time, date and details of an incident that requires implementing the PPC Plan.

Within 15 days after the incident, Newfield will submit a written report on the incident to PADEP and the U.S. Environmental Protection Agency regional administrator. The report must be submitted to:

Director - Bureau of Water Quality Management
Pennsylvania Department of Environmental Protection
909 Elmerton Avenue
Harrisburg, PA 17110

Regional Administrator
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103

Director - PADEP Northeast Office
Pennsylvania Department of Environmental Protection
2 Public Square
Wilkes-Barre, PA 18711

The report should include the following information:

- Name, address, and telephone number of the individual filing the report;
- Name, address, and telephone number of the facility;
- Date, time, type, and location of incident;
- A brief description of the circumstances causing the incident;
- Description and estimated quantity (by weight) of materials or wastes involved;
- The extent of injuries, if any;
- An assessment of actual or potential threat to human health or the environment and assessment of contamination of land, water, or air, where applicable;
- Estimated quantity and disposition of recovered materials or wastes that resulted from the incident; and
- A description of what actions Newfield intends to take to prevent a similar occurrence in the future.

2.4 CHAIN OF COMMAND

Facility personnel must report emergency situations to the Emergency Coordinators. A Chain of Command flow chart (Table 5, Appendix C) has been developed and should be implemented during an emergency. The Emergency Response Chain of Command flow chart will be posted

next to all telephones onsite, posted in areas where potential emergency situations could arise, and placed in onsite company vehicles, as appropriate.

2.5 DISTRIBUTION OF THIS PPC PLAN

A copy of this PPC Plan and subsequent revisions will be distributed to:

- Drilling Manager (Primary Emergency Coordinator)
- Production Manager (Secondary Emergency Coordinator)

The PPC Plan will be reviewed and amended, if necessary, based on the criteria described earlier in Section 1.7.

3.0 SPILL AND LEAK PREVENTION AND RESPONSE

The site will be maintained and operated to minimize the possibility of a fire, explosion or discharge of oils, hazardous materials or their constituents to air, soil, surface water or groundwater which could threaten human health or the environment, in accordance with the requirements of 25 PA Code Section 265.31.

3.1 PRE-RELEASE PLANNING

The following sections discuss specific locations where the potential exists for accidental spills of oils and/or chemicals. The controls that are in place to minimize the potential for an uncontrolled release to the environment are also discussed. In the event that an uncontrolled spill of hazardous substances occurs, the procedures described in Section 4.0 will be followed.

To enhance spill prevention at the facility, great care will be exercised in handling oil and other materials covered in this PPC Plan. Any unusual conditions observed by any employees or contractors will be reported to one of the Emergency Response Coordinators. Management personnel whose responsibilities include involvement with the materials discussed in this document will also be familiar with this plan and the procedures recommended for spill prevention.

Spill Prevention Measures: Procedures that are to be followed to prevent and/or minimize oil spills at the Newfield facility include:

- ASTs and/or containers will be stored in secondary containment with sufficient volume;
- ASTs and regulated material containers will be visually inspected weekly for leaks;
- Special care will be taken when transferring regulated materials to prevent product loss;
- Regulated materials will be stored in a manner that minimizes the potential for contact with stormwater;
- Absorbent and spill control materials shall be maintained on-site for emergency use;

- Emergency response personnel will be familiar with procedures to follow in the case of a spill; and
- In cases where there may be leaking equipment or operations where oil or oil-related compounds are leaked, spilled, or otherwise released, containment booms or absorbent materials shall be used and equipment shall be repaired.

In the event that an uncontrolled spill of oil or a hazardous material occurs, the procedures described in Section 4.0 will be followed. Responses should be coordinated with federal, state and local agencies as appropriate.

3.2 MATERIAL COMPATIBILITY

The majority of materials received on-site in totes, drums, pails or other small containers are stored in the containers supplied by the manufacturer.

Construction materials used for the ASTs have been selected and designed to be compatible with the materials that are being stored and are typical for the natural gas industry.

3.3 INSPECTIONS AND MONITORING PROGRAM

Operating equipment will be inspected daily, and a copy of the inspection and maintenance form is included in Appendix A. Employees are responsible for detecting and reporting potential problems on the inspection and maintenance form.

Storage tank inspections will be conducted weekly and include evaluation of the following: pumps, valves, and fittings for leaks; the tank condition for evidence of corrosion; secondary containment; evidence of spilled materials; and effectiveness of housekeeping practices.

Completed inspection forms and inspection reports will be maintained in the Primary Emergency Coordinator's office. Noncompliance issues identified during the comprehensive site evaluation will be addressed in a timely manner. If additional control measures are required, implementation of the measures will generally occur within 90 days of the site evaluation. Compliance issues that require revisions to the PPC Plan (description of additional pollutant sources, measures, or controls) will be incorporated into the plan within approximately 15 days of the site evaluation.

Stormwater Management System: Stormwater inspections will include an evaluation of best management practices (BMPs), where appropriate. In accordance with the erosion and sedimentation control plan prepared for the site, erosion and sedimentation control (ESC) measures will be implemented where there is the potential for sediment or soil particles to impact stormwater quality. Repairs will be made, as necessary, following the site inspection.

Storage Tanks and Drum Storage Areas: Tanks and drum storage areas will be accessed daily. Spills or leaks that may occur will be contained by secondary containment and noted as part of routine facility operations. To enhance the daily observations, periodic inspections will be performed for the tank and drum storage areas as described in Table 2. The inspections will include observation of spill and/or leaks and observations of the condition of associated secondary containment structures. Records for the inspections will be maintained in the Primary Emergency Coordinator's office.

3.4 PREVENTIVE MAINTENANCE

Newfield will ensure that preventative maintenance of operating machinery on each construction site is performed regularly.

3.5 HOUSEKEEPING PROGRAM

The Newfield Construction Manager will be responsible for general construction site housekeeping. Specific steps taken under this program will include:

- Debris and/or sediment removal, as necessary.
- Regular refuse pickup and disposal.
- Proper filling and emptying of storage containers, tanks, and equipment to minimize spill potential.
- Periodic review of good housekeeping procedures in the employee-training program.

Once completed, the Production Manager will have overall responsibility for housekeeping at the facility. Newfield currently does not anticipate that bulk quantities of hazardous waste materials will be stored at the facility.

3.6 SECURITY

The facility is not fully fenced but is located in a remote location with limited access except via the site access road. The facility is normally manned during drilling and well development.

Flow and drain valves are locked and in the off position when in non-operational or non-standby status. The starter controls for each oil pump are locked in the off position when in non-operating or non-standby status. Master flow/drain valves are all located on the Facility and monitored by staff.

Any loading/unloading connections of facility piping is capped or blind flanged when not in service or is in standby service for an extended amount of time.

The facility has lighting sufficient for detection of spills during nighttime operations. Consideration has been given to: (a) discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel, and (b) prevention of spills occurring through acts of vandalism.

3.7 EXTERNAL FACTOR PLANNING

External factors are not anticipated to increase the risk of a spill or release that would impact human safety or the environment. Power outages, adverse weather conditions, or employee strikes could result in discontinuation of earth moving, drilling or well preparation activities. The Emergency Coordinator will monitor operations and initiate their orderly shutdown when necessary.

Access road conditions may be impacted by adverse weather conditions, possibly increasing the risk of a release of materials being delivered or removed. Truck drivers should report poor road conditions to the Construction or Drilling Manager. If conditions deteriorate to where they may impact safe movement of materials, the construction or Drilling Manager will review the conditions and initiate repairs or road closure as deemed necessary.

3.8 EMPLOYEE TRAINING PROGRAM

Newfield's employee training program enables employees to understand the processes and materials with which they are working, the safety and health hazards, the practices for preventing spills, and the procedures for responding properly and rapidly to spills. It also familiarizes personnel with emergency procedures.

All Newfield employees receive job specific training. Emergency Coordinators, Well Tenders, and other oil or hazardous material handling employees receive annual training on the facility's PPC and SPCC plans.

Job specific training includes preventive maintenance, inspection and monitoring activities, shut down procedures and housekeeping practices. PPC training will include spill/release recognition, initial response, initial notifications and follow-up. The training program is designed to ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communications and alarms systems; response to fires and explosions; site evacuation procedures; and shutdown of operations.

Annual right-to-know training for all facility employees is conducted relevant to the materials present at the facility. Employees will be given detailed instructions regarding the materials and wastes with which they are working; including safety and health hazards, handling methods, proper disposal procedures, and emergency procedures. The location of MSDS's for on-site materials will be identified to all employees.

Training records will be maintained at the facility and in the employee's personnel file.

4.0 COUNTERMEASURES

4.1 COUNTERMEASURES TO BE UNDERTAKEN BY FACILITY

The following sections present general spill response practices to be implemented at the Newfield facility, as appropriate.

4.1.1 Spill Clean-Up Procedures - General

Incidental spills should be contained and cleaned up when discovered per the employees job related training. Clean up material should be placed into a marked container and the Construction or Drilling Manager notified appropriately.

For large spills or spills of oils or hazardous materials which may reach surface water or impact the environment, the employee who first discovers the spill should contact the Emergency Coordinator. He should then work to contain and clean-up the spill.

Spill clean-up involves three steps: containment, removal, and disposal. In the event of a spill, it is very important that the material be contained to the maximum extent possible in order to minimize the effect of the spill and the cost of clean-up. **NOTE: ANY SHEEN ON A WATERBODY (STREAM, RIVER, OR WETLAND) IS A REPORTABLE RELEASE.** Once the spill is contained, the spilled material and contaminated material must be collected and physically removed from the area

4.1.2 Spill Clean-Up Procedures - Specific

The employee should do the following:

- Contain the spill to the smallest area possible using absorbent materials, earthen dikes or other diversion or containment structures. Stormwater collection structures will be either blocked or pumped.
- Block off the area to prevent traffic or employees from entering the area.
- For oils and other organic materials, apply a non-reactive sorbent material, such as Oil-Dri or Kitty Litter, to the spill.
- In the case of a spill of acids hazardous waste, check the MSDS and then neutralize with lime or soda ash if appropriate.
- If a leaking tank is involved, stop liquid flows as appropriate and dike the tank area with earth or absorbent material.

- If a leaking pail, drum or other small container is involved, place it in an over-pack container.
- Clean up spilled material and place it in a marked container.
- Work with the emergency coordinator to properly store the material and arrange for proper disposal

4.1.3 Fire or Explosion

In the case of a fire or explosion, the local fire department should be notified by calling 911. Employees may attempt to extinguish fires using handheld fire extinguishers based upon their job training.

The Emergency Coordinator will determine if evacuation per section 4.4 is required.

4.2 COUNTERMEASURES TO BE UNDERTAKEN BY CONTRACTORS

The following list shows area emergency response contractors to contact should the facility require outside help.

Company: Minuteman Spill Response, Inc.
Address: P.O. Box 10
Mifflinville, PA 18631
Telephone Number: 570-759-3658
Response Time: Approximately 2 to 3 hrs
Equipment and Services: Hazardous Materials Emergency Response

4.3 INTERNAL AND EXTERNAL COMMUNICATIONS AND ALARM SYSTEM

This section describes the internal communications or alarm used to provide immediate emergency instruction (voice or signal) to installation personnel, and the external communications or alarm system used to summon emergency assistance from local police or fire departments.

Newfield facilities in Wayne County are remote and generally do not have land-line telephone systems or alarm systems. The primary means of communication is via voice or mobile telephones. Mobile phones are provided to the Drilling and Production Managers (Primary and Secondary Emergency Coordinators).

Fire, police, and emergency service can be summoned by calling the 911 or per the numbers listed in Table 3.

4.4 EVACUATION PLAN

In the unlikely event that the site must be evacuated, the Emergency Coordinator will alert personnel to re-group at the pre-designated location for attendance taking. The Emergency Coordinator is responsible to verify that all site workers are accounted for during an evacuation. Periodic drills will be conducted, if deemed necessary, to evaluate the effectiveness of this evacuation plan.

