
	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

Attachment: ApplicantWellInformation

Please save attachment and use the file name above.

APPLICANT INFORMATION

Applicant Registration Number: HVHFF-00003
 Applicant Name: Woolsey Operating Company, LLC
 Address: 125 N. Market St., Suite 1000
 City: Wichita State: KS Zip: 67202
 Email: woolsey@woolseyco.com Phone: (316) 267-4379 Fax: (316) 267-4383

Permittee is a:

Corporation
 Limited liability company
 Partnership
 Individual
 Other (explain)

If not an individual, please list all parent, subsidiary or affiliate entities – include name, address and legal status for each entity listed:

See Attached

WELL DESCRIPTION

Well Name: Woodrow 1H-310408-193
 Elevation of ground level at well location: 445 ft.
 GPS latitude and longitude of surface location of well: Lat: 38.1343680 Long: -88.3603830
 Legal description per the Public Land Survey System of the well site and its unit area:

Well Location: 279' South & 643' West of the NEc SW NE of Sec. 31-4S-8E, White County, IL
 Well Site Pad: East 550' of the NE SW NE containing 8.333 acres and the North 190' of the East 550' of the SE SW NE containing 2.40 acres all in Sec. 31-4S-8E, White County, IL
 Production Facility: South 150' of the East 300' of the S/2 SE SE SW, less the East 50' containing .8609 acres Sec. 30-4S-8E, White County, IL
 Unit Area: SW/4 NE/4; NW/4 SE/4; AND SW/4 SE/4 Sec. 30-4S-8E and NW/4 NW/4 Sec. 31-4S-8E, White County, IL

This application for permission to conduct HVHHF is for (check one):

a new well conversion of an existing vertical well conversion of an existing horizontal well

If you have previously applied for a permit to conduct HVHHF from this well site, please state the registration number, well name, and date of application for any such application:

NA

Outline the lease and drilling unit boundaries (provide a scale). Please certify the attachment with the following information.

I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE THE LOCATION AND ELEVATION OF THE ABOVE DESCRIBED WELL, FIXED AS THE RESULT OF AN INSTRUMENT SURVEY AND GLOBAL POSITIONING READING MADE BY ME IN COMPLIANCE WITH THE ILLINOIS OIL AND GAS ACT AND REGULATIONS, IS TRUE AND CORRECT, AND I HAVE SET A STAKE AT THE EXACT LOCATION DESIGNATED ABOVE.

[Redacted Signature] 5-2-17
Signature of registered Illinois land surveyor Date

104 S. 4th St VIENNA IL
Street address City State





WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Applicant Well Information

LIST OF ALL PARENT, SUBSIDIARY OR AFFILIATE ENTITIES:

Woolsey Companies, Inc. – Parent
125 N. Market, Suite 1000
Wichita, KS 67202

Woolsey Energy II, LLC–Affiliate (Kansas Limited Liability Company and Illinois Limited Liability Company)
125 N. Market, Suite 1000
Wichita, KS 67202

Woolsey Energy Corporation – Affiliate (Kansas Corporation)
125 N. Market, Suite 1000
Wichita, KS 67202

Woolsey Investments LLC – Affiliate (Kansas Limited Liability Company)
125 N. Market, Suite 1000
Wichita, KS 67202

End of Well
 Lat: 38.1497403
 Long: -88.3621095

Legend

- 40 Acre Vertical Units
- IDNR Horizontal Gas Drilling Unit
- Well Pad & Pits
- Fresh Water Pit
- Site Boundary



BEARINGS REFERENCED
 ILLINOIS STATE PLANE
 COORDINATE SYSTEM
 EAST ZONE
 NAD27

104 S. 4th St.
 P.O. Box 125
 Vienna, IL 62995
 618-658-6065

Production Facilities

Horizontal Path

Reservoir Intercept
 Lat: 38.1365649
 Long: -88.3606494

Woodrow #1H-310408-193
 Lat: 38.1343680
 Long: -88.3603830

Access Road

APPLICANT WELL INFORMATION
LEASE AND DRILLING
UNIT BOUNDARIES
WHITE COUNTY, ILLINOIS

Path: S:\2018\Wmireen N.Decatur.Latham-1342\Access Maps

Revisions		
#	Date	Note

Drafted by:	K. FIELD
Date:	3/15/2017
Reviewed by:	B. ABERNATHY
Scale:	1" = 1,200'
Job Number:	2016-363
Sheet:	1 of 1

Drawing Status:

Preliminary Drawing

Final Drawing

Requested By:



This Professional Service Conforms to
 The Current Illinois Minimum Standards
 of Practice Applicable To Boundary
 Survey

SW ¼
SEC 30 - T4S - R8E

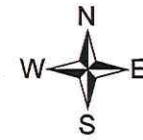
SE ¼
SEC 30 - T4S - R8E

NW ¼
SEC 31 - T4S - R8E

NE ¼
SEC 31 - T4S - R8E

Legend

- DISTANCE LINES
- SECTION LINES
- Well Pad & Pits
- Fresh Water Pit
- Site Boundary



BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27



104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

Woodrow #1H-310408-193
Lat: 38.1343680
Long: -88.3603830

APPLICANT WELL INFORMATION
1650' WEST & 1990' SOUTH OF NE
CORNER OF NE ¼ SEC 31 T4S R8E
WHITE & HAMILTON
COUNTIES, ILLINOIS

Path: S:\2016\Ameren N.Destaur-Latham-1342\Access Maps

Revisions

#	Date	Note

Drafted by: K. FIELD
Date: 3/28/2017
Reviewed by: B. ABERNATHY
Scale: 1" = 600'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:

- Preliminary Drawing
- Final Drawing

Requested By:



This Professional Service Conforms to
The Current Illinois Minimum Standards
of Practice Applicable To Boundary
Survey

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271	
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: WellSiteSetbackPlan

Please save attachment and use the file name above

Well Site Setback Plan §1-35(b)(3); 245.210(a)(3), 245.210(a)(7), 245.400. (NOTE: PLAT MAP REQUIRED) Distances must be measured horizontally from the nearest edge of the well site. (a) Is the site at least 500' from any residence or place of worship? ___ YES ___ NO

If "no," attach a signed, dated, and notarized copy of all agreements with the adjoining landowner(s).

(b) Is the site at least 500' from the property line of any school, hospital, or licensed nursing home facility? ___ YES ___ NO

If "no," explain:

Is the site at least 500' from the surface location of any water well or developed spring used for human or domestic animal consumption? ___ YES ___ NO

If "no," attach a signed, dated, and notarized copy of all agreements with the adjoining landowner(s).

(c) Is the site at least 300' from the center of all perennial streams and the ordinary high water mark of any river, natural or artificial lake, pond, or reservoir? ___ YES ___ NO

If "no," explain:

If you claim that a water source in question is wholly contained within the property of a landowner who expressly waives the setback requirements, attach a signed, dated and notarized a copy of the agreement with that landowner and describe the water source:

(d) Is the site at least 750 feet from any nature preserve or site on the Register of Land and Water Reserves? ___ YES ___ NO If "no," identify all such preserves or sites:

(e) Is the site at least 1,500 feet from all surface water or groundwater intakes of a public water supply? ___ YES ___ NO

If "no," identify the intake(s):

- (f) Please attach to this application a scaled plat map, indicating the scale, and showing
- 1) the proposed unit, including the unit boundaries and the location of the proposed well site, well pad, and well;
 - 2) the access road;
 - 3) any other operating facilities;
 - 4) all the features described in Section 245.400(a) of the Rules and/or §1-35(b)(3) of the Act, providing the distance in feet from the surface location of the well site; and

- 5) all known previous well bores within 750 feet of any part of the horizontal well bore that penetrated within 400 vertical feet of the formation that will be stimulated. If any such well bores are present, include for each well bore the well name, location and permit number.
- (g) Please provide an overhead sketch of the well site layout. Each square represents ____ feet. Include any significant structures such as those identified above, and the containment systems described in the containment plan for this site.

Please state how the size of the well site is sufficient to conduct all aspects of HVHFF operations within its boundaries.

The total well site boundaries including the well pad, pits and freshwater pit is approximately 10.73 acres. The well pad and pits' area is approximately 2.3 acres. The fresh water pit on the will site is approximately 1.47 acres. The total will site is approximately 6.96 acres more than the footprint of the well pad, pits and freshwater pit.

The production facility is 150' by 250' or .86 acres. An area of this size will be able to accommodate the following surface equipment, which will be sufficient for the anticipated production volumes.

- 4 - 12' X 15' Steel Stock Tanks
- 4 - 12' X 15' Fiberglass Water Tanks
- 1 - 6' X 15' Free Water Knockout
- 1 - 30" X 10' Vertical Separator
- 1 - 24" X 10' Vertical Separator
- 1 - 6' X 20' Heater Treater



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Well Site Setback Plan

COMPLIANCE STATEMENT:

The proposed location of the well site is in compliance with the setback requirements of Section 245.400.



BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27

104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

Horizontal Path

Reservoir Intercept
Lat: 38.1365649
Long: -88.3606494

Fresh Water Pit

Containment Dike:
Enclosing containers
storing chemicals used
during HVVHF operations
and tanks used during
flow back

SITE BOUNDARY

Well Site
Lat: 38.1343680
Long: -88.3603830

Access Road

**WELL SITE SETBACK PLAN
WELL PAD DETAIL
WHITE COUNTY, ILLINOIS**

Path: S:\2016\Ameren N.Decatur\Latham-1342\Access Maps

Revisions

#	Date	Note

Drafted by: K. FIELD
Date: 10/4/2016
Reviewed by: B. ABERNATHY
Scale: 1" = 300'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:

- Preliminary Drawing
- Final Drawing

Requested By:



This Professional Service Conforms to
The Current Illinois Minimum Standards
of Practice Applicable To Boundary
Survey

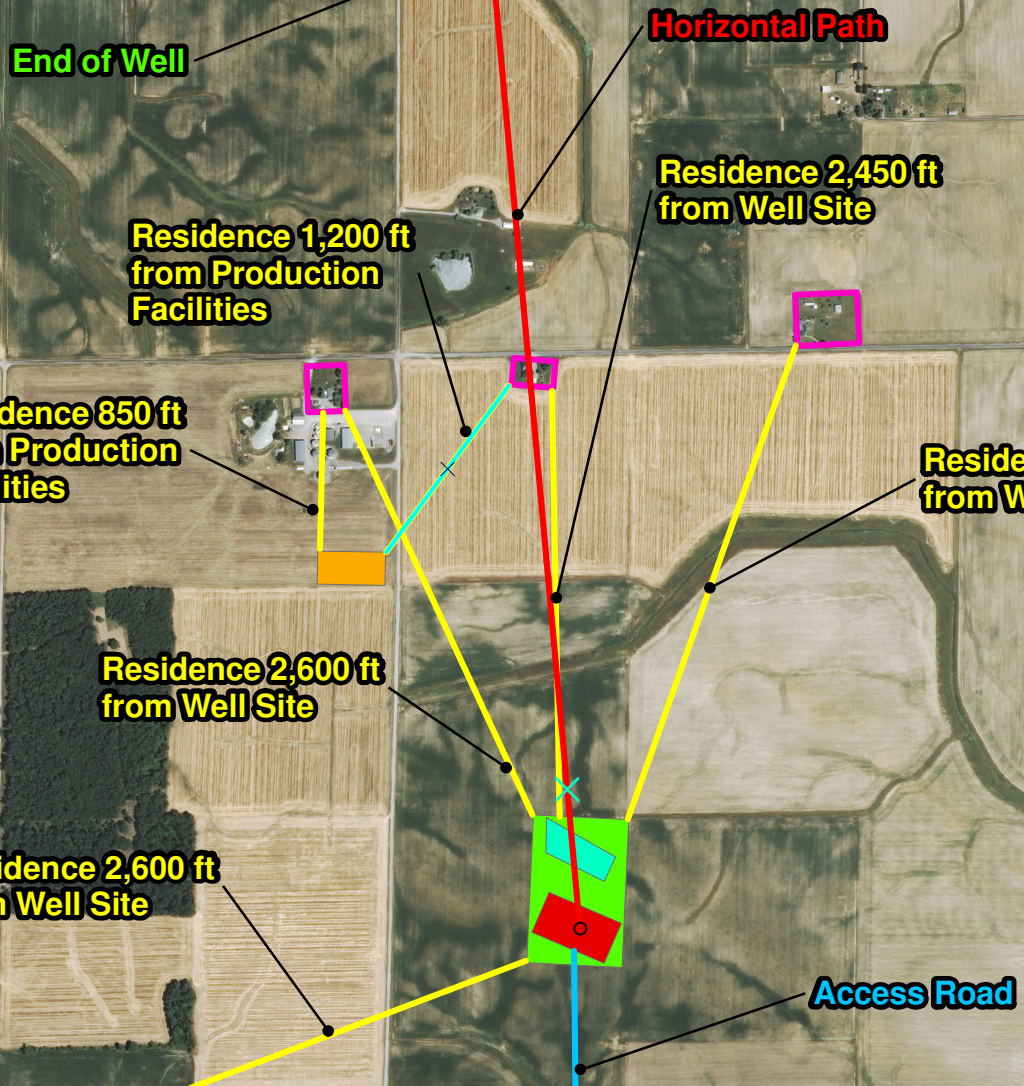
Legend

- Residence
- Reservoir Intercept
- Well Pad & Pits
- Well Site
- Fresh Water Pit
- Production Facilities



BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27

104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065



**WELL SITE SETBACK PLAN
EXHIBIT "A"
WHITE & HAMILTON
COUNTIES, ILLINOIS**

Path: S:\2016\Ameren N.Decatur\Latham-1342\Access Maps

Revisions		
#	Date	Note

Drafted by: K. FIELD
Date: 9/26/2016
Reviewed by: B. ABERNATHY
Scale: 1"= 1,100'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:
 Preliminary Drawing
 Final Drawing
Requested By:



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Survey

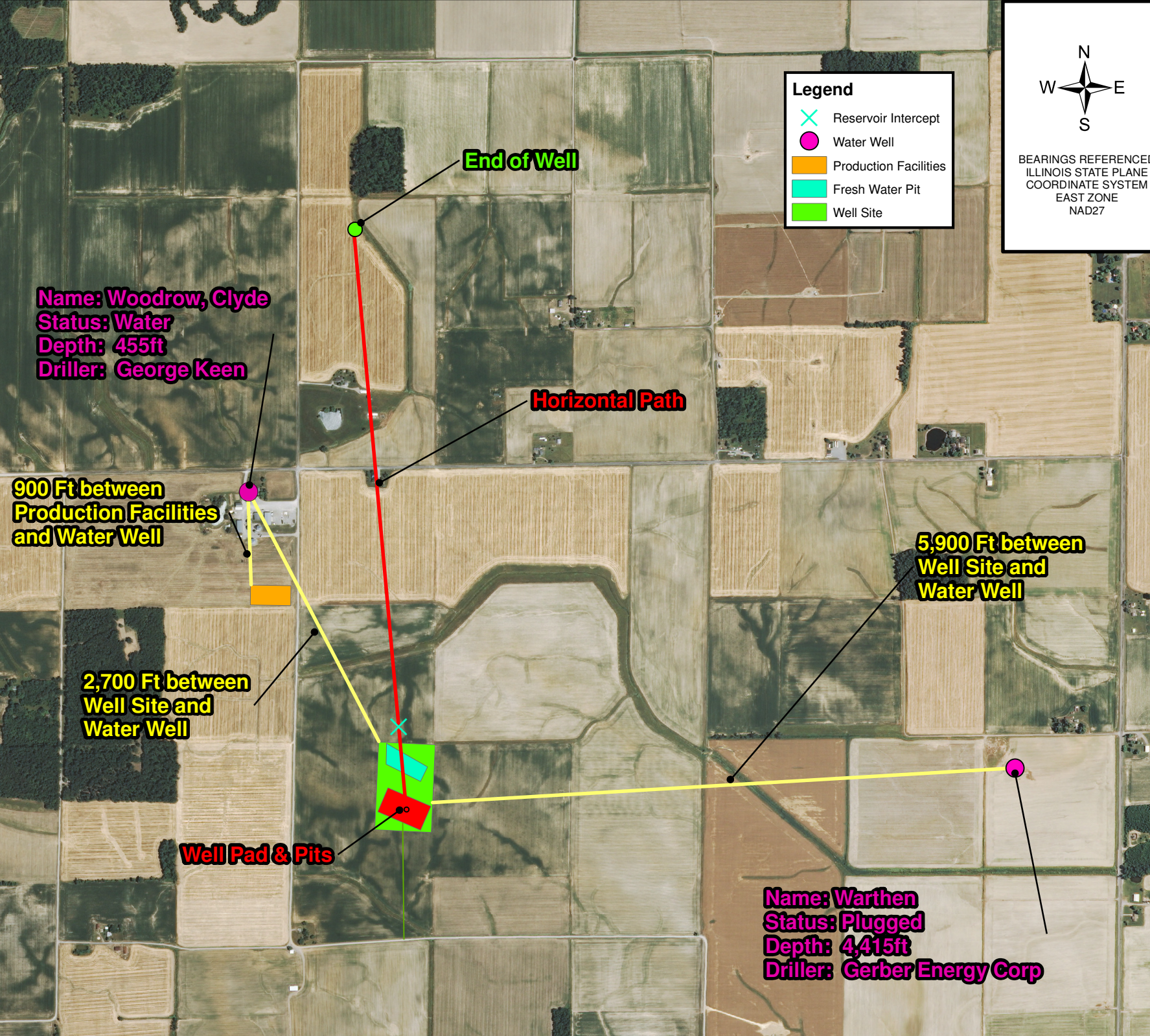


BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27

104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

Legend

- Reservoir Intercept
- Water Well
- Production Facilities
- Fresh Water Pit
- Well Site



Name: Woodrow, Clyde
Status: Water
Depth: 455ft
Driller: George Keen

**900 Ft between
Production Facilities
and Water Well**

**2,700 Ft between
Well Site and
Water Well**

Well Pad & Pits

End of Well

Horizontal Path

**5,900 Ft between
Well Site and
Water Well**

Name: Warthen
Status: Plugged
Depth: 4,415ft
Driller: Gerber Energy Corp

**WELL SITE SETBACK PLAN
EXHIBIT "B-2"
WHITE & HAMILTON
COUNTIES, ILLINOIS**

Path: S:\2016\Ameren N.Decatur\Latham-1342\Access Maps

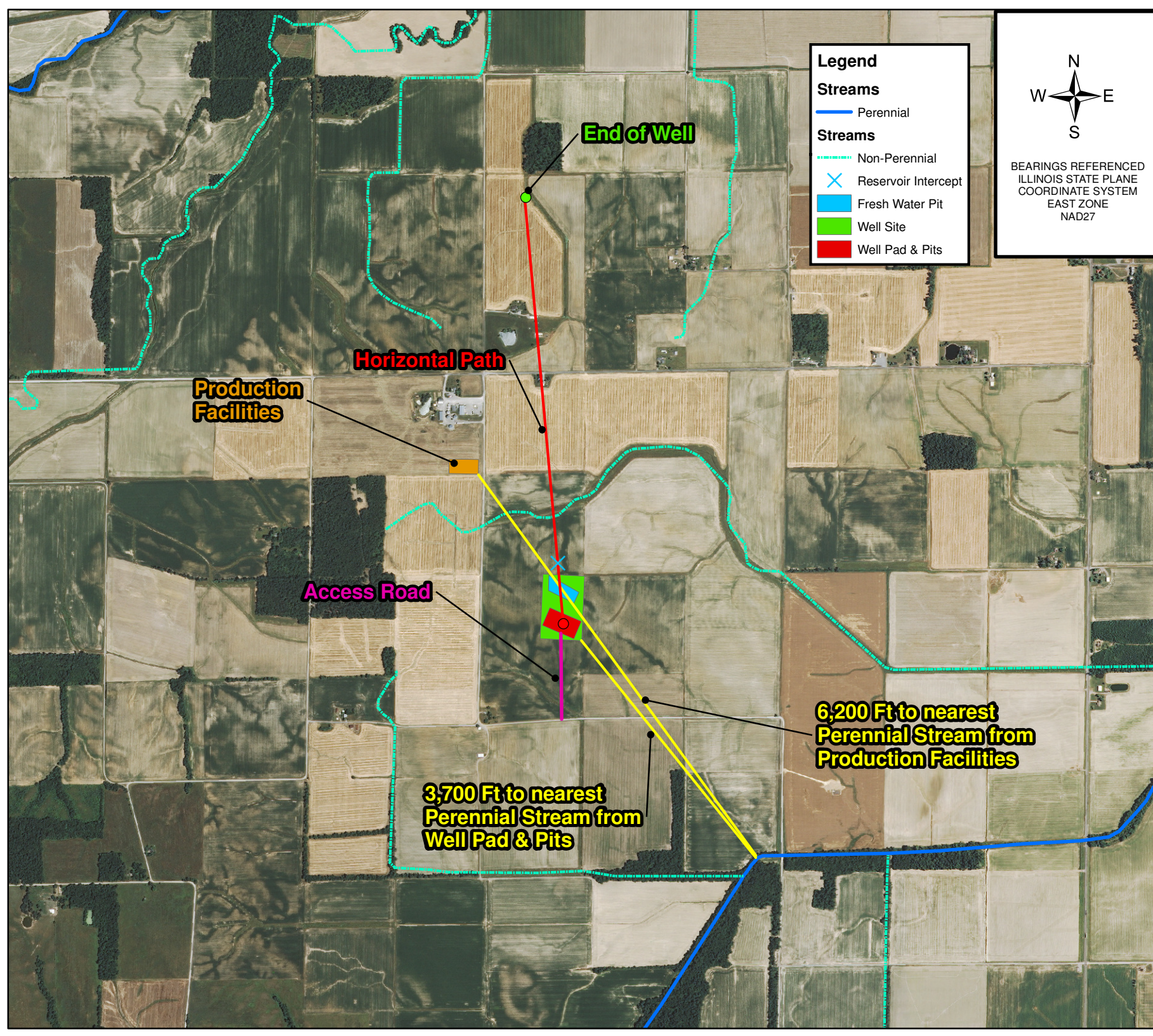
Revisions		
#	Date	Note

Drafted by: K. FIELD
Date: 9/26/2016
Reviewed by: B. ABERNATHY
Scale: 1" = 1,200'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:
 Preliminary Drawing
 Final Drawing
Requested By:



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Survey



Legend

Streams

- Perennial
- Non-Perennial

Streams

- Reservoir Intercept
- Fresh Water Pit
- Well Site
- Well Pad & Pits



BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27



104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

**WELL SITE SETBACK PLAN
EXHIBIT "C"
WHITE & HAMILTON
COUNTIES, ILLINOIS**

Path: S:\2016\White\2016-363\Deliverables

Revisions		
#	Date	Note

Drafted by: K. FIELD
Date: 9/26/2016
Reviewed by: B. ABERNATHY
Scale: 1"= 1,600'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:

Preliminary Drawing
 Final Drawing

Requested By:



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BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27

104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

Legend

- Nature Preserve
- Reservoir Intercept

**Karcher's Post Oak Woods
Nature Preserve**

**Nature Preserve
14.7 miles from Well Site**

End of Well

Well Site

1000 Ft Radius

**WELL SITE SETBACK PLAN
EXHIBIT "D"
WHITE & HAMILTON
COUNTIES, ILLINOIS**

Path: S:\2016\Ameren N.Decatur\Latham-1342\Access Maps

Revisions		
#	Date	Note

Drafted by: K. FIELD
Date: 9/26/2016
Reviewed by: B. ABERNATHY
Scale: 1" = 10,000'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:
 Preliminary Drawing
 Final Drawing

Requested By:



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of Practice Applicable To Boundary
Survey



BEARINGS REFERENCED
ILLINOIS STATE PLANE
COORDINATE SYSTEM
EAST ZONE
NAD27

104 S. 4th St.
P.O. Box 125
Vienna, IL 62995
618-658-6065

End of Well
Lat: 38.1497403
Long: -88.3621095

Horizontal Path

Reservoir Intercept
Lat: 38.1365649
Long: -88.3606494

Production Facilities

Access Road

Well Site
Lat: 38.1343680
Long: -88.3603830

**WELL SITE SETBACK PLAN
EXHIBIT "F"
WHITE & HAMILTON
COUNTIES, ILLINOIS**

Path: S:\2016\Ameren N.Decatur\Latham-1342\Access Maps

Revisions		
#	Date	Note

Drafted by: K. FIELD
Date: 9/26/2016
Reviewed by: B. ABERNATHY
Scale: 1" = 1,500'
Job Number: 2016-363
Sheet: 1 of 1

Drawing Status:
 Preliminary Drawing
 Final Drawing
 Requested By:



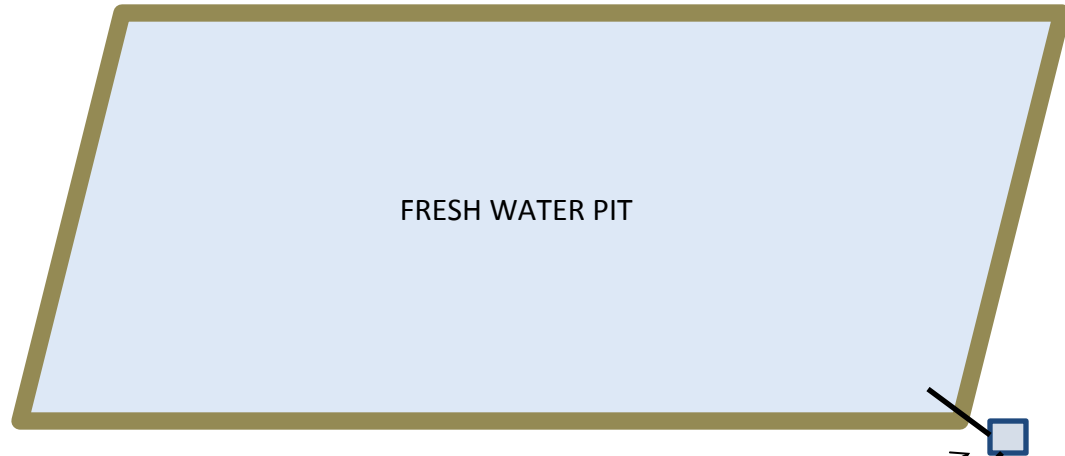
This Professional Service Conforms to
The Current Illinois Minimum Standards
of Practice Applicable To Boundary
Survey

WOOLSEY OPERATING COMPANY, LLC

WOODROW #1H-410308-193

WHITE COUNTY, ILLINOIS

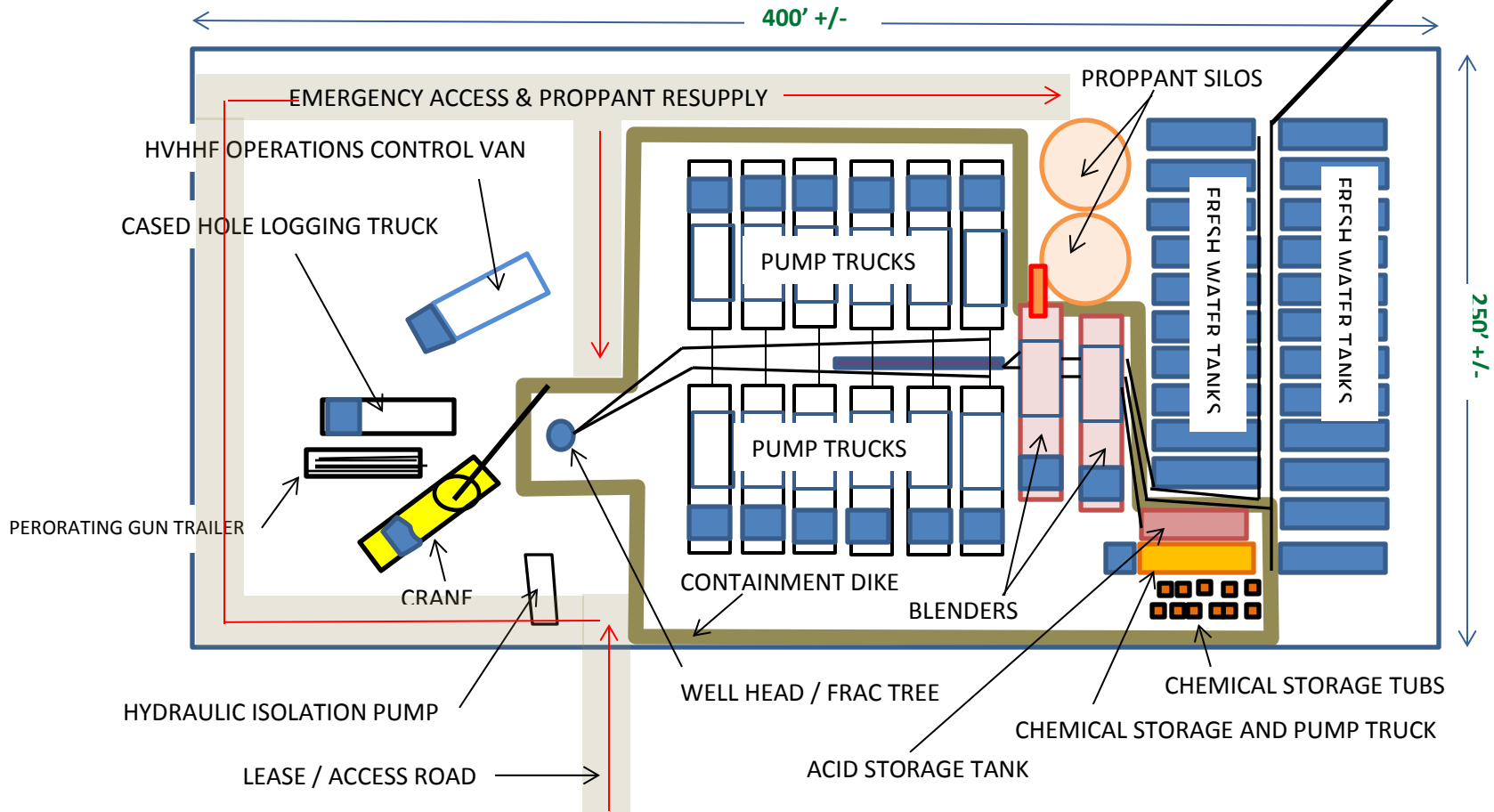
Well Site Set Back Plan – Exhibit G1



FRESH WATER PIT

SCHEMATIC of WELL PAD & HVHFF OPERATIONS

WATER TRANSFER PUMP & LINE



WOOLSEY OPERATING COMPANY, LLC

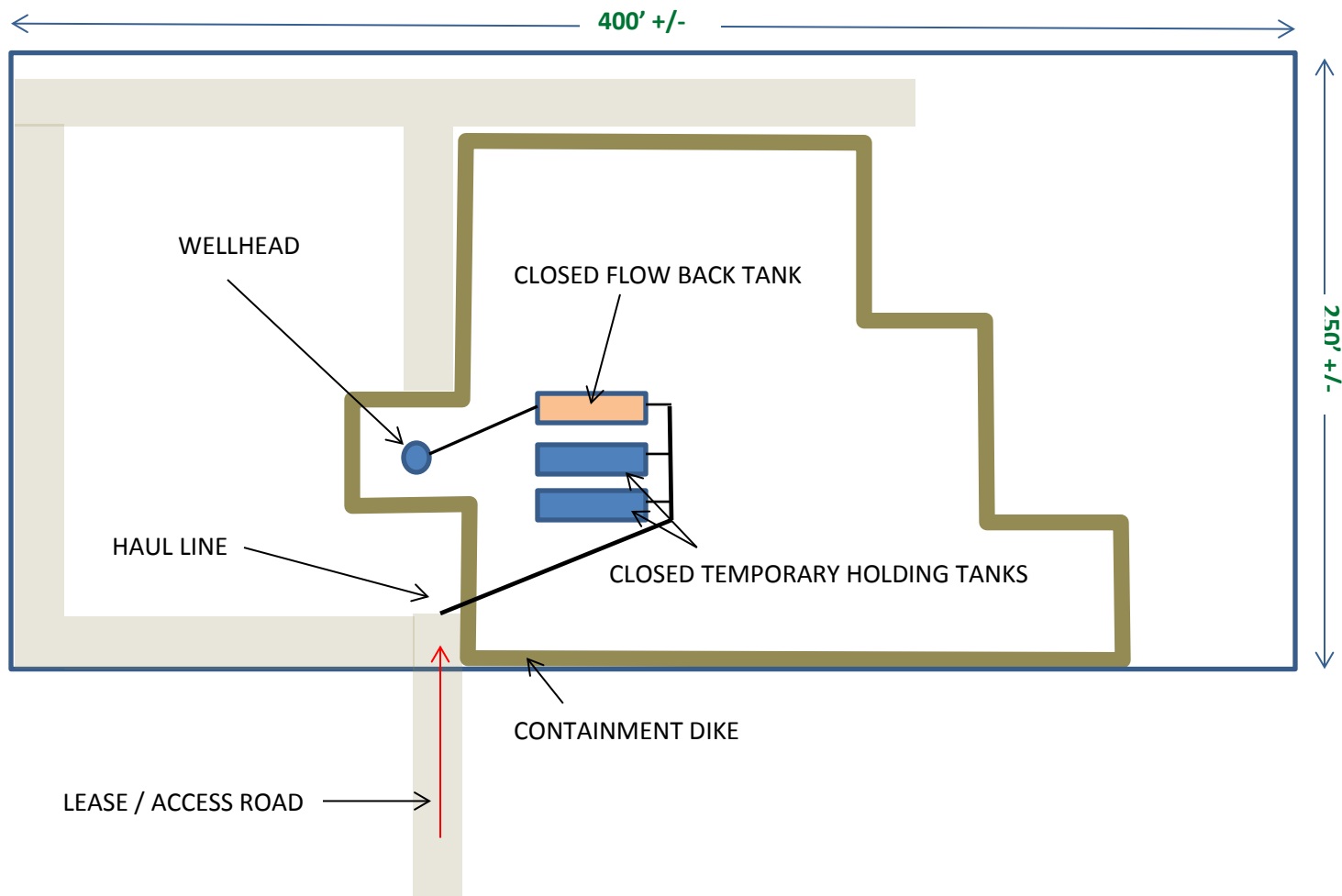
WOODROW #1H-410308-193



WHITE COUNTY, ILLINOIS

Well Site Set Back Plan – Exhibit G2



SCHEMATIC of WELL PAD & HVVHF FLOW BACK OPERATIONS



	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: DirectionalDrillingPlan

Please save attachment and use the file name above.