If an emergency situation requires evacuation of personnel, the Emergency Coordinator will implement the following evacuation procedures:

1. The Emergency Coordinator will provide evacuation instructions to facility personnel via the construction site communications network, as appropriate.
2. Personnel evacuation will typically proceed as follows:
 - a. If downwind of incident: Evacuate via the most accessible route perpendicular to the prevailing wind direction.
 - b. If upwind of incident: Evacuate in an upwind direction.
3. Personnel will reassemble at the public road at the facility entrance as shown on Figure 3 or an alternate assembly point identified by the Emergency Coordinator, that is upwind of the incident location, and remain at this location until the Emergency Coordinator has accounted for all personnel.
4. The names of employees and the destination of employees transported to hospitals, etc. for treatment will be recorded by the Emergency Coordinator, first aid personnel or fire officials.

Once on public roadways, evacuation routes are left up to the individual.

4.5 EMERGENCY EQUIPMENT AVAILABLE FOR RESPONSE

This section provides a list of available emergency equipment, and procedures for maintenance and decontamination of emergency equipment. Newfield's emergency equipment at the facility will allow personnel to respond safely and quickly to emergency situations. Equipment will be inspected and maintained by Construction Manager to assure recommended quantities are available and its proper operation in time of emergency. After an emergency, equipment will be decontaminated, cleaned, and re-fit for its intended use before normal operations resume.

The Newfield facility will be equipped with the following emergency response equipment:

- (1) Mobile telephones are provided to the Drilling and Production Managers and are immediately available at the scene of operations for summoning emergency assistance from local police departments, fire departments or State or local emergency response teams.
- (2) Portable fire extinguishers, fire control equipment, spill control equipment and decontamination equipment. This equipment is detailed in Table 4 of Appendix C.

5.0 EMERGENCY SPILL CONTROL NETWORK

5.1 ARRANGEMENTS WITH LOCAL EMERGENCY RESPONSE AGENCIES AND HOSPITALS

This section provides a list of local emergency response agencies and hospitals, and associated phone numbers. Arrangements can be made, as appropriate, to inform local emergency response agencies and hospitals concerning the type of materials handled at the Newfield facility and the potential need for services.

If appropriate, arrangements can be made to designate who will be the primary emergency response agency and who will provide support services during emergencies. Efforts can be made to familiarize police, fire departments, emergency response teams, and the Wayne County Emergency Management Agency (EMA) Coordinator with the layout of the site, the properties and dangers associated with any hazardous materials handled, places where personnel would normally be working, entrances to roads inside the site, and potential evacuation routes.

If considered appropriate by Newfield's Emergency Coordinator, agreements with hospitals and emergency response agencies can be made and included in the periodic updating or amending of the PPC Plan. The agreements and/or arrangements include efforts to familiarize area agencies and emergency responders with facility operations and potential emergency operations. The following agencies can be contacted and provided with a copy of this PPC Plan, at the discretion of the Newfield Emergency Coordinator.

- Local fire companies;
- Local county emergency response personnel;
- Local ambulance personnel; and
- Local hospital.

Table 3 lists local emergency response agencies to be contacted in the event of an emergency or reportable spill. In the unlikely event that a widespread emergency exists, the Wayne County EMA would be contacted first, and the Coordinator in turn could contact appropriate emergency response agencies through their communications network.

The Wayne County Emergency Management Agency can be contacted at (570) 253-1622. Routing of injured persons will be performed by emergency medical services personnel based on the number and type of injuries requiring treatment. The emergency medical services coordinator may be provided with a copy of this PPC Plan to assist in planning. The nearest hospitals are Catskill Regional Medical Hospital in Callicoon, New York, and Wayne County Memorial Hospital in Honesdale, Pennsylvania. The nearest fire departments are Callicoon Fire District in Callicoon, New York, Protection Engine Co No. 3 in Honesdale, Pennsylvania, and Narrowsburg Fire Department, in Narrowsburg, New York. The nearest police departments are the Honesdale Police Department, located in Honesdale, Pennsylvania, and Waymart Police Department in Honesdale Pennsylvania. All emergency response departments shall be reached through the 911 system.

5.2 NOTIFICATION LISTS

If the Emergency Coordinator determines that the facility has had an emission, discharge, fire, or explosion that could threaten human health or the environment, he will contact and report as necessary his findings to the appropriate agencies listed in Table 3. When calling any of the agencies listed in Table 3, the following information should be available for reporting to the identified agencies:

- Company name and location;
- Name of person reporting the spill, title, and telephone number;
- The type of material released;
- Estimated or exact (if known) quantity of material released (i.e., gallons, pounds, etc.);
- A brief description of the incident, including type of incident, nature of hazardous material involvement, and possible hazards to human health and the environment outside the facility;
- Probable source and location of the spill source;
- Date and time of the spill;
- Location of entry point into surface water and amount reaching the waterway (if applicable);
- The name of the receiving water and the downstream water bodies of which it is a tributary;
- Confirmation that release has been stopped or, if not, when will it be stopped;
- Mitigation/containment actions initiated;
- Direction of material movement;

- Potential population affected by the release;
- Name of person to contact on behalf of the company who will be at the scene and will be directing response measures;
- Telephone number where the on-scene coordinator can be reached; and
- The extent of injuries, if any.

A reporting form is attached in Appendix D for use by the Emergency Coordinator.

A written report including the above listed information, and other information that may be required by the applicable regulations (see 25 PA Code Section 265.56) regarding the spilled material, will need to be transmitted within 15 days to the following agencies:

U.S. Environmental Protection Agency
Region III
Spill Response Section
1650 Arch Street
Philadelphia, PA 19103

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management
2 Public Square
Wilkes-Barre, Pennsylvania 18711

6.0 WASTE DISPOSAL PRACTICES

Produced water will be removed periodically from the tanks at each well site and transported by a licensed residual waste hauler to a permitted disposal facility. Other wastes generated onsite will include used hydraulic oil that will be reclaimed from operating equipment and transported offsite for recycling. All wastes will be disposed in accordance with applicable local, state, and federal regulations.

7.0 STORMWATER MANAGEMENT PRACTICES

Newfield implements several Best Management Practices (BMPs) at each well site to reduce the potential for stormwater runoff of suspended solids and other contaminants. These BMPs include routine visual inspections, preventive maintenance, good housekeeping, and management of stormwater run-on and runoff. Routine inspection and monitoring, preventive maintenance, and good housekeeping programs are discussed in Sections 3.3, 3.4, and 3.5 of this PPC Plan. These programs prevent accidental releases of contaminants and reduce contaminant migrations via stormwater discharges. Stormwater management activities are discussed in Section 3.1 of this PPC Plan. The certification statement regarding the evaluation of discharges and confirmation that they will be comprised solely of stormwater is presented at the beginning of this Plan. Potential "significant sources of non-stormwater at the site" may include condensate, brine, hydraulic oil drums and tanks, gasoline and diesel fuel. Storage areas for these significant sources will be inspected on a daily basis.

8.0 SEDIMENT AND EROSION PREVENTION

Erosion and sedimentation controls are managed in accordance with PADEP requirements. Copies of the site E&S Plan are available at the Newfield office in Honesdale, PA and at each well site.

APPENDIX A
INSPECTION FORMS

**NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form**

Facility:	Inspector Name:
Date of Inspection:	

Instructions: Indicate yes or no. If no, record observations describing the specific equipment and discrepancy.

Aboveground Storage Tanks		
• Equipment appears adequately supported	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Coating condition appears satisfactory	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Corrosion appears acceptable	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Level gauages/alarms are operative	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Containers are labeled	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Observations:		

Processing Equipment		
• Equipment appears adequately supported	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Coating condition appears satisfactory	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Corrosion appears acceptable	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Observations:		

Other Facility Equipment is Checked for:		
❖ No evidence of active or past leaks		
❖ Condition of equipment appears to be satisfactory (i.e., not damaged, deteriorated, or worn), and		
❖ Corrosion appears to be acceptable.		
• Wellheads	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Gathering systems	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Well test stations	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Traps/Sumps	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Drainage systems and nearby ditches	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Applicable flowlines including right-of-way areas	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Containment systems	Yes <input type="checkbox"/>	No <input type="checkbox"/>
• Facility piping	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Observations:		

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Secondary Containment

- | | | |
|--|------------------------------|-----------------------------|
| • Passive containment (berm) has adequate capacity and integrity as intended | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| • Active containment measures are adequate | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| • No evidence of active or past leaks (i.e., staining, sheen) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| • Any valves are closed and plugged | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| • Active containment is free from a significant quantity of rain/snow | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

Observations:

Security

- | | | |
|--|------------------------------|-----------------------------|
| • Lighting is adequate to observe leaks, spills, and vandalism | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| • Pumps, valves, nozzles are locked | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

Observations:

Spill Response

- | | | |
|---|------------------------------|-----------------------------|
| • Spill response kits are stocked and located in readily accessible areas | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
|---|------------------------------|-----------------------------|

Observations:

Signature:

Date:

E&S INSPECTION FORM

The E&S plan contains a maintenance program which provides for inspection of BMPs (Best Management Practices such as filter sock, vegetation, construction entrances, etc.) on a weekly basis and after each measurable rainfall event, including the repair of BMPs to ensure effective and efficient operation. The maintenance program for both the temporary and permanent erosion and sediment control BMPs, including disposal of materials removed from the BMPs or project area, has been included in the narrative. The type of maintenance, such as cleanout, repair, replacement, regrading, re-stabilizing, etc. for each of the BMPs is included in the plan. **NOTE: This inspection report must be kept up to date and onsite.**

INSPECTION DATE	INITIALS	RAINFALL OR WEEKLY?	LOCATION OF E&S CONTROL(S)	CONDITION NOTED	CORRECTIVE MEASURES TAKEN

Facility: _____ Inspector: _____ Signed: _____ Date: _____
Print *Signature*

Tank Truck Loading and Unloading Checklist

Date: _____ Material being loaded/unloaded: _____

Driver/Loader present during loading or unloading of material _____
(signature)

_____ Current volume in storage tank was checked prior to loading.

_____ Fill hose inspected for condition prior to loading.

_____ Wheel chocks in place prior to loading.

_____ Tanker valve(s) were inspected for leakage prior to filling and departure.

_____ The loading of the tanker was monitored.

_____ Hoses were replaced and capped after loading.

_____ No material was spilled onto the containment pad or ground.

- These forms must be completed for every tank truck shipment and must be filed in the facility PPC Plan.
- All spills should be immediately reported to at least one of the following Newfield personnel:

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Burl Eakle
Cell: 918-448-1296