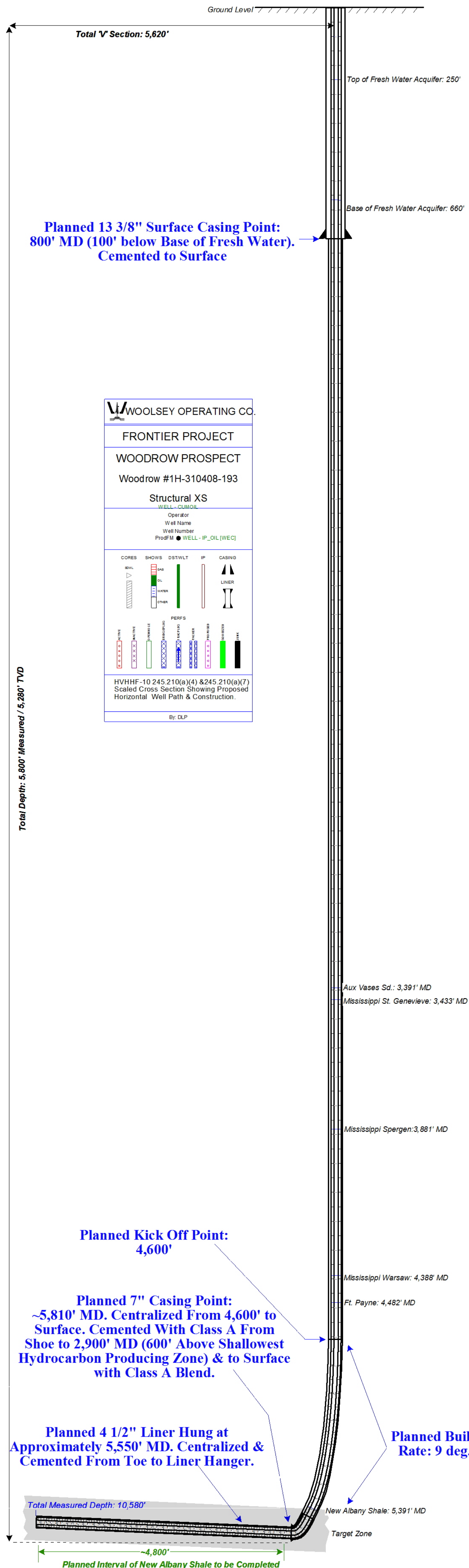
Directional Drilling Plan. §1-35(b)(4); 245.210(a)(4).

- (a) What is the total true vertical depth to which the well will be drilled or deepened? _____
- (b) What is the total measured depth to which the well will be drilled or deepened? _____
- (c) What is the proposed build angle of the well? _____
- (d) What is the proposed direction (heading) of the well? _____
- (e) At what depth will the well deviate from vertical? _____
- (f) At what verticle depth will the well enter the formation that will be stimulated? _____
- (g) What is the angle and direction of any nonvertical portion of the wellbore prior to total target depth/actual final depth? _____
- (h) What is the estimated length of the proposed horizontal lateral or wellbore? _____
- (i) What is the planned horizontal deviation of the horizontal lateral or wellbore? _____
- (j) What is the planned direction/heading of the horizontal lateral or wellbore? _____
- (k) What is the planned bottom hole location of the well (provide both PLSS and GPScoordinates)? _____

Scaled Cross (Top is Soil Surface). 245.210(a)(4), 245.210(a)(7). Attach a diagram of the well bore, showing in scaled cross-section of the following:

- 1) the well bore from the surface through the horizontal leg's total length
- 2) the dimensions and information stated in this Directional Drilling Plan
- 3) the features described in the Underground Fresh Water Plan in the following section; and
- 4) the formations to be stimulated as required by 245.210(a)(6)(A) and as described in the geological description in Attachment titled HVHFFOperationsPlan.

**PROPOSED:
WOOLSEY OPERATING COMPANY
WOODROW #1H-310408-193**



Total "V" Section: 5,620'

Top of Fresh Water Acquifer: 250'

Base of Fresh Water Acquifer: 660'

**Planned 13 3/8" Surface Casing Point:
800' MD (100' below Base of Fresh Water).
Cemented to Surface**

WOOLSEY OPERATING CO.	
FRONTIER PROJECT	
WOODROW PROSPECT	
Woodrow #1H-310408-193	
Structural XS	
WELL - CUMDOL	
Operator	
Well Name	
Well Number	
ProdM ● WELL-IP_OIL [WEC]	
CORES	SHOWS
DST/WLT	IP
CASING	LINER
PERFS	
HVHFF-10 245.210(a)(4) & 245.210(a)(7) Scaled Cross Section Showing Proposed Horizontal Well Path & Construction. By: DLP	

Total Depth: 5,800' Measured / 5,280' TVD

Aux Vases Sd.: 3,391' MD

Mississippi St. Genevieve: 3,433' MD

Mississippi Spergen: 3,881' MD

Mississippi Warsaw: 4,388' MD

Ft. Payne: 4,482' MD

**Planned Kick Off Point:
4,600'**

**Planned 7" Casing Point:
~5,810' MD. Centralized From 4,600' to
Surface. Cemented With Class A From
Shoe to 2,900' MD (600' Above Shallowest
Hydrocarbon Producing Zone) & to Surface
with Class A Blend.**

**Planned 4 1/2" Liner Hung at
Approximately 5,550' MD. Centralized &
Cemented From Toe to Liner Hanger.**

**Planned Build
Rate: 9 deg.**

Total Measured Depth: 10,580'

New Albany Shale: 5,391' MD

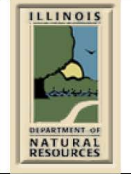
Target Zone

Planned Interval of New Albany Shale to be Completed



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: UndergroundFreshWaterInformation

Please save attachment and use the file name above

Underground Fresh Water Information Section 1-35(b)(5); 245.210(a)(5).

Please provide the estimated depth and elevation of the lowest potential fresh water along the entire length of the proposed well according to the most recent publication of the Illinois State Geological Survey of Groundwater or any other relevant information you have. **Show on attached diagram.**

Depth: _____ Elevation: _____

FRONTIER PROJECT

WOODROW PROSPECT

Woodrow #1H-310408-193

Depth to Base of Fresh Water



POSTED WELL DATA

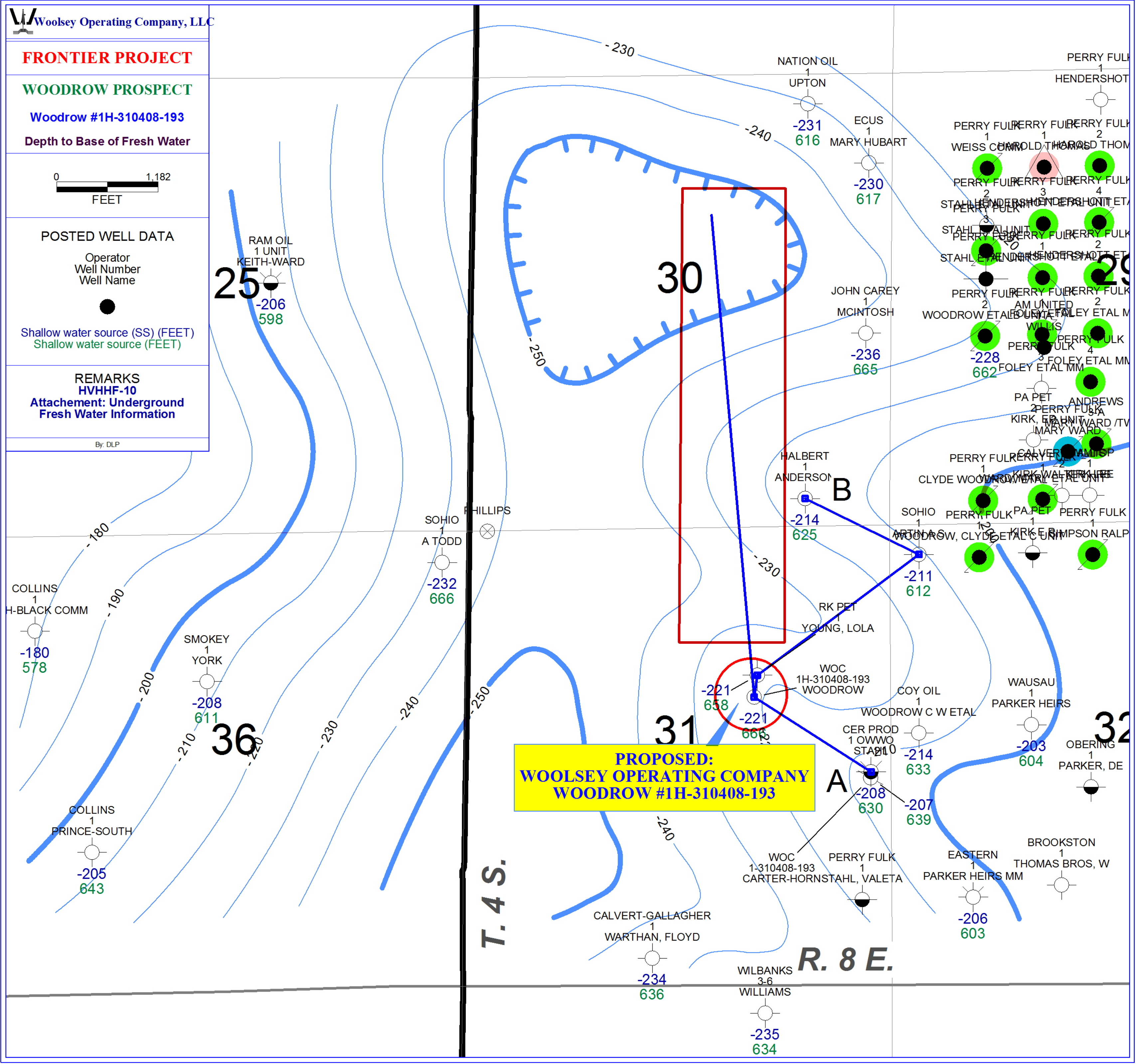
Operator
Well Number
Well Name

●

Shallow water source (SS) (FEET)
Shallow water source (FEET)

REMARKS
HVHF-10
Attachment: Underground
Fresh Water Information

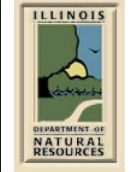
By: DLP





ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: HVHFFOperationsPlan

Please save attachment and use the file name above.

High Volume Horizontal Hydraulic Fracturing Operations Plan §1-35(b)(6), 245.210(a)(6).

Geological description.

Please list and describe in this attachment all formation(s) affected by the high volume horizontal hydraulic fracturing operation, including (but not limited to) the formation(s) to be stimulated and the formations constituting or contributing to the confining zone. For each such formation, please describe the lithology, extent, thickness, permeability, porosity, transmissive faults, fractures, water or water source content, and susceptibility to vertical propagation of fractures. For each formation, state if any of these features are unknown.

- a) what is the anticipated surface treating pressure range?
- b) what is the maximum anticipated injection treating pressure?
- c) what is the estimated or calculated fracture pressure of the producing zone?
- d) what is the estimated or calculated fracture pressure of the confining zones?
- e) what is the planned depth of all proposed perforations?
- f) what is the planned depth to the top of the open hole section?
- g) what is the type, source and volume of base fluid anticipated to be used?



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Operations Plan

Geologic Formations Affected:
New Albany Gp. (Target)
Compton / Chouteau
Borden / Springville
Ft. Payne
Lingle

Herein are listed the geologic descriptions of all formations that may be affected by the HVHHFO of the proposed, permitted well. As requested, the lithology, extent, thickness, permeability/porosity, water or water source content and susceptibility to vertical propagation of fractures will be discussed for each of the formations referenced below. In regard to transmissive faults and large through-going fractures, it can be stated that according to a 3-D seismic survey collected over the proposed location / prospect area, there are none that exist anywhere near the proposed wellbore, and specifically that part of the well bore that will be in the reservoir zone, the New Albany Shale (herein referenced as 'NAS').

*The drilling objective is the NAS; this shale is of Group status and actually is composed of 3 Formations, in ascending order from the base to the top, is the Blocher Shale Formation, the Selmier Shale Formation and the Grassy Creek Shale Formation. They are described below.

Blocher Shale: olive black, organic-rich, massive appearing to faintly laminated, slightly calcareous silty shale with common thin gray, sharply bedded traction deposits composed of silty calcarenites and calcisiltites. Average core measured porosity is 3 to 4% and has permeability in the nanodarcy range, and thus, is extremely tight. Some fractures are recognized in this section but are not large or long and typically mineralized. With the exception of saturation measurements, no information was collected or tested in regard to water from this formation.

Selmier Shale: olive gray, organic rich, but lesser so than the Blocher below and Grassy Creek above, pyritic, burrowed and bioturbated silty shale that represents more oxic deposition. Average core measured porosity is 5 to 6% and has permeability in the nanodarcy range, and thus is extremely tight. Some fractures are recognized in this section but are not large or long and typically mineralized. With the exception of saturation measurements, no information was collected or tested in regard to water from this formation.

Grassy Creek Shale (*horizontal target Formation*): dark gray to black, pyritic, organic-rich, faintly laminated and locally burrowed and bioturbated, slightly silty shale / mudrock that possesses thin light gray beds composed of quartz grains; algal cysts (*tasmanites*) express laminations. Average core measured porosity is 5 to 7% and, although the most permeably of the three NAS formations is also in the nanodarcy range, and is extremely tight. Natural fractures do exist in this section, especially in the lower 50', and are up to a foot or two long, vertically; most are mineralized but some open fractures do exist. Horizontal, healed, fractures associated with prior oil generation also exist. With the exception of saturation measurements, no information was collected or tested in regard to water from this formation.

*The potential formations that may be affected by the HVHHFO *above* the NAS, in *ascending* order are as follows: Compton Limestone, Borden Shale (a.k.a., Springville Shale), and the Fort Payne Limestone. All three formations are lower Mississippian in age. They are described below.

Compton Limestone: light grey to green mottled crinoid wackestone to sparse packstone with thin shale wisps, 8-10' thick throughout the prospect area. No measured porosity or permeability for this formation exists in or near the prospect area however, from cores in the basin these rocks visually are extremely tight and non-permeable (all logs in a 5 mile radius corroborate these visual observations). Fractures are at a minimum as small, healed (mineralized) microfractures. No information exists on water from the formation.

Borden Shale (a.k.a., Springville Shale): dark greenish gray, flaggy to slightly laminated, burrowed shale, 40-50' thick throughout the prospect area. No measured porosity or permeability for this formation exists in or near the prospect area however, from cores in the basin these rocks visually are extremely tight and non-permeable, and due to the layering specifically non-permeable vertically (all logs in a 5 mile radius corroborate these visual observations). Very few fractures exist in this formation and, when present, are small, healed (mineralized) microfractures. No information exists on water from this formation.

Fort Payne Limestone: very dark gray to black, extremely dense siliceous lime mudstone; the unit is slightly silty and spiculitic in the lower half and grades

upward into a lighter colored lime mudstone that becomes increasingly cherty upward; the chert is dark to light gray mottled and burrowed. This formation is ~500' thick in the prospect area. No measured porosity or permeability for this formation exists in or near the prospect area however, from cores in the basin these rocks visually are extremely tight and non-permeable (all logs in a 5 mile radius corroborate these visual observations). As stated previous, the limestone is extremely dense, particularly in the lower half and not fractured; fractures do occur upward in the section but are restricted to the small chert nodules and are mineralized. No information exists on water from this formation.

*The potential formations that may be affected by the HVHHFO *below* the NAS, in *descending* order are as follows: the Devonian, Lingle Limestone Formation. This formation is described below.

Lingle Limestone: light to medium and dark gray, crinoidal wackestone to packstone, with some rugose and button (*M. discus*) corals; this unit is argillaceous and in places, cherty. The chert occurs as 1 to 3" nodules and is medium to dark gray mottled with crinoid fragments. The formation in the prospect area is 75 to 85' thick. This unit in places throughout the Illinois Basin is porous near the top (typically 3 to 8%), near an intraformational unconformity, and does produce oil however, examination of all logs within a 5 mile radius of the proposed location show the Lingle to be extremely tight throughout. No measured porosity or permeability for this formation exists in or near the prospect area. Some fracturing was noted in collected cores, largely in the sections that contained chert but they were small fractures and most typically mineralized. No information exists on water from this formation.

Based on the lithology and gross petrophysics of the under and overlying units, it is not anticipated that the aforementioned units will be susceptible to vertical fracture propagation during completion of the NAS, Grassy Creek Shale Formation. Historically, from microseismic study in the basin, there appears to be two frac barriers to the objective Grassy Creek, the Fort Payne Limestone above, and the intraformational Selmier Shale, below.

- a) 1,000 psi – 7,900 psi
- b) 7,900 psi.
- c) 2,875 psi
- d) 4,000 psi
- e) Between 5,275' TVD and 5,245' TVD
- f) N/A
- g) Slickwater (3% KCl), Local well(s), Approx. 7,000,000 gal.



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: AdditionalRequiredMaps

Please save attachment and use the file name above.

Additional Required Maps §1-35(b)(7); 245.210(a)(7). In addition to the scaled plat map referred to in the Well Site Setback Plan above, and the scaled cross section diagram referred to under the Directional Drilling Plan, please attach a **SCALED TOP VIEW DIAGRAM** showing the well location, direction of drilling (below surface entry to the intersection with target formation) and horizontal leg to total length. At the surface indicate all known previous well bores within 750 feet of the vertical plane above any part of the horizontal well bore that penetrated within 400 vertical feet of the formation that will be stimulated as part of the high volume horizontal hydraulic fracturing operations. If well bores are present, include the well name, location and permit and reference number for each.



FRONTIER PROJECT

WOODROW PROSPECT

Woodrow #1H-310408-193

Surface Plat

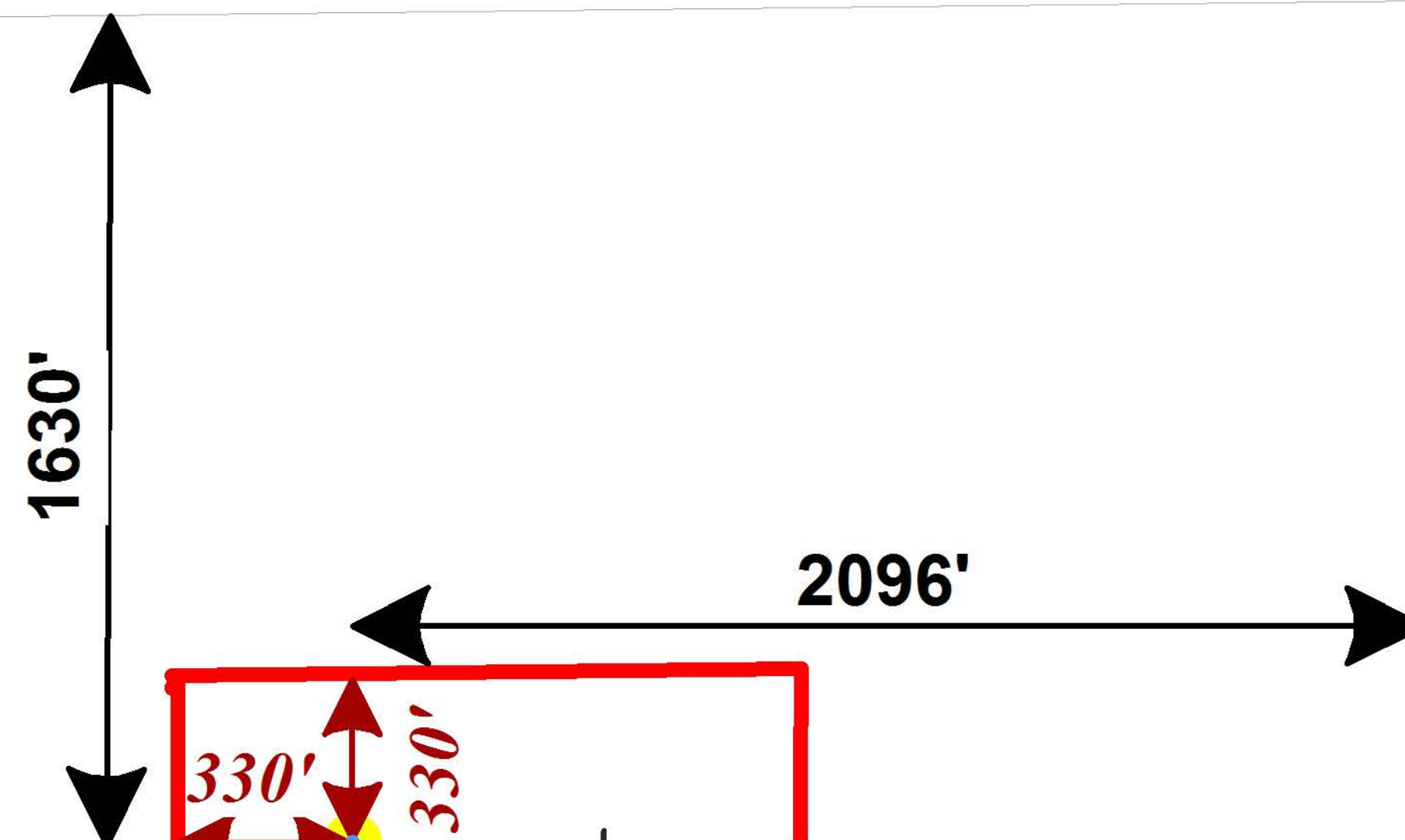
REMARKS
DNR HVHHF-10
Exhibit: Additional Required Maps

By: **BWW**

May 12, 2017

HAMILTON COUNTY

T. 4 S.



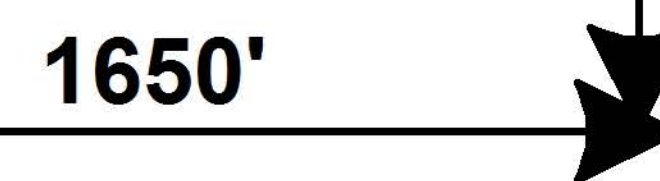
Bottom Hole Loc.:
2,096' FEL of Sec. 30-4S-8E
1,630 FNL of Sec. 30-T4S-R8E

Completed Horizontal Interval

N. 5 deg. W

Reservoir Intercept

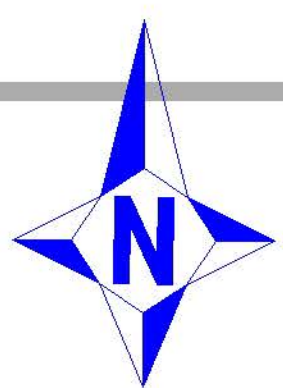
40 Ac. Stacked Vertical Drilling Units



PROPOSED:
WOOLSEY OPERATING COMPANY
WOODROW #1H-310408-193
Surface Loc.: 1,650' FEL of Sec. 31-4S-8E
1,990 FNL of Sec. 31-T4S-R8E

WHITE COUNTY

R. 8 E.



	ILLINOIS DEPARTMENT OF NATURAL RESOURCES Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271	
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: ChemicalDisclosureReport

Please save attachment and use the file name above.

Chemical Disclosure Report §1-35(b)(8); 245.210(a)(8), 245.700, 245.720.

- (a) Do you have on file with the Department a master list of chemicals, as required in §1-77 of the Act? ___ YES ___ NO If "NO" please attach a master list as "Attachment C(6)(a)." If you are claiming any trade secret under §§245.700, 245.720, you must attach redacted and un-redacted copies of the documents identifying the specific information on the master list of chemicals claimed to be protected as trade secrets. Also, if making a claim of trade secret please provide the Department with a telephone number and e-mail where the trade secret holder may be reached at any time (24 hours/day, 7 days/week).
- (b) Please list each chemical and proppant anticipated to be used in hydraulic fracturing fluid for each stage of the high volume horizontal hydraulic fracturing operation:
- (c) If using water in the high volume horizontal hydraulic fracturing treatment of the well, state the total volume of water anticipated to be used for each stage of the fracturing treatment. If using something other than water, state the type and total volume of base fluid anticipated to be used in the treatment. If the total volume is currently unknown, estimate the maximum volume anticipated to be used.
- (d) Please identify each hydraulic fracturing additive you anticipate using, including:
 1. Trade name
 2. Vendor
 3. Brief descriptor of the planned use or function of each additive
 4. Attach a copy of the Material Safety Data Sheet (MSDS) if applicable.

NOTE: if this information is unavailable, then list the chemical family and chemical effects of each. If the additives have not been determined at time of application, submit all possible additives that might be used. You may use the table below or provide your own.

TRADE NAME	VENDOR	PLANNED USE/FUNCTION

(e) Please identify each chemical anticipated to be intentionally added to the base fluid, the anticipated concentration in the base fluid (in percent by mass) of each chemical, and the Chemical Abstracts Service number. If CAS is not available, then list the chemical family and effects of each chemical. If the chemicals to be used have not been determined at the time of filing of this application, identify all possible chemicals that may be used. You may use the table below or provide your own.

CHEMICAL NAME	CONCENTRATION [__/__]	CHEMICAL ABSTRACTS SERVICE NUMBER (or chemical family and effects)

NOTE: if the contents of the fluid are adjusted or altered during the treatment process, the Department MUST be notified within 24 hours of departure from the initial treatment design and include an explanation detailing the reason for the departure from the original formulation.

NOTE: no less than 21 days before performing the FIRST stimulation treatment, maintain and disclose to the Department separate and up-to-date master lists of:

- 1) the base fluid to be used during any high volume horizontal hydraulic fracturing operations,
- 2) all hydraulic fracturing additives to be used during any high volume horizontal hydraulic fracturing operations, and
- 3) all chemicals and associated Chemical Abstract Service numbers to be used in any high volume horizontal hydraulic fracturing operations.

(f) Please provide the name, telephone number and address of an employee, agent or contractor of the permittee having knowledge of the specific chemicals being used in the HVHFF operation at any given time.



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Chemical Disclosure Report

- a) No
- b) See Attached Schedule
- c) 175,000 gal. per stage
- d) See Attached Schedule
- e) See Attached Schedule
- f) Kevin Gordley
Area Manager, Basic Energy services, LP
10244 NE State Road 61, Pratt, KS
620-770-2191



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Chemical Disclosure Report

The Chemical Disclosure Report does not contain any trade secrets and therefore no redacted versions will be submitted.



WOOLSEY OPERATING COMPANY, LLC

125 North Market, Suite 1000, Wichita, Kansas 67202-1775

(316) -267-4379 fax (316) 267-4383

HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION

CHEMICAL DISCLOSURE REPORT - PART b

CHEMICAL AND PROPPANT LIST EACH STAGE

WOODROW 1H-310408-193

Trade Name	Purpose	Ingredient	Chemical Abstract Service Number (CAS #)	Mass per Component (LBS)	Maximum Ingredient Concentration in HF Fluid (% by mass)
Water	Carrier/Base Fluid	Water	7732-18-5	2,503,500	91.45359%
Sand (Proppant)	Proppant	Crystalline Silica in the form of Quartz	14808-60-7	220,000	8.03666%
Cronox AK-50 CIA-I	Acid Inhibitor	Heavy aromatic naphtha	64742-94-5	3	0.00012%
Cronox AK-50 CIA-I	Acid Inhibitor	Isopropanol	67-63-0	3	0.00012%
Cronox AK-50 CIA-I	Acid Inhibitor	Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	2	0.00006%
Cronox AK-50 CIA-I	Acid Inhibitor	Formaldehyde	50-00-0	2	0.00006%
Cronox AK-50 CIA-I	Acid Inhibitor	Propargyl Alcohol	107-19-7	0	0.00001%
Cronox AK-50 CIA-I	Acid Inhibitor	Naphthalene	91-20-3	0	0.00001%
Plexslick 957	Friction Reducer	Distillates (petroleum), hydrotreated light	64742-47-8	266	0.00971%
Plexgel Breaker XPA	Slickwater Gel Breaker	Hydrogen Peroxide	7722-87-1	24	0.00089%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	Light aromatic naphta	64745-95-6	178	0.00652%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	1,2,4 - Trimethylbenzene	95-63-6	59	0.00210%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	1,2,3 - Trimethylbenzene	526-73-8	6	0.00022%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	1,3,5 - Trimethylbenzene	108-67-8	30	0.00109%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	Xylene	1330-20-7	6	0.00022%
NE-6 Arbreak 8792 demulsifier	Non-emulsifier/Surfactant	2-Ethylhexanol	104-76-7	30	0.00109%
Ferriplex 66	Iron Control	Acetic Acis	64-19-7	20	0.00072%
Ferriplex 66	Iron Control	Citirc Acid	77-92-9	20	0.00072%
Hydrochloric Acid	Acidize Formation	Hydrogen Chloride	7647-01-0	612	0.02235%

SAFETY DATA SHEET

M34514 NA_EN



Occidental Chemical Corporation

A subsidiary of Occidental Petroleum Corporation



HYDROCHLORIC ACID (HCl) (ALL GRADES)

MSDS No.: M34514

Rev. Date: 09-Aug-2012

Rev. Num. 06

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Company Identification: Occidental Chemical Corporation
5005 LBJ Freeway
P.O. Box 809050
Dallas, TX 75380-9050

24 Hour Emergency Telephone Number: 1-800-733-3665 or 1-972-404-3228 (U.S.); CHEMTREC (U.S.): 1-800-424-9300; CHEMTREC (outside U.S.): +1 703-527-3887

To Request an SDS: MSDS@oxy.com or 1-972-404-3245

Customer Service: 1-800-752-5151 or 1-972-404-3700

Trade Name: Hydrochloric Acid (HCl) aqueous all grades

Synonyms: Muriatic Acid, HCl Solution, Aqueous hydrogen chloride

Product Use: Process chemical, Metal cleaning, Water purification, Petroleum Industry

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Color: Colorless
Physical State: Liquid
Appearance: Clear
Odor: Irritating, Pungent, Sharp

Signal Word: Danger

HYDROCHLORIC ACID (HCl) (ALL GRADES)

M34514 NA_EN

MSDS No.: M34514

Rev. Date: 09-Aug-2012

Rev. Num. 06

MAJOR HEALTH HAZARDS: CAUSES BURNS TO THE RESPIRATORY TRACT, SKIN AND EYES. CAUSES PERMANENT EYE DAMAGE. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

PHYSICAL HAZARDS: May spatter or generate heat when mixed with water. Contact with metals may evolve flammable hydrogen gas.

PRECAUTIONARY STATEMENTS: Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling. Use only with adequate ventilation.

POTENTIAL HEALTH EFFECTS:

Inhalation: May cause irritation (possibly severe), chemical burns, and pulmonary edema.

Skin contact: May cause irritation (possibly severe) and chemical burns.

Eye contact: May cause irritation (possibly severe), chemical burns, eye damage, and blindness.

Ingestion: Not a likely route of exposure.

Chronic Effects: Repeated or prolonged exposure to dilute solutions may result in dermatitis. Discoloration of the teeth may occur as a result of long term exposure.