Delivery Information

Invoice No. _____

Load No. _____

Company _____

APPENDIX B
FIGURES



TETRA TECH

Figure 1
Well Field Map
Newfield Exploration Company

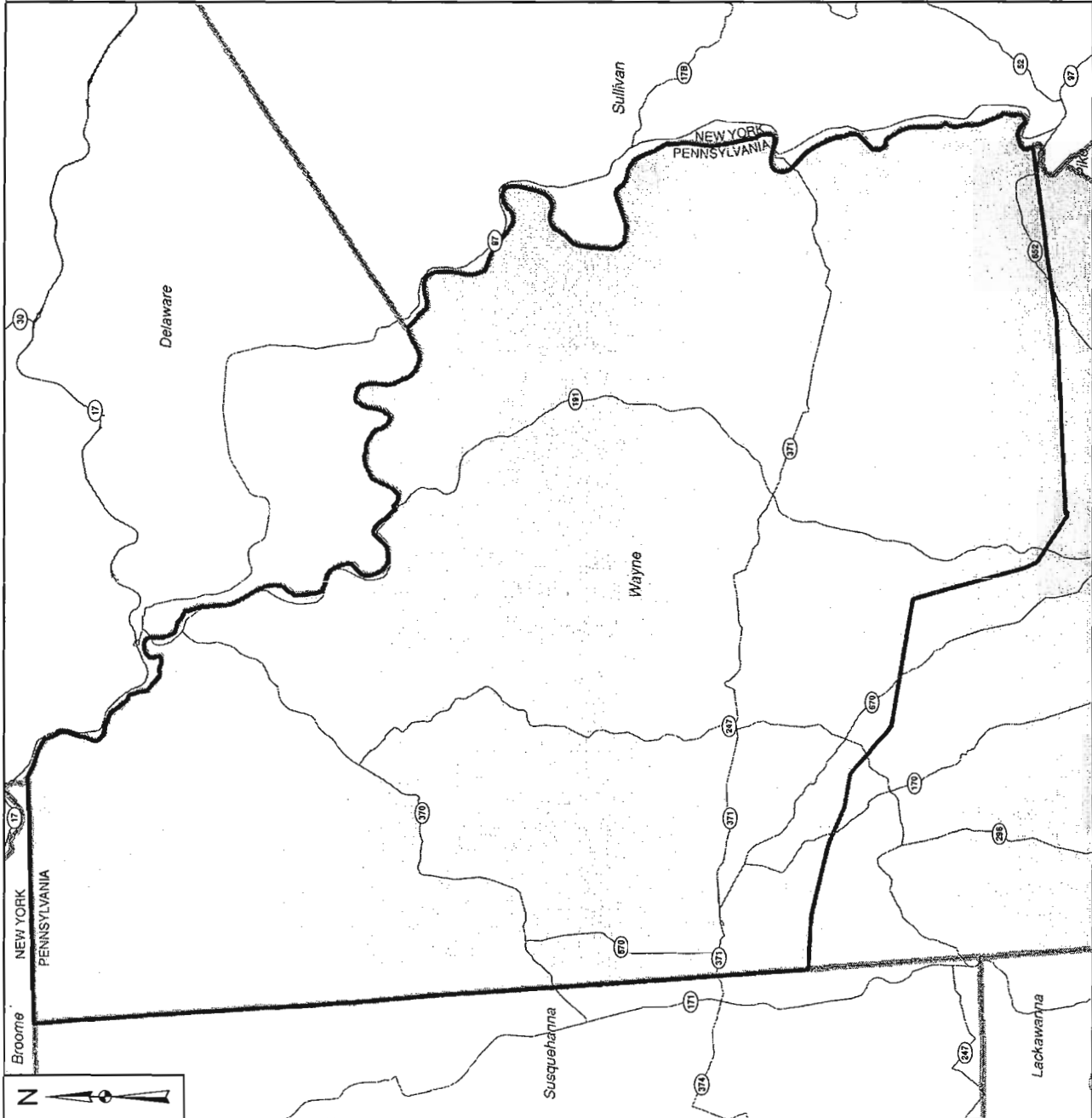
- Legend
- Road (E)
 - County (E)
 - Wayne County (E)
 - Lease Area (N)

Sources:
(E) - Indicates the data was provided by ESRI.
(N) - Indicates the data was provided by Newfield Exploration Company

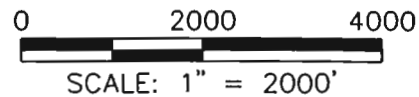


Drawn By: S. PAXTON 04/20/10
Checked By: A. STRASSNER 04/20/10
Approved By:

Contract Number: 112002679



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TETRA TECH

WWW.TETRATECH.COM

661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

NEWFIELD APPALACHIA PA, LLC
WAYNE COUNTY, PENNSYLVANIA
WOODLAND MANAGEMENT PARTNERS
WELL PAD
LOCATION MAP
SCALE: 1" = 2000'

DATE:	3/4/10
PROJECT NO.:	112C02568
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	RAL
SHEET:	1 OF 2

COPYRIGHT TETRA TECH INC.

FIGURE 2

APPENDIX C
TABLES

TABLE 1

LIST OF MATERIALS & WASTES

CONSTRUCTION

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	250 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	180 gallons	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

DRILLING

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	2000 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	320 gallons	Well Pad	Sorbent pads; shovels/Gang box
DURATONE HT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
GELTONE V	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Lime	7,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Base Fluid	300 bbl	Well Pad	Sorbent pads; shovels/Gang box
Rig Wash	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Calcium Chloride (CaCl ₂)	4,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
RHEMOD L	1,770 lbs	Well Pad	Sorbent pads; shovels/Gang box
LE SUPERMUL	8,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
BARACARB 25, 50 (2 pallets each)	12,600 lbs	Well Pad	Sorbent pads; shovels/Gang box
WALNUT	2,400 lbs	Well Pad	Sorbent pads; shovels/Gang box
DRILTREAT	1,900 lbs	Well Pad	Sorbent pads; shovels/Gang box
Liquid Mud	1,500 bbl	Well Pad	Sorbent pads; shovels/Gang box
BAROID REGULAR / **BAROID BULK (barite)	125,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Drill Cuttings	100,000 lbs	Air Pit	Sorbent pads; shovels/Gang box
Cement	130,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

TABLE 2

INSPECTION AND MONITORING ACTIVITIES

Activity	Frequency
Erosion and Sedimentation Control Measures	Weekly or after a significant rain event
Aboveground Storage Tanks	Daily
Drum Storage Areas	Daily
Best Management Practices (BMPs)	Per BMP requirements
Dust Control Measures	Daily
Preparedness, Prevention, and Contingency (PPC) Plan Compliance Evaluation Inspections and Update of PPC Plan, as Appropriate	Annually

**TABLE 3
AGENCY NOTIFICATION LIST**

The following agencies are to be contacted, as appropriate, in the event of an emergency, accident, or chemical release.

<u>Agency</u>	<u>Telephone No.</u>
PADEP Northeast Regional Office	570-826-2511
PADEP Southcentral Office (Harrisburg)	877-333-1904
Pennsylvania Emergency Management Agency	717-651-2001
Police Department	9-1-1
Volunteer Fire Department	9-1-1
U.S. Environmental Protection Agency	215-814-5700
U.S. Coast Guard National Response Center	800-424-8802
U.S. Coast Guard (local)	570-421-1191
Pennsylvania Fish and Boat Commission	814-445-8974
Chemical Transportation Emergency Center:	
* Chemical Exposure Information	800-424-9300

LOCAL EMERGENCY RESPONSE:

Fire Department –	9-1-1
Callicoon Fire District in Callicoon, New York,	
Protection Engine Co No. 3 in Honesdale, Pennsylvania	
Narrowsburg Fire Department, in Narrowsburg, New York.	
Police Department –	9-1-1
Honesdale Police Department, Honesdale, Pennsylvania	
Waymart Police Department, Honesdale Pennsylvania	
Hospitals-Wayne County Memorial Hospital, Honesdale, Pennsylvania	570-251-6672
Catskill Regional Medical Hospital in Callicoon, New York	845-887-5530
Local Emergency Management	
Wayne County EMA	570-253-1622

TABLE 4

On-Site Emergency Response Equipment

On-Site Emergency Response Equipment
Fire Extinguishers
Tyvek Suits
Nitrile Gloves
Hearing Protection
Particulate Adsorbent
Absorbent Pads
Shovels
Earth Moving Equipment
Decontamination Equipment

**TABLE 5
CHAIN OF COMMAND**

Primary Emergency Coordinator

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Secondary Emergency Coordinator

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Construction Manager

Burl Eakle
Cell: 918-448-1296

Offsite Emergency Response Contractors

Company: Minuteman Spill Response, Inc.
Telephone Number: 800-905-7788

**APPENDIX D
REPORTING FORM**

Spill Response Notification Form

GENERAL REPORTING INFORMATION			
Prepared _____			
(First)	(M.I.)	(Last)	(Position)
Daytime phone: (xxx) xxx-xxxx		Evening phone: (xxx) xxx-xxxx	
Newfield Appalachia PA LLC			
(Company)	(Address)	(City)	(State) (Zip)
Calling for responsible party? Yes		Were materials discharged? Yes Confidential? No	
Meeting Federal obligations to report: Yes			
INCIDENT DESCRIPTION			
Source and/or cause:			
Date of Incident: Time of Incident:			
Incident Location/Address			
Nearest City: XXXX, PA XXXXX (XXXXXXXX County)			
Distance from City: In city limits		Direction from City: In city limits	
Facility Oil Storage Capacity: XXXXXX gallons			
Container Type: Container Capacity: _____ (gals)			
Facility Latitude: xx° xx' xx" Longitude xx° xx' xx"			
MATERIAL			
Name (or CHRIS Code):			
Discharged Quantity (Units):		Discharged to Water (Units):	
RESPONSE ACTION			
Actions taken to correct, control or mitigate incident:			
IMPACT			
No. of Injuries:		No. of Deaths:	Other:
Evacuation (Y/N):	Damage (Y/N):	Amount (\$):	
Medium Affected:	Description:		Additional Information:
AGENCY NOTIFIED			
NRC 800-424-8802	Date:	Time:	Contact:
PADEP (570) 826-2511	Date:	Time:	Contact:
USCG	Date:	Time:	Contact:
Other	Date:	Time:	Contact:
ADDITIONAL INFORMATION:			

APPENDIX E
MSDS SHEETS



MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

EMERGENCY OVERVIEW

CAUTION!

OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED

Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer. If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).



NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800) 424-9300
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Diesel Fuel (68476-34-6)	100
Naphthalene (91-20-3)	Typically < 0.01

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES

Contact with liquid or vapor may cause mild irritation.

SKIN

May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.



MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

INHALATION

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY

Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION

Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	> 125 °F (> 52 °C) minimum PMCC
AUTOIGNITION POINT:	494 °F (257 °C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%):	0.6
UPPER EXPLOSIVE LIMIT (%):	7.5

FIRE AND EXPLOSION HAZARDS

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or Halon.



MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static



MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ["Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Components (CAS No.)	Source	Exposure Limits	
		TWA/STEL	Note
Diesel Fuel: (68476-34-6)	OSHA	5 mg/m, as mineral oil mist	
	ACGIH	100 mg/m ³ (as totally hydrocarbon vapor) TWA	A3, skin
Naphthalene (91-20-3)	OSHA	10 ppm TWA	
	ACGIH	10 ppm TWA / 15 ppm STEL	A4, Skin

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

**MATERIAL SAFETY DATA SHEET****Diesel Fuel (All Types)****MSDS No. 9909****RESPIRATORY PROTECTION**

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES**APPEARANCE**

Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR

Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE: 320 to 690 oF (160 to 366 °C)
VAPOR PRESSURE: 0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1): > 1.0
SPECIFIC GRAVITY (H₂O = 1): 0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES: 100 %
EVAPORATION RATE: Slow; varies with conditions
SOLUBILITY (H₂O): Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES**ACUTE TOXICITY**

Acute dermal LD50 (rabbits): > 5 ml/kg Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits) Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)

This material has been positive in a mutagenicity study.



MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types) **MSDS No. 9909**


12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	Diesel Fuel	Placard (International Only):
HAZARD CLASS and PACKING GROUP:	3, PG III	
DOT IDENTIFICATION NUMBER:	NA 1993 (Domestic)	
	UN 1202 (International)	
DOT SHIPPING LABEL:	None	

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

<u>ACUTE HEALTH</u>	<u>CHRONIC HEALTH</u>	<u>FIRE</u>	<u>SUDDEN RELEASE OF PRESSURE</u>	<u>REACTIVE</u>
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the *de minimis* levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

<u>INGREDIENT NAME (CAS NUMBER)</u>	<u>Date Listed</u>
Diesel Engine Exhaust (no CAS Number listed)	10/01/1990

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)



MATERIAL SAFETY DATA SHEET
Diesel Fuel (All Types) MSDS No. 9909

16. OTHER INFORMATION

NFPA® HAZARD RATING HEALTH: 0
 FIRE: 2
 REACTIVITY: 0

Refer to NFPA 704 "Identification of the Fire Hazards of Materials" for further information

HMIS® HAZARD RATING HEALTH: 1 * * Chronic
 FIRE: 2
 PHYSICAL: 0

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
 N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
AIHA	American Industrial Hygiene Association	OPA	Oil Pollution Act of 1990
ANSI	American National Standards Institute (212) 642-4900	OSHA	U.S. Occupational Safety & Health Administration
API	American Petroleum Institute (202) 682-8000	PEL	Permissible Exposure Limit (OSHA)
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]	REL	Recommended Exposure Limit (NIOSH)
EPA	U.S. Environmental Protection Agency	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
HMIS	Hazardous Materials Information System	SCBA	Self-Contained Breathing Apparatus
IARC	International Agency For Research On Cancer	SPCC	Spill Prevention, Control, and Countermeasures
MSHA	Mine Safety and Health Administration	STEL	Short-Term Exposure Limit (generally 15 minutes)
NFPA	National Fire Protection Association (617)770-3000	TLV	Threshold Limit Value (ACGIH)
NIOSH	National Institute of Occupational Safety and Health	TSCA	Toxic Substances Control Act
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	TWA	Time Weighted Average (8 hr.)
		WEEL	Workplace Environmental Exposure Level (AIHA)
		WHMIS	Canadian Workplace Hazardous Materials Information System

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

MATERIAL SAFETY DATA SHEET

Review Date: 04/23/2007

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

MSDS NUMBER: 614348LU - 1

PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

MANUFACTURER

SOPUS Products

P.O. Box 4427

Houston, TX. 77210-4427

TELEPHONE NUMBERS

Spill Information: (877) 242-7400

Health Information: (877) 504-9351

MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

INGREDIENTS	CAS#	CONCENTRATION
Heavy Duty Motor Oil		
Highly refined petroleum oils	Mixture	90 - 99 %volume
Zinc Dialkyldithiophosphate	68649-42-3	1 - 5 %volume
Proprietary additives	Mixture	1 - 5 %volume

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance & Odor: Bright and clear liquid. Mild odor.