Interaction with Other Chemicals Which Enhance Toxicity: None known.

Medical Conditions Aggravated by Exposure: None known.

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Component	%	CAS Number
Hydrogen chloride	9 - 36	7647-01-0
Water	63 - 91	7732-18-5

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing and shoes before reuse. GET MEDICAL ATTENTION IMMEDIATELY.

HYDROCHLORIC ACID (HCl) (ALL GRADES)

EYE CONTACT: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire.

Fire Fighting: Keep unnecessary people away, isolate hazard area and deny entry. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode. Move container from fire area if it can be done without risk. Cool non-leaking containers with water. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Sensitivity to Mechanical Impact: Not sensitive.

Sensitivity to Static Discharge: Not sensitive.

Flash point: Not flammable

Hazardous Combustion Products: Hydrogen chloride, Chlorine, Hydrogen gas

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Remove sources of ignition. Wear appropriate personal protective equipment recommended in Section 8 of the SDS. Stop leak if possible without personal risk. Consider evacuation of personnel located downwind if material is leaking. Shut off ventilation system if needed. Completely contain spilled material with dikes, sandbags, etc. Neutralize with soda ash or dilute caustic soda. Collect with appropriate absorbent and place into suitable container. Liquid material may be removed with a properly rated vacuum truck. Keep out of water supplies and sewers. This material is acidic and may lower the pH of the surface waters with low buffering capacity. Releases should be reported, if required, to appropriate agencies.

7. HANDLING AND STORAGE

Storage Conditions: Store and handle in accordance with all current regulations and standards. Store in rubber-lined steel, acid-resistant plastic or glass containers. Keep container tightly closed. Store in a cool, dry area. Store in a well-ventilated area. Keep away from heat, sparks and open flames. Keep separated from incompatible substances (see Section 10 of SDS). Do not store in aluminum container or use aluminum fittings or transfer lines. Protect from physical damage. Dike and vent storage tanks.

HYDROCHLORIC ACID (HCl) (ALL GRADES)

M34514 NA_EN

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Handling Procedures: Avoid breathing vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. When mixing, slowly add to water to minimize heat generation and spattering.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Regulatory Exposure Limit(s): As listed below

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrogen chloride 7647-01-0	-----	-----	5 ppm 7 mg/m ³

OEL: Occupational Exposure Limit; **OSHA:** United States Occupational Safety and Health Administration; **PEL:** Permissible Exposure Limit; **TWA:** Time Weighted Average; **STEL:** Short Term Exposure Limit

Non-Regulatory Exposure Limit(s): As listed below

Component	CAS Number	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Hydrogen chloride	7647-01-0	-----	-----	2 ppm	-----	-----	5 ppm 7 mg/m ³

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

ENGINEERING CONTROLS: Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear chemical safety goggles with a face-shield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Always place pants legs over boots.

Hand Protection: Wear appropriate chemical resistant gloves. Consult a glove supplier for assistance in selecting an appropriate chemical resistant glove.

Protective Material Types: Nitrile, Neoprene, Butyl rubber, Polyvinyl chloride (PVC), Responder®, Trelchem® HPS, Tychem®

Component	Immediately Dangerous to Life/ Health (IDLH)
Hydrogen chloride	50 ppm IDLH

Respiratory Protection: A NIOSH approved full-face respirator equipped with acid gas cartridges (appropriate for hydrogen chloride) may be permissible when symptoms have been observed that are indicative of overexposure. When the level may be above the IDLH, use an SCBA or pressure-demand supplied air with an auxiliary self-contained escape pack. Pressure-demand SCBA (self-contained breathing apparatus) must be used when there is a potential for uncontrolled release or unknown concentrations. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

HYDROCHLORIC ACID (HCl) (ALL GRADES)

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9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Clear
Color:	Colorless
Odor:	Irritating, Pungent, Sharp
Odor Threshold:	0.3 ppm (causes olfactory fatigue)
Molecular Weight:	36.46
Molecular Formula:	HCl
Boiling Point/Range:	140 - 221°F (60 - 105 °C)
Freezing Point/Range:	-29 to 5 °F (-34 to -15 °C)
Vapor Pressure:	14.6 - 80 mmHg @ 20 °C
Vapor Density (air=1):	1.3 @ 20 °C
Specific Gravity (water=1):	1.05 - 1.18
Density:	8.75 - 9.83 lbs/gal
Water Solubility:	100%
pH:	2 @ (0.2% solution)
Volatility:	9 - 36% by volume
Evaporation Rate (ether=1):	< 1.00 (butyl acetate = 1)
Flash point:	Not flammable

10. STABILITY AND REACTIVITY

Reactivity/ Stability: Stable at normal temperatures and pressures.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Avoid contact with water. Will react with some metals forming flammable hydrogen gas. Hydrogen chloride may react with cyanide, forming lethal concentrations of hydrocyanic acid. Avoid contact with incompatible materials.

Incompatibilities/ Materials to Avoid: Metals, Alkalis, Oxidizing agents, Mercuric sulfate, Perchloric acid, Carbides of calcium, cesium, rubidium, Acetylides of cesium and rubidium, Phosphides of calcium and uranium, Lithium silicide

Hazardous Decomposition Products: chlorine, hydrogen chloride, hydrogen gas

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

IRRITATION DATA: As listed below

Standard Draize (Eye):	rabbit-eye mild
Standard Draize (Skin):	human-skin mild

HYDROCHLORIC ACID (HCl) (ALL GRADES)

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MSDS No.: M34514

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TOXICITY DATA:

Component	LD50 Oral:	LC50 Inhalation:	LD50 Dermal:
Hydrogen chloride	700 mg/kg (Rat)	3124 ppm (1 hr-Rat)	5010 mg/kg (Rabbit)
Water	900 mg/kg (Rabbit)	1108 ppm (1hr-Rat)	

TOXICITY:

Inhalation will cause severe irritation and possible burns with coughing and choking. If inhaled deeply, edema and hemorrhage of the lungs may occur. Prolonged exposure may cause discoloration and/or erosion of teeth. Contact with eyes causes immediate severe irritation with possible burns, permanent visual impairment, or total loss of sight. Skin contact with this material may cause severe irritation and corrosion of tissue. Ingestion may cause immediate burns of the mouth, esophagus, and stomach. Ingestion may cause intense pain, nausea, vomiting, bleeding, circulating collapse, shock, and death.

CARCINOGENICITY: This product is not classified as a carcinogen by NTP, IARC or OSHA.

12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

- **Aquatic Toxicity:**
LC50 *Gambusia affinis*: 282 mg/L 96 hr.
- **Fish Toxicity:**
LC50 Goldfish: 178 mg/L (1 to 2 hour survival time)
- **Freshwater Fish Toxicity:**
LC50 Bluegill: 3.6 mg/L 48 hr
- **Invertebrate Toxicity:**
LC50 Shrimp: 100 - 330 mg/L

FATE AND TRANSPORT:

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is believed not to persist in the environment. This material is believed to exist in the disassociated state in the environment. If released to soil, hydrogen chloride will sink into the soil. The acid will dissolve some soil material (in particular, anything with a carbonate base) and will be somewhat neutralized. The remaining portion is thought to transport downward to the water table. If released to water, it dissociates almost completely and will be neutralized by natural alkalinity and carbon dioxide.

BIOCONCENTRATION: This material is not expected to bioconcentrate in organisms.

ADDITIONAL ECOLOGICAL INFORMATION: This material has exhibited toxicity to terrestrial organisms. May decrease pH of waterways and adversely affect aquatic life.

HYDROCHLORIC ACID (HCl) (ALL GRADES)

M34514 NA_EN

MSDS No.: M34514

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Rev. Num. 06

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. All disposals of this material must be done in accordance with local, state and federal regulations. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

UN NUMBER: UN1789
PROPER SHIPPING NAME: Hydrochloric acid solution
HAZARD CLASS/ DIVISION: 8
PACKING GROUP: II
LABELING: 8
REQUIREMENTS:
RQ (lbs): RQ 5,000 Lbs. (Hydrochloric acid)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

UN NUMBER: UN1789
SHIPPING NAME: Hydrochloric acid solution
CLASS OR DIVISION: 8
PACKING/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS:

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 426-2675.

Component	CERCLA Reportable Quantities:
Hydrogen chloride	5000 lb (final RQ)

EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):

If a release is reportable under EPCRA, notify the state emergency response commission and local emergency planning committee. If the TPQ is met, facilities are subject to reporting requirements under EPCRA Sections 311 and 312.

HYDROCHLORIC ACID (HCl) (ALL GRADES)

M34514 NA_EN

MSDS No.: M34514

Rev. Date: 09-Aug-2012

Rev. Num. 06

Component	EPCRA RQs	Threshold Planning Quantity (TPQs)
Hydrogen chloride	5000 lb (EPCRA RQ)	500 lb (TPQ) gas only

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):

Acute Health Hazard, Reactive Hazard

EPCRA SECTION 313 (40 CFR 372.65):

The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements.

Component	Status:
Hydrogen chloride	Listed – Aerosol form only

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119): Not regulated

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA): All components are listed or exempt

TSCA 12(b): This product is not subject to export notification

Canadian Chemical Inventory: All components of this product are listed on either the DSL or the NDSL.

STATE REGULATIONS

California Proposition 65:

This product is not listed, but it may contain impurities/trace elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act.

Hydrogen chloride	
California Proposition 65 Cancer WARNING:	Not Listed
California Proposition 65 CRT List - Male reproductive toxin:	Not Listed
California Proposition 65 CRT List - Female reproductive toxin:	Not Listed
Massachusetts Right to Know Hazardous Substance List	Listed
New Jersey Right to Know Hazardous Substance List	sn 1012; sn 2909 (gas only)
New Jersey Special Health Hazards Substance List	corrosive
New Jersey - Environmental Hazardous Substance List	Listed
Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Special Hazardous Substances	Not Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

CANADIAN REGULATIONS

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

Canada - CEPA Schedule I - Toxic Substance list	Not Listed
WHMIS - Classifications of Substances:	• E - Corrosive material

HYDROCHLORIC ACID (HCl) (ALL GRADES)

M34514 NA_EN

MSDS No.: M34514

Rev. Date: 09-Aug-2012

Rev. Num. 06

16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Disclaimer:

This information is intended solely for the use of individuals trained in the NFPA and/or HMIS systems.

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health: 3 **Flammability:** 0 **Reactivity:** 1

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health: 3 **Flammability:** 0 **Reactivity:** 1

Reason for Revision:

- Updated 24 Hour Emergency Telephone Number: SEE SECTION 1
- PPE recommendations have been modified: SEE SECTION 8
- Updated Transportation Information: SEE SECTION 14
- Revised California Proposition 65 Statement: SEE SECTION 15
- Revised Preparer Information: SEE SECTION 16
- Added "End of Safety Data Sheet" phrase

IMPORTANT:

The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY OR OTHERWISE. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and OxyChem assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws.

OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees.

End of Safety Data Sheet



SAFETY DATA SHEET

Section 1. Identification

Product name : CRONOX™ AK-50 CORROSION INHIBITOR
™ a trademark of Baker Hughes Incorporated.
Product code : CROAK50

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Acid Corrosion Inhibitor.

Print date : 1/8/2015.
Validation date : 12/30/2014.
Version : 2

Supplier's details : Aquaness Chemical
A Division of Baker Petrolite Corp.
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Emergency telephone number (with hours of operation) : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606 (North America 24 hour)
CANUTEC: 613-996-6666 (Canada 24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY: ORAL - Category 4
ACUTE TOXICITY: SKIN - Category 3
ACUTE TOXICITY: INHALATION - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation and Narcotic effects] - Category 3
AQUATIC HAZARD (ACUTE) - Category 2
AQUATIC HAZARD (LONG-TERM) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Section 2. Hazards identification

Hazard statements	: Flammable liquid and vapor. Toxic in contact with skin or if inhaled. Harmful if swallowed. Causes serious eye irritation. Causes skin irritation. May cause an allergic skin reaction. May cause cancer. May cause respiratory irritation. May cause drowsiness and dizziness. Toxic to aquatic life with long lasting effects.
Precautionary statements	
Prevention	: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace.
Response	: Collect spillage. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. Take off contaminated clothing. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
Storage	: Store locked up. Store in a well-ventilated place. Keep cool.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Supplemental label elements	: Avoid contact with skin and clothing. Wash thoroughly after handling.
Hazards not otherwise classified	: Prolonged or repeated contact may dry skin and cause irritation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Oxyalkylated alkylphenol	10 - 20	Trade secret.
Heavy aromatic naphtha	10 - 20	64742-94-5
Isopropanol	10 - 20	67-63-0
Fatty acids	5 - 10	Trade secret.
Complex alkylaryl polyo-ester	5 - 10	Trade secret.
Tar bases, quinoline derivs., benzyl chloride-quaternized	5 - 10	72480-70-7
Formaldehyde	5 - 10	50-00-0
Acetylenic alcohol	1 - 5	Trade secret.
Propargyl alcohol	1 - 5	107-19-7
Naphthalene	1 - 5	91-20-3

Section 4. First aid measures

Description of necessary first aid measures

- | | |
|---------------------|---|
| Eye contact | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Continue to rinse for at least 10 minutes. Check for and remove any contact lenses. Get medical attention. |
| Inhalation | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. |
| Skin contact | : Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. If necessary, call a poison center or physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse. |
| Ingestion | : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |

Most important symptoms/effects, acute and delayed

Potential acute health effects

- | | |
|---------------------|---|
| Eye contact | : Causes serious eye irritation. |
| Inhalation | : Toxic if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure. |
| Skin contact | : Toxic in contact with skin. Causes skin irritation. Defatting to the skin. May cause an allergic skin reaction. |
| Ingestion | : Harmful if swallowed. Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach. |

Over-exposure signs/symptoms

- | | |
|---------------------|--|
| Eye contact | : pain or irritation, watering, redness |
| Inhalation | : respiratory tract irritation, coughing, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness |
| Skin contact | : irritation, redness, dryness, cracking |
| Ingestion | : No specific data. |

Indication of immediate medical attention and special treatment needed, if necessary

- | | |
|----------------------------|---|
| Notes to physician | : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. |
| Specific treatments | : No specific treatment. |

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO₂, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : carbon dioxide, carbon monoxide, nitrogen oxides, sulfur oxides, halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Section 8. Exposure controls/personal protection

Occupational exposure limits			TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredients:	List name	ppm	mg/m³	Other	ppm	mg/m³	Other	ppm	mg/m³	Other	Notations	
Isopropanol	US ACGIH	200	-	-	400	-	-	-	-	-		
	OSHA PEL	400	980	-	-	-	-	-	-	-		
	OSHA PEL 1989	400	980	-	500	1225	-	-	-	-		
Formaldehyde	US ACGIH	-	-	-	-	-	-	0.3	0.37	-	[3]	
	OSHA PEL	0.75	-	-	2	-	-	-	-	-		
	OSHA PEL 1989	0.75	-	-	2	-	-	-	-	-		
Propargyl alcohol	OSHA PEL Z2	0.75	-	-	2	-	-	-	-	-		
	US ACGIH	1	2.3	-	-	-	-	-	-	-	[1]	
	OSHA PEL 1989	1	2	-	-	-	-	-	-	-	[1]	
Naphthalene	US ACGIH	10	52	-	-	-	-	-	-	-	[1]	
	OSHA PEL	10	50	-	-	-	-	-	-	-		
	OSHA PEL 1989	10	50	-	15	75	-	-	-	-		

[1]Absorbed through skin. [3]Skin sensitization

Consult local authorities for acceptable exposure limits.

Only components of this product with established exposure limits appear in the box above.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.
- Hand protection** : Chemical-resistant gloves.
- Skin protection** : Wear long sleeves to prevent repeated or prolonged skin contact.
- Respiratory protection** : If a risk assessment indicates it is necessary, use a properly fitted, air purifying or supplied air respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Amber.
- Odor** : Pungent.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting/freezing point** : Not available.
- Boiling point** : Not available.
- Initial Boiling Point** : Not available.

Section 9. Physical and chemical properties

Flash point	: Closed cup: 37.8°C (100°F) [SFCC]
Burning time	: Not applicable.
Burning rate	: Not applicable.
Evaporation rate	: Not available.
Flammability (solid, gas)	: Flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: 5 kPa (37.2 mm Hg) @ 37.8°C
Vapor density	: >1 [Air = 1]
Relative density	: 0.9664 (15.6°C)
Density	: 8.05 (lbs/gal)
Solubility in water	: Insoluble
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Dynamic (15.6°C): 38 cP
VOC	: Not available.
Pour Point	: -23.3°C (-9.9°F)

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	: Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis. Isopropanol is incompatible with acrylaldehyde, aluminum powder, and potassium tert-butoxide.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Heavy aromatic naphtha	LC50 Inhalation Vapor	Rat	>11.4 mg/l	6 hours
	LD50 Oral	Rat	3200 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-
Isopropanol	LC50 Inhalation Vapor	Rat	>10000 ppm	6 hours
	LD50 Dermal	Rabbit	6.29 g/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
Fatty acids	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>10000 mg/kg	-
Formaldehyde	LD50 Dermal	Rabbit	270 mg/kg	-
	LD50 Oral	Rat	640 mg/kg	-
	LD50 Oral	Rat	800 mg/kg	-
Acetylenic alcohol	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	4100 mg/kg	-
Propargyl alcohol	LD50 Oral	Rat	55 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
CRONOX™ AK-50 CORROSION INHIBITOR	LD50 Dermal	Rabbit	630 mg/kg	-
	LD50 Oral	Rat	1400 mg/kg	-

Irritation/Corrosion

No applicable toxicity data

Sensitization

No applicable toxicity data

Mutagenicity

No applicable toxicity data

Carcinogenicity

Product/ingredient name	OSHA	IARC	NTP
Isopropanol	-	3	-
Formaldehyde	+	1	Known to be a human carcinogen.
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

No applicable toxicity data

Teratogenicity

No applicable toxicity data

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Heavy aromatic naphtha	Category 3	Not applicable.	Narcotic effects
Isopropanol	Category 3	Not applicable.	Narcotic effects
Formaldehyde	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not applicable.

Aspiration hazard

Name	Result
Heavy aromatic naphtha	ASPIRATION HAZARD - Category 1

Section 11. Toxicological information

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis. Once sensitized; a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (vapors)	8.145 mg/l

Additional information

Testing of similar products provided rabbit dermal LD50's of >200mg/kg and <1000mg/kg.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Isopropanol	Acute LC50 1400000 µg/l Marine water	Crustaceans - Crangon crangon	48 hours
	Acute LC50 1400000 µg/l	Fish - Gambusia affinis	96 hours
Formaldehyde	Acute EC50 0.788 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute EC50 12.98 mg/l Fresh water	Crustaceans - Ceriodaphnia dubia	48 hours
Propargyl alcohol	Acute EC50 14000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 1.41 ppm Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 100 µg/l Marine water	Algae - Phyllospora comosa	96 hours
	EC50 98.1 mg/l	Algae	72 hours
	Acute EC50 3.36 mg/l	Daphnia	48 hours
	Acute LC50 4.64 mg/l	Fish	96 hours
Naphthalene	Acute EC50 1.6 ppm Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days

Persistence and degradability

Section 12. Ecological information












Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Propargyl alcohol	-	-	Readily

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	UN1992	UN1992	UN1992	UN1992
UN proper shipping name	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)
Transport hazard class(es)	3 (6.1)   	3 (6.1)   	3 (6.1)   	3 (6.1)  
Packing group	III	III	III	III
Environmental hazards	Yes.	Yes.	No.	No.
Additional information	-	-	Emergency schedules (EmS) F-E S-E	-

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 14. Transport information

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

DOT Reportable Quantity Formaldehyde, 167 gal of this product.
 Propargyl alcohol, 2535 gal of this product.
 Naphthalene, 837 gal of this product.

Marine pollutant Heavy aromatic naphtha
 Acetylenic alcohol

North-America NAERG : 131

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 12(b) one-time export:** No products were found.
 TSCA 12(b) annual export notification: No products were found.
 United States inventory (TSCA 8b): All components are listed or exempted.
 Clean Water Act (CWA) 307: Naphthalene
 Clean Water Act (CWA) 311: Formaldehyde; Naphthalene; Potassium hydroxide

Clean Air Act (CAA) 112 regulated toxic substances: Formaldehyde

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

SARA 302/304

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
Formaldehyde	5 - 10	Yes.	500	6.7	100	1.3

SARA 311/312

Classification : Fire hazard
 Immediate (acute) health hazard
 Delayed (chronic) health hazard

SARA 313

	Product name	CAS number	%
Supplier notification	Formaldehyde	50-00-0	5 - 10
	Propargyl alcohol	107-19-7	1 - 5
	Naphthalene	91-20-3	1 - 5

Canada

Canada (CEPA DSL): : At least one component is not listed in DSL but all such components are listed in NDSL.

Section 16. Other information

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



History

Date of printing : 1/8/2015.

Section 16. Other information

☑ Indicates information that has changed from previously issued version.

Notice to reader

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

NC 1

NE-6 Material Safety Data Sheet

Section 1. Chemical Product and Company Identification			
Product Name	ARBREAK 8792 DEMULSIFIER	Code	ARB8792
Supplier	Aquaness Chemical A Division Of Baker Petrolite Corporation A Baker Hughes company 12645 W. Airport Blvd. (77478) P.O. Box 5050 Sugar Land, TX 77487-5050 For Product Information/MSDSs Call: 800-231-3606 (8:00 a.m. - 5:00 p.m. cst. Monday - Friday)	Version	1.0
Material Uses	Demulsifier.	Effective Date	12/14/2004
24 Hour Emergency Numbers	CHEMTREC 800-424-9300 (U.S. 24 hour) Baker Petrolite 800-231-3606 (North America 24 hour) CANUTEC 613-996-6686 (Canada 24 hours)	Print Date	12/14/2004
National Fire Protection Association (U.S.A.)			

Section 2. Composition and Information on Ingredients			
Name	CAS #	% by Weight	Exposure Limits
Light aromatic naphtha	64742-95-6	30-60	Not available.
1,2,4-Trimethylbenzene	95-63-6	10-30	Not available.
1,2,3-Trimethylbenzene	526-73-8	1-5	Not available.
1,3,5-Trimethylbenzene	108-67-8	5-10	Not available.
Xylene	1330-20-7	1-5	ACGIH (United States). TWA: 434 mg/m ³ 8 hour(s). STEL: 651 mg/m ³ 15 minute(s). TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). OSHA (United States). TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). TWA: 435 mg/m ³ 8 hour(s). STEL: 655 mg/m ³ 15 minute(s).
2-Ethylhexanol	104-76-7	5-10	Manufacturer TWA: 20 ppm

While trimethylbenzene isomers do not have exposure limits, trimethylbenzene (mixed isomers)(CAS No. 25551-13-7) has TWA value of 25 ppm for both ACGIH and OSHA (revoked limit).

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Section 3. Hazards Identification

Physical State and Appearance	State: Liquid., Color: Dark Brown., Odor: Acidic. Aromatic hydrocarbon.
CERCLA Reportable Quantity	Xylene 793 gal.
Hazard Summary	WARNING. May cause chronic effects. Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded. May be irritating to eyes, skin and respiratory tract. May cause central nervous system (CNS) effects if inhaled.
Routes of Exposure	Skin (Contact), Eyes, Inhalation.
Potential Acute Health Effects	<p>Eyes May be severely irritating to the eyes.</p> <p>Skin May be irritating to skin.</p> <p>Inhalation May cause central nervous system (CNS) effects if inhaled. May be irritating to lungs.</p> <p>Ingestion Not considered a likely route of exposure, however, may be harmful or cause irritation if swallowed.</p>
Medical Conditions aggravated by Exposure	Exposure to this product may aggravate medical conditions involving the following: blood system, kidneys, nervous system, liver, gastrointestinal tract, respiratory tract, skin/epithelium, eyes.
See Toxicological Information (section 11)	
Additional Hazard Identification Remarks	May be harmful if ingested. This product may be aspirated into the lungs during swallowing or vomiting of swallowed material. Aspiration into the lungs may produce chemical pneumonitis, pulmonary edema, and hemorrhaging. Repeated or prolonged contact may cause dermatitis (inflammation) and defatting of the skin (dryness).

Section 4. First Aid Measures

Eye Contact	Flush eyes with plenty of water for 15 minutes, occasionally lifting upper and lower eyelids. Get medical attention immediately.
Skin Contact	Remove and launder or clean contaminated clothing and shoes. Wash with soap and water for at least 15 minutes or until no evidence of material remains. Get medical attention if irritation occurs.
Inhalation	Remove to fresh air. Oxygen may be administered if breathing is difficult. If not breathing, administer artificial respiration and seek medical attention. Get medical attention if symptoms appear.
Ingestion	If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never induce vomiting or give anything by mouth to a victim who is unconscious or having convulsions. Get medical attention if symptoms appear.
Notes to Physician	Not available.
Additional First Aid Remarks	If product is ingested and vomiting occurs naturally, have person lean forward to reduce the risk of aspiration into the lungs. If breathing has stopped or the heart has stopped, trained personnel should immediately administer artificial respiration or cardiopulmonary resuscitation, as required.

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Section 5. Fire Fighting Measures

Flammability of the Product	Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded.
OSHA Flammability Class	II
Autoignition temperature	Not available.
Flash Points	Closed cup: 46.7°C (116°F). (PMCC)
Flammable Limits	L.E.L. Not available. U.E.L. Not available.
Products of Combustion	These products are carbon oxides (CO, CO ₂) nitrogen oxides (NO, NO ₂ ...) sulfur oxides (SO ₂ , SO ₃ ...).
Fire Hazards in Presence of Various Substances	Open Flames/Sparks/Static. Heat.
Fire Fighting Media and Instructions	In case of fire, use foam, dry chemicals, or CO ₂ fire extinguishers. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and public waterways. Note that flammable vapors may form an ignitable mixture with air. Vapors may travel considerable distances and flash back if ignited.
Protective Clothing (Fire)	Do not enter fire area without proper personal protective equipment, including NIOSH approved self-contained breathing apparatus.
Special Remarks on Fire Hazards	Not available.

Section 6. Accidental Release Measures

Spill	Put on appropriate personal protective equipment. Keep personnel removed and upwind of spill. Shut off all ignition sources; no flares, smoking, or flames in hazard area. Approach release from upwind. Shut off leak if it can be done safely. Contain spilled material. Keep out of waterways. Dike large spills and use a non-sparking or explosion-proof means to transfer material to an appropriate container for disposal. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container. Note that flammable vapors may form an ignitable mixture with air. Vapors may travel considerable distances from spill and flash back, if ignited. Waste must be disposed of in accordance with federal, state and local environmental control regulations.
Other Statements	If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.
Additional Accidental Release Measures Remarks	Not available.

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Section 7. Handling and Storage

Handling and Storage Put on appropriate personal protective equipment. Avoid contact with eyes, skin, and clothing. Avoid breathing vapors or spray mists. Use only with adequate ventilation. Store in a dry, cool and well ventilated area. Keep away from heat, sparks and flame. Keep away from incompatibles. Keep container tightly closed and dry. To avoid fire or explosion, ground container equipment and personnel before handling product.

Additional Handling and Storage Remarks Not available.

Section 8. Exposure Controls/Personal Protection

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors or particles below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection
 Personal Protective Equipment recommendations are based on anticipated known manufacturing and use conditions. These conditions are expected to result in only incidental exposure. A thorough review of the job tasks and conditions by a safety professional is recommended to determine the level of personal protective equipment appropriate for these job tasks and conditions.

Eyes Chemical safety goggles.

Body Wear long sleeves to prevent repeated or prolonged skin contact.

Respiratory Respirator use is not expected to be necessary under normal conditions of use. In poorly ventilated areas, emergency situations or if exposure levels are exceeded, use NIOSH approved full face respirator.

Hands Chemical resistant gloves. Nitrile or Neoprene gloves. 4H gloves.

Feet Chemical resistant boots or overshoes.

Other Information Not available.

Additional Exposure Control Remarks Not available.

Section 9. Typical Physical and Chemical Properties

Physical State and Appearance	Liquid.	Odor	Acidic. Aromatic hydrocarbon.
pH	6.5 - 9.5 (5% of product in 75% isopropanol / 25% water solution)	Color	Dark Brown.
Specific gravity	0.952 - 0.964 @ 16°C (60°F)		
Density	7.93 - 8.03 lbs/gal @ 16°C (60°F)		
Vapor Density	>1 (Air = 1)		
Vapor Pressure	7.6 - mmHg @ 21°C (70°F) Calculated Value for all Components.		
Evaporation Rate	Not Available or Not Applicable for Solids.		
VOC	Not available.		
Viscosity	11 - 12 cps @ 38°C (100°F) Kinematic		
Pour Point	-40°C (-40°F)		
Solubility (Water)	Dispersible		
Boiling Point	Not available.		

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Physical Chemical	Not available.
Comments	

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
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Conditions of Instability	Not available.
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Incompatibility with Various Substances	Oxidizing material.
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Hazardous Decomposition Products	Not applicable.
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Hazardous Polymerization	Hazardous polymerization is not expected to occur.
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Special Stability & Reactivity Remarks	Not available.
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Section 11. Toxicological Information**Component Toxicological Information****Acute Animal Toxicity**

Light aromatic naphtha	ORAL (LD50): Acute: 2800 mg/kg [Rat]. 8400 mg/kg [Rat].
1,2,4-Trimethylbenzene	ORAL (LD50): Acute: 5000 mg/kg [Rat]. VAPOR (LC50): Acute: 18000 mg/m ³ 4 hour(s) [Rat].
1,2,3-Trimethylbenzene	Not available.
1,3,5-Trimethylbenzene	VAPOR (LC50): Acute: 24000 mg/m ³ 4 hour(s) [Rat].
Xylene	ORAL (LD50): Acute: 4300 mg/kg [Rat]. 3523 mg/kg [Male rat]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit]. VAPOR (LC50): Acute: 5000 ppm 4 hour(s) [Rat].
2-Ethylhexanol	ORAL (LD50): Acute: 3730 mg/kg [Rat]. 2500 mg/kg [Mouse]. DERMAL (LD50): Acute: 1970 mg/kg [Rabbit].

Chronic Toxicity Data

1) Light aromatic naphtha

Ingestion has produced Central Nervous System effects in laboratory animals. (EPA/OTS 87-8214199 and 88-920000348)

2) 1,2,4-Trimethylbenzene

1,2,4-Trimethylbenzene, also known as pseudocumene, is a component of this product. Chronic pseudocumene exposure may provoke bronchospasm with cough and wheezing (Punkett, 1976; ACGIH, 1991; Baltig et al, 1956). Respiratory distress was noted in experimental animals following sub acute inhalation exposure (Gage, 1970). Nervousness and anxiety were noted with chronic occupational exposure (Baltig et al, 1956; ACGIH, 1991).

At the time of this review, no studies were found on the potential adverse reproductive effects of pseudocumene in humans, but trimethylbenzenes (including pseudocumene) can cross the placental barrier (Clayton & Clayton, 1994; Doroty et al, 1976). In an experimental animal study, offspring born to pregnant rats exposed to pseudocumene were healthy at birth and grew normally (Cameron et al, 1938).

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Blood effects such as anemia and delayed clotting time have been noticed in workers chronically exposed to a solvent containing trimethylbenzene. The blood effects, however, may have been due to a contaminant in the solvent such as benzene (a known blood toxin).

3) 1,2,3-Trimethylbenzene

Not available.

4) 1,3,5-Trimethylbenzene

1,3,5-Trimethylbenzene (Mesitylene) is a component of this product. Chronic asthmatic-like bronchitis may be a delayed chronic hazard (EPA, 1985; Laham, 1987; HSDB, 1997). Nervousness, tension, and anxiety have been noted in chronically exposed workers with exposure to a mixture of solvents including mesitylene (HSDB, 1997). Elevated alkaline phosphates and SGOT (liver enzymes) levels have been noted in chronic animal inhalation studies (Clayton & Clayton, 1994). These effects have not been reported in exposed humans. (Reprotex)

Thrombocytopenia (a lack of platelets in the blood) with bleeding from the gums and nose and mild anemia may occur with chronic exposure to mesitylene as a component of the commercial solvent mixture, "Fleet-X-DV-99" (Plunkett, 1976; Finkel, 1983; HSDB, 1997). Coagulation (clotting of the blood) times were delayed by about 40% in a group of workers chronically exposed to a mixture of solvents containing about 30% mesitylene (Laham, 1987). These hematological disorders may have been due to a contaminant, such as benzene (Mathaway et al, 1996). Thrombocytosis (an increase of platelets in the blood) and thrombocytopenia have been noted in rabbits (Clayton & Clayton, 1994). (Reprotex)

1,3,5-Trimethylbenzene has been positive in a mutagenicity assay (Lewis, 1992). (Reprotex)

5) Xylene

Xylene (mixed isomers) is a component of this product. Effects of chronic exposure to xylene are similar to those of acute exposure, but may be more severe. Chronic inhalation reportedly was associated with headache, tremors, apprehension, memory loss, weakness, dizziness, loss of appetite, nausea, ringing in the ears, irritability, thirst, anemia, mucosal bleeding, enlarged liver, and hyperplasia, but not destruction of the bone marrow (Clayton & Clayton, 1994; ILO, 1983). Some earlier reports of effects of chronic exposure to xylene have been questioned, as exposures were not limited to xylene alone.

Effects on the blood have been reported from chronic exposure to as little as 60 mg/m³ (Pap & Varga, 1987). Repeated exposure can damage bone marrow, causing low blood cell count and can damage the liver and kidneys (NJ Department of Health, Hazardous Substance Fact Sheet). Chronic xylene exposure (usually mixed with other solvents) has produced irreversible damage to the CNS (ILO, 1983). CNS effects may be exacerbated by ethanol abuse (Savolainen, 1980). Xylene may damage hearing or enhance sensitivity to noise in chronic occupational exposures (Morata et al, 1994), probably from neurotoxic mechanism. Tolerance to xylene can occur over the work week and disappear over the weekend. (ACGIH, 1992).

Inhalation exposure has produced fetotoxicity and postnatal developmental toxicity in laboratory animals. (API, 1978, Kensington, MD, EPA/OTS Document No. 878210350 and Hass, U., et al, 1995, Neurotoxicology and Teratology 17: 341-349 and 1997, Neurotoxicology 18: 647-652)

6) 2-Ethylhexanol

2-Ethylhexanol (2EH) is a component of this product. Chronic overexposure has been suggested as a cause of the following effects in laboratory animals, and may aggravate pre-existing disorders of these organs in humans: liver abnormalities, kidney damage, lung damage, cardiac abnormality, blood abnormalities, and spleen damage. (Vendor MSDS)

In subchronic oral studies, 2EH has produced liver and kidney effects in laboratory animals. (RTECS)


2EH has produced developmental effects in oral studies in laboratory animals including teratogenicity at maternally toxic doses (Clayton & Clayton, 1994). (HSDB)

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Product Toxicological Information		
Acute Animal Toxicity	Not available.	
Target Organs	blood system, kidneys, nervous system, liver, gastrointestinal tract, respiratory tract, skin/epithelium, eyes.	
Other Adverse Effects	Not available.	

Section 12. Ecological Information	
Ecotoxicity	Not available.
BOD5 and COD	Not available.
Biodegradable/OECD	Not available.
Toxicity of the Products of Biodegradation	Not available.
Special Remarks	Not available.

Section 13. Disposal Considerations	
Responsibility for proper waste disposal rests with the generator of the waste. Dispose of any waste material in accordance with all applicable federal, state and local regulations. Note that these regulations may also apply to empty containers, liners and rinsate. Processing, use, dilution or contamination of this product may cause its physical and chemical properties to change.	
Additional Waste Remarks	Not available.

Section 14. Transport Information		
DOT Classification	FLAMMABLE LIQUID, N.O.S. (Contains: Light aromatic naphtha, 1,2,4-Trimethylbenzene), 3, UN1993, III	
DOT Reportable Quantity	Xylene 793 gal.	
Marine Pollutant	Not applicable.	
Additional DOT information	Not available.	
Emergency Response Guide Page Number	128	

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Section 15. Regulatory Information

HCS Classification	Target organ effects, Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded. Irritant.
U.S. Federal Regulations	
Environmental Regulations	Extremely Hazardous Substances: Not applicable to any components in this product. SARA 313 Toxic Chemical Notification and Release Reporting: 1,2,4-Trimethylbenzene; Xylene; SARA 302/304 Emergency Planning and Notification substances: Not applicable to any components in this product. Hazardous Substances (CERCLA 302): Xylene 793 gal.; SARA §11/312 MSDS distribution - chemical inventory - hazard identification: fire; immediate health hazard; delayed health hazard; Clean Water Act (CWA) 307 Priority Pollutants: Not applicable to any components in this product. Clean Water Act (CWA) 311 Hazardous Substances: Xylene; Clean Air Act (CAA) 112(r) Accidental Release Prevention Substances: Not applicable to any components in this product.
Threshold Planning Quantity (TPQ)	Not applicable.
TSCA Inventory Status	All components are included or are exempted from listing on the US Toxic Substances Control Act Inventory. This product contains the following components that are subject to the reporting requirements of TSCA Section 12(b) if exported from the United States: Xylene; Naphthalene.
State Regulations	State specific information is available upon request from Baker Petrolite.
International Regulations	
Canada	All components are compliant with or are exempted from listing on the Canadian Domestic Substance List.
WHMIS (Canada)	B-3, D-2A, D-2B
European Union	All components are included or are exempted from listing on the European Inventory of Existing Commercial Chemical Substances or the European List of Notified Chemical Substances. International inventory status information is available upon request from Baker Petrolite for the following countries: Australia, China, Korea (TCCL), Philippines (RA6969), or Japan.
Harmonized Tariff Code	Not available.
Other Regulatory Information	No further regulatory information is available.

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Section 16. Other Information

Other Special File 2634
Considerations

Baker Petrolite Disclaimer

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Petrolite, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

Safety Data Sheet



Section 1: Identification

Product identifier

Product Name • Plexbreak 134
Product Code • 00204

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Petrochemical industry

Details of the supplier of the safety data sheet

Manufacturer • Chemplex | Solvay USA Inc. | Novocare Division
 506 CR 137
 P.O. Box 1071 Snyder, TX 79550
 United States
 www.chemplex.net
 SDS@chemplex.net
Telephone (General) • 325.573.7298

Emergency telephone number

Manufacturer • 800.424.9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012

- Flammable Liquids 3
- Skin Corrosion 1B
- Serious Eye Damage 1
- Specific Target Organ Toxicity Single Exposure 1
- Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects

Label elements

OSHA HCS 2012

DANGER



Hazard statements • Flammable liquid and vapour
 Causes severe skin burns and eye damage.
 Causes serious eye damage
 May cause drowsiness or dizziness

Causes damage to organs - Central Nervous System (CNS), Optic Nerve via Inhalation, Skin, Ingestion/Oral

Precautionary statements

- Prevention**
- Keep container tightly closed.
 - Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.
 - Take precautionary measures against static discharge.
 - Ground and/or bond container and receiving equipment.
 - Use explosion-proof electrical/ventilating/lighting/equipment.
 - Use only non-sparking tools.
 - Do not eat, drink or smoke when using this product.
 - Do not breathe dust, fume, gas, mist, vapours and/or spray.
 - Wear protective gloves/protective clothing/eye protection/face protection.
 - Use only outdoors or in a well-ventilated area.
 - Wash thoroughly after handling.
 - In case of fire: Use appropriate media for extinction.

- Response**
- In case of fire: Use appropriate media Dry chemical, carbon dioxide, alcohol resistant foam, or water spray for extinction.
 - IF exposed: Call POISON CENTER or doctor/physician.
 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 - Wash contaminated clothing before reuse.
 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 - Immediately call a POISON CENTER or doctor/physician.
 - Specific treatment, see supplemental first aid information.

- Storage/Disposal**
- Store locked up.
 - Store in a well-ventilated place. Keep container tightly closed.
 - Store in a well-ventilated place. Keep cool.
 - Keep away from heat, ignition sources and strong oxidizing agents.
 - Wear protective gloves/protective clothing/eye protection/face protection.
 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
 - Wash thoroughly after handling.

- HCS 2012 Other Information**
- Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.

Other hazards

OSHA HCS 2012

- Corrosive. Causes pain and severe burns to mouth, throat and stomach. Mists are irritating and corrosive to respiratory system.

Canada

According to: WHMIS

Classification of the substance or mixture

WHMIS

- Flammable Liquids - B2
- Corrosive - E
- Other Toxic Effects - D2A

Label elements

WHMIS



- Flammable Liquids - B2
- Corrosive - E
- Other Toxic Effects - D2A

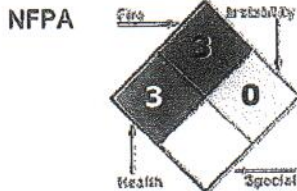
Other hazards

WHMIS

- No data available

Other information

- Very toxic to aquatic life
Toxic to aquatic life with long lasting effects



- Health Hazard: 3 - Warning: Corrosive or toxic. Avoid skin contact or inhalation.
Flammability: 3 - Warning: Flammable liquid flash point below 100°F
Reactivity: 0 - Stable: Not reactive under normal conditions

- HMIS
- HMIS Health - 3: Serious Hazard
HMIS Flammability - 3: Serious Hazard
HMIS Physical Hazard - 0: Minimal Hazard

Section 3 - Composition/Information on Ingredients

Substances

- Not applicable. This material is a mixture.

Mixtures

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Composition			
Chemical Name	Identifiers	%	Hazardous
Isopropyl alcohol	CAS:67-63-0	20% TO 25%	Yes
Quaternary Ammonium Chloride	Proprietary	5% TO 10%	Yes
Methanol	CAS:67-56-1	1% TO 5%	Yes
Castor oil	CAS:8001-79-4	0.1% TO 1%	Yes

- This product is considered hazardous according to the OSHA Hazard Communication Standard 29 CFR 1910.1200. Under Canadian regulations (Workplace Hazardous Materials Information System (WHMIS) - Hazardous Products Act (HPA), this material is hazardous.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. If breathing is difficult, give oxygen. Get medical attention if symptoms occur.

Skin

- Rinse skin immediately with plenty of water for 15-20 minutes. Take off contaminated clothing and wash before reuse. Get medical attention immediately.

Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,

Ingestion

if present and easy to do. Continue rinsing. Hold eyelids open. Get medical attention immediately.

- Do not give anything by mouth to an unconscious person. Do NOT induce vomiting. Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side. Get medical attention immediately.

Most important symptoms and effects, both acute and delayed

- Pain, irritation, redness or blistering of skin. May cause severe irritation and eye damage. May cause drowsiness or dizziness. Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. There is no specific antidote available. Treat symptomatically. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media • LARGE FIRES: Dry chemical, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO₂, water spray or alcohol-resistant foam.

Unsuitable Extinguishing Media • DO NOT use high volume water jet.

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards

- FLAMMABLE LIQUID AND VAPOR
Containers may explode when heated.
Vapors can spread a long distance to ignition source and ignite or flash back.

Hazardous Combustion Products

- Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes)
Carbon monoxide (CO), and Carbon dioxide (CO₂)
Nitrogen Oxides.

Advice for firefighters

- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.
Standard procedures for chemical fires.
Collect contaminated fire extinguishing materials separately. This must be not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Cool closed containers exposed to fire with water spray.

Other information

- Causes severe skin burns and eye damage.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions

- Wear appropriate protective clothing. Ventilate the area. Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use only non-sparking tools. Avoid all contact. Strict hygiene. Stop leak if you can do it without risk. Ventilate closed spaces before entering.

Environmental precautions

- Spills may be reportable to the National Response Center (800-424-8802) and to state and or local agencies. Do not flush to sewer or allow to enter waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- Contain and recover liquid when possible. Collect liquid with explosion proof pumps and/or non-combustible absorbent. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Wash remainder with plenty of water. Water will make area slippery. Repeat cleaning process until the contaminated surface is no longer slippery. Refer to Section 13 - Disposal Considerations.

Prohibited Materials

- Avoid heat, sparks, fire, and oxidizing agents.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Keep away from fire. Keep away from sources of ignition – No Smoking. Keep away from fire, sparks and heated surfaces. Use explosion-proof electrical/ventilating/lighting/equipment. Avoid contact with skin and eyes. Wash thoroughly after handling. Do not breathe vapors or spray mist. DO NOT ingest.

Conditions for safe storage, including any incompatibilities

Storage

- Keep only in the original container/package in a cool well-ventilated place. Keep away from fire. Avoid contact with heat and ignition sources. Do not store with oxidizers. Store locked up.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines

- Use only with adequate ventilation. Avoid all contact. Strict hygiene.

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Methanol (67-56-1)	TWAs	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA	200 ppm TWA; 260 mg/m3 TWA
Isopropyl alcohol (67-63-0)	TWAs	200 ppm TWA	400 ppm TWA; 980 mg/m3 TWA	400 ppm TWA; 980 mg/m3 TWA

Exposure Control Notations

ACGIH

•Methanol (67-56-1): **Skin:** (Skin - potential significant contribution to overall exposure by the cutaneous route)

NIOSH

•Methanol (67-56-1): **Skin:** (Potential for dermal absorption)

Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

- When respirators are required, use NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate

- Eye/Face**
 - regulatory standards and/or industrial recommendations.
 - Wear eye/face protection - Safety Glasses with Side-Shields, - Face-shield. Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.
- Skin/Body**
 - Wear protective gloves/protective clothing/eye protection/face protection.
- General Industrial Hygiene Considerations**
 - Avoid all contact. Strict hygiene. Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Keep away from food, drink and animal feeding stuffs.
- Environmental Exposure Controls**
 - Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
- Additional Protection Measures**
 - The protective equipment must be selected in accordance with local standards and in cooperation with the supplier of the protective equipment. Selection of the appropriate personal protective equipment should be based upon an evaluation of the performance characteristics of the protective equipment relative to the tasks to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use. Emergency equipment should be immediately accessible, with instructions for use. Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use.

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Pale yellow liquid.
Color	Light Yellow.	Odor	Alcohol-like
Taste	No data available	Odor Threshold	No data available
General Properties			
Boiling Point	No data available	Melting Point	No data available
Decomposition Temperature	No data available	pH	Neutral
Specific Gravity/Relative Density	= 0.9739 Water=1	Density	8.12 lbs/gal
Water Solubility	Soluble	Viscosity	No data available
Volatility			
Vapor Pressure	No data available	Vapor Density	2.08 Air=1
Evaporation Rate	No data available		
Flammability			
Flash Point	82 F(27.7778 C) CC (Closed Cup)	UEL	No data available
LEL	No data available	Autoignition	No data available
Flammability (solid, gas)	Flammable Liquid.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- Reactive with oxidizing agents.

Chemical stability

- This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Avoid heat, sparks, fire and sources of ignition.

Incompatible materials

- Store away from strong oxidizing agents.

Hazardous decomposition products

- Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes). Oxides of carbon. Nitrogen Oxides.

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Acute Toxicity - Dermal - Classification criteria not met; Acute Toxicity - Inhalation - Classification criteria not met; Acute Toxicity - Oral - Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	OSHA HCS 2012 • Skin Corrosion 1B
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 1; Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Serious Eye Damage 1

Potential Health Effects

Inhalation

- Acute (Immediate) • No data available
- Chronic (Delayed) • No data available

Skin

- Acute (Immediate) • Causes severe skin burns and eye damage. Methanol is a cumulative toxin readily absorbed.
- Chronic (Delayed) • No data available

Eye

- Acute (Immediate) • Causes serious eye damage.
- Chronic (Delayed) • No data available

Ingestion

Acute (Immediate)

- Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.

Chronic (Delayed)

- No data available

Other

Acute (Immediate)

- The substance is classified as specific target organ toxicant, single exposure, category 1, central nervous system, optic nerve by ingestion, skin, or inhalation (vapour) routes. The substance is classified as specific target organ toxicant, single exposure, category 3, central nervous system. May cause drowsiness or dizziness.

Carcinogenic Effects		
	CAS	IARC
Isopropyl alcohol	67-63-0	Group 3-Not Classifiable

Section 12 - Ecological Information

Toxicity

- Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Persistence and degradability

- No data available

Bioaccumulative potential

- No data available

Mobility in Soil

- No data available

Other adverse effects

Section 13 - Disposal Considerations

Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations.

Packaging waste

- Rinse with an appropriate solvent. Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN2920	Corrosive liquids, flammable, n.o.s.	3,8	II	Marine Pollutant
TDG	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	8,3	II	Marine Pollutant
IMO/MDG	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	3,8	II	Marine Pollutant

IATA/CAO	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	3,8	II	Acute Aquatic Toxicity, Chronic Aquatic Toxicity
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Special precautions for user • For personal protection see section 8. NOTE: The order in which classes appear in above table does not reflect precedence of classes. See UN number, proper shipping name, class(es) and packing group for each agency below.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code • No data available

Other information

• Transportation status: The listed Transportation Classification does not address all regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors. NOTE: The order in which classes appear in above table does not reflect precedence of classes. See UN number, proper shipping name, class(es) and packing group for each agency below.

DOT • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT, RQ (METHANOL)

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101. The product quantity, in one package, which triggers the RQ requirements under 49 CFR for each ingredient is as follows:

Reportable quantities: RQ substance: Methanol RQ limit for substance: 5,000 lbs.

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 132.

TDG • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 132.

IMO/IMDG • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

IATA/CAO • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute, Fire

United States

Environment		
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	5000 lb final RQ; 2270 kg final RQ
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPOs

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Isopropyl alcohol	67-63-0	1.0 % de minimis concentration (only if manufactured by the strong acid process, no supplier notification)
• Methanol	67-56-1	1.0 % de minimis concentration
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	developmental toxicity, initial date 3/16/12
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

Other Information

- All components of this product are listed on the following:

US TSCA Inventory

Australia Inventory of Chemical Substances (AICS)

China Inventory of Existing chemical Substances in China (IECSC)

Korea Existing Chemical Inventory (KECI)

Section 16 - Other Information

Last Revision Date

- 08/June/2015

Preparation Date

- 22/May/2015

Disclaimer/Statement of Liability

- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but does not replace them. Thus, the information only relates to the

designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

IARC = International Agency for Research on Cancer

MSHA = Mine Safety and Health Administration

NIOSH = National Institute of Occupational Safety and Health

NTP = National Toxicology Program

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

- Trade name Plexslick 957

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

Uses advised against

- For industrial use only.

1.3 Details of the supplier of the safety data sheet

Company

Chemplex, Solvay Group
506 CR 137
Snyder, TX 97549
Phone: (325) 573-7298

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CONTACT: CHEMTREC 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

- Not a hazardous product according to Globally harmonized System (GHS)

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

- Not a hazardous product according to Globally harmonized System (GHS)

2.3 Other hazards which do not result in classification

- Slightly irritating to eyes.
- Aspiration of the swallowed or vomited product can cause severe pulmonary complications.
- No specific risk when handled in accordance with good occupational hygiene and safety practice.
- Does NOT present any particular fire hazard.
- Hazardous reactions may occur on contact with certain chemicals. (Refer to the list of incompatible materials section 10: "Stability-Reactivity").

SECTION 3: Composition/information on ingredients

3.1 Substance



- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Emulsion of petroleum distillate and aqueous solution.

Hazardous Ingredients and Impurities

Chemical Name	Identification number CAS-No.	Concentration [%]
Distillates (petroleum), hydrotreated light	64742-47-8	14 - 19

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

- Show this material safety data sheet to the doctor in attendance.
- First responder needs to protect himself.
- Place affected apparel in a sealed bag for subsequent decontamination.

In case of inhalation

- Remove to fresh air.
- If breathing is difficult, give oxygen.
- If breathing has stopped, apply artificial respiration.
- Consult a physician if necessary.

In case of skin contact

- Wash off with soap and plenty of water.
- Remove contaminated clothing and shoes.
- Wash contaminated clothing before re-use.
- Call a physician if irritation develops or persists.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Consult a physician if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Do not give anything to drink.
- Seek medical advice.
- Do not leave the victim unattended.
- Vomiting may occur spontaneously
- Risk of product entering the lungs on vomiting after ingestion.
- Lay victim on side.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- No information available.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

SECTION 5: Firefighting measures

Flash point > 200 °F (> 93 °C)
closed cup

Flammability class: Will burn

Autoignition temperature no data available

Flammability / Explosive limit no data available

5.1 Extinguishing media**Suitable extinguishing media**

- Water mist
- Carbon dioxide (CO₂)
- Foam
- Dry chemical

Unsuitable extinguishing media

- Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture**Specific hazards during fire fighting**

- Under fire conditions:
- Will burn
- (following evaporation of water)
- Harmful or toxic vapors are released.

Hazardous combustion products:

- Hazardous combustion products
- Carbon oxides
- Nitrogen oxides (NO_x)
- Sulfur oxides

5.3 Advice for firefighters**Special protective equipment for fire-fighters**

- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Specific fire fighting methods

- Cool closed containers exposed to fire with water spray.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Avoid contact with the skin and the eyes.
- Wear suitable protective equipment.
- For personal protection see section 8.
- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.

6.2 Environmental precautions

- Do not let product enter drains.
- Prevent product from entering sewage system.
- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

Recovery

- Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
- Sweep up and shovel into suitable containers for disposal.
- Never return spills in original containers for re-use.

Decontamination / cleaning

- Clean contaminated surface thoroughly.
- Wash off with plenty of water.
- Recover the cleaning water for subsequent disposal.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.

Disposal

- Dispose of in accordance with local regulations.

Additional advice

- Material can create slippery conditions.

6.4 Reference to other sections

- no data available

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Avoid inhalation, ingestion and contact with skin and eyes.
- Handle in accordance with good industrial hygiene and safety practice.

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
- 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
- 3) Wash exposed skin promptly to remove accidental splashes or contact with material.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

- Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
- Keep in a dry, cool and well-ventilated place.
- Keep container tightly closed.
- Do not freeze.
- Keep away from open flames, hot surfaces and sources of ignition.
- Keep away from incompatible materials to be indicated by the manufacturer

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

Components with workplace occupational exposure limits

Ingredients	Value type	Value	Basis
Distillates (petroleum), hydrotreated light	TWA	200 mg/m3	American Conference of Governmental Industrial Hygienists
Danger of cutaneous absorption Expressed as :as total hydrocarbon vapor			
Distillates (petroleum), hydrotreated light	TWA	500 ppm 2,000 mg/m3	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
The value in mg/m3 is approximate.			

8.2 Exposure controls

Control measures

Engineering measures

- Effective exhaust ventilation system
- Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures :

Individual protection measures

Respiratory protection

- Use a respirator with an approved filter if a risk assessment indicates this is necessary.
- When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

Hand protection

- Where there is a risk of contact with hands, use appropriate gloves
- Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.
- Gloves must be inspected prior to use.

- Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection

- Safety glasses with side-shields
- Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.
- Eye contact should be prevented through the use of:

Skin and body protection

- Remove and wash contaminated clothing before re-use.
- Choose body protection according to the amount and concentration of the dangerous substance at the work place.
- Protective suit
- Boots

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
 - 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
 - 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
 - 3) Wash exposed skin promptly to remove accidental splashes or contact with material.

Protective measures

- Ensure that eyewash stations and safety showers are close to the workstation location.
- The protective equipment must be selected in accordance with current local standards and in cooperation with the supplier of the protective equipment.
- Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use.

SECTION 9: Physical and chemical properties

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product information phone number in Section 1 for its exact specifications.

9.1 Information on basic physical and chemical properties

<u>Appearance</u>	<u>Physical state:</u> liquid <u>Color:</u> white
<u>Odor</u>	oily
<u>Odor Threshold</u>	no data available
<u>pH</u>	not determined
<u>Boiling point/boiling range</u>	no data available
<u>Flash point</u>	> 200 °F (> 93 °C) closed cup

	Flammability class: Will burn
<u>Evaporation rate (Butylacetate = 1)</u>	no data available
<u>Flammability (solid, gas)</u>	no data available
<u>Flammability (liquids)</u>	no data available
<u>Flammability / Explosive limit</u>	no data available
<u>Autoignition temperature</u>	no data available
<u>Vapor pressure</u>	no data available
<u>Vapor density</u>	no data available
<u>Density</u>	1.02 - 1.11 g/cm ³ (25 °C)
<u>Solubility</u>	no data available
<u>Partition coefficient: n-octanol/water</u>	no data available
<u>Thermal decomposition</u>	no data available
<u>Viscosity</u>	no data available
<u>Explosive properties</u>	no data available
<u>Oxidizing properties</u>	no data available

9.2 Other information

no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Polymerization

- Hazardous polymerization does not occur.

10.4 Conditions to avoid

- Heat, flames and sparks.

10.5 Incompatible materials

- Strong oxidizing agents

10.6 Hazardous decomposition products

- On combustion or on thermal decomposition (following the evaporation of water) releases:
- Carbon oxides
- Nitrogen oxides (NOx)
- Sulfur oxides

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity no data available

Acute inhalation toxicity no data available

Acute dermal toxicity no data available

Acute toxicity (other routes of
administration) no data available

Skin corrosion/irritation

Not classified as irritating to skin
According to the data on the components

Serious eye damage/eye irritation

slight Irritation

Respiratory or skin sensitization

Not classified as sensitizing by skin contact
According to the data on the components

Mutagenicity

Genotoxicity in vitro no data available

Genotoxicity in vivo no data available

Carcinogenicity

no data available

Ingredients	CAS-No.	Rating	Basis
Distillates (petroleum), hydrotreated light	64742-47-8	Confirmed animal carcinogen with unknown relevance to humans	ACGIH

This product does not contain any ingredient designated as probable or suspected human carcinogens by:

- NTP
- IARC
- OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility no data available

Developmental Toxicity/Teratogenicity no data available

STOT

STOT-single exposure no data available

STOT-repeated exposure no data available

Aspiration toxicity no data available

SECTION 12: Ecological Information

12.1 Toxicity no data available

12.2 Persistence and degradability**Biodegradation**

Biodegradability The product itself has not been tested.

12.3 Bioaccumulative potential no data available

12.4 Mobility in soil no data available

12.5 Results of PBT and vPvB assessment This mixture contains no substance considered to be persistent, bioaccumulating, and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects no data available

Ecotoxicity assessment

Acute aquatic toxicity This product has no known ecotoxicological effects.
According to the data on the components

Chronic aquatic toxicity This product has no known ecotoxicological effects.
According to the data on the components

SECTION 13: Disposal considerations**13.1 Waste treatment methods****Product Disposal**

- Chemical additions, processing or otherwise altering this material may make the waste management information presented in this SDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.



Waste Code

- Environmental Protection Agency
- Hazardous Waste – NO

Advice on cleaning and disposal of packaging

- Completely empty the packaging prior to decontamination.
- Rinse with an appropriate solvent.
- Dispose of in accordance with local regulations.

Measure for waste avoidance or recovery

- Do not dispose of the product at a dump.

SECTION 14: Transport information

DOT

not regulated

TDG

not regulated

NOM

no data available

IMDG

not regulated

IATA

not regulated

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	On TSCA Inventory
Canadian Domestic Substances List (DSL)	All components of this product are on the Canadian DSL.
Australia Inventory of Chemical Substances (AICS)	On the inventory, or in compliance with the inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	On the inventory, or in compliance with the inventory
Korea. Korean Existing Chemicals Inventory (KECI)	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	On the inventory, or in compliance with the inventory

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA HAZARD DESIGNATION SECTIONS 311/312 (40 CFR 370)

Fire Hazard	no
Reactivity Hazard	no
Sudden Release of Pressure Hazard	no
Acute Health Hazard	no
Chronic Health Hazard	no

Section 313 Toxic Chemicals (40 CFR 372.65)

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)

Ingredients	CAS-No.	Reportable quantity
Oxirane	75-21-8	10 lb
Formaldehyde	50-00-0	100 lb

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)

Ingredients	CAS-No.	Reportable quantity
Oxirane	75-21-8	10 lb
Formaldehyde	50-00-0	100 lb

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

Ingredients	CAS-No.	Reportable quantity
Diethanolamine	111-42-2	100 lb
Oxirane	75-21-8	10 lb
1,4-Dioxane	123-91-1	100 lb
Formaldehyde	50-00-0	100 lb
Methanol	67-56-1	5000 lb
Acetaldehyde	75-07-0	1000 lb

15.3 State Regulations
US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

WARNING! This product contains a chemical known in the State of California to cause cancer.

Ingredients	CAS-No.
Diethanolamine	111-42-2
Oxirane	75-21-8
Acetaldehyde	75-07-0
1,4-Dioxane	123-91-1
Formaldehyde	50-00-0

WARNING: This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

Ingredients	CAS-No.
Methanol	67-56-1
Oxirane	75-21-8

SECTION 16: Other information
NFPA (National Fire Protection Association) - Classification

Health	0 minimal
Flammability	1 slight
Instability or Reactivity	0 minimal

HMIS (Hazardous Materials Identification System (Paint & Coating)) - Classification

Health	0 minimal
Flammability	1 slight
Reactivity	0 minimal
PPE	Determined by User; dependent on local conditions

Further information

- Product classified under the US GHS format.

Date Prepared: 03/13/2015

Key or legend to abbreviations and acronyms used in the safety data sheet

- TWA 8-hour, time-weighted average
- ACGIH American Conference of Governmental Industrial Hygienists
- OSHA Occupational Safety and Health Administration
- NTP National Toxicology Program

PRCO90068264
 Version: 1.00 / US (Z8)

www.solvay.com



Chemplex
SOLVAY GROUP

SAFETY DATA SHEET

Plexslick 957

Revision Date 03/13/2015

- IARC International Agency for Research on Cancer
- NIOSH National Institute for Occupational Safety and Health

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.



Safety Data Sheet

Section 1: Identification

Product identifier

- Product Name** • Claymax
- Synonyms** • Product number: 00601

Relevant identified uses of the substance or mixture and uses advised against

- Recommended use** • Potassium chloride substitute in oil well treatment

Details of the supplier of the safety data sheet

- Manufacturer** • Chemplex | Solvay USA Inc. | Novecare Division
506 CR 137
P.O. Box 1071 Snyder, TX 79550
United States
www.chemplex.net
SDS@chemplex.net

- Telephone (General)** • 325.573.7298

Emergency telephone number

- Manufacturer** • 800.424.9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

- OSHA HCS 2012** • Classification criteria not met

Label elements

- OSHA HCS 2012**
Hazard statements • No label element(s) required

Other hazards

- OSHA HCS 2012** • This product is not considered hazardous under the U.S. OSHA 29 CFR 1910.1200 Hazard Communication Standard.

Canada

According to WHMIS

Classification of the substance or mixture

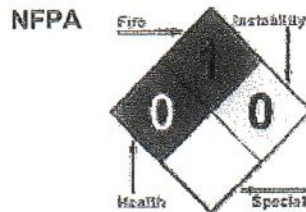
- WHMIS** • Classification criteria not met

Label elements**WHMIS**

- No label element(s) required

Other hazards**WHMIS**

- In Canada, the product mentioned above is not considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Other information

See Section 12 for Ecological Information.

Section 3 - Composition/Information on Ingredients**Substances****Mixtures**

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	CAS:67-48-1	40% TO 70%	Ingestion/Oral-Rat LD50 • 3400 mg/kg	OSHA HCS 2012: Not Classified - Criteria not met	NDA
Water	CAS:7732-18-5	15% TO 40%	Ingestion/Oral-Rat LD50 • >90 mL/kg	OSHA HCS 2012: Not Hazardous	NDA

- Material does not meet the criteria of a mixture.

See Section 11 for Toxicological Information.

Section 4: First-Aid Measures**Description of first aid measures****Inhalation**

- Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing.

Skin

- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention.

Eye

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes.

Ingestion

- Do NOT induce vomiting. Get medical attention immediately.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5: Fire-Fighting Measures

Extinguishing media

- Suitable Extinguishing Media**
- LARGE FIRE: Water spray, fog or regular foam.
 - SMALL FIRES: Dry chemical, CO₂, water spray or regular foam.

- Unsuitable Extinguishing Media**
- No data available.

Special hazards arising from the substance or mixture

- Unusual Fire and Explosion Hazards**
- No unusual fire and explosion hazards known.

- Hazardous Combustion Products**
- No data available.

Advice for firefighters

- Structural firefighters' protective clothing will only provide limited protection. Wear positive pressure self-contained breathing apparatus (SCBA).

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

- Personal Precautions**
- Wear appropriate personal protective equipment. Do not walk through spilled material.

- Emergency Procedures**
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Stay upwind. Ventilate closed spaces before entering.

Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

- Containment/Clean-up Measures**
- Stop leak if you can do it without risk.
 - Prevent entry into waterways, sewers, basements or confined areas.
 - SMALL SPILLS: Take up with sand or other non-combustible absorbent material and place into containers for later disposal.
 - LARGE SPILLS: Dike far ahead of liquid spill for later disposal.

Section 7 - Handling and Storage

Precautions for safe handling

- Handling**
- Wear appropriate personal protective equipment. Avoid contact with skin and eyes. DO NOT ingest. Wash thoroughly after handling.