Health Hazards: No known immediate health hazards.

Physical Hazards: No known physical hazards.

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

Hazard Rating: Least - 0 Slight - 1 Moderate - 2 High - 3 Extreme - 4

Inhalation:

Inhalation of vapors (generated at high temperatures only) or oil mist may cause mild irritation of the nose, throat, and respiratory tract.

Eye Irritation:

Lubricating oils are generally considered no more than minimally irritating to the eyes.

Skin Contact:

May cause slight irritation of the skin. If irritation occurs, a temporary burning sensation and minor redness and/or swelling may result.

Ingestion:

Lubricating oils are generally no more than slightly toxic if swallowed.

Other Health Effects:

The International Agency for Research on Cancer (IARC) has determined there is sufficient evidence for the carcinogenicity in experimental animals of used gasoline motor oils. Handling procedures and safety precautions in the MSDS should be followed to minimize exposure to the used product.

Signs and Symptoms:

Irritation as noted above.

Aggravated Medical Conditions:

Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

For additional health information, refer to section 11.

SECTION 4	FIRST AID MEASURES
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Inhalation:

Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.

Skin:

Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye:

Flush with water. If irritation occurs, get medical attention.

Ingestion:

Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

Note to Physician:

In general, emesis induction is unnecessary in high viscosity, low volatility products such as oils and greases.

SECTION 5	FIRE FIGHTING MEASURES
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Flash Point [Method]: >400 °F/>204.44 °C [Pensky-Martens Closed Cup]

Extinguishing Media:

Material will float and can be re-ignited on surface of water. Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames. Do not use a direct stream of water.

Fire Fighting Instructions:

Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure, NIOSH approved, self-contained breathing apparatus. This material is non-flammable.

Unusual Fire Hazards:

Material may ignite when preheated.

SECTION 6**ACCIDENTAL RELEASE MEASURES****Protective Measures:**

May burn although not readily ignitable.

Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

Spill Management:

FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

Place in container for proper disposal. Remove contaminated soil to remove contaminated trace residues. Dispose of in same manner as material.

Reporting:

CERCLA: Product is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion. Releases to air, land, or water are not reportable under CERCLA (Superfund).

CWA: This product is an oil as defined under Section 311 of EPA's Clean Water Act (CWA). Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 1-800-424-8802.

SECTION 7**HANDLING AND STORAGE****Precautionary Measures:**

Wash with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet. Launder contaminated clothing before reuse. Properly dispose of contaminated leather articles such as shoes or belts that cannot be decontaminated. Avoid heat, open flames, including pilot lights, and strong oxidizing agents. Use explosion-proof ventilation to prevent vapor accumulation. Ground all handling equipment to prevent sparking.

Storage:

Do not store in open or unlabeled containers. Store in a cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.

Container Warnings:

Keep containers closed when not in use. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

SECTION 8**EXPOSURE CONTROLS/PERSONAL PROTECTION**

Chemical	Limit	TWA	STEL	Ceiling	Notation
Oil mist, mineral	ACGIH TLV	5 mg/m ³	10 mg/m ³		
Oil mist, mineral	OSHA PEL	5 mg/m ³			

Exposure Controls

Provide adequate ventilation to control airborne concentrations below the exposure guidelines/limits.

Personal Protection

Personal protective equipment (PPE) selections vary based on potential exposure conditions such as handling practices, concentration and ventilation. Information on the selection of eye, skin and respiratory protection for use with this material is provided below.

Eye Protection:

Chemical Goggles, or Safety glasses with side shields

Skin Protection:

Use protective clothing which is chemically resistant to this material. Selection of protective clothing depends on potential exposure conditions and may include gloves, boots, suits and other items. The selection(s) should take into account such factors as job task, type of exposure and durability requirements.

Published literature, test data and/or glove and clothing manufacturers indicate the best protection is provided by:
Neoprene, or Nitrile Rubber

Respiratory Protection:

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, an approved respirator must be worn. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Types of respirator(s) to be considered in the selection process include:

For Mist: Air Purifying, R or P style NIOSH approved respirator.

For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Bright and clear liquid. Mild odor.

Substance Chemical Family: Petroleum Hydrocarbon

Flash Point	> 400 °F [Pensky-Martens Closed Cup]	Pour Point	-20 °F
Solubility (in Water)	Insoluble	Specific Gravity	0.88 - 0.89
Stability	Stable	Viscosity	103 cSt @ 40 °C

SECTION 10 REACTIVITY AND STABILITY

Stability:

Material is stable under normal conditions.

Conditions to Avoid:

Avoid heat and open flames.

Materials to Avoid:

Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:

Thermal decomposition products are highly dependent on combustion conditions. A complex mixture of airborne solids, liquids and gases will evolve when this material undergoes pyrolysis or combustion. Aldehydes, Carbon Monoxide, Carbon Dioxide, Hydrogen Sulfide, Ketones, Nitrogen Oxides and other unidentified organic compounds may be formed upon combustion.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity

TEST	Result	OSHA Classification	Material Tested
Dermal LD50	>5.0 g/kg(Rabbit)	Non-Toxic	Based on components(s)
Oral LD50	>5.0 g/kg(Rat)	Non-Toxic	Based on components(s)

Carcinogenicity Classification

Chemical Name	NTP	IARC	ACGIH	OSHA
Heavy Duty Motor Oil	No	Not Reviewed by IARC	Not Reviewed	No

SECTION 12 ECOLOGICAL INFORMATION

Environmental Impact Summary:

There is no ecological data available for this product. However, this product is an oil. It is persistent and does not readily biodegrade. However, it does not bioaccumulate.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

Under RCRA, it is the responsibility of the user of the material to determine, at the time of the disposal, whether the material meets RCRA criteria for hazardous waste. This is because material uses, transformations, mixtures, processes, etc. may affect the classification. Refer to the latest EPA, state and local regulations regarding proper disposal.

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

International Air Transport Association

Not regulated under IATA rules.

International Maritime Organization Classification
Not regulated under International Maritime Organization rules.

SECTION 15 REGULATORY INFORMATION

Federal Regulatory Status

OSHA Classification:
Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Ozone Depleting Substances (40 CFR 82 Clean Air Act):
This material does not contain nor was it directly manufactured with any Class I or Class II ozone depleting substances.

Superfund Amendment & Reauthorization Act (SARA) Title III:
There are no components in this product on the SARA 302 list.

SARA Hazard Categories (311/312):

Immediate Health	Delayed Health	Fire	Pressure	Reactivity
NO	NO	NO	NO	NO

SARA Toxic Release Inventory (TRI) (313):
Zinc compounds

Toxic Substances Control Act (TSCA) Status:
All component(s) of this material is(are) listed on the EPA/TSCA Inventory of Chemical Substances.

Other Chemical Inventories:
Component(s) of this material is (are) listed on the Australian AICS, Canadian DSL, Chinese Inventory, European EINECS, Korean Inventory, Philippines PICCS,

State Regulation

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

SECTION 16 OTHER INFORMATION

Revision#: 1
Review Date: 04/23/2007
Revision Date: 12/19/2006
Revisions since last change (discussion): This Material Safety Data Sheet (MSDS) has been reviewed to fully comply with the guidance contained in the ANSI MSDS standard (ANSI Z400.1-2003). We encourage you to take the opportunity to read the MSDS and review the information contained therein.

SECTION 17 LABEL INFORMATION

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

ATTENTION!

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE OIL ACNE OR DERMATITIS. USED GASOLINE ENGINE OIL HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS.

Precautionary Measures:

Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid breathing of vapors, fumes, or mist. Use only with adequate ventilation. Wash thoroughly after handling.

FIRST AID

Inhalation: If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.

Skin Contact: Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye Contact: Flush with water. If irritation occurs, get medical attention.

Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO₂) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK

Dike and contain spill.

FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

CONTAINS: Highly refined petroleum oils, Mixture; Zinc Dialkyldithiophosphate, 68649-42-3; Proprietary additives; Mixture

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

TRANSPORTATION

US Department of Transportation Classification

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LE SUPERMUL**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LE SUPERMUL

Synonyms: None

Chemical Family: Blend

Application: Emulsifier

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Diethylene glycol monobutyl ether	112-34-5	1 - 5%	Not applicable	Not applicable
Ethylene glycol monobutyl ether	111-76-2	1 - 5%	20 ppm	50 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin 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 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):	> 200Min: > 200
Flash Point/Range (C):	> 100Min: > 93
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. 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 1, Reactivity 0
HMS Ratings: Flammability 1, Reactivity 0, Health 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. 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 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.
In high concentrations, supplied air respirator or a self-contained breathing apparatus.

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
LE SUPERMUL
Page 2 of 6

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Amber
Odor:	Mild
pH:	2.6
Specific Gravity @ 20 C (Water=1):	0.924
Density @ 20 C (lbs./gallon):	7.7
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):	-6.6
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):	280-300
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)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	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 eye irritation.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Lung disorders. Skin disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause reproductive system damage. 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

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.
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 For This Product	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	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	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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® OIL ABSORBENT**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® OIL ABSORBENT
Synonyms: None
Chemical Family: Mineral
Application: Suspending Agent

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Magnesium silicate	1343-90-4	60 - 100%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	2-6	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. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

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

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. Do not reuse empty container. Product has a shelf life of 60 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:	Granules
Color:	Gray to tan
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32-38
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 anticipated
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 eye irritation.
Ingestion	May be harmful if swallowed.
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 Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
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	Product contains one or more components not 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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **RHEMOD L**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: RHEMOD L
Synonyms: None
Chemical Family: Tall oil fatty acid
Application: Viscosifier

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fatty acids, C18-unsatd., trimers	68937-90-6	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye and skin irritation. May be harmful if swallowed.

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):	518
Flash Point/Range (C):	270
Flash Point Method:	COC
Autoignition Temperature (F):	> 425
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

Special Exposure Hazards Decomposition in fire may produce toxic gases.

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

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMS Ratings: Flammability 0, Reactivity 0, Health 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. Scoop up and remove.

7. HANDLING AND STORAGE

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

Storage Information Store in a cool, dry location. Product has a shelf life of 36 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:
Organic vapor respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Normal work coveralls.

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:	Dark
Odor:	Fatty acid
pH:	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	0.96
Density @ 20 C (lbs./gallon):	8
Bulk Density @ 20 C (lbs/ft3):	57.30
Boiling Point/Range (F):	> 572
Boiling Point/Range (C):	> 300
Freezing Point/Range (F):	< -4
Freezing Point/Range (C):	< 25
Vapor Pressure @ 20 C (mmHg):	< 0.001
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	0
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	1849 @ 25C
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 known.
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye and skin contact.
Inhalation	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 mild eye irritation.
Ingestion	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	Skin disorders.
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:	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 Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
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	One or more components listed.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® RIG WASH**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® RIG WASH
Synonyms: None
Chemical Family: Blend
Application: Surfactant

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Isopropanol	67-63-0	1 - 5%	200 ppm	400 ppm

3. HAZARDS IDENTIFICATION

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

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. 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: If swallowed dilute with 1-2 glasses of milk or water and then induce vomiting.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined	Min: > 220
Flash Point/Range (C):	Not Determined	Min: > 104
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.