Conditions for safe storage, including any incompatibilities

- Storage**
- Keep away from heat, ignition sources and strong oxidizing agents. Store in a cool, dry, well-ventilated place. Keep container closed when not in use. Avoid storing at elevated temperatures and freezing temperatures. Optimal storage temperature: 41-81 F; Ground all equipment containing material.

Section 8 - Exposure Controls/Personal Protection

Control parameters

- Exposure Limits/Guidelines**
- No applicable exposure limits have been established for the components or the

material.

Exposure controls

Engineering Measures/Controls

- Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use. Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Pictograms



Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment.

Eye/Face

- Wear protective eyewear (goggles, face shield, or safety glasses).

Skin/Body

- Wear appropriate gloves.

General Industrial Hygiene Considerations

- Do not get in eyes or on skin or clothing. Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

Environmental Exposure Controls

- No data available

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Colorless to yellow liquid with slight fish odor.
Color	Colorless to pale yellow.	Odor	Slight fish odor.
Odor Threshold	Data lacking		
General Properties			
Boiling Point	> 212 F(> 100 C)	Melting Point	Data lacking
Decomposition Temperature	Data lacking	pH	Near neutral (1% solution with water)
Specific Gravity/Relative Density	1.0856 Water=1	Water Solubility	100 %
Viscosity	Data lacking		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	Not Defined
Evaporation Rate	Data lacking		
Flammability			
Flash Point	> 200 F(> 93.3333 C) Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- No data available.

Incompatible materials

- No data available.

Hazardous decomposition products

- No data available.

Section 11 - Toxicological Information**Information on toxicological effects**

		Components
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride (40% TO 70%)	67-48-1	Acute Toxicity: Ingestion/Oral-Rat LD50 • 3400 mg/kg; <i>Sense Organs and Special Senses:Eye:Chromodacyroffhea; Behavioral:Excitement; Lungs, Thorax, or Respiration:Respiratory depression</i>

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	OSHA HCS 2012 • Classification criteria not met
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Classification criteria not met

Route(s) of entry/exposure

- Inhalation, Skin, Eye, Ingestion

Potential Health Effects**Inhalation****Acute (Immediate)**

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available.

Skin**Acute (Immediate)**

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available.

Eye

- Acute (Immediate) ● Under normal conditions of use, no health effects are expected.
- Chronic (Delayed) ● No data available.

Ingestion

- Acute (Immediate) ● Under normal conditions of use, no health effects are expected.
- Chronic (Delayed) ● No data available.

Key to abbreviations

LD = Lethal Dose

Section 12 - Ecological Information**Toxicity**

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations**Waste treatment methods**

- Product waste** ● Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
- Packaging waste** ● Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class (es)	Packing group	Environmental hazards
DOT	NDA	Not regulated	NDA	NDA	NDA
TDG	NDA	Not regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not regulated	NDA	NDA	NDA

Special precautions for user ● None known.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code ● Not relevant.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • None

State Right To Know				
Component	CAS	MA	NJ	PA
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	No	No	No
Water	7732-18-5	No	No	No

Inventory				
Component	CAS	Canada DSL	Canada NDSL	TSCA
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Yes	No	Yes
Water	7732-18-5	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Uncontrolled product according to WHMIS classification criteria (including 60%, 70%)
• Water	7732-18-5	Uncontrolled product according to WHMIS classification criteria

Canada - WHMIS - Ingredient Disclosure List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
--	---------	------------

• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Developmental Toxicity		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - Pennsylvania

Labor		
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - Rhode Island

Labor		
U.S. - Rhode Island - Hazardous Substance List		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Section 16 - Other Information

Revision Summary		
Date	MSDS No.	Changes
18/August/2014		• Section 1 changed. Changes include Company Name Change.

Last Revision Date

- 18/August/2014

Preparation Date

- 27/November/2013

Disclaimer/Statement of Liability

- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

NDA = No data available

Safety Data Sheet



Section 1: Identification

Product identifier

- Product Name** • **Ferriplex 66**
Synonyms • Acetic Acid Solution
Product Code • 00307
Chemical Category • Organic acids

Relevant identified uses of the substance or mixture and uses advised against

- Recommended use** • Petrochemical industry

Details of the supplier of the safety data sheet

- Manufacturer** • Chemplex | Solvay USA Inc. | Novocare Division
 506 CR 137
 P.O. Box 1071 Snyder, TX 79550
 United States
 www.chemplex.net
 SDS@chemplex.net
Telephone (General) • 325.573.7298

Emergency telephone number

- Manufacturer** • 800.424.9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

- OSHA HCS 2012** • Skin Corrosion 1A
 Serious Eye Damage 1

Label elements

OSHA HCS 2012

DANGER



- Hazard statements** • Causes severe skin burns and eye damage.
 Causes serious eye damage

Precautionary statements

- Prevention** • Keep container tightly closed.
 Keep only in original container.
 Wash thoroughly after handling.
 Wear protective gloves/protective clothing/eye protection/face protection.
 In case of inadequate ventilation wear respiratory protection.

- Response** • IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 Wash contaminated clothing before reuse.
 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 Immediately call a POISON CENTER or doctor/physician.

- Storage/Disposal** • Wash thoroughly after handling.
 Wear protective gloves/protective clothing/eye protection/face protection.
 Store in a well-ventilated place. Keep cool.
 Store locked up.
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Other hazards

OSHA HCS 2012

- Acetic acid concentrated at elevated temperature may be corrosive to metals and evolve flammable hydrogen gas. Mists of weak acid solution in water may be irritating to the respiratory system.

Canada

According to: WHMIS

Classification of the substance or mixture

WHMIS

- Corrosive - E
- Other Toxic Effects - D2B

Label elements

WHMIS



- Corrosive - E
- Other Toxic Effects - D2B

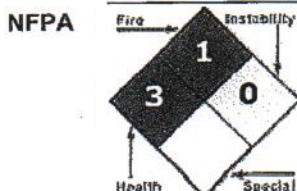
Other hazards

WHMIS

- No other WHMIS hazards than those reported above.

Other information

- One should be specifically trained before communicating or using the following National Fire Protection Association (NFPA) and or Hazardous Materials Identification System (HMIS) categories since the definition and scales applied do not match US OSHA GHS and HAZCOM 2012 definitions and rules.



- Health Hazard: 3 - Warning: Corrosive or toxic. Avoid skin contact or inhalation.
Flammability: 1 - Combustible if heated
Reactivity: 0 - Stable: Not reactive under normal conditions
- HMIS • HMIS Health - 2: Moderate Hazard
HMIS Flammability - 1: Slight Hazard
HMIS Physical Hazard - 0: Minimal Hazard

Section 3 - Composition/Information on Ingredients

Substances

- Not applicable. This material is a mixture.

Mixtures

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Composition			
Chemical Name	Identifiers	%	Hazardous
Acetic acid	CAS:64-19-7	40% TO 50%	Yes
Citric acid	CAS:77-92-9	25% TO 30%	Yes

- This product is considered hazardous according to the OSHA Hazard Communication Standard 29 CFR 1910.1200. Under Canadian regulations (Workplace Hazardous Materials Information System (WHMIS) - Hazardous Products Act (HPA), this material is hazardous.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation

- Get medical attention immediately if symptoms occur. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Skin

- Get medical attention immediately if symptoms occur. Rinse skin immediately with plenty of water for 15-20 minutes. Take off contaminated clothing and wash before reuse.

Eye

- Flush eyes with water for at least 15 minutes while holding eyelids open. Get medical attention immediately. If easy to do, remove contact lenses, if worn.

Ingestion

- Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side. Do NOT induce vomiting. Get medical attention immediately. Give nothing to drink.

Most important symptoms and effects, both acute and delayed

- Pain, irritation, redness or blistering of skin. May cause severe irritation and eye damage.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. Treat symptomatically. There is no specific antidote available. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media • LARGE FIRES: Dry chemical, CO2, alcohol-resistant foam or water spray.
 SMALL FIRES: Dry chemical, CO2, water spray or alcohol-resistant foam.

Unsuitable Extinguishing Media • DO NOT use high volume water jet.

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards • Corrosive
 When heated to decomposition it emits acrid smoke and irritating fumes.

Hazardous Combustion Products • Carbon monoxide (CO), and Carbon dioxide (CO2)
 Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes).

Advice for firefighters

- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.
 Standard procedures for chemical fires.
 Collect contaminated fire extinguishing materials separately. This must not be discharged into drains.
 Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
 Cool closed containers exposed to fire with water spray.
 Refer to Section 8 - Exposure Controls/Personal Protection.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions • Contact may cause burns to skin and eyes. Wear suitable protective clothing. Ventilate the area. Refer to Section 8 - Exposure Controls/Personal Protection.

Emergency Procedures • Keep unauthorized personnel away. Avoid all contact. Strict hygiene. Ventilate closed spaces before entering. Stop leak if you can do it without risk.

Environmental precautions

- Spills may be reportable to the National Response Center (800-424-8802) and to state and or local agencies. Do not flush to sewer or allow to enter waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Methods and material for containment and cleaning up

Containment/Clean-up Measures • Dike to collect large liquid spills.
 Contain and recover liquid when possible.
 Neutralize the residue with dilute solution of sodium carbonate.
 Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
 Wash remainder with plenty of water.
 Water will make area slippery.
 Repeat cleaning process until the contaminated surface is no longer slippery.
 Refer to Section 13 - Disposal Considerations.

Prohibited Materials • Strong alkalines and oxidizing materials. Sources of ignition - heat, sparks and open flames.

Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection.

Section 7 - Handling and Storage

Precautions for safe handling

Handling • Do not breathe (dust, vapor or spray mist). Avoid contact with skin and eyes. Wash thoroughly after handling. Use only in well ventilated areas. Do not breathe (dust, vapor or spray mist)

Conditions for safe storage, including any incompatibilities

Storage

- Store locked up. Keep only in the original container/package in a cool well-ventilated place. Store away from alkali(bases)and oxidizing agents. Avoid excessive heat.

Incompatible Materials or Ignition Sources

- Reactive with strong bases and oxidizing agents. May be corrosive to metals.

Refer to Section 8 - Exposure Controls/Personal Protection.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines

- Use only with adequate ventilation. Avoid all contact. Strict hygiene.

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Acetic acid (64-19-7)	TWAs	10 ppm TWA	10 ppm TWA; 25 mg/m3 TWA	10 ppm TWA; 25 mg/m3 TWA

Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

- When respirators are required, use NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

Eye/Face

- Wear tightly fitting safety goggles to protect from serious eye damage.

Skin/Body

- Wear protective gloves/protective clothing/eye protection/face protection.

General Industrial Hygiene Considerations

- Avoid all contact. Strict hygiene. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Keep away from food, drink and animal feeding stuffs.

Environmental Exposure Controls

- Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Additional Protection Measures

- The protective equipment must be selected in accordance with local standards and in cooperation with the supplier of the protective equipment. Selection of the appropriate personal protective equipment should be based upon an evaluation of the performance characteristics of the protective equipment relative to the tasks to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use. Emergency equipment should be immediately accessible, with instructions for use. Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use.

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Color	Clear Colorless .
Odor	Pungent, Vinegar-like.	Odor Threshold	0.48 ppm acetic acid
General Properties			
Boiling Point	None	Melting Point	None

Decomposition Temperature	None	pH	2 to 4
Specific Gravity/Relative Density	= 1.18 @ 25 C(77 F) Water=1	Density	9.67 lbs/gal
Water Solubility	Soluble	Viscosity	None
Volatility			
Vapor Pressure	None	Vapor Density	1.45 Air=1
Evaporation Rate	No data available		
Flammability			
Flash Point	> 260 F(> 93.3333 C) closed cup	UEL	None
LEL	None	Autoignition	463 C(865.4 F) acetic acid
Flammability (solid, gas)	None		
Environmental			
Octanol/Water Partition coefficient	None	Bioaccumulation Factor	None

Section 10: Stability and Reactivity

Reactivity

- Strong Bases, Strong oxidizing agents, Strong reducing agents.

Chemical stability

- This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excess heat.

Incompatible materials

- Strong alkalines and oxidizing materials. Acetic acid concentrated at elevated temperature may be corrosive to metals and evolve flammable hydrogen gas.

Hazardous decomposition products

- Carbon monoxide (CO), and Carbon dioxide (CO2) Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes)

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Acute Toxicity - Dermal - Classification criteria not met; Acute Toxicity - Inhalation - Classification criteria not met; Acute Toxicity - Oral - Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met

Skin corrosion/Irritation	OSHA HCS 2012 • Skin Corrosion 1A
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Serious Eye Damage 1

Medical Conditions Aggravated by Exposure Potential Health Effects

- None known.

Inhalation

Acute (Immediate)

- Classification criteria not met. Mists of weak acid solution in water may be irritating to the respiratory system.

Chronic (Delayed)

- No data available

Skin

Acute (Immediate)

- Causes severe skin burns and eye damage.

Chronic (Delayed)

- No data available

Eye

Acute (Immediate)

- Causes serious eye damage.

Chronic (Delayed)

- No data available

Ingestion

Acute (Immediate)

- May cause burns of the gastrointestinal tract if swallowed.

Chronic (Delayed)

- No data available

Section 12 - Ecological Information

Toxicity

- No data available

Persistence and degradability

- No data available

Bioaccumulative potential

- No data available

Mobility in Soil

- No data available

Other adverse effects

- According to test data on the components and the classification criteria for mixtures, this product has no known adverse effects on aquatic organisms.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Please be advised that state and local requirements for

Packaging waste

waste disposal may be more restrictive or otherwise different from federal laws and regulations.

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Empty containers pose a fire risk, evaporate the residue under a fume hood. Rinse with an appropriate solvent.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class (es)	Packing group	Environmental hazards
DOT	UN2790	ACETIC ACID SOLUTION	8	II	NDA
TDG	UN2790	ACETIC ACID SOLUTION	8	II	NDA
IMO/MDG	UN2790	ACETIC ACID SOLUTION	8	II	NDA
IATA/ICAO	UN2790	ACETIC ACID SOLUTION	8	II	NDA

Special precautions for user • No data available

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code • No data available

Other information

- Transportation status: The listed Transportation Classification does not address all regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.
- **DOT** • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101. The product quantity, in one package, which triggers the RQ requirements under 49 CFR for each ingredient is as follows:

Reportable quantities: RQ substance: Acetic acid RQ limit for substance: 5,000 lbs.

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 153.

- **TDG** • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 153.

- **IMO/MDG** • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

- **IATA/ICAO** • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

Note: The above regulatory prescriptions are those valid on the date of the publication of this sheet. Given the possible evolution of transportation regulations for Hazardous materials, it would be advisable to check their validity with your sales office.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute

United States

Environment

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Acetic acid	64-19-7	5000 lb final RQ; 2270 kg final RQ
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

Section 16 - Other Information

Last Revision Date

- 03/March/2015

Preparation Date

- 03/March/2015

Other Information

- All components of this product are listed on the following:

US TSCA Inventory

Canada Domestic Substance List (DSL)

Australia Inventory of Chemical Substances (AICS)

China Inventory of Existing chemical Substances in China (IECSC)

Japan Inventory of Existing and New Chemicals (ENCS)

Korea Existing Chemical Inventory (KECI)

Disclaimer/Statement of Liability



- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but does not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

Feniple: 66

ACGIH = American Conference of Governmental Industrial Hygiene
IARC = International Agency for Research on Cancer
MSHA = Mine Safety and Health Administration
NIOSH = National Institute of Occupational Safety and Health

NTP = National Toxicology Program
OSHA = Occupational Safety and Health Administration
STEL = Short Term Exposure Limits are based on 15-minute exposures
TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

	<p>ILLINOIS DEPARTMENT OF NATURAL RESOURCES</p> <p>Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271</p>	
<p>HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10</p>		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: WaterUseSelfCertification

Please save attachment and use the file name above.

Water Use Self-Certification §1-35(b)(9); 245.210(a)(9). Attach a certification explaining your compliance with the Water Use Act of 1983 (525 ILCS 45/1 et seq) and applicable regional water supply plans. Include proof of delivery of the plan to the applicable Soil and Water Conservation District and any Community Water Supply within 20 miles of the proposed water source.

Water Use Self Certification

This Water Use Self Certification describes the measures that will be taken to comply with the Water Use Act of 1983 ("the Act" 525 ILCS 45/1 *et seq*). This certification shall be submitted to the White County Soil and Water Conservations District (SWCD) and to community water systems within 20 miles of the proposed water wells as shown on the attached Exhibit A. The certification was mailed USPS Certified with mail dates and USPS Certified Receipt # as shown on Exhibit A.

As described in the Water Source Management Plan included in the permit application, groundwater will be used for HVVHF treatment of the proposed oil well. Three water supply wells are planned. Although it is unlikely that an individual well will qualify as a "high capacity intake" as defined in the Act, the cumulative total extraction capacity for all wells may qualify as such. Therefore, compliance with the requirements of the Act will be accomplished by the following means.

(a) Notification

The White County Soil and Water Conservation District shall be provided with a copy of this Certification and the Water Source Management Plan, which describes the withdrawal points and anticipated quantities as required by 525 ILCS 45/5.1.

(b) Compliance with SWCD guidance and investigations.

SWCD provides guidance for construction of water wells, and Woolsey and their water drilling contractor has received such information from SWCD. That guidance has been used in the placement and design of the proposed wells. SWCD may also investigate any complaints of third-party groundwater users in the vicinity of the wells, alleging that a drop in water level in the third-party well is reducing capacity of that well, and is caused by excessive withdrawal from the newly constructed Woolsey water supply wells. In the event that SWCD receives such a complaint, and requests a modification of the withdrawal rate from the Woolsey water supply wells, the withdrawal rate of the wells shall be modified as directed, or reduced to no longer be a high capacity intake subject to the requirements of the Act.

(c) Water Use Recording

The wells will be equipped with individual totalizing meters on their output lines. The total output from each well will be recorded daily by the operator in the well log during the operation of the water wells. As required by the Water Use Act of 1983, (525 ILCS 45/5.3) the water withdrawal shall be reported to the Illinois State Water Survey's (ISWS) Illinois Water Inventory Program, In addition, the water use shall be reported to the SWCD, as required by the District.

I certify that the water supply wells constructed by Woolsey Operating Company shall comply with the requirements of the Illinois Water Use Act of 1983.

■ 

(signature)

Manager

(title)

Woolsey Operating Company, LLC

Exhibit A
Water Use Self Certification

White County

Brownsville Community Water System
Jeffrie Nix, President
838 Co. Rd. 1225 North
Carmi, IL 62821
(618) 384-7023

USPS Certified Receipt #

9171 9690 0935 0157 7002 87
May 4, 2017

Burnt Prairie Community Water System
Carroll D. Dozier, President
Village of Burnt Prairie
431 Main St
Burnt Prairie, IL 62820
(618) 896-7378

9171 9690 0935 0157 7002 70
May 4, 2017

Water Department
Jeff Pollard, Mayor
City of Carmi
225 E. Main St.
Carmi, IL 62821
(618) 382-8118

9171 9690 0935 0157 7002 63
May 4, 2017

Crossville Water Department
Henry Feldman, Mayor
Village of Crossville
Crossville, IL 62827
(618) 966-2237

9171 9690 0935 0157 7002 56
May 4, 2017

Enfield Water Department
Tom Harbour, President
105 E. Main St
Enfield, IL 62835
(618) 963-2222

9171 9690 0935 0157 7002 49
May 4, 2017

Grayville Water Department
Joe W. Bisch, Mayor
City Hall
122 S. Court St.
Grayville, IL 62844
(618) 375-3671

9171 9690 0935 0157 7002 32
May 4, 2017

Mill Shoals Community Water System
C/O Joshua Boyd
1106 W Delaware St
Fairfield, IL 62837
(618) 847-4241

9171 9690 0935 0157 7002 25
May 4, 2017

Norris City Water System
Mike D. Hite, Superintendent
406 S. Division Street
Norris City, IL 62869
(618) 383-2703

9171 9690 0935 0157 7002 18
May 4, 2017

Springerton Community Water System
Curtis R. Rush, President
P.O. Box 37
Springerton, IL 62887
(618) 842-4096

9171 9690 0935 0157 7002 01
May 4, 2017

White County SWCD
Charles Nolan, Chairman
1105 W. Main St.
Carmi, IL 62821

9171 9690 0935 0157 7001 95
May 4, 2017

Hamilton County

Broughton Water District
David R. Essary, Mayor
P.O. Box 87
Broughton, IL 62817
(618) 647-2416

9171 9690 0935 0157 7001 88
May 4, 2017

Dahlgren Community Water System
Chris Nichols
Village of Dahlgren
P.O. Box 98
Dahlgren, IL 62828

9171 9690 0935 0157 7001 71
May 4, 2017

Hamilton County Water District
Robert Drake, Chairman
P.O. Box 220
McLeansboro, IL 62859
(618) 643-4744

9171 9690 0935 0157 7001 64
May 4, 2017

McLeansboro Water Department
Dick Deitz, Mayor
City Hall
McLeansboro, IL 62859
(618) 643-2723

9171 9690 0935 0157 7001 57
May 4, 2017

Dale Public Water District
Terry Hunt, Chairman
P.O. Box 101
Dale, IL 62869

9171 9690 0935 0157 7001 40
May 4, 2017

Wayne County

Boyleston Waterworks Corporation
Terry Legg, Corporation President
732 Co Rd 1500 East
Fairfield, IL 62837
(618) 842-2433

9171 9690 0935 0157 7001 33
May 4, 2017

Fairfield Water Department
Charles Griswold, Mayor
City Hall
109 NE 2nd St
Fairfield, IL 62837
(618) 847-3871

9171 9690 0935 0157 7001 26
May 4, 2017

Jasper Waterworks Corp.
Robert J. Hawkins, President
115 NE 3rd St
Fairfield, IL 62837
(618) 842-2666

9171 9690 0935 0157 7001 19
May 4, 2017

Jeffersonville (Geff) Water System
Russell Hilliard, Village President
220 W Mechanic
P.O. Box 67
Jeffersonville, IL 62842

9171 9690 0935 0157 7001 02
May 4, 2017

New Hope Waterworks Corp.
Gaylord Vaughan, President
P.O. Box 668
Fairfield, IL 62837
(618) 847-7773

9171 9690 0935 0157 7000 96
May 4, 2017

Sims Water System
Terry Walters
P.O. Box 9
Simms, IL 62886
(618) 892-2761

9171 9690 0935 0157 7000 89
May 4, 2017

Wayne City Water Department
Staci Choate, Village Clerk
102 S. Main St.
P.O. Box 176
Wayne City, IL 62895
(618) 895-2241

9171 9690 0935 0157 7000 72
May 4, 2017

Western Wayne Water District
Larry Reed, President
P.O. Box 336, RR2
Wayne City, IL 62895
(618) 895-2813

9171 9690 0935 0157 7000 65
May 4, 2017

Edwards County

Ellery Water Corporation
Dale Woods, President
P.O. Box 45
Albion, IL 62806
(618) 445-2858

9171 9690 0935 0157 7000 58
May 4, 2017

Gallatin County

Gallatin –White Water District
Keith Lamb
P.O. Box 8
Omaha, IL 62871
(618) 962-3245

9171 9690 0935 0157 7000 41
May 4, 2017

Omaha Water
Ralph Pritchett, Operator
Village Hall
P.O. Box 84
Omaha, IL 62871
(618) 962-3145

9171 9690 0935 0157 7000 34
May 4, 2017

Saline County

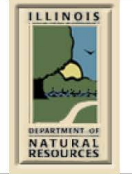
Saline Valley Conservancy District
Mark Fulkerson
435 Dewey St.
Eldorado, IL 62930
(618) 276-4911

9171 9690 0935 0157 7000 27
May 4, 2017



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: WaterSourceManagementPlan

Please save attachment and use the file name above.

Water Source Management Plan §1-35(b)(10); 245.210(a)(10). Note: If recycled water is anticipated to be used in the HVHFF treatment, describe the source of the recycled water and the anticipated water to be used in (a), but skip subsections (c) through (g) below. If water other than fresh water or recycled water is anticipated to be used in the HVHFF treatment, describe the source and the anticipated volume to be used in (a); and if the water derives from a river, lake, stream, other surface water or groundwater and, but for the total dissolved solids (TDS) levels, would be considered fresh water, provide all the information requested in this section.

- (a) List the source(s) of the water (surface, groundwater, etc.) that will be used in the HVHFF treatment
- (b) Identify precisely the anticipated withdrawal location(s) including county, latitude and longitude
- (c) Identify the anticipated volume and rate of each water withdrawal from each withdrawal location.
- (d) Identify the months when water withdrawals are expected to be made from each location
- (e) Identify the methods to be used to accurately monitor water withdrawals, and how the data will be recorded and maintained.
- (f)) Identify the methods to be used to minimize adverse impact to aquatic life.
- (g) Identify the methods to be used to minimize withdrawals as much as feasible.
- (h) Specify how you will transport or deliver water to the well site

Source water is subject to a Source Water Sampling Plan under §1-80 of the Act. Describe the general structure of the sampling program, including but not limited to: who will conduct the sampling, sampling protocols, and provide any relevant certifications. The required tests are marked in **bold** in the table below. You can use the table provided or insert your own table and/or text.

Water Source Management Plan

This Water Source Management Plan is submitted to identify the source of water to be used for High Volume Horizontal Hydraulic Fracturing (HVHFF) operations and the management of the source water. This plan shall be submitted to the White County Soil and Water Conservations District, as well as to Community Water Suppliers in the area.

(a) List the source(s) of water that will be used in the HVHFF Treatment

Groundwater will be used for HVHFF treatment. Three new water supply wells will be drilled in close proximity to the HVHFF well and will supply the full volume of water needed for hydraulic fracturing. Temporary above-ground storage of the extracted groundwater will be provided in an excavated water supply impoundment pit to be constructed at the well site to allow the limited number of wells to make the total required volume of water available prior to the start of hydraulic fracturing operations. Backflow will not commence until injection in all frac stages have been completed, thus there will be no opportunity for use of recycled water in the hydraulic fracture completion.

(b) Identify precisely the anticipated withdrawal location(s) including county, latitude and longitude.

Well No.	County	Latitude	Longitude
WSW 1	White	38.135287	-88.361048
WSW 2	White	38.135171	-88.360673
WSW 3	White	38.134849	-88.360967

(c) Identify the anticipated withdrawal volume and rate of each water withdrawal from each withdrawal location.

Well No.	Rate Gallons/day	Volume Total Gallons
WSW 1	34,000	2.5×10^6

WSW 2	34,000	2.5 x 10 ⁶
WSW 3	34,000	2.5 x 10 ⁶

(d) Identify the months when water withdrawals are expected to be made from each location.

The following schedule assumes that the drilling permit and HVHWF permit will be issued by June 15, 2017. The individual withdrawal rates may vary to achieve the overall 7,500,000 gallons required.

Month	Well No.	Quantity (Gallons)
July, 2017	WSW 1	500,000
Aug, 2017	WSW 1,2, & 3	3,000,000
Sept, 2017	WSW 1,2, & 3	3,000,000
Oct, 2015	WSW 1,2,& 3	1,000,000

(e) Identify the methods to be used to accurately monitor water withdrawals, and how the data will be recorded and maintained.

The three wells will be equipped with individual totalizing meters on their output lines. The total output from each well will be recorded daily by the operator in the well log during the operation of the water wells. As required by the Water Use Act of 1983, (525 ILCS 45/5.3) the water withdrawal shall be reported to the Illinois State Water Survey's (ISWS) Illinois Water Inventory Program, In addition, the water use shall be reported to the White County Soil and Water Conservation District, as required by the District.

(f) Identify the methods to be used to minimize impact to aquatic life.

Since no surface water supply will be used other than the fresh water reservoir pit to be constructed prior to HVHWF operations, there will be no impact to aquatic life in surface waters.

(g) Identify the methods to be used to minimize withdrawals as much as feasible.

It is not in the interest of the applicant to overuse water in the HVHWF process. Excessive use of water results in the need for additional storage capacity for both the raw water and the flowback water that results from the process. In addition, treatment, transport, and disposal of flowback water results in increased well costs. Wasting water is in no one's best interest.

The design of hydraulic fracturing stages and the chemistry of the fluids used will dictate the quantity of water required. Additional water in the mix will only degrade the effectiveness of the HVHWF process.

The highest potential for wasting water would be from leakage of water in the pumping, storage, and delivery systems to be used at the site. This potential will be minimized by locating the water wells in close proximity to the HVHWF well, and using piping rather than trucking of the water to and from the impoundment reservoir. Piping the water eliminates the loading and off-loading of water trucks, which would be the process with the highest potential for loss due to overfilling of the transport vehicles.

(h) Specify how you will transport or deliver water to the well site.

As described above, the water will be produced from on-site wells, and transported by pipeline from the water wells to the storage reservoir. No off-site traffic will result from water transport to the site, other than the one-time movement of equipment to and from the well site.

SOURCE WATER SAMPLING

The source water wells will be within 1,500 feet of the proposed HVHWF well. Thus, in addition to the requirements of a Source Water Sampling Plan, they will be included in the required Water Quality Monitoring Work Plan (WQMWP – Section 21 of this application). Under that plan, the wells will each be sampled a minimum of three times between the date of their completion and the start of hydraulic fracturing operations. This will be accomplished by the collection of grab samples from the pump discharges. After HVHWF operations are complete, the wells will continue to be monitored under the WQMWP. Since water quality parameters may change due to exposure at the surface, the on-site reservoir shall also be sampled prior to

beginning HVHHF operations. Analytes for each well and the surface impoundment shall include the following:

Analyte	Method Used (EPA Method unless otherwise noted)
Arsenic	6010
Barium	6010
Cadmium	6010
Calcium	6010
Chromium	6010
Iron	6010
Lead	6010
Magnesium	6010
Selenium	6010
Silver	6010
Mercury	7470
Volatile Organic Compounds (VOCs)	8260
BTEX (included in VOCs)	8260
Dissolved Propane	RSK-175
Dissolved Methane	RSK-175
Dissolved Ethane	RSK-175
Chloride	300.0
Sulfide	376x/SM4500 S2-F
Nitrate	300.0
Nitrite	300/SM 4500 NO3 F
Sulfate	300.0
Gross Alpha	900.0
Gross Beta	900.0
pH	Measured in the field
Total Dissolved Solids	160.1 / SM2540C
Alkalinity	310.x / SM2320B
Specific Conductance	120.1 / SM2510B



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
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Attachment: HydraulicFracturingFluidsandFlowbackPlan

Please save attachment using the name above

Hydraulic Fracturing Fluids and Flowback Plan §1-35(b)(11); 245.210(a)(11), 245.530, 245.560.

Please review the above-listed statute and rules and describe the handling, storage, transportation and disposal, and recycling or reuse of hydraulic fracturing fluids and flowback in sufficient detail to demonstrate that your plan for these materials meets the requirements of the statute and rules. In so doing, (a) identify, including name, identification number, and specific location, the Class II injection well or wells to be used for disposal, reuse, or facility or facilities to be used for recycling of the fluid; (b) explain the injection schedule, flow rate, reuse volume, storage, any treatment, and total volume in detail; (c) describe the capacity and qualities of tanks and any lined reserve pit to be used for capture and storage of flowback, the expected flowback rate and amount, and the frequency that the storage tanks will be emptied, and (d) describe your plan for testing flowback water. If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, identify measures you will take to protect the components in this plan against earthquakes of M4.5 or more.



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316)-267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Hydraulic Fracturing Fluids and Flow back Plan

The Class II injections wells that are planned to be used for disposal are:

Trueflow #1, Reference #216072, SE SW SW, Sec 6-6S-9E, White County, IL., MIT

Date: 3/27/2015

Rankin #1 SWD, Reference #11947, SE N/2 NE, Sec 31-3S-11E, White County, IL.,

MIT Date; 9/20/2013

The fracturing treatment fluids will be flowed into a purpose built lined and closed flow back tank having a capacity of approximately 500 barrels. This tank will be used to separate any gas or proppant in the flow back fluid and measure the flow back fluid volume. Up to five (5) additional closed storage tanks will be connected to the primary flow back tank for temporary storage of the flow back fluid (approx. 3,000 barrels of maximum onsite storage). Flow back operations will occur at the wellsite on the drilling pad. The temporary storage tanks will be enclosed by earthen containment berms which will be of sufficient size to contain all of the possible flow back fluid temporary storage volume. The flow from the well will be regulated by an adjustable choke. Anticipated flow rates will be between 10 and 25 barrels per hour. The flow back fluid will be hauled on a 24 hour basis as needed. Multiple water transports will be available and will be undertaken by liquid oilfield waste haulers permitted by the Illinois Department of Natural Resources. Expected haul frequency will depend on the flow rate and the size of the truck available. Bobtail trucks commonly can haul 80 barrels at a time and transports 120 barrels. If, for any reason the fluid cannot be hauled timely or safely, the well will be closed in until the fluid can be hauled. There are no plans to use open pits for capture and store of flow back fluids. The primary site where the flow back fluid will be disposed of at is the TrueFlo Solutions LLC Trueflo #1 Class II disposal facility located in White County, Illinois. A secondary site is the Haggard Well Service Rankin #1 Class II disposal in White County, Illinois. There are no plans to reuse or recycle the water. The well will be flowed until there is no proppant being produced. At that time flow back operations will cease and the well turned to production facilities. It is anticipated that between 4,000 and 5,000 barrels of flow back will be recovered.

The wellsite lies outside of the area identified by the U.S. Geological Survey as having a 2% or greater probability of exceedance in 50 years of ground acceleration of 0.4 standard gravity or more.



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



**HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING
PERMIT APPLICATION HVHFF-10**

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: WellSiteSafetyPlan

Please save attachment and use the file name above.

Well Site Safety Plan §1-35(b)(12); 245.210(a)(12). Provide a copy of the OSHA-compliant plan for the safety measures you will employ during high volume horizontal hydraulic fracturing operations to protect persons on site and the general public. Please address safety measures for an emergency, identify the presence of any hazardous materials used or stored at the site, and provide contact information for the applicant and for all appropriate emergency responders. If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, identify measures you will take to protect the components in this plan against earthquakes of M4.5 or more.

Have you provided a copy of this plan to the county or counties in which fracturing operations will be occurring? YES NO If "NO" provide, within 15 calendar days after submitting the permit application to the Department, a copy of the plan to the county or counties in which hydraulic fracturing operations will occur as required by § 1-35(12).



Woolsey Operating Company, LLC
125 North Market, Suite 1000
Wichita, Kansas, 67202

Well Site Safety and Health Plan
Woodrow #1H-410308-193

Raymond Gibson

Prepared by:
SRP Environmental, LLC
(318) 222-2364

February 2, 2017

Date

Mark Sooter

Approved by:
Vice President of Business Development
Woolsey Companies, Inc. LLC
(Phone)

May 5, 2017

Date

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Abbreviations and Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standard Institute
APR	air purifying respirator
AQC	air quality control
CFR	Code of Federal Regulations
CHSM	Corporate Health and Safety Manager
CIH	Certified Industrial Hygienist
CNS	central nervous system
CPR	cardiopulmonary resuscitation
CSP	Certified Safety Professional
dB	decibel
dBA	decibel average
EPA	U.S. Environmental Protection Agency
H&S	health and safety
HSP	health and safety program
HVHFH	High Volume Horizontal Hydraulic Fracturing
IDLH	immediately dangerous to life or health
JSA	job safety analysis
mg/m ³	milligrams per cubic meter
MSA	Mine Safety Appliance Company
NFPA	National Fire Protection Agency
NIOSH	National Institute for Occupational Safety and Health
NORM	naturally occurring radioactive material
NRR	noise reduction rating
OSHA	Occupational Safety and Health Administration
OU	operable unit
OCV	Operations Control Van
PEL	permissible exposure limit
PID	photoionization detector
PM	project manager
PPE	personal protective equipment
ppm	parts per million
SDS	safety data sheet
SSHO	site safety and health officer
SSHP	site safety and health plan
STEL	short-term exposure limit
TLV	threshold limit value
TWA	time-weighted average

WGBT

Wet-Bulb Globe Temperature

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Section 1: Introduction

1.1 Purpose and Objectives

This Site Safety and Health Plan (SSHP) addresses the minimum safety, health, and emergency response requirements for Woolsey Operating Company, LLC (Woolsey) during High Volume Horizontal Hydraulic Fracturing (HVHMF) operations. These HVHMF activities have the potential to result in employee and general public exposure to potential health and safety hazards. Woolsey has developed this SSHP to mitigate these concerns. Woolsey will obtain full compliance with this plan by its employees and subcontractors. All HVHMF personnel and subcontractors are required to adhere to the SSHP requirements. Trespassers not associated with the field activities will be discouraged from entering the site.

The SSHP objectives are to ensure that all necessary precautions for HVHMF activities are in place and that appropriate health and safety procedures are followed at all times to protect personnel and the general public; to prevent damage, injury, or loss of property and equipment; and to respond quickly and effectively to activity-related emergencies.

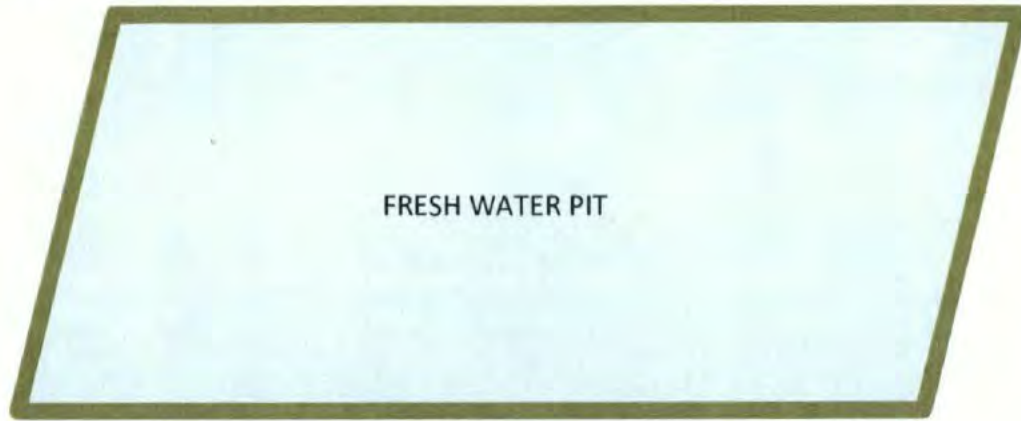
Before commencing HVHMF activities, all company and subcontractor employees assigned to the project will receive a copy of the SSHP and will be trained in its provisions. A copy of the SSHP will be kept on site in the Operations Control Van (OCV) at all times. The site safety and health officer (SSHO) (or alternate SSHO) will be responsible for ensuring that the SSHP requirements are understood by field personnel and that site activities are performed with the utmost regard for the safety and health of all personnel, subcontractors and the general public involved. Woolsey is only responsible for the health, safety, and emergency response activities related to its activities. Woolsey and its subcontractors are required to conduct job safety analysis (JSAs) summarizing the potential hazards that may be encountered while conducting the HVHMF tasks for this project. The JSAs will also provide a summary of the precautionary and preventative measures associated with these hazards. The requirements of this section are based on current information and understanding of the existing impacts at the site. Woolsey will assess all aspects of safety and health protection, including individual activities and long-term health monitoring, and will continually evaluate future health and safety requirements.

1.2 Plan Updates and Revisions

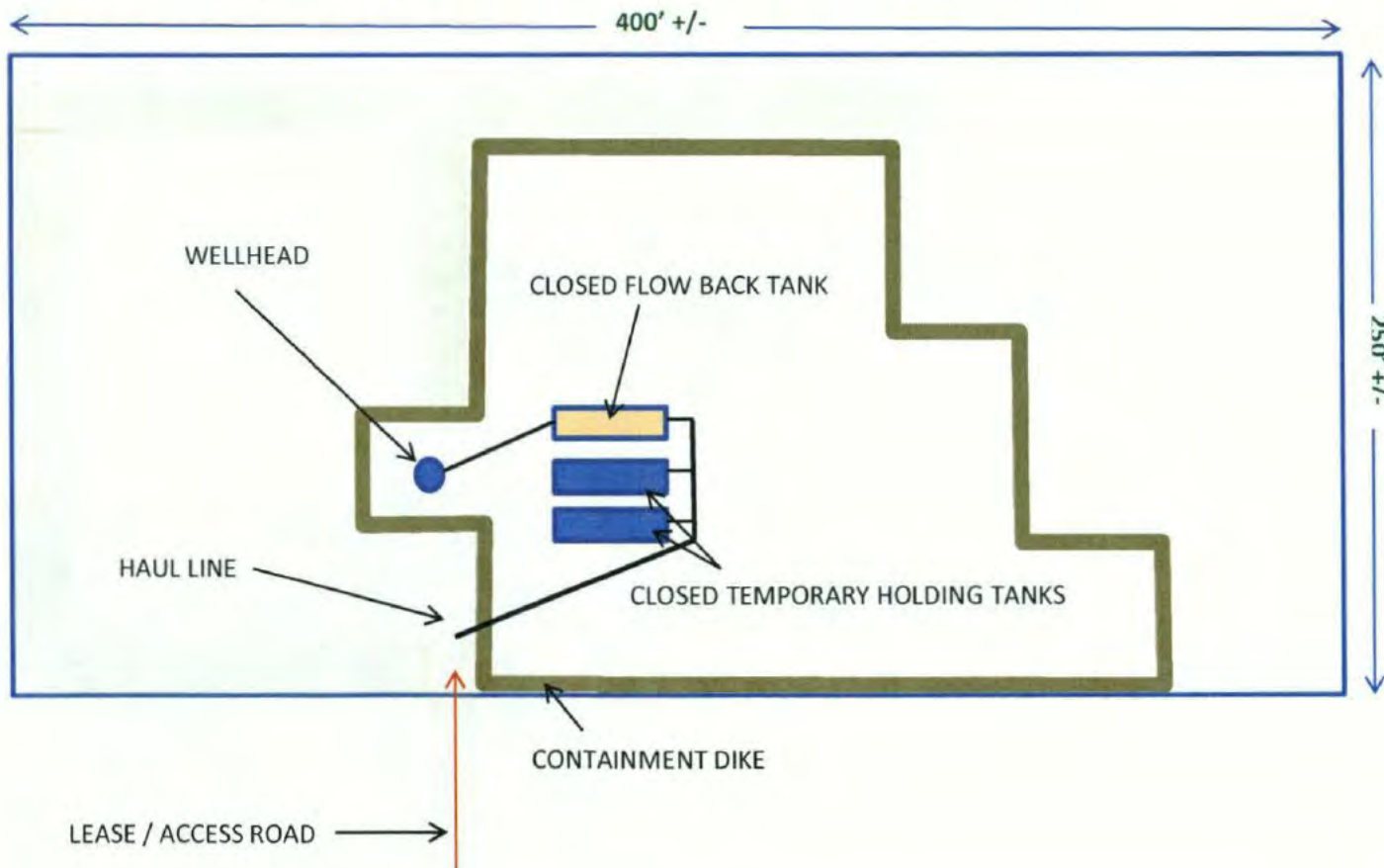
This SSHP will be evaluated on an annual basis to ensure compliance with local, state, and federal regulations. The plan will be updated based upon the review findings.

WOOLSEY OPERATING COMPANY, LLC

WOODROW #1H-410308-193
WHITE COUNTY, ILLINOIS



SCHMATIC of WELL PAD & HVVHF FLOW BACK OPERATIONS



Section 2: Site Description
Figure 2-1 Work Site Description

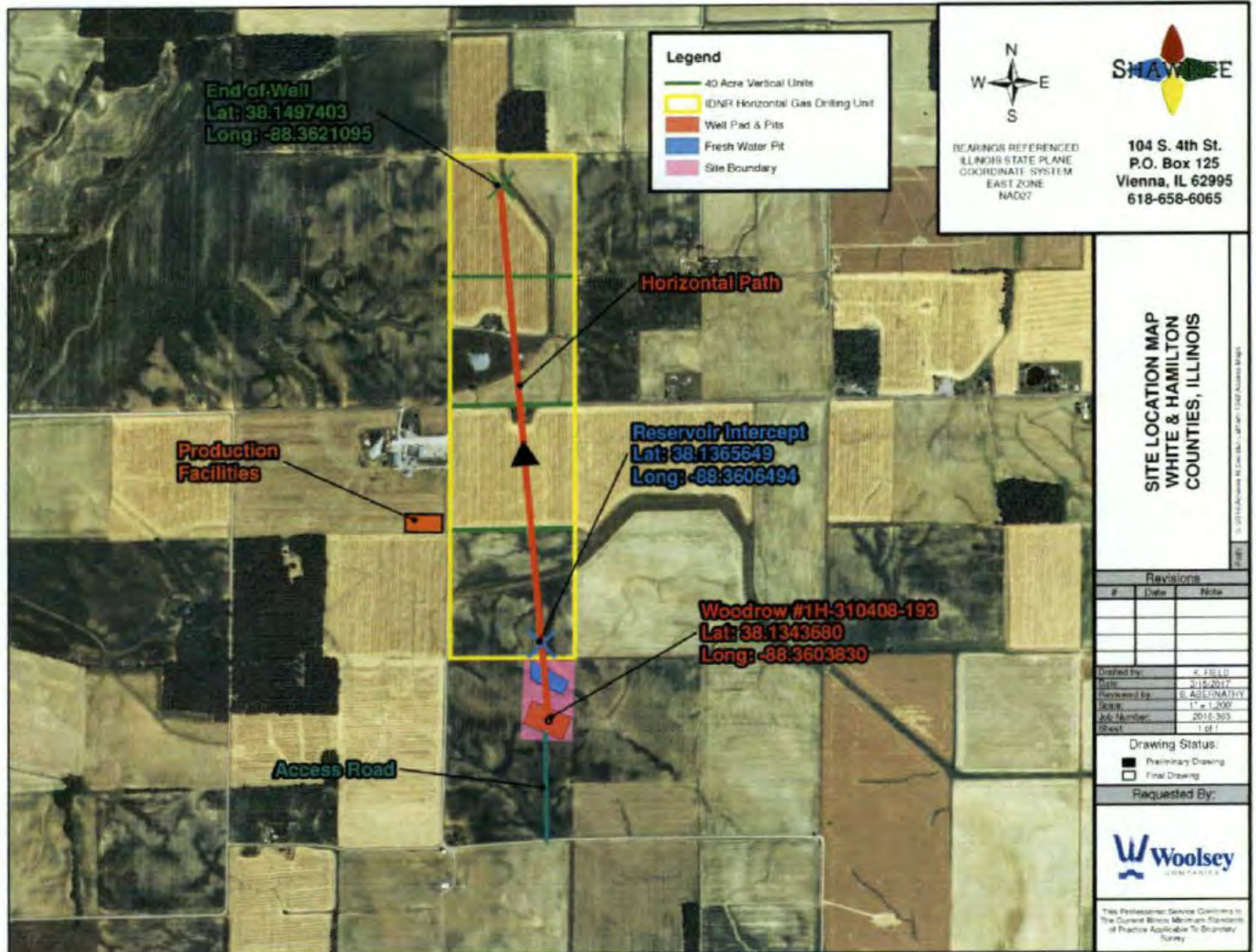


Figure 2-2: Site Location Map

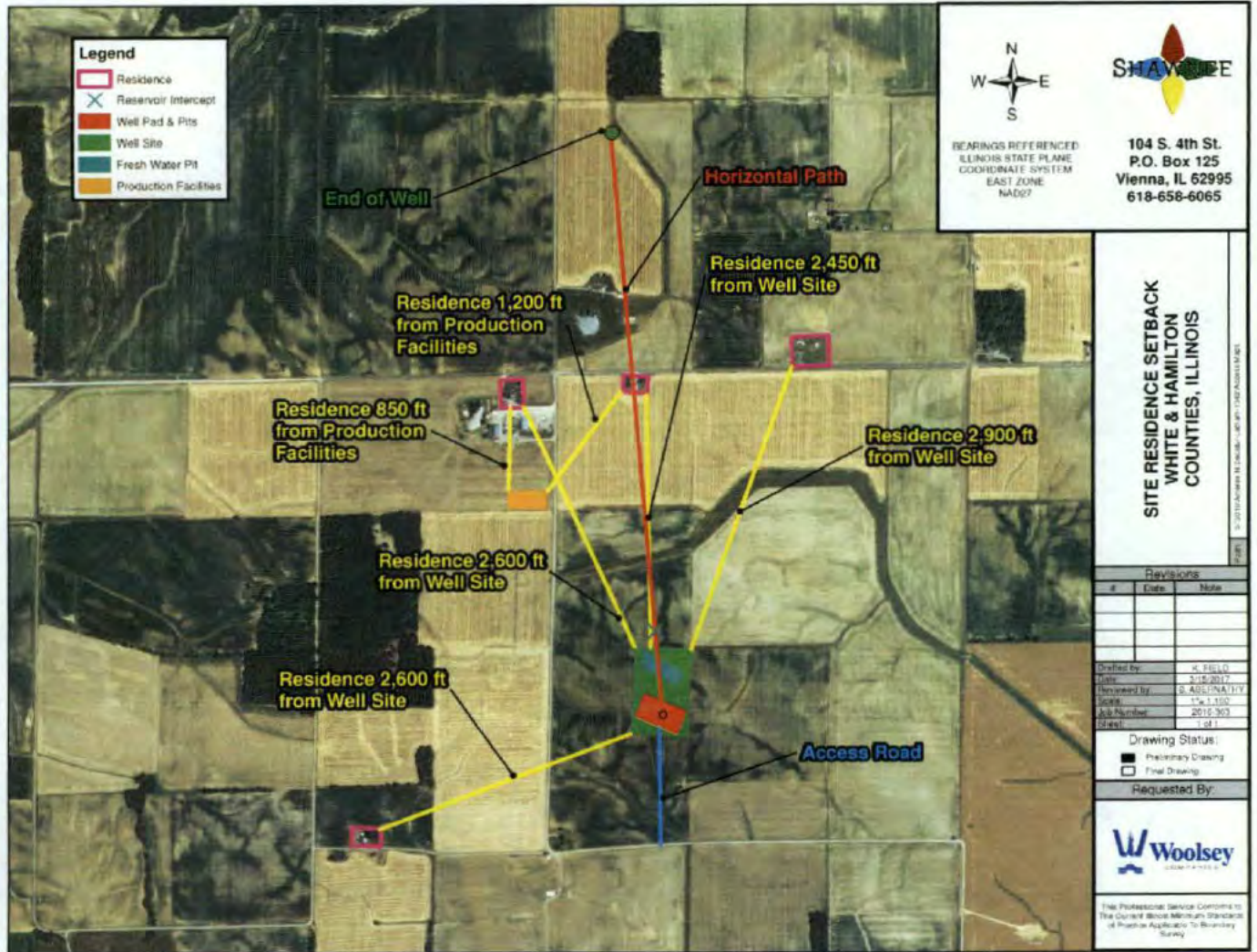


Figure 2-3: Site Residence Setback

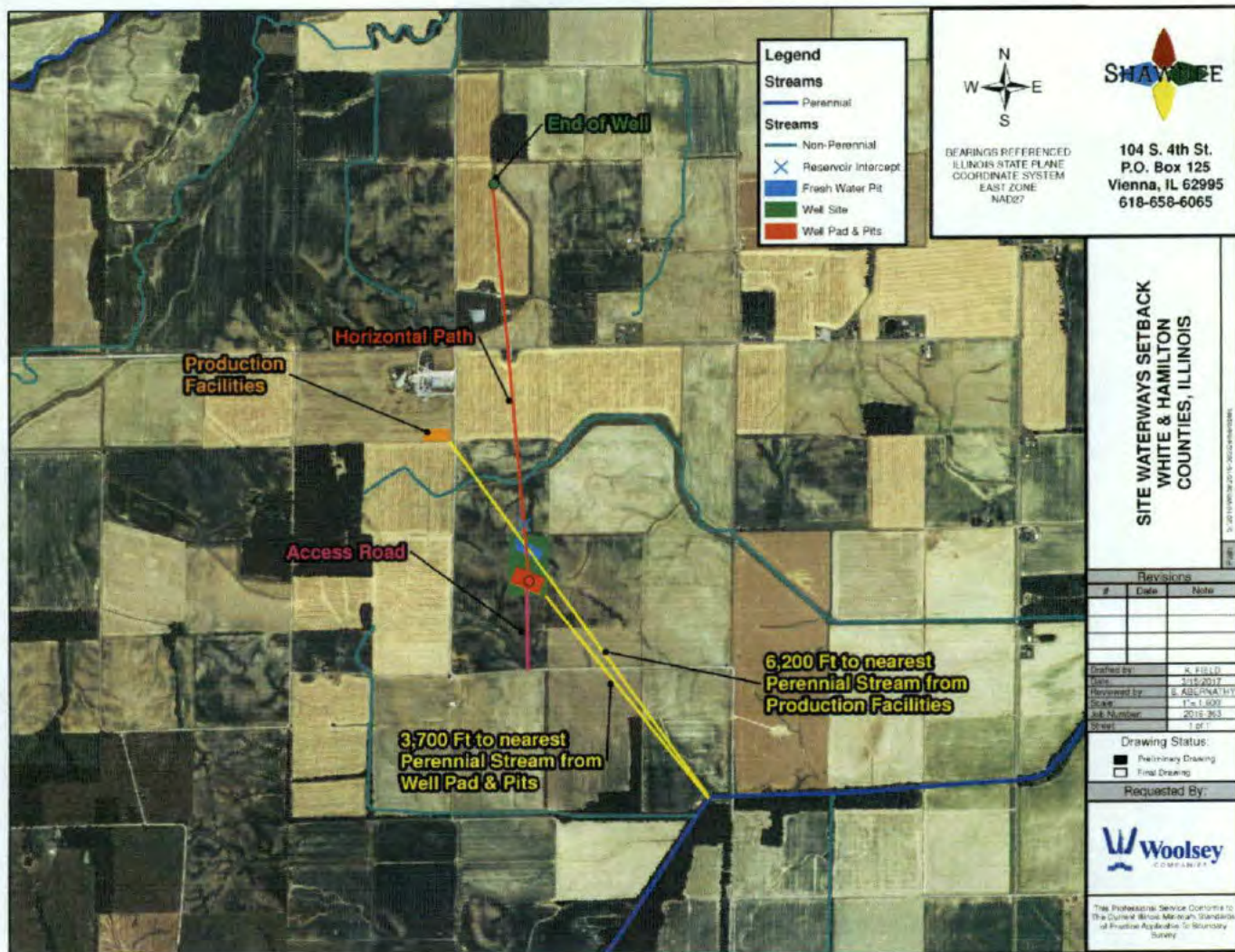


Figure 2-4: Site Waterways Setback

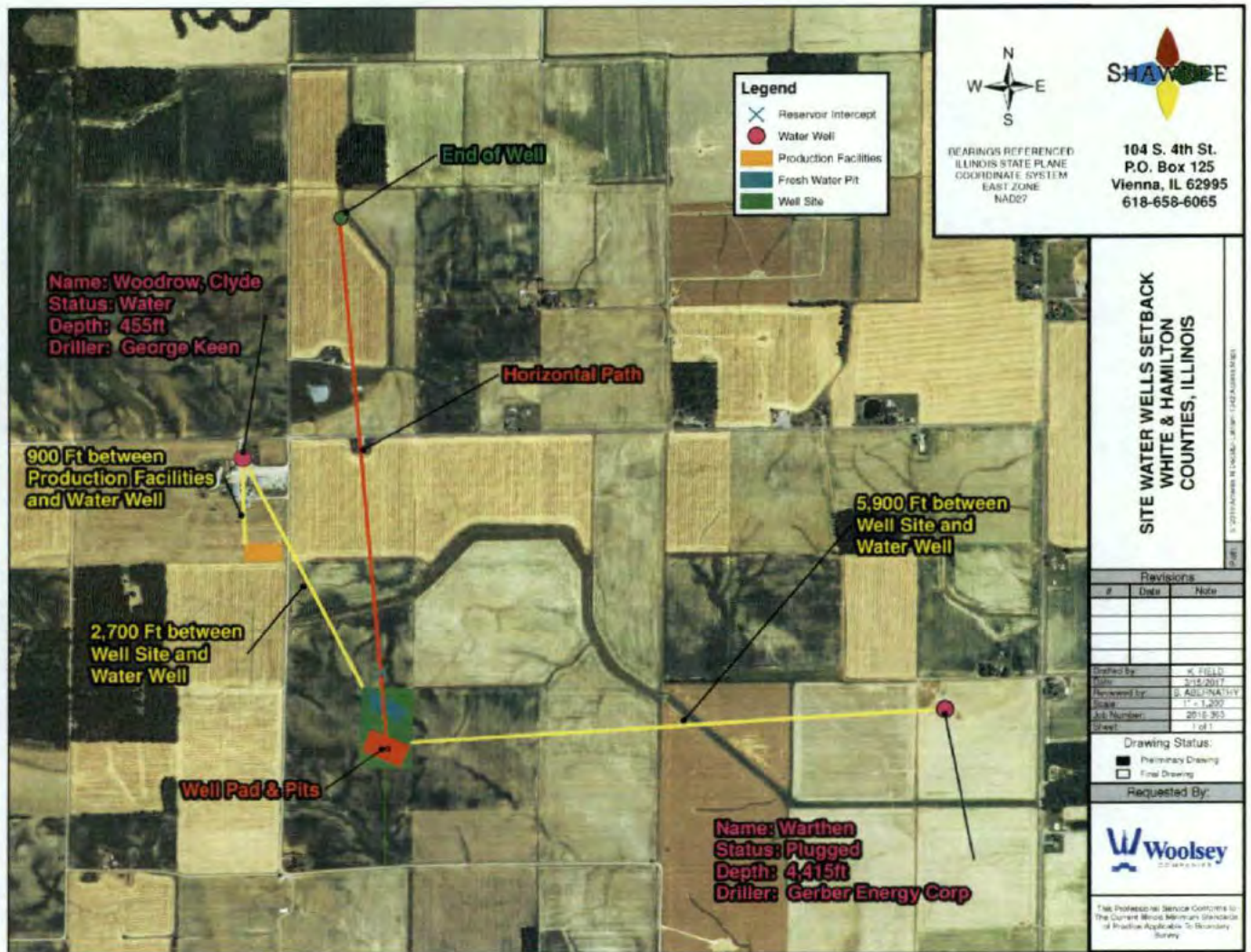


Figure 2-5: Site Water Wells Setback

Section 3: Hazard/Risk Analysis

3.1 Chemical Hazards

Woolsey and subcontractor employees will be exposed to various chemicals throughout the duration of this project. Safety Data Sheets (SDSs) will be located in the OCV. A list of hazardous materials used or stored at the site during HVHMF activities is included in Table 3-1.

Table 3-1

TRADE NAME/MATERIAL
Hydrochloric Acid
Cronox AK-50
NE-6 Surfactant
Plexgel Breaker XPA/Plexbreak 134
Plexslick 957 FR-7
Ferriplex 66
Diesel

3.1.1 Skin Contact

One route of possible exposure is through skin contact. Acute exposure to these chemicals can produce skin irritation. The following PPE to protect against skin contact will be utilized by personnel during chemical handling activities:

- Nitrile disposable gloves
- Butyl-rubber gloves

3.1.2 Eye Contact

Safety glasses in accordance with American National Standard Institute (ANSI) Z87.1 will be worn for all site activities. Face splash shields will be worn during mixing or pouring of chemicals. A portable eyewash station will be present onsite during all activities. Location of the eyewash station will be checked prior to activities that require the use of face splash shields to ensure it is readily accessible.

3.1.3 Inhalation

Another possible route of exposure is inhalation of vapors and dust particles. Refer to the Fugitive Dust Control Plan (Attachment E) for potential inhalation hazards and controls.

3.2 Physical Hazards

Physical hazards will be present in all job areas. The SSHO (or alternate SSHO) will screen the area for physical hazards prior to beginning work. Multiple physical hazards may be present at the area.

3.2.1 Heat and Cold Stress

Seasonal site conditions should be considered for all HVVHF activities. For field personnel, heat stress is usually a result of protective clothing decreasing natural body ventilation, although it may occur at any time work is being performed at elevated temperatures. Factors that contribute to cold stress exposure include temperature, humidity, wind, sunlight, rain, snow, fog, exposure duration, clothing, and work activity. Thus, heat and cold stress prevention will be practiced in accordance with the techniques in Section 9 and in Attachment B of this SSHP.

3.2.2 Slips, Trips, and Falls

Possible site conditions including rough terrain and steep slopes may be encountered for all HVVHF activities. Slips, trips, and falls can be easily prevented by using common sense practices such as good housekeeping procedures, identifying tripping hazards and rectifying or avoiding them, and walking slowly with proper footwear on slippery surfaces.

3.2.3 Working near Heavy Equipment

Heavy equipment activities during will include the use of excavators, front loaders, and dump trucks. Hazards associated with heavy equipment activities include mechanical hazards associated with rotating and/or unsecured equipment or cables, tripping hazards, falling objects, electrical shock from surface or underground utility lines or electrical equipment, noise from operating equipment, burns which might be incurred using pressure washer equipment, and inhalation hazards associated with equipment exhaust, or dust.

3.2.4 Noise

Use of heavy equipment may expose the field team to noise levels that exceed the Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) of 90 decibels average (dBA) for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period
- Interference with speech communication and the perception of auditory signals
- Interference with the performance of complicated tasks
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ

Since personal noise monitoring will not be conducted during the proposed activities, all personnel performing activities at the jobsite while heavy equipment and drilling equipment is in operation must wear either disposable earplugs or earmuffs, but all hearing protection must have a minimum noise reduction rating (NRR) of 27 decibels (dB). An ear protection station with a sign stating “Ear Protection Required” will be placed at the entry point.

3.2.5 Handling Heavy Objects

Use mechanical means for lifting whenever possible (i.e., forklift, lift gate, loader, etc.). Observe proper lifting techniques and use certified lift chains and appropriate load points. Obey sensible lifting limits (60 pound maximum per person manual lifting or 1/3 a person’s bodyweight, whichever is less).

3.2.6 Combustible and Flammable Materials/Liquids

FM/UL-approved flammable liquid containers, labeled with the content, will be used to store fuel.

All fuel containers will be stored at least 15 meters (50 feet) from any facilities and ignition sources or

stored inside an approved flammable storage cabinet.

ABC fire extinguishers will be located in each field vehicle and on all heavy equipment.

Post “NO SMOKING” signs in refueling areas and on fuel storage tanks.

Avoid parking vehicles in area of tall dry grass or other potentially combustible material

3.2.7 Fire Protection

The work site will at all times be equipped with a means of communication with the fire department (i.e., cell phone), a 20# ABC portable fire extinguisher, and a shovel.

Combustible material hazards may include materials near ignition sources (hot motor or exhaust system), and transfer and storage of flammable or combustible liquids (if a generator or other portable fueled equipment is used).

Only FM/UL-approved flammable liquid containers, labeled with the content, will be used to store fuel.

All fuel containers will be stored at least 15 meters (50 feet) from any facilities and ignition sources, or stored inside an approved flammable storage cabinet.

Fire suppression equipment will be staged in all areas where flammable materials are stored (i.e. fuel dispensing and storage locations).

3.2.8 Electrical Hazards

3.2.8.1 Electrical Installation

Woolsey employees will not conduct electrical installation activities.

3.2.8.2 Working near Energized Circuits

Per OSHA electrical regulations (29 Code of Federal Regulations [CFR] 1910.333), only "qualified" persons may work on energized electrical circuit parts or equipment or perform testing work on energized electrical circuits or equipment.

The OSHA standard further states that even qualified persons working near exposed energized electrical parts can't approach closer than 1 foot of a system that is over 300 volts (V) but not over 750V. The standard does allow for closer approaches by qualified personnel if personnel are wearing insulated gloves with the proper voltage rating. For this program, qualified personnel will wear rubber insulated gloves with a voltage rating of up to 1,000 V (Class O glove). Leather protector gloves will be worn over the rubber insulating gloves.

3.2.8.3 Lock-Out/Tag-Out

It is the responsibility of Woolsey employees and/or subcontractors to verify that all equipment is locked out in accordance with standard operating procedures before performing any maintenance or repair work on energized equipment. The source must be locked out; it is not enough to push the power switch to “off” and disconnect the breaker. Anyone can re-engage power under these circumstances. Locking out the power source is the only way to guarantee that the power will not be inadvertently reactivated.

3.2.9 Confined Space Entry

Woolsey employees will not enter into confined spaces.

3.2.10 Naturally Occurring Radioactive Material (NORM)

NORM might be released from oil and gas formations. Workers at risk of exposure include those who handle pipes and equipment that might have been contaminated with NORM. Sludge, drilling mud, and

pipe scales, for example, often contain elevated levels of NORM, and the radioactive materials might be moved from site to site as equipment and materials are reused. Disposal, reuse, and recycling of NORM might cause worker exposures.

Testing of black shale drill cuttings, flowback, surface waters, and soil will be conducted to determine levels the presence and levels of the following:

- Total dissolved solids
- Gross Alpha
- Gross Beta
- Radium-226
- Radium-228
- Potassium-40

Site characterization of radioactive materials in the soil and surface waters will be determined during the initial site sampling event.

3.2.10.1 Scope of Field Testing

Field screening activities will consist of using field measurement instruments to identify the presence and approximate amounts of NORM and TENORM in cutting pits (open and closed), flowback and produced water. Screening of solid and aqueous samples and swipes (smears) samples will also be performed.