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: Flammability 0, Reactivity 0, Health 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. 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. Keep container closed when not in use. 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 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:	Clear blue
Odor:	Slight Alcohol
pH:	9.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	1.025
Density @ 20 C (lbs./gallon):	8.5
Bulk Density @ 20 C (lbs/ft ³):	63.6
Boiling Point/Range (F):	> 212
Boiling Point/Range (C):	> 100
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 known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. 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 eye irritation.
Ingestion	May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Skin disorders.
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:	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 Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute 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: Glycol Ethers//34398-01-1 Isopropanol//67-63-0
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	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	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*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: FWCA CEMENT ADDITIVE

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FWCA CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polysaccharide
Application: Free Water Control 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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	10 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye 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
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	770
Autoignition Temperature (C):	410
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 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 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.

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. (95%)

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:	White
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	6.5
Specific Gravity @ 20 C (Water=1):	1.39
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft ³):	32
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:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
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):	>600

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	Aldehydes. Carboxylic acids. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
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:	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	Readily biodegradable
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	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.
WHMIS Hazard Class	Un-Controlled

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 322 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 322 CEMENT ADDITIVE

Synonyms: None

Chemical Family: Blend

Application: Cement 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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium formate	141-53-7	1 - 5%	Not applicable	Not applicable
Cellulose derivative		10 - 30%	10 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause 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
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 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 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 Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location.

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. (95%)

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:	Red
Odor:	Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.28
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35.2
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):	Partially soluble
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):	>600

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 sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause 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:	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 Readily biodegradable
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	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	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	Un-Controlled

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.
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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.
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END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 344 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 344 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polymer
Application: Fluid Loss 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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified acrylamide copolymer		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye and respiratory irritation.

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: 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: 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 spray, dry chemical, or foam.

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 0, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 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. Do not swallow. Avoid contact with eyes, skin, or clothing.

Storage Information Store in a cool, dry location. Store away from oxidizers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Nitrile gloves. Polyvinylchloride gloves. Neoprene gloves. Rubber gloves. Butyl rubber gloves. Cloth 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

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to off white
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.37
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	25-35
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	18
Freezing Point/Range (C):	-8
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
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):	>600

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	Oxides of nitrogen. 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.
Skin Contact	Prolonged or repeated contact may cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	No adverse health effects are expected from swallowing.
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:	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	BOD(28 Day): 3% of COD
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM48: 2000 mg/l (Arcatia tonsa)
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	EC50: 3300 mg/l (Skeletonema costatum)

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	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	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	Un-Controlled

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*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-5**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-5
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye and respiratory irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

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

Special Exposure Hazards Decomposition in fire may produce toxic gases.

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

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

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

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 in a cool, dry location.

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. (95%)

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:	Black
Odor:	Molasses
pH:	9.5-10.3
Specific Gravity @ 20 C (Water=1):	1.32

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	29.8
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):	25
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 sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
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:	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 Readily biodegradable
Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: > 1000 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 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	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.
WHMIS Hazard Class	Un-Controlled

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-601**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-601
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye and respiratory irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.2
Flammability Limits in Air - Upper (%):	Not Determined
Flammability Limits in Air - Upper (oz./ft3):	3.5

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 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 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. (95%)

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:	Brown
Odor:	Woody
pH:	7.8
Specific Gravity @ 20 C (Water=1):	1.08
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30.5
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 (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 anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
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: > 5000 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:	TLM48: > 1000 mg/l (Daphnia magna)
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.
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.
WHMIS Hazard Class	Un-Controlled

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*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: KCL POTASSIUM CHLORIDE

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: KCL POTASSIUM CHLORIDE
Synonyms: None
Chemical Family: Inorganic Salt
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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Potassium chloride	7447-40-7	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

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, 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 Not applicable.

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

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

Storage Information Store in a cool, dry location. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Dust proof goggles.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White to gray
Odor:	Odorless
pH:	9.2
Specific Gravity @ 20 C (Water=1):	1.99
Density @ 20 C (lbs./gallon):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Bulk Density @ 20 C (lbs/ft ³):	72.8
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):	25.5
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):	74.55

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	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause moderate 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.
Aggravated Medical Conditions	Skin disorders.
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: > 5000 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 Not determined
Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: 100-330 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 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
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.
WHMIS Hazard Class	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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **POZ STANDARD CEMENT 50/50**

Revision Date: 05-Jan-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: POZ STANDARD CEMENT 50/50
Synonyms: None
Chemical Family: Cement
Application: Cement

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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fly ash	68131-74-8	30 - 60%	Not applicable	Not applicable
Bentonite	1302-78-9	1 - 5%	Not applicable	Not applicable
Portland cement	65997-15-1	30 - 60%	10 mg/m ³	15 mg/m ³
Crystalline silica, quartz	14808-60-7	1 - 5%	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, skin, 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. Get medical attention if irritation persists.
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	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 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

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

Storage Information Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 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	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	Not Determined
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):	Not Determined
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)	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	Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.
Eye Contact	May cause severe eye irritation.
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, <u>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 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	E Corrosive Material 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*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CEMENT - CLASS H - PREMIUM**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CEMENT - CLASS H - PREMIUM
Synonyms: None
Chemical Family: Cement
Application: Cement

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

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Portland cement	65997-15-1	60 - 100%	10 mg/m ³	15 mg/m ³
Crystalline silica, quartz	14808-60-7	<3	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, skin, 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. Get medical attention if irritation persists.
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	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 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

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	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 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	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	3.15
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:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.5
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	Keep away from any contact with water.
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	Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.
Eye Contact	May cause severe eye irritation.
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 Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
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	E Corrosive Material 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*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 25**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 25
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier Baroid Drilling Fluids
a Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2
Limestone	1317-65-3	60 - 100%	10 mg/m ³	15 mg/m ³

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

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

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

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 Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. 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 away from acids. 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. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. 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 Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft³):	168
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 acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. 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	May cause skin irritation.
Eye Contact	May cause eye irritation.
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:	LD50: > 5000 mg/kg (Rat)
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:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
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.
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 For This Product	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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 50**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 50
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Limestone	1317-65-3	60 - 100%	10 mg/m ³	15 mg/m ³
Crystalline silica, quartz	14808-60-7	0 - 1%	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, skin, 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. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

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

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 Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. 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 away from acids. 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. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. 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 Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	72-112
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 acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. 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	May cause skin irritation.
Eye Contact	May cause eye irritation.
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:	LD50: > 5000 mg/kg (Rat)
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 (June 1997)</u> .
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:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
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.
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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID®**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID®
Synonyms: None
Chemical Family: Mineral
Application: Weight Additive

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Barium sulfate	7727-43-7	60 - 100%	10 mg/m ³	15 mg/m ³
Crystalline silica, quartz	14808-60-7	1 - 5%	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, skin, and respiratory irritation. May be harmful if swallowed.

DANGER! - CHRONIC HEALTH HAZARD

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

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

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	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 Not applicable.

Special Protective Equipment for Fire-Fighters Not applicable.

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

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. Do not reuse empty container. Product has a shelf life of 60 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:	Pink to tan to gray
Odor:	Odorless
pH:	8-9-
Specific Gravity @ 20 C (Water=1):	4.2
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	100- 155
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):	233.4

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	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 mild eye irritation.
Ingestion	May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.
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:	TLM96: 7500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 132.6 ppb
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.
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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LIME**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LIME
Synonyms: None
Chemical Family: Inorganic
Application: pH Control

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium hydroxide	1305-62-0	60 - 100%	5 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

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

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. 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

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 Not applicable.

Special Protective Equipment for Fire-Fighters Not Determined

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

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 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 acids. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

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:	Solid
Color:	White
Odor:	Odorless
pH:	12.2
Specific Gravity @ 20 C (Water=1):	2.24
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	75
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

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):	0.2
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):	74.1

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Causes severe skin irritation. May cause skin burns on prolonged contact.
Eye Contact	Causes severe eye irritation May cause eye burns.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Skin disorders.
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: 7340 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 Not determined
Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 100-500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: 478,520 ppm (Mysidopsis bahia) SPP @ 8 ppb
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 Empty container completely. Transport with all closures in place. Return for reuse or dispose in a sanitary landfill according to 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

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
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 For This Product	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	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	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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WALNUT HULLS**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WALNUT HULLS
Synonyms: None
Chemical Family: Nut Hulls
Application: Loss Circulation Material

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Walnut hulls	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye irritation.

4. FIRST AID MEASURES

Inhalation: Under normal conditions, first aid procedures are not required.

Skin: Under normal conditions, first aid procedures are not required.

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 - Lower (oz./ft ³):	0.07
Flammability Limits in Air - Upper (%):	Not Determined

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

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 dry location.

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. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Safety glasses.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid
Color: Brown
Odor: Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.1
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):	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)	Strong oxidizers.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
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:	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 Biodegradable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 10 ppb

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.
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 For This Product	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.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

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

Not applicable

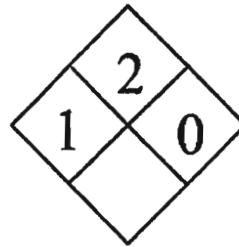
Additional Information For additional information on the use of this product, contact your local Halliburton representative.

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

SECTION I - MANUFACTURER

Integrity Industries, Inc.
2710 E. Corral St.
Kingsville, Texas 78363
Emergency Phone: (361) 595-5561

Revised Date: 06/05/2008
Supersedes: new

THIS DOCUMENT IS PREPARED PURSUANT TO THE OSHA HAZARDOUS COMMUNICATION STANDARD (29 CFR 1910.1200). ALSO, OTHER SUBSTANCE NOT DEEMED "HAZARDOUS" PER THIS MSDS MAY BE LISTED.

SECTION II - MATERIAL IDENTIFICATION

Trade Name: **SYNVERT Base Oil**
Synonyms/Other Designations: Synthetic Drilling Fluid / Polymer Suspension Base
Placard: Not Applicable
Hazard(s): non-hazardous

<u>Component</u>	<u>CAS Number</u>	<u>Weight</u>
Paraffin/Olefin blend	Mixture	100%

SECTION III - PHYSICAL & CHEMICAL DATA

Boiling Point: IBP > 300 °F	Pour Point: ND
Specific Gravity (H2O=1): 0.766	Vapor Pressure (mm Hg @ 68 °F): 0.135
Vapor Density (Air=1): n/a	Solubility in H2O: Insoluble
Appearance: Clear, oily liquid	Viscosity (cSt @104 °F): 1.4

SECTION IV - REACTIVITY

Stability: Stable
Incompatibility: Heat, sparks, open flame. May react with strong acids/strong oxidizing agents, chlorates, nitrates, peroxides.
Hazardous Decomposition Products: Oxides of carbon. Hazardous Polymerizations: will not occur

SECTION V - FIRE & EXPLOSION DATA

Flash Point (ASTM D-93): > 200 °F
Autoignition: n/a
Extinguishing Media: Water spray, Dry Chemical, Foam, CO2
Special Fire Fighting Procedures: Respirators/eye protection and full firefighting protective gear.
Unusual Fire Hazards: Remove containers from source of heat.

**TABLE 3
AGENCY NOTIFICATION LIST**

The following agencies are to be contacted, as appropriate, in the event of an emergency, accident, or chemical release.