Direct-read radiological survey instruments will be used throughout the HVHFF operations of the project for scanning and surveying of personnel, equipment, materials and general areas. The survey instruments will be operated and maintained by Woolsey personnel or qualified contractors. Additional equipment that may be used on-site will be maintained and operated by the operator's technician(s) or subcontractors. Proposed instruments, detectors, and equipment (or their equivalents) to be used on-site during field screening are listed below.

Table 3-2

Equipment Instrument	Detector	Parameter
Ludlum Model 2224, or equivalent	Ludlum Model 43-89, alpha/beta scintillator, or equivalent	Portable scaler/ ratemeter for detecting alpha and beta radiation
Ludlum Model 2221, or equivalent	Ludlum Model 44-10, gamma scintillator, or equivalent	Portable scaler/ ratemeter for detecting gamma radiation
Ludlum Model 2929, or equivalent	Ludlum Model 43-10-1, or equivalent	Table top counter for detecting alpha and beta radiation
Bicron Microrem, or equivalent	Internally-mounted plastic gamma scintillator	Portable exposure rate survey meter for gamma radiation
Ludlum Model 3, or equivalent	Ludlum Model 44-9, thin window GM detector, or equivalent	Portable survey meter for detecting beta radiation
Ludlum Model 19, MicroR meter, or equivalent	Internally-mounted 1x1 NaI gamma scintillator	Portable exposure rate survey meter for gamma radiation

3.2.10.2 Field Sampling Activities

Field sampling will consist of collecting representative samples of environmental media from sources for

either on-site measurements or off-site laboratory analysis. The following types of field samples will be collected:

- Black shale drill cuttings, accumulated solids, scale, treatment water sludge, discharge sediment, soil samples and crystalline salts from brine water evaporation as appropriate for off-site radiological laboratory analyses for characterization and evaluation of potential mobility in the environment;
- Flowback and produced water, for off-site radiological laboratory analysis for characterization purposes;
- Solid and aqueous phases to be evaluated separately;
- Swipe (smear) samples to determine removable alpha and beta surface contamination as an indicator of potential inhalation or incidental ingestion exposures.

3.2.10.3 Sampling Methods

Solid samples will be collected using reusable or disposable sampling tools (e.g., stainless steel trowels or tubes). Sampling tools will be decontaminated prior to first use on-site, between sampling locations, and following last use on-site (i.e., before demobilizing that equipment) as appropriate based on survey data. The samples selected for analysis will be placed into laboratory approved containers immediately following collection and labels promptly affixed to the sample containers. The samples will be transported via delivery service under chain-of-custody control to the off-site subcontract laboratory for analysis.

Representative samples will be collected for flowback and production water by performing multiple collection events over the entire flowback period and initial production. A representative grab sample will be collected from the appropriate tank/outlet using a disposable Teflon® bailer or a reusable stainless steel thief sampler; contents of the selected sampling implement will be added directly to sample containers. Samples will be placed into laboratory-prepared containers immediately following collection and caps and labels promptly affixed to the sample containers. In cases where sample valves are available, samples may be collected directly into approved sample containers. The samples will be transported under chain-of-custody control to the off-site subcontract laboratory.

3.2.10.4 Sampling Equipment Decontamination

Disposable sampling equipment will be used wherever possible to reduce decontamination requirements. When reusable equipment is used, such equipment will be decontaminated both prior to sampling in the field, between uses, and following the last use on each site, as appropriate. The following decontamination steps will be performed for reusable equipment, in the following order as necessary:

- 1) Potable water rinse;
- 2) Wash with laboratory-grade detergent (Alconox®, Liquinox® or equivalent);
- 3) Distilled water rinse;
- 4) Acetone, Isopropanol or Methanol rinse;
- 5) Distilled water rinse; and
- 6) Air drying.

3.3 Biological Hazards

The SSHO (or alternate SSHO) will also screen the area for biological hazards prior to beginning work. Care should be taken during field activities to prevent contact with biological hazards.

3.3.1 Insects

Ticks, bees, wasps, yellow jackets, black widow spiders, and brown recluse spiders present a potential hazard on this project. A victim suspected of being bitten by a black widow spider or brown recluse spider will receive medical attention. The venom from the brown recluse spider is capable of causing coma and kidney failure in its victim.

Protection against insects, such as protective clothing (Level D) and insect repellents (where necessary), will be used. Personnel will receive training on working in conditions where insects will be present prior to HVHFF activities.

3.3.2 Vermin

Feral cats, skunks, rats, mice, squirrels, and rabbits may be carriers of disease. Where vermin are identified in work areas, the SSHO (or alternate SSHO) shall be immediately notified. Bites will be immediately reported and medical care obtained.

Infections may occur in humans associated with activities that bring humans into contact with rodents, rodent saliva, or rodent excreta. Activities that may bring humans into contact with the etiologic agents causing infections include the following situations:

- Working in areas of field crops
- Disturbing rodent-infested areas
- Visiting areas where rodent populations have increased
- Entry into potential rodent-infested areas

Transmission of disease may occur through broken skin, contact with conjunctivae, ingestion of contaminated food or water, or inhalation of aerosols. Personal hygiene practices, such as frequent hand-washing, will help prevent rodent-borne diseases as well as using caution in areas likely to be occupied by vermin.

Workers will be advised that if a fever or respiratory illness develops within 45 days of the potential exposure, they should seek medical attention and inform the physician of potential Hantavirus exposure. All precautions will be made to ensure Hantavirus exposure is eliminated in the field. Rodent-borne diseases, including Hantavirus, result in severe respiratory distress and plague.

Section 4: Responsibilities

Woolsey's responsibilities and chain of command are discussed below.

4.1 Woolsey Responsibilities

Woolsey is responsible for taking all necessary precautions and providing the necessary protection to prevent damage, injury, or loss (as a result of project activities) to the following:

- All individuals at or near the location of the work performed
- All Woolsey employees and subcontractors
- All equipment or materials used in the work performed
- Other property at or adjacent to the site or work location

Woolsey will notify the project manager (PM) immediately when work may affect adjacent properties. Woolsey will obtain full compliance with this plan by its employees and subcontractors.

4.2 Chain of Command

Accountability for implementing and enforcing this SSHP lies with the CHSM. Day-to-day onsite accountability is delegated to the SSHO (or alternate SSHO). Each employee is responsible for

performing the tasks assigned to him/her in this SSHP. The individuals who fill these positions and the responsibilities assigned to them are detailed in Sections 4.2.1 and 4.2.2.

Subcontractor competent persons are also responsible for implementing and enforcing this SSHP.

4.2.1 Woolsey Corporate Health and Safety Manager

Mickey Neville from Basic's Pressure Service Division will act as the Corporate Safety and Health Manager (CSHM) on this project.

4.2.2 Site Safety and Health Officer

Tommy Marcellus will act as the Site Safety and Health Officer (SSHO) for this project.

Shane Herridge will act as an alternate SSHO for this project.

4.2.3 Public Visitors

Public Visitors who arrive on-site are responsible for following the Health, Safety and Environment policies of Woolsey (HSE) Management. Visitors are required to sign in immediately upon arrival and must be accompanied at all times while on-site with no exceptions. This policy allows site personnel to implement and maintain the HSE program and will periodically assess its effectiveness. On-site personnel who accompany visitors will ensure that safety programs are being followed, identify safety needs, communicate hazards, and supply and enforce the use of appropriate personal protective equipment and clothing. Employees, contractors, and visitors are expected to obey all safety rules, follow recommended procedures, use personal protective equipment and clothing, communicate hazards, and assist with ongoing improvements to Woolsey's HSE Management policies. Visitors and contractors who knowingly violate safety rules may face disciplinary action, dismissal and/or legal action.

Section 5: Health and Safety Training

Woolsey understands the importance of ensuring that employees and subcontractors are adequately trained to safely perform those tasks to which they are assigned during the HVHHF operations.

5.1 Site-Specific Health and Safety Training

Site-specific H&S training is presented to all employees as they are assigned to the site and periodically during the course of the project when there is a change in site activities. This onsite Field H&S Meeting will cover specific topics including: chemical and physical hazards associated with the task to be performed; necessary PPE required for the task; the type of environmental monitoring to be performed during the task; actions to be initiated based on environmental monitoring results; emergency and contingency plans; and task-specific topics such as small spill containment. Meeting attendance and materials covered are documented using the Field H&S Meeting Record in Attachment C.

No Woolsey employee or subcontractor will be put into a hazardous field situation without training. Prior to the initiation of HVHHF activities, all employees will attend a site-specific safety orientation given by the SSHO (or alternate SSHO) emphasizing the following:

- Names of personnel and alternates responsible for site H&S
- Site-specific H&S hazards
- Basic occupational H&S
- Appropriate PPE
- General occupational health
- Work practices by which employees can minimize risks from hazards
- Medical surveillance requirements, including recognition of symptoms and signs of exposure

- Onsite communication
- Evacuation routes
- Route to the hospital
- Emergency and fire response
- Smoking restrictions
- Locations of emergency equipment and list of emergency contacts
- Site work areas
- The SSHP

Topics covered in initial employee training are reinforced and emphasized in field orientation. It will include a tour of site facilities relevant to the HVVHF activities to be performed and the site safety equipment including the following (as appropriate):

- Fire extinguishers
- Eye wash stations
- Designated work areas
- First aid kits
- Posted emergency contact list

The contents of this SSHP shall be discussed among the entire field team prior to start of work. The field team shall simulate an emergency situation to exercise the guidance within this plan for emergency response procedures. The SSHO (or alternate SSHO) will evaluate the response, and provide feedback for lessons learned that will be incorporated into the existing site procedures.

5.2 Hazard Communication

OSHA Standard 29 CFR 1910.1200 "Hazard Communication Standard" requires that all employees handling or using materials that may be hazardous be advised and informed as to the hazard potential associated with those materials.

The SSHO (or alternate SSHO) will discuss with the team members the following items:

- An overview of the hazard communication requirement
- A review of the chemicals anticipated to be encountered during the course of project work
- The location and availability of the written hazard communication program and an inventory of chemicals expected to be encountered
- Methods and observation techniques that may be used to detect the presence or release of hazardous chemicals in the work area
- Procedures to lessen or prevent exposure to hazardous workplace chemicals
- Emergency procedures to follow if employees are exposed to hazardous chemicals
- Explanation of the proper use of PPE

5.3 Daily Health and Safety Meetings

The SSHO (or alternate SSHO) will conduct the daily H&S meetings for field workers. The SSHO (or alternate SSHO) will address safety concerns before the day's planned activities. The SSHO (or alternate SSHO) will discuss the meeting places in case of evacuation and rally points at this daily safety meeting,

as well as other H&S reminders regarding safe work practices discussed in this SSHP. These meetings will be documented in the field logbook. A brief meeting at the end of the day's work will also be attended by the field team if an emergency response situation has occurred.

5.4 Training Records

Initial employee, site-specific, and daily H&S training will be documented. The SSHO (or alternate SSHO) is responsible for documenting all training activities and maintaining the files. To ensure that all site employees have read and fully understand the contents of this SSHP, a signature form is provided as Attachment D.

Section 6: Personal Protective Equipment

For the protection of all persons involved with HVHHF operations on Woolsey projects, general application is required for the PPE described in this section. The SSHO (or alternate SSHO) will perform a hazard assessment requiring the use of PPE when developing a JSA for each Definable Feature of Work. Employees will review these PPE requirements during JSA review and at the safety meetings.

6.1.1 Eye Protection

Safety glasses shall be worn at all times except while in vehicles with enclosed cabs or where additional eye protection is required. Safety goggles in accordance with ANSI Z87.1 shall be worn when working with corrosive chemicals or when possible eye irritation hazards are present.

6.1.2 Hard Hats

Hard hats in accordance with ANSI Z89.1 shall be worn during all heavy equipment and HVHHF activities. No modification to the shell or suspension is allowed unless approved by the manufacturer in writing. Hard hats will be worn with the bill facing forward.

6.1.3 Shoes

Steel-toed boots are required. All foot gear must meet the requirements of ANSI Z41.1.

6.1.4 Shirts and Pants

The outer most layers must be fire resistant (FR) material and meet the NFPA 2112 standard.

6.1.5 Gloves

Personnel shall wear gloves that are appropriate for the hazard they require protection from.

6.1.6 Hearing Protection

Woolsey will implement a hearing protection program. This program will consist of performing an initial assessment that is designed to determine if persons in the defined work areas are exposed to sound levels greater than 85 dBA as a time-weighted average or 140 dBA impulses. Based on the initial assessment, the SSHO (or alternate SSHO) will make sure adequate protection is worn during those operations. If field conditions change, another assessment will be performed. This assessment will be based on task-based operations and will also focus on the work zone boundary.

6.1.7 Respiratory Protection

Woolsey has established a respiratory protection program for any employee that may be exposed to inhalation hazards while within the footprint of the wellsite. Any person required to wear a respirator on the job will receive instruction and training prior to using the equipment. In part, the training will include the nature, extent, and effects of the respiratory hazards to which a person may be exposed as well as signs and symptoms of exposure. Before a person is required to wear a respirator on the job, a

determination will be made that he/she is physically fit and able to wear a respirator. The respiratory protective program can be found in Attachment F of this SSHP.

6.1.8 Vehicle Safety

Seat belts shall be worn in all vehicles. Riding in the bed of pickups is prohibited. Vehicles will be inspected prior to each use. Only authorized Woolsey personnel and designated contractors are allowed to operate Woolsey vehicles used during the HVHHF operations.

6.1.9 Visitor Protection

All visitors to the well site will be provided with a hard hat, safety glasses, and hearing protection to ensure they are protected from potential hazard exposure while on the job site. Visitors will also be accompanied by site personnel while they are within the footprint of the operation to ensure they maintain a safe distance from any high hazard areas.

Section 7: Medical Surveillance

7.1 Purpose and Scope

All personnel performing onsite work that will result in exposure to contaminant-related H&S hazards shall be enrolled in a medical surveillance program that complies with OSHA standards 29 CFR (f) and 29 CFR 1926.65 (f).

Woolsey administers an occupational medical surveillance program for the following activities:

- Hazardous waste operations
- Activities that require the use of respiratory protection beyond the use of “loose fitting dust masks”
- Project-specific activities or job assignments that may expose employees to hazards where medical surveillance is required by regulation or it has been determined by the PM, resource manager and/or CHSM that a project-specific medical evaluation program or biological monitoring is warranted
- As requested by a client

The occupational medical surveillance program is designed and overseen by a board-certified occupational physician. The medical surveillance program is intended primarily to monitor an employee’s fitness for duty and is not intended for the diagnosis or treatment of injury or illness. The functions of the medical surveillance program include:

- Establishing a baseline medical condition prior to project or job assignment
- Monitoring the employee’s physical ability to perform assigned job functions
- Identifying the presence or absence of conditions that could be aggravated by the type of work assigned
- Monitoring health trends during hazardous waste and other designated project assignments
- Establishing a medical condition at time of termination or post assignment

In addition, medical exams or evaluations of employees may be provided in the following circumstances:

- Employment-related injuries or illnesses
- Exposures to toxic or hazardous substances
- Medical clearance to return to work

7.2 Responsibilities

Direct Managers and Resource Managers – Direct managers and resource managers ensure employees participate in the medical surveillance program when required by project assignment and notify the CHSM of employee termination or reassignment requiring an exit physical examination.

Corporate H&S Manager – The CHSM selects and monitors performance of the medical contractor and oversees Woolsey administration of the program.

H&S Coordinators – The H&S coordinator or their designees coordinate medical appointments and maintain employee medical clearance forms for their office(s).

Medical Consultant – The medical surveillance consultant identifies qualified clinics, medical facilities, and maintains employee medical records. The medical consultant provides the services of a board certified occupational physician to advise on recommended medical protocols, provide medical opinions regarding employee fitness for duty, and provide medical advice as requested.

Employees – Employees selected for activities that include participation in a medical surveillance program are responsible for participating in the program by attending assigned appointments and maintaining their medical qualifications.

7.3 Medical Release Forms

Upon completion of a medical exam or evaluation, results shall be reviewed by the medical consultant's occupational physician and a medical release letter shall be sent to the H&S database administrator indicating the medical status of the employee. The medical consultant shall also provide a copy of the results of the exam to the employee.

7.4 Employment-Related Injury or Illness Medical Evaluations

In a non-emergency situation, employees who are injured or contract an illness that may be related to their employment at Woolsey should notify their direct manager or resource manager and contact their CHSM or H&S coordinator. If necessary, an appointment will be arranged at a medical facility identified by the medical consultant at a time and location convenient to the employee.

The CHSM or H&S coordinator must be notified by the employee, their group leader, direct manager, or resource manager prior to seeking non-emergency medical services for employment-related injuries or illnesses.

7.5 Return to Work Examinations

An employee desiring to return to work following a leave of absence due to injury or illness, or return to full work status from a restricted work period, must obtain a medical release to work, signed by a licensed physician stating that the employee is capable of performing assigned duties with or without restrictions and with or without reasonable accommodation. The content of the examination may be determined by the medical consultant and may be performed at a facility selected by the medical consultant at a time and location acceptable to the employee. A medical work status form should be provided to the CHSM and human resources benefits manager.

7.6 Access to Medical Records and Exposure Data

Employee medical records, including results of medical tests and X-Rays, shall be retained by the medical consultant and kept confidential in accordance with OSHA medical record-keeping requirements, 29 CFR 1910.1020. Medical records, and information obtained in the course of the administration of the Woolsey medical surveillance program shall be kept confidential and released only under the following conditions:

- An employee, former employee, or their designated representative may obtain a copy of his/her personal records by submitting a written request for the information to the CHSM. The written

request must include the employee's name, the address to send the records to, and a phone number to call to verify the identity of the requestor.

- Woolsey's workers' compensation insurance carrier may request information related to alleged occupational illnesses or injuries with the written permission of the employee.
- The CHSM may obtain medical information without personal identifiers by submitting a written request to the medical consultant.
- Recognized government research and regulatory agencies may obtain medical information without personal identifiers by submitting a written request to the CHSM. The request shall identify the nature and purpose of the information requested.

Air monitoring data and exposure records for specific projects are kept with project H&S records. Employees may obtain access to data related to their exposure or generic data associated with potential exposure of employees in their job classification or performing similar duties by submitting a written request to their CHSM.

Section 8: Air Monitoring

Refer to the Fugitive Dust Control Plan for air monitoring requirements. All personnel will wear personal monitors while working on location.

Section 9: Heat and Cold Stress Prevention

Seasonal site conditions should be considered for all HVHMF activities. Heat and cold stress prevention will be practiced in accordance with the techniques in the following sections and in Attachment B of this SSHP.

9.1 Heat Stress Prevention

Heat stress occurs when the body's physiological processes fail to maintain a normal body temperature because of excessive heat. Individual susceptibility to heat stress disorders can vary widely. Individual physical factors that can affect a person's response to hot work environments include a person's general fitness and age. If necessary, appropriate heat stress prevention can include the following techniques:

- Advise workers to drink 16-ounces of water before beginning HVHMF activities and continue to drink fluids throughout the work day.
- Acclimatize workers to site work conditions by slowly increasing workloads.
- Wear loose clothing, appropriate to the weather and HVHMF tasks.
- In hot weather, conduct HVHMF activities in the early morning and evening.
- Allow appropriate rest period (i.e., at least 15 minutes each hour, depending on working and weather conditions).
- Ensure that adequate shelter is available to protect personnel against heat.

Attachment B to this SSHP, Heat and Cold Stress Guidelines, contains more information regarding heat stress monitoring.

9.2 Cold Stress Prevention

Factors that contribute to cold stress exposure include temperature, humidity, wind, sunlight, rain, snow, fog, exposure duration, clothing, and work activity. Cold Stress is not a major concern since colder temperatures are not expected during field activities. If necessary, the following prevention techniques should be considered when working in ambient air temperatures below 40 degrees Fahrenheit (°F),

especially when other contributing weather conditions such as snow, rain, or wind are present.

- Employees whose clothing may become wet shall wear an outer layer of clothing that is impermeable to water.
- Dress in layers and bring extra clothing.
- When manual dexterity is not required of an employee, thermally protective gloves shall be worn.
- Curtail work if extreme weather conditions such as a blizzard, extreme wind chill (e.g., less than 0°F), torrential cold rains, or wind is expected.
- Take warming breaks as needed.

Attachment B to this SSHP, Heat and Cold Stress Guidelines, contains more information regarding heat stress monitoring.

Section 10: Standard Work Practices

Standard work practices have been developed for general as well as for specific task activities. Some minimum standard general work practices are outlined below.

10.1 General HVVHF Activities

Specific safety practices associated with equipment and HVVHF activities conducted during work activities are listed in the JSAs; general safety practices include:

- Qualified, adequately trained, and licensed personnel will be onsite.
- Personnel will not consume or be under the influence of alcoholic beverages, medication, or drugs while operating heavy equipment. The presence of intoxicating substances on site is strictly prohibited.
- Work area will be kept clear of obstructions and debris.
- Personnel will wear proper PPE during all activities

10.2 Working around Heavy Equipment

Heavy equipment will be used on the jobsite. All heavy equipment shall be operated only by qualified (by training and experience) personnel who are authorized to operate the equipment to be used onsite.

- Assume the operator cannot see you. The operator's vision may be blocked by blind spots. He or she is frequently concentrating on their work and equipment and may not notice a site visitor.
- If you must approach the operator, be sure you have made eye contact with the operator and they know you will be approaching them before approaching the equipment. Verbal contact, direct or by radio, is even better. Do not approach if the equipment is moving or in operation.
- Stay clear of pinch points and swing areas of equipment. At Woolsey projects, these areas should be taped or barricaded off, however, when equipment moves frequently, you cannot count on the other organizations to mark these zones.
- Do not walk near a moving piece of equipment. It could turn or rotate any minute. Modern construction equipment moves fast and in any direction.
- On a noisy site, you may not notice the equipment's' backup alarm. Keep aware of what is happening around you.
- Never walk under a load on a crane or hoist.
- Do not cut across the path of equipment backing up.

- Wear your hardhat and safety glasses. The safety glasses protect your eyes from dust and debris and the hardhat provides protection for your head and makes you more visible on the site.
- On sites where there is frequent vehicle or construction equipment movement, wear high-visibility clothing.
- Maintain a clearance of a least 10 feet between any part of the machine or its load and electrical line or apparatus carrying up to 50,000 V. One foot of additional clearance is required for every additional 30,000 V.

10.3 Underground Utilities

Some tasks milestones in this SSHP may require drilling or heavy equipment penetrating the ground. In all these tasks utilities located underground will be a concern and hazard. Utility mark outs and geophysical contractors will be procured to locate any potential underground utilities in all work areas prior to any work completed in each milestone.

10.4 Spill Response

In the event that a spill occurs, the following procedures will be taken:

- The spill will have absorbent material placed over the area. Enough absorbent will be used to contain the entire spill. The absorbent material will then be placed in an appropriately labeled container using a shovel and disposed of properly.
- PPE to be used during the spill cleanup will be equal to the PPE being worn when the spill occurred, unless the SSHO (or alternate SSHO) determines that a PPE upgrade is necessary.
- The spill will be reported to the Woolsey PM and noted in the field logbook.

The spill response equipment will be stored in the OCV.

10.5 Site Safety Practices

Historically, slips, trips, and falls have been major causes of physical injuries. To prevent this type of hazard, tools, parts, and other equipment should not be left lying around. Grease and oils found on the ground should be cleaned up as soon as possible. The simple knowledge of proper lifting techniques, bending the knees and lifting with muscles of the legs can eliminate many strained or injured backs.

Several general practices will be followed to ensure personnel safety during operations at the site. The following is a list of some of these practices:

- Do not run on location.
- Do not operate moving equipment unless instruction in its use has been given and use authorized by the SSHO (or alternate SSHO).
- Observe driving regulations within the site. These include wearing seat belts at all times when the vehicle is in motion and maintaining posted speeds or under 10 miles per hour.
- Get authorization from the SSHO (or alternate SSHO) before removing safety equipment or supplies from their normal location.
- Clean hand tools and special tools and keep them in good repair.
- Use the correct tool for the particular job in the proper manner.
- Carry materials and tools with concern for overloads and balance, and hold these items securely.
- Avoid movement with obscured vision.
- Practice good housekeeping at all times.

- Do not participate in "horseplay". Horseplay is defined as any frivolous behavior that increases the probability of an accident.

10.6 Material Lifting

Many types of objects may be handled during the course of HVHHF activities. Care should be taken in handling heavy or bulky items, because they are the cause of a considerable number of accidents. There are certain fundamentals in the proper lifting of materials to avoid back injuries as listed below:

- The size, shape, and weight of the object to be lifted must be considered. A worker will not lift more than what one person can handle comfortably.
- The feet will be placed far enough apart for good balance and stability. The footing will be solid.
- The worker will get as close to the load as possible. The legs will be bent at the knees. If the load is too large or bulky and the worker cannot see around or over it, the worker will get assistance.
- The back will be kept as straight as possible.
- The object will be gripped firmly.
- To lift the object, the legs are straightened from their bend. Twisting motions will be avoided while lifting and/or carrying objects.
- A worker will never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

When two or more workers are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the persons carrying the load. When carrying the object, each worker, if possible, will face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines will be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential. The hands and object will be free of oil, grease, or water that might prevent a firm grip.
- The item will be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces.
- Gloves will be used when necessary.
- The fingers will be kept away from any points that may cause the fingers to be pinched or crushed, especially when setting the object down.

10.7 Contingency Plans

If unexpected hazards or conditions are encountered, field personnel will stop work and move a safe distance from the site, upwind or to the access road. Work stoppage will continue until the SSHO (or alternate SSHO) indicates it is safe to return to the site.

If unsafe conditions persist, the SSHO (or alternate SSHO) will notify Woolsey's PM, and the Woolsey CHSM will be notified by the PM, as needed.

Section 11: Site Control and Personal Hygiene

The following site control and personal hygiene activities will be followed:

- All personnel and general public will be required to sign in and out of the location for accountability purposes and to ensure that unauthorized access to the site is not granted.
- Signs will be posted at the entrance to the location to distinguish the wellsite to the general public,

so that they will know that there are additional hazards associated with the locations footprint.

- All Woolsey and subcontractor personnel assigned to work in any restricted area must be provided with a copy of this SSHP, agree to the terms in writing and sign the form in Attachment D, and attend a safety briefing before commencing work.
- All team members will make sure to address personal hygiene issues by washing hands, arms, and face prior to eating, drinking, smoking, applying lipstick, or any other hand to mouth function.
- Eating, drinking, and chewing gum, or tobacco will only be permitted outside the work zone. Smoking is permitted in designated areas only.
- Before initiating any non-routine operation, personnel must consult the SSHO (or alternate SSHO) about H&S requirements for that operation.

Section 12: Accident and Illness Prevention

12.1 Introduction

Woolsey believes that the H&S of each of its employees is of the utmost importance. Woolsey's objective is a HSP that reduces the number of illnesses and injuries to an absolute minimum. The Woolsey medical surveillance program, designed and administered by a board-certified, occupational physician, consists of a combination of (1) baseline, annual, interim, exit, and return to work examinations; (2) services for the evaluation and follow-up of occupationally-related injuries and illnesses; and (3) emergency medical services required to stabilize severely injured or ill patients prior to their transport to an offsite medical care facility. The prevention of occupationally induced illnesses and injuries takes precedence over operating productivity at all times. Woolsey provides quality supervision, training and educational opportunities, and protective clothing and equipment to ensure maximum employee H&S protection. Subcontractors will provide training and educational opportunities, and protective clothing and equipment for subcontractor employees to ensure H&S protection of its employees.

12.2 Safety Promotion

The training and subsequent implementation of the HSP, as well as the scheduled site-specific training, are all designed to instill a high level of safety consciousness in all personnel working on the project. These programs, in conjunction with the high level of experience and professionalism of the personnel working onsite and the periodic safety audits and inspections, will maintain safety as a prime concern for all involved. Additionally, the performance of work in a safe manner is expected and required from each Woolsey employee and subcontractor.

12.3 Medical and First Aid Requirements

Notification of, and arrangement with medical facilities, ambulance service, and medical personnel will be established to ensure their readiness and availability for prompt attention to the injured prior to implementation of HVHFF activities. The list of emergency contacts is included in Table 13-1. A minimum of two Woolsey or subcontractor employees performing HVHFF activities for this project will have current First Aid/CPR training certificates.

At least one first aid kit will be maintained onsite during field operations. These kits will have been reviewed by a medical consultant for their adequacy. The first aid kit will be stored in the OCV.

Section 13: Emergency Response and Contingency Procedures

If field personnel observe a potential or actual emergency condition, such as a chemical spill or fire, they will notify the personnel listed in Table 13-1. In the case of an emergency such as a fire at an off-site location, the appropriate agencies (i.e., the fire department [911]) will be notified. During the morning

H&S briefing, the emergency action plan will be discussed and demonstrated. The contents of this SSHP shall be discussed among the entire field team prior to start of work. The field team shall simulate an emergency to exercise the guidance within this plan for emergency response procedures. The SSHO (or alternate SSHO) will evaluate the response, and provide feedback for lessons learned that will be incorporated into the existing site procedures.

The emergency alerting procedure will be a 5-second continuous sounding of the field vehicle's horn. All posted safety and health requirements onsite will be strictly followed. If unexpected hazards or conditions occur, field personnel will evacuate immediately and meet upwind of the site at the meeting place designated during the field kickoff meeting. It will be the responsibility of the SSHO (or alternate SSHO) to account for all field personnel that have evacuated the site. Field personnel will be instructed to contact the SSHO/alternate SSHO via cell phone if they evacuate the site to somewhere other than the agreed upon safe meeting location. The proper authorities listed in Table 13-1 will be contacted.

13.1 Emergency Medical Facility

The medical facility used for emergencies related to HVVHF activities conducted is:

Hamilton Memorial Hospital
611 S. Marshall Ave.
McLeansboro, Illinois 62859

Directions to Hospital from worksite:

Head north on County Road 50E toward County Road 1825N – 0.06 mi
Turn right at the first cross street onto County Road 1825N – 1.5 mi
Turn right onto US-45S – 4.2 mi
Turn right onto IL-14W – 11.2 mi
Turn left onto S. Marshall Avenue – 0.2 mi

13.2 Medical Emergencies

In the event of an accident requiring first aid, the SSHO (or alternate SSHO) will be responsible for coordinating the first aid and/or requesting aid from a medical service (Table 13-1). If the person requiring attention is capable of being moved without further injury, the SSHO (or alternate SSHO) may transport the injured party to obtain medical assistance. Site support vehicles may be used to transport injured or ill personnel. Directions and maps showing the routes to the medical facility will be located in all vehicles. This SSHP should also be brought to the hospital. As aforementioned, a minimum of two Woolsey or subcontractor employees performing field activities for this project will have current CPR and first aid training certifications.

Depending on the seriousness of the injury, treatment may be given at the site by trained response personnel. Emergency first aid equipment, such as a first aid kit, will be in the OCV on site. For more serious injuries, additional assistance may be required at the site, or the victim may have to be treated at a medical facility. Any members of the general public, who incur any injury while within the footprint of the project, will be treated in the same manner as those working on the job site.

Life-saving care should be instituted immediately without considering decontamination, if chemical exposure occurs. The outside garments can be removed (depending on the weather) if they do not cause delays, interfere with treatment, or aggravate the problem. If the other contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating the inside of the ambulance and/or medical personnel. Outside garments will then be removed at the medical facility. No attempt should be made to wash or rinse the victim. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material that could also cause further or severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

Exposure to chemicals can be divided into two categories:

1. Injuries from direct contact such as acid burns or inhalation of toxic chemicals
2. Potential injury due to gross contamination on clothing or equipment

If a contaminant is inhaled, treatment can only be conducted by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed. Workers showing symptoms of acute exposure should be transported, immediately, following appropriate decontamination, to the nearest medical facility.

Heat-related illnesses range from heat fatigue to heat stroke, the most serious condition. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Section 9 and Attachment B present a discussion of recommended heat stress prevention procedures. Any worker who is medically treated for a heat stress related injury will be evaluated by a physician and medically cleared before return to work.

13.3 Exposure/Injury Reporting

The purpose of the exposure/injury reporting system is twofold: (1) to learn from past mistakes in order to maintain an exposure/injury-free work environment and (2) to document incidents as required by OSHA. The reporting system consists of monthly surveys and exposure/incident reports. All incidents involving injury, illness, exposure, vehicle, or equipment damage will be thoroughly investigated by the CHSM, including incidents that might not cause injury, illness, or property damage but had the potential to do so ("near miss incidents").