<u>Agency</u>	<u>Telephone No.</u>
PADEP Northeast Regional Office	570-826-2511
PADEP Southcentral Office (Harrisburg)	877-333-1904
Pennsylvania Emergency Management Agency	717-651-2001
Police Department	9-1-1
Volunteer Fire Department	9-1-1
U.S. Environmental Protection Agency	215-814-5700
U.S. Coast Guard National Response Center	800-424-8802
U.S. Coast Guard (local)	570-421-1191
Pennsylvania Fish and Boat Commission	814-445-8974
Chemical Transportation Emergency Center:	
* Chemical Exposure Information	800-424-9300

LOCAL EMERGENCY RESPONSE:

Fire Department –	9-1-1
Wayne County Company #3, 13, 21, 28, 43, and 65	
Police Department –	9-1-1
PSP, Honesdale, Pennsylvania	
Hospitals/Ambulances-	
Damascus Township Ambulance, Pennsylvania	9-1-1
MT Pleasant Ambulance	
Northern Wayne Ambulance	
Mobile 504	
Wayne County Memorial Hospital, Honesdale, Pennsylvania	570-251-6672
CMC – Trauma Center, Scranton, Pennsylvania	570-969-8128
Catskill Regional Medical Hospital in Callicoon, New York	845-887-5530
Local Emergency Management	
Wayne County EMA	570-253-1622

Air Quality Concerns at Woodland Management Gas Drilling Site, Damascus, PA

15 September 2010

Greg Swartz and Tannis Kowalchuk

The drilling of the Woodland Management Gas well was completed about 2 weeks ago and the drilling rig has been moved to the Crum site in Milanville, PA. Our farm and home are located 0.3 miles from the Woodland site. This past Sunday September 5, we smelled a very strong chemical sulfuric odor. We were busy picking and packing vegetables for a farmers market and we did not do anything about the odor. Monday morning the odor was again present. Here is a summary of events:

<u>September 5</u>	7am	Smelled chemical sulfuric odor. Lessened by afternoon.
<u>September 6</u>	9am	Smelled chemical sulfuric odor
	9:38am	Telephoned the DEP Emergency Response Line. Call was answered by an answering service who indicated that they would page DEP personnel. We received no call back from the DEP.
	10:20am	Called 911 to report the odor
	10:30am	Equinunk Volunteer Fire Department responded. They confirmed the odor. The Chief immediately went to the Woodland well site and inspected the pad and waste pond. Chemical odor was evident. He spoke with security personnel there who indicated that the waste water pond was to be pumped on Tuesday (9-7). Fire Department indicated that they were not concerned about the air quality and they left.
<u>September 7</u>	10am	Smelled chemical sulfuric odor. Heavy tanker truck activity- ostensibly emptying the waste pond.
	12:58pm	Called DEP Northeast Regional Office. They had no record of our call and referred me to Northcentral office who handles oil and gas issues.

12:59 Called DEP Northcentral Regional Office and left a message with the person I was directed to. We called without leaving a message several more times throughout the afternoon- no one answered.

4:15pm Called DEP Northcentral office again and left a message. We have still not received a call back.

September 8

9:00am Chemical sulfuric odor not present. Called DEP Northcentral Regional Director, Nels Taber. His assistant connected us with Jennifer Means, DEP Northcentral Oil and Gas Program Manager. We related the events of the past 3 days. She had no record of our initial emergency call and indicated that normally she receives the emergency calls. She indicated that she would research what went wrong and that she would be back in touch with us. We requested that an inspection be done of the well site.

4:10pm We received a call from Denise Brinley (DEP Deputy Secretary) and Kerry Leib (DEP Emergency Management Coordinator) who were asking for further information. They said:

1) the answering service had no record of our call and they don't know why the communication breakdown occurred.

2) Northcentral staff person who I spoke with should have handled my call on Tuesday differently because they do in fact have inspection staff in Scranton

3) They issued an order to send an inspector to the site this morning at 11am. They weren't sure when s/he would arrive.

4) They will be back in touch to respond to the lack of response from the DEP and with a report from the inspector.

September 9

4:30pm Kelly Hefner, DEP Deputy Secretary for Field Operations left a phone a message.

September 10	9:00am	Spoke with Kelly Hefner. She offered her “sincere apology” for the troubles we have had with DEP. She confirmed that they have no record of our call. She said that an inspector was on site on Tuesday and Wednesday. We asked for: Air quality tests, water tests, soil tests, location of waste water treatment. We also asked what chemicals used in the drilling process would cause the sulfur odor. She promised results by Monday.
September 13	12:30pm	Left message for Heffner
	5:30pm	Heffner left message for us
September 14	10:00am	Left message for Heffner
	1:47pm	Left message for Heffner
	5:15pm	Heffner left a message for us saying she was in meetings and too busy to call earlier.

We are deeply concerned about the environmental and health impacts of drilling, in particular for the health of our 2 year old son. This specific case of air quality is troubling. What is even more troubling is the DEP’s lack of response to our call. We don’t know exactly what has been flying in the air. It may or may not be acutely toxic. It was a significant enough event that the DEP should have investigated immediately. This event highlights that the DEP is not prepared to handle the environmental risks which are part and parcel of gas drilling. We are still waiting for an official response and explanation from the DEP. We can’t help but wonder what will happen when there is a catastrophic gas drilling emergency and how long it will take DEP to respond? Our volunteer fire department was here almost immediately and professionally handled the situation. However, they are not trained in air quality monitoring or any of the other potential fallout from gas drilling.

Greg Swartz and Tannis Kowlachuk
25 Stone House Rd, Damascus, PA
570-224-8013
greg@willowwisporganic.com, tannis@nacl.org

9-16-10 Email Correspondence from PADEP Acting Deputy Secretary Kelly Hefner concerning my outstanding questions about odor at the Woodland site. Attached to this correspondence were the 2 inspection reports and water test from 8-10-10 (see below).

Good Afternoon Mr. Swartz:

As we have discussed the phone side of the matter and you have taken my word that it has been addressed (thank you), I will simply add I am sorry the call was mishandled, but we have been able to make some changes that will prevent this in the future.

As we have further discussed your concerns, I have attempted to address the questions you posed when we talked on Friday and to answer the questions you posed in your Thursday morning email. I apologize that we keep missing each other.

Attached please find the answers to the questions posed at the end of last week re: the pit on the Woodland Management Site, Operated by Newfield

1. Yes, the wastewater from the pit was sampled and those results are attached.
2. The water in the pit and tanks was hauled offsite by Koberlein Environmental. They are a DEP approved waste hauler. The water went to the waste disposal facilities of Eureka Resources LLC (Williamsport, Pa.) and Waste Treatment Corporation in Warren, Pa. Manifests are on file for every load of this water hauled and disposed of.
3. Air monitoring for hydrogen sulfide (H₂S) gas was not conducted. There was no air quality monitoring by DEP or the Fire Department.
4. DEP has investigated these type of pits turning septic (anaerobic digestion which generates H₂S) in other parts of the Commonwealth. As of now, there is not certainty about what the food source is for the bacteria, but we suspect that it might be from drilling fluids. Some companies have added sulfide scavengers to the pits to prevent the bacterial action.

It is fairly common for H₂S to be released into the environment from natural decomposition and our staff encounters it fairly regularly. Similar to what occurs at a wetland, the sludge at the bottom of an impoundment can undergo anaerobic digestion and release H₂S gas. Because H₂S gas has a low odor threshold, humans smell it at very low concentrations. High concentrations are highly unusual in an outdoor, well-ventilated area.

DEP was not able to have air tests done prior to the removal of the fluids on the Tuesday after Labor Day. There are limited mobile units and they are deployed in other locations in the Northern Tier doing testing but were not there on Labor day or September 7th. The odor developed in just a few days (3) due to bacteria in the pit. The H2S indeed smells bad, and is certainly irritating, but it is very, unlikely to have caused any health impacts in this circumstance. Removing the water expeditiously was the correct response.

Inspection Summary (field report attached)

NEWFIELD APPALACHIA PA LLC
WOODLAND MGMT PARTNERS 1 1
Permit 127-20017
Spud date (initiation of drilling activities) was 06/25/2010
Damascus Township, Wayne County

In response to a complaint by Mr. Greg Swartz of sulphur odors emanating from the above referenced well site, on September 8, 2010, Oil & Gas Inspector Steve Watson inspected the site and documented the following. The service contractor on-site, H&K Construction, was in the process of dewatering the reserve pit. As they pump the fluid to the frac tanks and then to the tanker trucks for transport and disposal, odors from the pit are emitted through vents on the tanks. Also, stirring up the fluid in the pit allowed odors to release to the atmosphere as well. At the time of the inspection, 95% of the fluid had already been removed from the pit. They were planning on solidifying the pit and then folding over the liner to prepare for encapsulation on Thursday, September 9, 2010. The Department intends to complete an additional inspection of the site today Friday, September 10, 2010. At the time of this e-mail, the findings of this Friday inspection have not yet been reported back to the regional office.

The Department also inspected this site on Thursday September 2, 2010, prior to the initial complaint received on either Monday or Tuesday, September 6 or 7, 2010. During this inspection it was noted that the service contractor was the only party on site. Trucks were hauling off the last pieces of the drilling rig to be moved to the next planned drilling site. Two workers were observed skimming off an oil sheen on the pit fluids, the liner was inspected showing no holes or tears. Several frac tanks are located on site for temporary storage of the fluids being removed. The only odors detected during this visit were those that would be associated with drilling fluids and/or cuttings.

Text from Thursday 9/16 email

Good Morning Ms. Heffner,

Thank you for taking the time to send the pit water test results from 8-10-10. These results are of interest to me yet they do not represent pit contents after 8-10-10. I believe that drilling activities continued past that date. You will recall from our conversation on 9-10-10 that I requested the report and test results from your inspector's visit to the Woodland site the week of 9-6. I was told that you sent an inspector on 9-7 and 9-8. I respectfully again request the following information:

- 1) Inspector's full reports from 9-7 and 9-8. [These are attached.](#)
- 2) Pit water test results from that day(s). [There is no additional water test data.](#)
- 3) Air quality test results from that day(s) [There is no site specific air quality data.](#) DEP's MAU (Mobile Analytical Unit) is doing multi-area samplings across the Northern Tier over the next 4 weeks. As this information is synthesized, DEP will make it available.

4) Explanation of what chemical used in the drilling process would create the odor that we and 911 responders observed

At this time DEP is still unsure of the specific “chemical” that triggers the sulfide reaction. As I mentioned previously, DEP has seen this problem in other areas of the state.

5) Health implications of said odors

H₂S is primarily an eye irritant. The H₂S was very smelly; it was being released in a well ventilated area and there is limited

6) Destination of waste water which has been trucked off site. See number 2 above.

I have to leave the office early today, but will be in tomorrow

Kelly Heffner

Kelly Jean Heffner | Acting Deputy Secretary
Office of Field Operations
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.5028 | Fax: 717.772.3314
www.depweb.state.pa.us



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	Inspection Record #
	Enforcement Record #
Complaint Record #	

INSPECTION REPORT

DEP Office	Swanton	Phone	570 346 5541	Permit or Reg. #	127-20017
Address	101 Penn Ave Swanton PA 18503			Project #	
Oper Name	Newfield Appalachia			Farm Name & Well #	Woodland Mgt Partners I
Address	119 Lincoln Street Honesdale PA 18431			County	Wayne
				Municipality	Damascus
				Latitude:	0 ' " N
				Longitude:	0 ' " W

Inspection Code:

<input type="checkbox"/> BDREL - Bond Release	<input type="checkbox"/> DRALT - Drilling or Alteration	<input type="checkbox"/> RDSPR - Road Spreading
<input type="checkbox"/> CEI - Compliance Evaluation	<input checked="" type="checkbox"/> FLWUP - Follow-up	<input type="checkbox"/> RESTR - Site Restoration
<input type="checkbox"/> COMPL - Complaint Inspection	<input type="checkbox"/> PLUG - Plugging	<input type="checkbox"/> RTNC - Routine

Other: Permit Expired Alt/Meth. Annulus Open Cement Returns Recommend Bond Release

Fold Line

Location	Insp.	Violation	Driller's Log Information			Depth:	
			Fresh Water Amt / Depth	Salt Water Amt / Depth	Coal Thickness / Depth	Formations Oil / Depth Gas / Depth	
Site ID Sign	X						
Well Tag							
Distance Restrict							
E/S Plan on Site							
E/S Controls							
Encroachments							
Site Restoration							
Drilling / Plugging							
Drilling-Plugging			Filling Material & Plugs			Casing & Tubing	
Notification			From	To	Size	Pulled	Left
B.O.P.							
Casing							
Monument							
Waste Mgmt.							
Top Hole Water							
Fluids Mgmt.	X						
Impoundment/pit	X						
Pollution Prevent	X						
Residual Waste							
			Compliance Assistance	Code	Code	Inspection Results	Code
							NOU10

Remarks: Follow up inspection to determine activity on well. At time of inspection, trucks hauling off last few pieces of rig to next site (CRUM). H-K contracting on site. Two workers skinning off oily sheen from reserve pit. I inspected lines - no tears were observed. Several fract tanks on site are to be used to temporarily store fluid from pit as they pump it down. Plan to solidify and encapsulate next week sometime.

Sample No.	Location / Description	DEP Rep:	Date:
		(signature) <i>Stephen Watson</i>	9/2/10
		(print name) <i>Steve WATSON</i>	Time: @ 1:30

ANALYTICAL REPORT

DRBC Well Smp, Wayne County PA

Lot #: COH110479

Steve Moyer

Tetra Tech NUS, Inc
116 N. Washington Avenue
Office 1G
Scranton, PA 18503

TESTAMERICA LABORATORIES, INC.



Veronica Bortot
Project Manager

August 18, 2010

NELAC REPORTING:

At the time of analysis the laboratory was in compliance with the current NELAC standards and held accreditation for all analyses performed unless noted by a qualifier. The labs accreditation numbers are listed below. The format and contents of the report meets all applicable NELAC standards except as noted in the narrative and shall not be reproduced except in full, without the written approval of the laboratory. The table below presents a summary of the certifications held by TestAmerica Pittsburgh. Our primary accreditation authority for the Non-potable water and Solid & Hazardous waste programs is Pennsylvania DEP. A more detailed parameter list is available upon request. Please ask your project manager for this information when required.

Certifying State/Program	Certificate #	Program Types	TestAmerica
DoD ELAP	ADE-1442	WW HW	X
US Dept of Agriculture Arkansas	(#P330-10-00139) (#88-0690)	Foreign Soil Import Permit	X
California - NELAC	04224CA	WW HW	X X
Connecticut	(#PH-0688)	WW HW	X X
Florida - NELAC	(#E871008)	WW HW	X X
Illinois - NELAC	(#002319)	WW HW	X X
Kansas - NELAC	(#E-10350)	WW HW	X X
Louisiana - NELAC	(#04041)	WW HW	X X
New Hampshire - NELAC	(#203010)	WW --	X --
New Jersey - NELAC	(PA-005)	WW HW	X X
New York - NELAC	(#11182)	WW HW	X X
North Carolina	(#434)	WW HW	X X
Pennsylvania - NELAC	(#02-00416)	WW HW	X X
South Carolina	(#89014002)	WW HW	X X
Utah - NELAC	(STLP)	WW HW	X X
West Virginia	(#142)	WW HW	X X
Wisconsin	998027800	WW HW	X X

The codes utilized for program types are described below:

- HW Hazardous Waste certification
- WW Non-potable Water and/or Wastewater certification
- X Laboratory has some form of certification under the specific program. Many states certify laboratories for specific parameters or tests within a category. The information in the table indicates the lab is certified in a general category of testing. Please contact the laboratory if parameter specific certification information is required.

Updated: 05/19/10 N:\Reporting\NELAC NARRATIVE Pitsburgh_Updated 051910.doc

**CASE NARRATIVE
TETRA TECH**

Lot #: C0H110479

Sample Receiving:

TestAmerica's Pittsburgh laboratory received one sample on August 11, 2010. The cooler was received within the proper temperature range.

If project specific QC was not required for samples contained in this report, when batch QC was completed on these samples, anomalous results will be discussed below.

GC/MS Volatiles:

All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

Metals:

The sample and associated matrix spikes were over the instrument's linear range for sodium and strontium and was analyzed at a dilution.

The method blanks had analytes detected at concentrations between the MDL and the reporting limit. The results were flagged with a "B" qualifier. Any sample associated with a method blank that had the same analyte detected had the result flagged with a "J" qualifier.

For the matrix spike and matrix spike duplicate, potassium, sodium and strontium recoveries were not calculated due to the concentration of analyte in the sample being >4 times the concentration of spike added.

The matrix spikes recovered outside control limits for aluminum.

General Chemistry:

The test for pH is a field parameter. The laboratory pH analysis was completed at the request of the client.

METHODS SUMMARY

COH110479

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>	<u>PREPARATION METHOD</u>
pH (Electrometric)	SM20 4500-H+B	SM20 4500-H B
Biochemical Oxygen Demand 5210B	SM20 5210B	SM20 5210B
Mercury (Manual Cold Vapor Technique)	MCAWW 245.1	MCAWW 245.1
N-Hexane Ext. Material, Silica Gel Treated-1664A	CFR136A 1664A S	EPA 1664A
Total Cyanide	MCAWW 335.4	MCAWW 335.4
Total Suspended Solids SM 2540 D	SM20 2540D	SM20 2540D
Trace Inductively Coupled Plasma (ICP) Metals	MCAWW 200.7	MCAWW 200.7
Volatile Organics by GC/MS	SW846 8260B	SW846 5030B

References:

- CFR136A "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.
- MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.
- SM20 "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER", 20TH EDITION."
- SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

C0H110479

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
L5EXN	001	WMP-TOPHOLE 081010	08/10/10	13:45

NOTE(S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filler test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

GC/MS Volatiles

Lot-Sample #...: C0H110479-001 Work Order #...: L5EXN1A4 Matrix.....: WATER
Date Sampled...: 08/10/10 Date Received..: 08/11/10 MS Run #.....: 0228124
Prep Date.....: 08/16/10 Analysis Date..: 08/16/10
Prep Batch #...: 0228193 Analysis Time..: 09:28
Dilution Factor: 1
Method.....: SW846 8260B

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u>	
		<u>LIMIT</u>	<u>UNITS</u>
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	5.0	ug/L
Toluene	ND	5.0	ug/L
Xylenes (total)	ND	15	ug/L

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
1,2-Dichloroethane-d4	107	(62 - 123)
Toluene-d8	96	(80 - 120)
4-Bromofluorobenzene	92	(75 - 120)
Dibromofluoromethane	104	(80 - 120)

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C0H110479
MB Lot-Sample #: C0H160000-193
Analysis Date...: 08/16/10
Dilution Factor: 1

Work Order #...: L5L921AA
Prep Date.....: 08/16/10
Prep Batch #...: 0228193

Matrix.....: WATER
Analysis Time...: 07:06

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u>		
		<u>LIMIT</u>	<u>UNITS</u>	<u>METHOD</u>
Benzene	ND	5.0	ug/L	SW846 8260B
Ethylbenzene	ND	5.0	ug/L	SW846 8260B
Toluene	ND	5.0	ug/L	SW846 8260B
Xylenes (total)	ND	15	ug/L	SW846 8260B

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
1,2-Dichloroethane-d4	117	(62 - 123)
Toluene-d8	94	(80 - 120)
4-Bromofluorobenzene	101	(75 - 120)
Dibromofluoromethane	97	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C0H110479 Work Order #...: L5L921AC Matrix.....: WATER
 LCS Lot-Sample#: C0H160000-193
 Prep Date.....: 08/16/10 Analysis Date..: 08/16/10
 Prep Batch #...: 0228193 Analysis Time..: 07:43
 Dilution Factor: 1

<u>PARAMETER</u>	PERCENT <u>RECOVERY</u>	RECOVERY <u>LIMITS</u>	<u>METHOD</u>
1,1-Dichloroethene	82	(69 - 127)	SW846 8260B
Trichloroethene	98	(80 - 120)	SW846 8260B
Chlorobenzene	89	(83 - 120)	SW846 8260B
Benzene	95	(80 - 120)	SW846 8260B
Toluene	83	(80 - 124)	SW846 8260B

<u>SURROGATE</u>	PERCENT <u>RECOVERY</u>	RECOVERY <u>LIMITS</u>
1,2-Dichloroethane-d4	112	(62 - 123)
Toluene-d8	95	(80 - 120)
4-Bromofluorobenzene	97	(75 - 120)
Dibromofluoromethane	108	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C0H110479 Work Order #...: L5E0M1C7-MS Matrix.....: WATER
 MS Lot-Sample #: C0H110483-001 L5E0M1C8-MSD
 Date Sampled...: 08/10/10 Date Received...: 08/11/10 MS Run #.....: 0228124
 Prep Date.....: 08/16/10 Analysis Date...: 08/16/10
 Prep Batch #...: 0228193 Analysis Time...: 08:07
 Dilution Factor: 1

PARAMETER	PERCENT	RECOVERY	RPD		METHOD
	RECOVERY	LIMITS	RPD	LIMITS	
1,1-Dichloroethene	86	(69 - 127)			SW846 8260B
	93	(69 - 127)	8.4	(0-20)	SW846 8260B
Trichloroethene	98	(80 - 120)			SW846 8260B
	110	(80 - 120)	11	(0-20)	SW846 8260B
Chlorobenzene	99	(83 - 120)			SW846 8260B
	98	(83 - 120)	1.2	(0-20)	SW846 8260B
Benzene	105	(80 - 120)			SW846 8260B
	105	(80 - 120)	0.0	(0-20)	SW846 8260B
Toluene	90	(80 - 124)			SW846 8260B
	89	(80 - 124)	0.22	(0-20)	SW846 8260B

SURROGATE	PERCENT	RECOVERY
	RECOVERY	LIMITS
1,2-Dichloroethane-d4	115	(62 - 123)
	117	(62 - 123)
Toluene-d8	95	(80 - 120)
	94	(80 - 120)
4-Bromofluorobenzene	94	(75 - 120)
	94	(75 - 120)
Dibromofluoromethane	108	(80 - 120)
	115	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

TOTAL Metals

Lot-Sample #...: C0H110479-001
Date Sampled...: 08/10/10

Date Received...: 08/11/10

Matrix.....: WATER

PARAMETER	RESULT	REPORTING			METHOD	PREPARATION-	WORK
		LIMIT	UNITS			ANALYSIS DATE	ORDER #
Prep Batch #...: 0224387							
Silver	ND	5.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AA
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Aluminum	2420 J	200	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AH
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Arsenic	11.4	10.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AJ
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Barium	1830	200	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AK
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Beryllium	ND	4.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AL
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Boron	249	200	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AM
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Calcium	108000 J	5000	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AN
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Cadmium	ND	5.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AP
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Cobalt	1.6 B	50.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AQ
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Chromium	9.6	5.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AR
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Copper	10 B	25.0	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AC
		Dilution Factor: 1		Analysis Time..: 13:43		MS Run #.....: 0224231	
Iron	3010	100	ug/L	MCAWW 200.7		08/12-08/13/10	L5EXN1AD
		Dilution Factor: 1		Analysis Time..: 16:34		MS Run #.....: 0224231	

(Continued on next page)

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

TOTAL Metals

Lot-Sample #...: C0H110479-001

Matrix.....: WATER

PARAMETER	RESULT	REPORTING		METHOD	PREPARATION-	WORK
		LIMIT	UNITS		ANALYSIS DATE	ORDER #
Potassium	249000	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AE
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Lithium	3190	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AF
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Magnesium	2730 B,J	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AG
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Manganese	101	15.0	ug/L	MCAWW 200.7	08/12-08/16/10	L5EXN1AT
		Dilution Factor: 1		Analysis Time..: 12:07	MS Run #.....: 0224231	
Molybdenum	89.9	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AU
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Sodium	801000	25000	ug/L	MCAWW 200.7	08/12-08/16/10	L5EXN1AV
		Dilution Factor: 5		Analysis Time..: 12:26	MS Run #.....: 0224231	
Nickel	7.6 B	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AW
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Lead	22.6	3.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AX
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Selenium	5.5	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1A0
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Strontium	10800 J	250	ug/L	MCAWW 200.7	08/12-08/16/10	L5EXN1A1
		Dilution Factor: 5		Analysis Time..: 12:26	MS Run #.....: 0224231	
Zinc	21.3	20.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1A2
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Prep Batch #...: 0230021						
Mercury	0.35	0.20	ug/L	MCAWW 245.1	08/18/10	L5EXN1A3
		Dilution Factor: 1		Analysis Time..: 07:59	MS Run #.....: 0230010	

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: C0H120000-387 Prep Batch #...: 0224387						
Aluminum	67.6 B	200	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AH
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Arsenic	ND	10.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AJ
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Barium	ND	200	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AK
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Beryllium	0.31 B	4.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AL
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Boron	ND	200	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AM
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Cadmium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AP
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Calcium	87.9 B	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AN
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Chromium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AR
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Cobalt	ND	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AQ
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Copper	ND	25.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AC
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Iron	ND	100	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AD
		Dilution Factor: 1				
		Analysis Time..: 16:12				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u>		<u>METHOD</u>	<u>PREPARATION-</u>	<u>WORK</u>
		<u>LIMIT</u>	<u>UNITS</u>		<u>ANALYSIS DATE</u>	<u>ORDER #</u>
Lead	ND	3.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AX
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Lithium	ND	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AF
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Magnesium	54.5 B	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AG
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Manganese	ND	15.0	ug/L	MCAWW 200.7	08/12-08/16/10	L5HKP1AT
		Dilution Factor: 1				
		Analysis Time..: 11:55				
Molybdenum	ND	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AU
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Nickel	ND	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AW
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Potassium	ND	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AE
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Selenium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1A0
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Silver	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AA
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Sodium	ND	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AV
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Strontium	0.44 B	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1A1
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Zinc	ND	20.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1A2
		Dilution Factor: 1				
		Analysis Time..: 13:26				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u> <u>LIMIT</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION-</u> <u>ANALYSIS DATE</u>	<u>WORK</u> <u>ORDER #</u>
MB Lot-Sample #: C0H180000-021		Prep Batch #... : 0230021				
Mercury	ND	0.20	ug/L	MCAWW 245.1	08/18/10	L5P4D1AA
		Dilution Factor: 1				
		Analysis Time..: 07:56				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
LCS Lot-Sample#: C0H120000-387 Prep Batch #...: 0224387					
Silver	92	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A3
		Dilution Factor: 1	Analysis Time..: 13:30		
Copper	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A4
		Dilution Factor: 1	Analysis Time..: 13:30		
Iron	89	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A5
		Dilution Factor: 1	Analysis Time..: 16:17		
Potassium	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A6
		Dilution Factor: 1	Analysis Time..: 13:30		
Lithium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A7
		Dilution Factor: 1	Analysis Time..: 13:30		
Magnesium	97	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A8
		Dilution Factor: 1	Analysis Time..: 13:30		
Aluminum	100	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A9
		Dilution Factor: 1	Analysis Time..: 13:30		
Arsenic	101	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CA
		Dilution Factor: 1	Analysis Time..: 13:30		
Barium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CC
		Dilution Factor: 1	Analysis Time..: 13:30		
Beryllium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CD
		Dilution Factor: 1	Analysis Time..: 13:30		
Boron	101	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CE
		Dilution Factor: 1	Analysis Time..: 13:30		
Calcium	99	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CF
		Dilution Factor: 1	Analysis Time..: 13:30		
Cadmium	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CG
		Dilution Factor: 1	Analysis Time..: 13:30		
Cobalt	99	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CH
		Dilution Factor: 1	Analysis Time..: 13:30		

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
Chromium	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CJ
		Dilution Factor: 1		Analysis Time..: 13:30	
Manganese	95	(85 - 115)	MCAWW 200.7	08/12-08/16/10	L5HKP1CK
		Dilution Factor: 1		Analysis Time..: 11:59	
Molybdenum	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CL
		Dilution Factor: 1		Analysis Time..: 13:30	
Sodium	97	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CM
		Dilution Factor: 1		Analysis Time..: 13:30	
Nickel	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CN
		Dilution Factor: 1		Analysis Time..: 13:30	
Lead	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CP
		Dilution Factor: 1		Analysis Time..: 13:30	
Selenium	104	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CQ
		Dilution Factor: 1		Analysis Time..: 13:30	
Strontium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CR
		Dilution Factor: 1		Analysis Time..: 13:30	
Zinc	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CT
		Dilution Factor: 1		Analysis Time..: 13:30	
LCS Lot-Sample#:	C0H180000-021	Prep Batch #...	0230021		
Mercury	100	(85 - 115)	MCAWW 245.1	08/18/10	L5P4D1AC
		Dilution Factor: 1		Analysis Time..: 07:57	

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
MS Lot-Sample #: C0H110479-001 Prep Batch #...: 0224387							
Aluminum	153 N	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CQ
	147 N	(70 - 130)	2.3	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CR
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Arsenic	114	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CT
	111	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CU
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Barium	106	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CV
	102	(70 - 130)	2.1	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CW
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Beryllium	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CX
	97	(70 - 130)	3.8	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C0
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Boron	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C1
	99	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C2
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Cadmium	98	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C5
	95	(70 - 130)	3.4	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C6
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Calcium	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C3
	94	(70 - 130)	2.1	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C4
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
Chromium	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C9
	98	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DA
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Cobalt	111	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C7
	107	(70 - 130)	3.5	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C8
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Copper	103	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CE
	99	(70 - 130)	3.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CF
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Iron	116	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CG
	117	(70 - 130)	0.33	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CH
			Dilution Factor: 1				
			Analysis Time...: 16:45				
			MS Run #.....: 0224231				
Lead	105	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DL
	101	(70 - 130)	3.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DM
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Lithium	111	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CL
	104	(70 - 130)	1.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CM
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Magnesium	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CN
	96	(70 - 130)	3.7	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CP
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				

(Continued on next page)

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
Manganese	101	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DC
	99	(70 - 130)	1.8	(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DD
			Dilution Factor: 1				
			Analysis Time...: 12:16				
			MS Run #.....: 0224231				
Molybdenum	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DE
	97	(70 - 130)	2.4	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DF
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Nickel	109	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DJ
	105	(70 - 130)	3.3	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DK
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Potassium	NC	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CJ
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CK
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Selenium	115	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DN
	111	(70 - 130)	3.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DP
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Silver	102	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CC
	100	(70 - 130)	2.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CD
			Dilution Factor: 1				
			Analysis Time...: 13:52				
			MS Run #.....: 0224231				
Sodium	NC	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DG
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DH
			Dilution Factor: 5				
			Analysis Time...: 12:35				
			MS Run #.....: 0224231				

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
Strontium	NC	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DQ
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DR
Dilution Factor: 5							
Analysis Time...: 12:35							
MS Run #.....: 0224231							
Zinc	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DT
	98	(70 - 130)	2.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DU
Dilution Factor: 1							
Analysis Time...: 13:52							
MS Run #.....: 0224231							

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

NC The recovery and/or RPD were not calculated.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>WORK ORDER #</u>
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MS Lot-Sample #: C0H110483-001 Prep Batch #...: 0230021

Mercury	95	(70 - 130)			MCAWW 245.1	08/18/10	L5E0M1DG
	87	(70 - 130)	7.6	(0-20)	MCAWW 245.1	08/18/10	L5E0M1DH

Dilution Factor: 1

Analysis Time...: 08:02

MS Run #.....: 0230010

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

General Chemistry

Lot-Sample #...: C0H110479-001 Work Order #...: L5EXN Matrix.....: WATER
 Date Sampled...: 08/10/10 Date Received...: 08/11/10

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	8.2	--	--	SM20 4500-H+B	08/16/10	0228263
		Dilution Factor: 1		Analysis Time..: 14:06	MS Run #.....: 0228171	
Biochemical Oxygen Demand (BOD)	436	2.0	mg/L	SM20 5210B	08/12-08/17/10	0224155
		Dilution Factor: 1		Analysis Time..: 12:25	MS Run #.....: 0224080	
Total Cyanide	ND	0.010	mg/L	MCAWW 335.4	08/13/10	0225143
		Dilution Factor: 1		Analysis Time..: 10:56	MS Run #.....: 0225056	
Total Suspended Solids	238	4.0	mg/L	SM20 2540D	08/16-08/17/10	0228259
		Dilution Factor: 1		Analysis Time..: 07:30	MS Run #.....: 0228163	
TPH (SGT-HEM)	ND	5.8	mg/L	CFR136A 1664A SGT	08/12/10	0224136
		Dilution Factor: 1.15		Analysis Time..: 09:01	MS Run #.....:	

METHOD BLANK REPORT

General Chemistry

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING</u>		<u>METHOD</u>	<u>PREPARATION-</u>	<u>PREP</u>
		<u>LIMIT</u>	<u>UNITS</u>		<u>ANALYSIS DATE</u>	<u>BATCH #</u>
Biochemical Oxygen Demand (BOD)	ND	2.0	mg/L	SM20 5210B	08/12-08/17/10	0224155
		Work Order #: L5GAD1AA MB Lot-Sample #: C0H120000-155				
		Dilution Factor: 1				
		Analysis Time..: 12:25				
Total Cyanide	ND	0.010	mg/L	MCAWW 335.4	08/13/10	0225143
		Work Order #: L5H171AA MB Lot-Sample #: C0H130000-143				
		Dilution Factor: 1				
		Analysis Time..: 10:56				
Total Suspended Solids	ND	4.0	mg/L	SM20 2540D	08/16-08/17/10	0228259
		Work Order #: L5MFX1AA MB Lot-Sample #: C0H160000-259				
		Dilution Factor: 1				
		Analysis Time..: 07:30				
TPH (SGT-HEM)	ND	5.0	mg/L	CFR136A 1664A SGT	08/12/10	0224136
		Work Order #: L5F871AA MB Lot-Sample #: C0H120000-136				
		Dilution Factor: 1				
		Analysis Time..: 09:01				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Biochemical Oxygen Demand (BOD)		WO#:L5GAD1AC-LCS/L5GAD1AD-LCSD			LCS Lot-Sample#: C0H120000-155		
	92	(85 - 115)			SM20 5210B	08/12-08/17/10	0224155
	91	(85 - 115)	0.55	(0-20)	SM20 5210B	08/12-08/17/10	0224155
		Dilution Factor: 1			Analysis Time..: 12:25		
TPH (SGT-HEM)		WO#:L5F871AC-LCS/L5F871AD-LCSD			LCS Lot-Sample#: C0H120000-136		
	89	(64 - 132)			CFR136A 1664A SGT	08/12/10	0224136
	86	(64 - 132)	2.8	(0-34)	CFR136A 1664A SGT	08/12/10	0224136
		Dilution Factor: 1			Analysis Time..: 09:01		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479

Matrix.....: WATER

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	100	(99 - 101)	Work Order #: L5MG11AA SM20 4500-H+B Dilution Factor: 1	LCS Lot-Sample#: C0H160000-263 08/16/10 Analysis Time..: 14:04	0228263
Total Cyanide	103	(90 - 110)	Work Order #: L5H171AC MCAWW 335.4 Dilution Factor: 1	LCS Lot-Sample#: C0H130000-143 08/13/10 Analysis Time..: 10:56	0225143
Total Suspended Solids	83	(80 - 120)	Work Order #: L5MFX1AC SM20 2540D Dilution Factor: 1	LCS Lot-Sample#: C0H160000-259 08/16-08/17/10 Analysis Time..: 07:30	0228259

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received...: 08/11/10

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>RPD</u>	<u>RPD LIMITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Total Cyanide			WO#:	L5EXN1DV-MS/L5EXN1DW-MSD	MS Lot-Sample #:	C0H110479-001	
	105	(90 - 110)			MCAWW 335.4	08/13/10	0225143
	100	(90 - 110)	4.6	(0-20)	MCAWW 335.4	08/13/10	0225143
			Dilution Factor: 1				
			Analysis Time...: 10:56				
			MS Run #.....: 0225056				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479

Work Order #...: L5EKJ-SMP
L5EKJ-DUP

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received..: 08/11/10

<u>PARAM</u>	<u>RESULT</u>	<u>DUPLICATE</u> <u>RESULT</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD</u> <u>LIMIT</u>	<u>METHOD</u>	<u>PREPARATION-</u> <u>ANALYSIS DATE</u>	<u>PREP</u> <u>BATCH #</u>
Total Suspended Solids	75.0	73.0	mg/L	2.7	(0-20)	SM20 2540D	08/16-08/17/10	0228259
		Dilution Factor: 1		Analysis Time.: 07:30		MS Run Number.: 0228163		
SD Lot-Sample #: C0H110430-001								

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479

Work Order #...: L5EXN-SMP
L5EXN-DUP

Matrix.....: WATER

Date Sampled...: 08/10/10

Date Received..: 08/11/10

<u>PARAM</u>	<u>RESULT</u>	<u>DUPLICATE RESULT</u>	<u>UNITS</u>	<u>RPD</u>	<u>RPD LIMIT</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
pH	8.2	8.2	--	0.12	(0-2.0)	SM20 4500-H+B	08/16/10	0228263
			Dilution Factor: 1			Analysis Time..: 14:06	MS Run Number..: 0228171	
Biochemical Oxygen Demand (BOD)	436	490	mg/L	12	(0-20)	SM20 5210B	08/12-08/17/10	0224155
			Dilution Factor: 1			Analysis Time..: 12:25	MS Run Number..: 0224080	