13.3.1 Accident Reporting and Investigation

Personnel are required to notify the CHSM of reportable exposures and injuries. Individuals will discuss all potential exposures with the CHSM and/or SSHO/alternate SSHO to ascertain if the exposure is reportable. All injuries will be reported.

An Injury/Illness Report Form will serve as the basis for the written documentation and investigation of all accidents resulting in employees receiving more than first aid. All such accidents will be verbally communicated to the CHSM or SSHO/alternate SSHO as soon as medical services are secured. These individuals will verbally notify the CHSM within 24 hours of the accident.

The investigation will be thorough and performed by the injured employee's immediate supervisor. The results of the investigation will be documented using the report form and will be signed by the investigator. The form will then be sent to the appropriate section or local manager, who following a review is also required to sign the form before forwarding it to the SSHO (or alternate SSHO). Following the SSHO/alternate SSHO's review and signature, a copy of the form will be made for the office/project file with the original forwarded to the CHSM.

13.3.2 Follow-Up

If the injury/illness resulted from the uncontrolled release of hazardous material, the CHSM will be notified immediately, so that discussions with the occupational physician can occur to determine if additional biological monitoring should be prescribed.

As soon as practical, following the initial medical treatment, the injured employee will be scheduled into the clinic that administers the annual examinations for the injured employee's office. This procedure is

necessary to ensure that the employee receives quality medical treatment during any type of recovery period.

The CHSM and the SSHO/alternate SSHO will follow up with the PM to ensure that corrective action, if identified in the Injury/Illness Report Form, has been implemented.

13.3.3 Occupational Injuries and Illnesses

The CHSM maintains a log of all occupational injuries and illnesses in accordance with OSHA requirements. The log is maintained using OSHA Form 200.

13.4 Emergency Evacuation Plan

The following steps are to be taken in the event that evacuation of the general public in close proximity of the well site becomes necessary due to a fire, explosion, or spill.

1. In the event that there is a problem at the well site which poses a threat to the general public, the SSHO will notify the Sheriff's Department. If the SSHO is incapacitated the site supervisor will make the proper notification.
2. Once the Sheriff's Department has been notified of the emergency, they will contact additional resources dependent upon the type of emergency.
3. If isolation and evacuation are necessary, the Sheriff's Department will dispatch units to set up roadblocks and assist with the evacuation.
4. The project manager will begin the evacuation of those in immediate danger, based on wind conditions at the site. They will begin by telephoning any residents in the danger zone directly downwind from the location in the potential radius for exposure. They will then proceed to the residents whom they were not able to contact by phone to make a face-to-face contact to insure that they have evacuated.
5. The entrance to the location will be blocked off and any incoming vehicles will be diverted away from the wellsite. Only emergency response and authorized vehicles will be granted entrance to the location.
6. In the event that it becomes necessary to divert school busses away from the wellsite, the project manager, or their designee, will notify the local school district.
7. Onsite personnel will take every step within the means of their training to mitigate or eliminate the emergency situation and begin to establish a safe perimeter.
8. The Illinois Department of Natural Resources (IDNR) and any other appropriate government officials will be notified of the emergency situation.
9. Other contractors may be called upon to assist in the elimination and cleanup from the emergency situation.

13.5 Fire or Explosion Response Procedures

The objective of this Emergency Response Procedure is to identify the appropriate actions to take in the event of a fire or explosion at the wellsite location.

1. If you observe a fire and/or explosion on or near the location, contact personnel in the OCV and sound the alarm. Give specific directions to the area affected by the fire or explosion. Provide the OCV with sufficient information to determine what response actions and resources are necessary.
2. If a fire or explosion is ongoing, the OCV will immediately call 911 (fire department) and provide the dispatcher with the following information
 - a. Location of the fire
 - b. Time the fire started or the explosion occurred
 - c. Number of personnel on the site at the time of the incident
 - d. Any chemicals which may be involved in the fire or explosion

- e. Any other pertinent information the dispatcher may ask for
3. The OCV shall then notify and direct the First Responders to the scene. Depending on the severity of the fire or explosion, the Responder(s) should wait at a safe distance to direct other responders or implement evacuation of the area, if necessary.
4. The OCV shall monitor the location entrance to direct any emergency vehicles to the scene. If possible, an employee will be at the gates to escort responders to the scene.
5. The First Responders shall evaluate the fire/explosion to determine the following:
 - a. Location of the fire/explosion
 - b. Type of material(s) that are burning
 - c. Potential spread or exposure
 - d. Fire protection systems activated
 - e. Site evacuation necessary or on-going
 - f. Other potential safety or environmental hazards
6. The evaluation information can be relayed by the First Responders either upon the fire department arrival on-scene or through continuous contact through the dispatcher
7. If Responder(s) determine that the fire is already extinguished or will be extinguished immediately using on-site resources (incipient stage fires only), the Incident Commander can cancel fire department prior to its arrival.
8. If the potential for encounter with smoke or an Immediate Dangerous to Life and Health (IDLH) atmosphere exists, prior to entry, the First Responders may don self-contained breathing apparatus (SCBA). SCBA shall only be worn by personnel trained and medically cleared for its use. Upon encountering smoke or a potential IDLH environment, First Responders shall immediately activate their SCBA unit and exit the area. The First Responders shall not use SCBA for any firefighting or search and rescue purposes, but rather solely for respiratory protection during egress. All firefighting beyond the incipient stage, and all personnel search and rescue shall be performed by the fire department.
9. Responder(s) shall ensure that any affected electrical systems are shut down along with any affected operations, if it is safe to do so.
10. The OCV will notify the First Responder(s) of the arrival of the fire department. The First Responder(s) will report to the location entrance, if necessary, and coordinate with the fire department in establishing an on-scene mobile command post to direct fire or explosion responders. They will direct individuals to assemble at the command post to help coordinate response efforts, verify that the appropriate fire or explosion response personnel have responded to the incident, and obtain additional back-up, if necessary.
11. All First Responders will assist the fire department as necessary and as directed (if the activities can be conducted in a safe manner) by the Incident Commander with:
 - a. Connections to water sources.
 - b. Identification of materials involved.
 - c. Use of proper personal protective clothing.
 - d. Isolation of electrical systems
 - e. Identification of fire suppression systems
12. Responders will identify any hazardous substances that may have been involved in the fire or explosion. SDS may be obtained from the electronic database, or if necessary and safely obtainable, hard copies in the OCV respectively. Responders shall also refer to the U.S. Department of Transportation Guidebook for First Response to Hazardous Materials Incidents for Emergency Actions for Small and Large Fires. The Responder(s) shall implement the wellsite spill response plan, as needed, to address a spill of oil or hazardous material associated with the fire or to initiate cleanup activities.

13. The Responder(s) will evaluate the need for medical services and perform rescue operations. Refer to the medical procedures and evacuation procedures.
14. The Incident Commander will assess actions needed to mitigate on-site and off-site impacts and environmental impacts.
15. The Incident Commander will determine when the emergency is over and provide the “all clear” announcement.
16. After the emergency has been terminated, the Incident Commander shall coordinate a debriefing and emergency documentation. Other activities to be considered/conducted following termination of the incident shall include:
 - a. Briefing Public Relations so that all questions can be directed to them
 - b. Coordinate the refilling of any fire extinguisher which may have been used
 - c. Forming a team to clean up the affected area to resume normal operations
 - d. Conducting an incident investigation
 - e. Analyzing the fire/explosion emergency response plan for its effectiveness

13.6 Spill Response Procedures

Significant spillage of certain types of materials that are at the facility may need to be reported to agencies such as Illinois Department of Natural Resources (IDNR), Environmental Protection Agency (EPA), etc. Substantial fines can result from improper or unauthorized handling of spills, as well as from not reporting them to the proper agencies.

The objective of this Emergency Response Procedure is to identify the appropriate actions to take when a spill or release of oil, hazardous materials or other potentially harmful substances (i.e., sanitary waste, blood, etc.) occurs at the wellsite location. The intent is to minimize the health, safety and environmental impacts from a discharge of fuel, lubricating oil, or hazardous material and to prevent discharge(s) from leaving the site, especially to the nearby waterways. Response activities will be completed only when it is determined to be safe to do so.

A spill is defined as a release of a material from outside its normal container. Spilled materials can be liquid, solid, or gas in nature. Because fires also release chemicals (smoke, fumes, etc.), they fall into the definition of a spill and therefore, also need to be reported internally. Releases into spill containment areas (dikes, separators, etc.) are still considered spills, must be reported internally, and may need to be reported to governmental agencies depending upon the type and quantity of material released.

- a. Immediate notification shall be given by the owner/operator of the wellsite location when a release equal to or exceeding the reportable quantity of an extremely hazardous substance or a CERCLA hazardous substance is released at the wellsite location. Notification will be provided to the following:
 1. Illinois Emergency Management Agency (IEMA)/State Emergency Response Commission (SERC) at 1-800-782-7860
 2. The Local Emergency Planning Committee for Hamilton County (Mr. William Sandusky) at 1-618-231-4001
 3. The National Response Center (NRC) at 1-800-424-8802 (if the substance meets the criteria of a CERCLA hazardous substance.
- b. Immediate notification must also be given if the hazardous substance release results in any of the following:
 1. A member of the general public is killed
 2. A member of the general public receives injuries resulting in hospitalization
 3. An authorized official of an emergency agency recommends an evacuation of an area by the general public
 4. Fire, breakage, release or suspected contamination occurs involving an infectious agent

5. Any release of petroleum (or oil) that produces a sheen on nearby surface water⁴ and/or threatens navigable waters
- c. Notification shall include the following criteria:
 1. The chemical name or identity of any substance involved in the release
 2. An indication of whether the substance is an extremely hazardous substance
 3. An estimate of the quantity in pounds of any such substance that was released into the environment
 4. The time and duration of the release
 5. The specific location of the release
 6. The medium or media (air, land, water) into which the release occurred
 7. Any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for exposed individuals
 8. Proper precautions to take as a result of the release, including evacuations
 9. The name and telephone number of the person or persons to be contacted for further information.
- d. Written follow-up notice is required with respect to incidents as described above, according to the IEMA. As soon as practicable after such release (within 30 days), the owner or operator shall provide a written follow-up emergency notice (or notices, as more information becomes available) to the SERC and the LEPC, updating the information provided in the immediate notification and including additional information with respect to:
 1. Actions taken to respond to and contain the release
 2. Any known acute or chronic health effects associated with the released substance
 3. Advice regarding medical attention necessary for exposed individuals

13.6.1 Spill Response

1. If you detect a spill at the wellsite location:
 - a. Immediately contact the OCV. Provide information regarding the nature and extent of the spill so that they can initiate appropriate response activities. This information shall include:
 - Type of chemical spilled
 - Location of the spill
 - Approximate volume of the spill
 - Number of injured employees; and
 - If possible, a copy of the SDS for the spilled chemical.
 - b. Determine if the spill is significant by estimating the volume of spilled material.
 - c. If the spill is not significant, operations must clean up the spill immediately. For non-significant spill cleanup procedures, refer to the SDS or contact the SSHO. Notify your supervisor and/or the SSHO following clean up.
2. If you detect a spill that is in progress, initiate actions to stop or control the spill, if it is safe to do so and you are adequately trained and authorized to do so. Your supervisor should be informed of the spill as soon as conditions permit.
3. Based on the information provided, Operations will notify the First Responders and direct them to the scene. Operations may also notify additional response personnel, including the emergency coordinator (for significant spills), fire department (in case of fire/explosion, the waste contractor, and/or off-site resources) as directed by the Incident Commander.
4. Upon arrival at the scene, the Responder(s) shall

- a. Assess the spill event and secure access to the affected area. Depending on the type or quantity spilled.
 - b. Determine if any injuries are involved, and if so, will implement or direct someone else to implement the Medical Emergency Procedure.
 - c. Determine if evacuation is necessary and if so, will implement or direct someone to implement the Evacuation Procedure.
 - d. Determine if a fire/explosion hazard exists and if so, will implement or direct someone to implement the Fire/Explosion.
5. The Responder(s) should cordon off and secure the spill area, at a safe distance and should secure any affected operating equipment and possible ignition sources or other hazards.
 6. The Incident Commander should designate support, decontamination and hot zones as necessary.
 7. If the release has impacted or may potentially impact the surrounding waterways, the Responder(s), under the direction of the Incident Commander, should secure access to the affected area, which may include:
 - a. Request the Control Van to notify the Emergency Spill Responders
 - b. Securing skimmers and/or booms near openings to those waterways
 8. If a potential Reportable Quantity (RQ) has been released, the Incident Commander will request the OCV to notify the SSHO to assist in the evaluation of the spill/release to determine whether the release potentially triggers any reporting criteria.
 9. Following the completion of spill response activities, the Incident Commander should contact the SSHO to arrange for the storage and disposal of waste generated during spill response. Types of solid materials that may need to be disposed of include sorbent pads, protective clothing, and soil impacted by the release. Liquids would include water, oil, and chemicals recovered as part of the spill response activity, as well as fluids used for decontamination processes.
 10. Soils that are excavated must be transported to a secure location at a designated soil stockpile area, where they must be segregated, placed on plastic sheeting, covered, and labeled pending characterization and disposal. Other solid waste, slurry, sediment, and liquid waste must be containerized in drums or tanks and labeled with sufficient information to enable subsequent tracking and disposal. The EHS department must be notified of the quantities, nature, and date of generation of all waste products, and is responsible for arranging for classification and recycling, re-use, or disposal in accordance with State and Federal regulations.
 11. After the spill/release incident has been stabilized or remediated, the Incident Commander shall conduct a debriefing/critique of the spill/release ERP.

13.7 Equipment and Training

The well site is located in White County and this area has for decades experienced oil production, field service, drilling and completion activity. The White County Emergency Management Agency has the training and equipment for oil field related fires, including foam trucks. Emergency spill contractors have been identified in Table 13-1. The Mt. Vernon, Illinois Fire Department has 2 Hazmat Trucks and Trailers with Hazmat equipment.

Table 13-1 Emergency Contacts

Resource	Provider/Title	Telephone No.
Emergency Contacts		

Fire Department	Enfield Fire Protection District	911
Ambulance Service	White County Ambulance Service	911
Hospital	Hamilton Memorial Hospital	(618) 643-2361
Poison Control Center		(800) 222-1222
Woolsey Operating Company		
Ryan Kelley	Project Manager	██████████
Mickey Neville	CHSM	██████████
Tommy Marcellus	SSHO	██████████
Woolsey – Wichita, Kansas	Main Number	(316) 267-4379
Emergency Spill Contractors		
Bodine Environmental Services, Inc.	Decatur, IL Springfield, IL	(217) 428-3629 (217) 698-0700
SET Environmental, Inc.	Glenwood, IL	(847) 537-9221
SWS Environmental Services	Paducah, KY	(270) 444-8003

Figure 13-1 Map to Emergency Medical Facility





Attachment A

Safety Data Sheets

SAFETY DATA SHEET

M34514 NA_EN



Occidental Chemical Corporation

A subsidiary of Occidental Petroleum Corporation



HYDROCHLORIC ACID (HCl) (ALL GRADES)

MSDS No.: M34514

Rev. Date: 09-Aug-2012

Rev. Num. 06

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Company Identification: Occidental Chemical Corporation
5005 LBJ Freeway
P.O. Box 809050
Dallas, TX 75380-9050

24 Hour Emergency Telephone Number: 1-800-733-3665 or 1-972-404-3228 (U.S.); CHEMTREC (U.S.): 1-800-424-9300; CHEMTREC (outside U.S.): +1 703-527-3887

To Request an SDS: MSDS@oxy.com or 1-972-404-3245

Customer Service: 1-800-752-5151 or 1-972-404-3700

Trade Name: Hydrochloric Acid (HCl) aqueous all grades

Synonyms: Muriatic Acid, HCl Solution, Aqueous hydrogen chloride

Product Use: Process chemical, Metal cleaning, Water purification, Petroleum Industry

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Color: Colorless
Physical State: Liquid
Appearance: Clear
Odor: Irritating, Pungent, Sharp

Signal Word: Danger

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MAJOR HEALTH HAZARDS: CAUSES BURNS TO THE RESPIRATORY TRACT, SKIN AND EYES. CAUSES PERMANENT EYE DAMAGE. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

PHYSICAL HAZARDS: May spatter or generate heat when mixed with water. Contact with metals may evolve flammable hydrogen gas.

PRECAUTIONARY STATEMENTS: Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling. Use only with adequate ventilation.

POTENTIAL HEALTH EFFECTS:

Inhalation: May cause irritation (possibly severe), chemical burns, and pulmonary edema.

Skin contact: May cause irritation (possibly severe) and chemical burns.

Eye contact: May cause irritation (possibly severe), chemical burns, eye damage, and blindness.

Ingestion: Not a likely route of exposure.

Chronic Effects: Repeated or prolonged exposure to dilute solutions may result in dermatitis. Discoloration of the teeth may occur as a result of long term exposure.

Interaction with Other Chemicals Which Enhance Toxicity: None known.

Medical Conditions Aggravated by Exposure: None known.

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Component	%	CAS Number
Hydrogen chloride	9 - 36	7647-01-0
Water	63 - 91	7732-18-5

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing and shoes before reuse. GET MEDICAL ATTENTION IMMEDIATELY.

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EYE CONTACT: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire.

Fire Fighting: Keep unnecessary people away, isolate hazard area and deny entry. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode. Move container from fire area if it can be done without risk. Cool non-leaking containers with water. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Sensitivity to Mechanical Impact: Not sensitive.

Sensitivity to Static Discharge: Not sensitive.

Flash point: Not flammable

Hazardous Combustion Products: Hydrogen chloride, Chlorine, Hydrogen gas

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Remove sources of ignition. Wear appropriate personal protective equipment recommended in Section 8 of the SDS. Stop leak if possible without personal risk. Consider evacuation of personnel located downwind if material is leaking. Shut off ventilation system if needed. Completely contain spilled material with dikes, sandbags, etc. Neutralize with soda ash or dilute caustic soda. Collect with appropriate absorbent and place into suitable container. Liquid material may be removed with a properly rated vacuum truck. Keep out of water supplies and sewers. This material is acidic and may lower the pH of the surface waters with low buffering capacity. Releases should be reported, if required, to appropriate agencies.

7. HANDLING AND STORAGE

Storage Conditions: Store and handle in accordance with all current regulations and standards. Store in rubber-lined steel, acid-resistant plastic or glass containers. Keep container tightly closed. Store in a cool, dry area. Store in a well-ventilated area. Keep away from heat, sparks and open flames. Keep separated from incompatible substances (see Section 10 of SDS). Do not store in aluminum container or use aluminum fittings or transfer lines. Protect from physical damage. Dike and vent storage tanks.

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Handling Procedures: Avoid breathing vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. When mixing, slowly add to water to minimize heat generation and spattering.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Regulatory Exposure Limit(s): As listed below

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrogen chloride 7647-01-0	-----	-----	5 ppm 7 mg/m ³

OEL: Occupational Exposure Limit; **OSHA:** United States Occupational Safety and Health Administration; **PEL:** Permissible Exposure Limit; **TWA:** Time Weighted Average; **STEL:** Short Term Exposure Limit

Non-Regulatory Exposure Limit(s): As listed below

Component	CAS Number	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Hydrogen chloride	7647-01-0	-----	-----	2 ppm	-----	-----	5 ppm 7 mg/m ³

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

ENGINEERING CONTROLS: Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear chemical safety goggles with a face-shield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Always place pants legs over boots.

Hand Protection: Wear appropriate chemical resistant gloves. Consult a glove supplier for assistance in selecting an appropriate chemical resistant glove.

Protective Material Types: Nitrile, Neoprene, Butyl rubber, Polyvinyl chloride (PVC), Responder®, Trelchem® HPS, Tychem®

Component	Immediately Dangerous to Life/ Health (IDLH)
Hydrogen chloride	50 ppm IDLH

Respiratory Protection: A NIOSH approved full-face respirator equipped with acid gas cartridges (appropriate for hydrogen chloride) may be permissible when symptoms have been observed that are indicative of overexposure. When the level may be above the IDLH, use an SCBA or pressure-demand supplied air with an auxiliary self-contained escape pack. Pressure-demand SCBA (self-contained breathing apparatus) must be used when there is a potential for uncontrolled release or unknown concentrations. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

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9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Clear
Color:	Colorless
Odor:	Irritating, Pungent, Sharp
Odor Threshold:	0.3 ppm (causes olfactory fatigue)
Molecular Weight:	36.46
Molecular Formula:	HCl
Boiling Point/Range:	140 - 221°F (60 - 105 °C)
Freezing Point/Range:	-29 to 5 °F (-34 to -15 °C)
Vapor Pressure:	14.6 - 80 mmHg @ 20 °C
Vapor Density (air=1):	1.3 @ 20 °C
Specific Gravity (water=1):	1.05 - 1.18
Density:	8.75 - 9.83 lbs/gal
Water Solubility:	100%
pH:	2 @ (0.2% solution)
Volatility:	9 - 36% by volume
Evaporation Rate (ether=1):	< 1.00 (butyl acetate = 1)
Flash point:	Not flammable

10. STABILITY AND REACTIVITY

Reactivity/ Stability: Stable at normal temperatures and pressures.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Avoid contact with water. Will react with some metals forming flammable hydrogen gas. Hydrogen chloride may react with cyanide, forming lethal concentrations of hydrocyanic acid. Avoid contact with incompatible materials.

Incompatibilities/ Materials to Avoid: Metals, Alkalis, Oxidizing agents, Mercuric sulfate, Perchloric acid, Carbides of calcium, cesium, rubidium, Acetylides of cesium and rubidium, Phosphides of calcium and uranium, Lithium silicide

Hazardous Decomposition Products: chlorine, hydrogen chloride, hydrogen gas

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

IRRITATION DATA: As listed below

Standard Draize (Eye):	rabbit-eye mild
Standard Draize (Skin):	human-skin mild

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TOXICITY DATA:

Component	LD50 Oral:	LC50 Inhalation:	LD50 Dermal:
Hydrogen chloride	700 mg/kg (Rat)	3124 ppm (1 hr-Rat)	5010 mg/kg (Rabbit)
Water	900 mg/kg (Rabbit)	1108 ppm (1hr-Rat)	

TOXICITY:

Inhalation will cause severe irritation and possible burns with coughing and choking. If inhaled deeply, edema and hemorrhage of the lungs may occur. Prolonged exposure may cause discoloration and/or erosion of teeth. Contact with eyes causes immediate severe irritation with possible burns, permanent visual impairment, or total loss of sight. Skin contact with this material may cause severe irritation and corrosion of tissue. Ingestion may cause immediate burns of the mouth, esophagus, and stomach. Ingestion may cause intense pain, nausea, vomiting, bleeding, circulating collapse, shock, and death.

CARCINOGENICITY: This product is not classified as a carcinogen by NTP, IARC or OSHA.

12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

- **Aquatic Toxicity:**
LC50 Gambusia affinis: 282 mg/L 96 hr.
- **Fish Toxicity:**
LC50 Goldfish: 178 mg/L (1 to 2 hour survival time)
- **Freshwater Fish Toxicity:**
LC50 Bluegill: 3.6 mg/L 48 hr
- **Invertebrate Toxicity:**
LC50 Shrimp: 100 - 330 mg/L

FATE AND TRANSPORT:

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is believed not to persist in the environment. This material is believed to exist in the disassociated state in the environment. If released to soil, hydrogen chloride will sink into the soil. The acid will dissolve some soil material (in particular, anything with a carbonate base) and will be somewhat neutralized. The remaining portion is thought to transport downward to the water table. If released to water, it dissociates almost completely and will be neutralized by natural alkalinity and carbon dioxide.

BIOCONCENTRATION: This material is not expected to bioconcentrate in organisms.

ADDITIONAL ECOLOGICAL INFORMATION: This material has exhibited toxicity to terrestrial organisms. May decrease pH of waterways and adversely affect aquatic life.

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13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. All disposals of this material must be done in accordance with local, state and federal regulations. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

UN NUMBER: UN1789
PROPER SHIPPING NAME: Hydrochloric acid solution
HAZARD CLASS/ DIVISION: 8
PACKING GROUP: II
LABELING 8
REQUIREMENTS:
RQ (lbs): RQ 5,000 Lbs. (Hydrochloric acid)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

UN NUMBER: UN1789
SHIPPING NAME: Hydrochloric acid solution
CLASS OR DIVISION: 8
PACKING/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS:

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 426-2675.

Component	CERCLA Reportable Quantities:
Hydrogen chloride	5000 lb (final RQ)

EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):

If a release is reportable under EPCRA, notify the state emergency response commission and local emergency planning committee. If the TPQ is met, facilities are subject to reporting requirements under EPCRA Sections 311 and 312.

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Component	EPCRA RQs	Threshold Planning Quantity (TPQs)
Hydrogen chloride	5000 lb (EPCRA RQ)	500 lb (TPQ) gas only

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):

Acute Health Hazard, Reactive Hazard

EPCRA SECTION 313 (40 CFR 372.65):

The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements.

Component	Status:
Hydrogen chloride	Listed – Aerosol form only

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119): Not regulated

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA): All components are listed or exempt

TSCA 12(b): This product is not subject to export notification

Canadian Chemical Inventory: All components of this product are listed on either the DSL or the NDSL.

STATE REGULATIONS

California Proposition 65:

This product is not listed, but it may contain impurities/trace elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act.

Hydrogen chloride	
California Proposition 65 Cancer WARNING:	Not Listed
California Proposition 65 CRT List - Male reproductive toxin:	Not Listed
California Proposition 65 CRT List - Female reproductive toxin:	Not Listed
Massachusetts Right to Know Hazardous Substance List	Listed
New Jersey Right to Know Hazardous Substance List	sn 1012; sn 2909 (gas only)
New Jersey Special Health Hazards Substance List	corrosive
New Jersey - Environmental Hazardous Substance List	Listed
Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Special Hazardous Substances	Not Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

CANADIAN REGULATIONS

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

Canada - CEPA Schedule I - Toxic Substance list	Not Listed
WHMIS - Classifications of Substances:	• E - Corrosive material

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16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Disclaimer:

This information is intended solely for the use of individuals trained in the NFPA and/or HMIS systems.

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health: 3 **Flammability:** 0 **Reactivity:** 1

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health: 3 **Flammability:** 0 **Reactivity:** 1

Reason for Revision:

- Updated 24 Hour Emergency Telephone Number: SEE SECTION 1
- PPE recommendations have been modified: SEE SECTION 8
- Updated Transportation Information: SEE SECTION 14
- Revised California Proposition 65 Statement: SEE SECTION 15
- Revised Preparer Information: SEE SECTION 16
- Added "End of Safety Data Sheet" phrase

IMPORTANT:

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OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees.

End of Safety Data Sheet



SAFETY DATA SHEET

Section 1. Identification

Product name : CRONOX™ AK-50 CORROSION INHIBITOR
™ a trademark of Baker Hughes Incorporated.
Product code : CROAK50

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Acid Corrosion Inhibitor.

Print date : 1/8/2015.
Validation date : 12/30/2014.
Version : 2

Supplier's details : Aquaness Chemical
A Division of Baker Petrolite Corp.
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Emergency telephone number (with hours of operation) : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606 (North America 24 hour)
CANUTEC: 613-996-6666 (Canada 24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY: ORAL - Category 4
ACUTE TOXICITY: SKIN - Category 3
ACUTE TOXICITY: INHALATION - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation and Narcotic effects] - Category 3
AQUATIC HAZARD (ACUTE) - Category 2
AQUATIC HAZARD (LONG-TERM) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Section 2. Hazards identification

Hazard statements : Flammable liquid and vapor.
 Toxic in contact with skin or if inhaled.
 Harmful if swallowed.
 Causes serious eye irritation.
 Causes skin irritation.
 May cause an allergic skin reaction.
 May cause cancer.
 May cause respiratory irritation.
 May cause drowsiness and dizziness.
 Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace.

Response : Collect spillage. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. Take off contaminated clothing. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Avoid contact with skin and clothing. Wash thoroughly after handling.

Hazards not otherwise classified : Prolonged or repeated contact may dry skin and cause irritation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Oxyalkylated alkylphenol	10 - 20	Trade secret.
Heavy aromatic naphtha	10 - 20	64742-94-5
Isopropanol	10 - 20	67-63-0
Fatty acids	5 - 10	Trade secret.
Complex alkylaryl polyo-ester	5 - 10	Trade secret.
Tar bases, quinoline derivs., benzyl chloride-quaternized	5 - 10	72480-70-7
Formaldehyde	5 - 10	50-00-0
Acetylenic alcohol	1 - 5	Trade secret.
Propargyl alcohol	1 - 5	107-19-7
Naphthalene	1 - 5	91-20-3

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Continue to rinse for at least 10 minutes. Check for and remove any contact lenses. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. If necessary, call a poison center or physician. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Toxic if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : Toxic in contact with skin. Causes skin irritation. Defatting to the skin. May cause an allergic skin reaction.
- Ingestion** : Harmful if swallowed. Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

- Eye contact** : pain or irritation, watering, redness
- Inhalation** : respiratory tract irritation, coughing, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness
- Skin contact** : irritation, redness, dryness, cracking
- Ingestion** : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : carbon dioxide, carbon monoxide, nitrogen oxides, sulfur oxides, halogenated compounds

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flames, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Section 8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			Notations
Ingredients:	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	
Isopropanol	US ACGIH	200	-	-	400	-	-	-	-	-	
	OSHA PEL	400	980	-	-	-	-	-	-	-	
	OSHA PEL 1989	400	980	-	500	1225	-	-	-	-	
Formaldehyde	US ACGIH	-	-	-	-	-	-	0.3	0.37	-	[3]
	OSHA PEL	0.75	-	-	2	-	-	-	-	-	
	OSHA PEL 1989	0.75	-	-	2	-	-	-	-	-	
	OSHA PEL Z2	0.75	-	-	2	-	-	-	-	-	
Propargyl alcohol	US ACGIH	1	2.3	-	-	-	-	-	-	-	[1]
	OSHA PEL 1989	1	2	-	-	-	-	-	-	-	[1]
Naphthalene	US ACGIH	10	52	-	-	-	-	-	-	-	[1]
	OSHA PEL	10	50	-	-	-	-	-	-	-	
	OSHA PEL 1989	10	50	-	15	75	-	-	-	-	

[1]Absorbed through skin. [3]Skin sensitization

Consult local authorities for acceptable exposure limits.

Only components of this product with established exposure limits appear in the box above.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.

Hand protection : Chemical-resistant gloves.

Skin protection : Wear long sleeves to prevent repeated or prolonged skin contact.

Respiratory protection : If a risk assessment indicates it is necessary, use a properly fitted, air purifying or supplied air respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.
Color : Amber.
Odor : Pungent.
Odor threshold : Not available.
pH : Not available.
Melting/freezing point : Not available.
Boiling point : Not available.
Initial Boiling Point : Not available.

Section 9. Physical and chemical properties

Flash point	: Closed cup: 37.8°C (100°F) [SFCC]
Burning time	: Not applicable.
Burning rate	: Not applicable.
Evaporation rate	: Not available.
Flammability (solid, gas)	: Flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: 5 kPa (37.2 mm Hg) @ 37.8°C
Vapor density	: >1 [Air = 1]
Relative density	: 0.9664 (15.6°C)
Density	: 8.05 (lbs/gal)
Solubility in water	: Insoluble
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Dynamic (15.6°C): 38 cP
VOC	: Not available.
Pour Point	: -23.3°C (-9.9°F)

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
Incompatible materials	: Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis. Isopropanol is incompatible with acrylaldehyde, aluminum powder, and potassium tert-butoxide.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Heavy aromatic naphtha	LC50 Inhalation Vapor	Rat	>11.4 mg/l	6 hours
	LD50 Oral	Rat	3200 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-
Isopropanol	LC50 Inhalation Vapor	Rat	>10000 ppm	6 hours
	LD50 Dermal	Rabbit	6.29 g/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
Fatty acids	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>10000 mg/kg	-
Formaldehyde	LD50 Dermal	Rabbit	270 mg/kg	-
	LD50 Oral	Rat	640 mg/kg	-
	LD50 Oral	Rat	800 mg/kg	-
Acetylenic alcohol	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	4100 mg/kg	-
Propargyl alcohol	LD50 Oral	Rat	55 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
CRONOX™ AK-50 CORROSION INHIBITOR	LD50 Dermal	Rabbit	630 mg/kg	-
	LD50 Oral	Rat	1400 mg/kg	-

Irritation/Corrosion

No applicable toxicity data

Sensitization

No applicable toxicity data

Mutagenicity

No applicable toxicity data

Carcinogenicity

Product/Ingredient name	OSHA	IARC	NTP
Isopropanol	-	3	-
Formaldehyde	+	1	Known to be a human carcinogen.
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

No applicable toxicity data

Teratogenicity

No applicable toxicity data

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Heavy aromatic naphtha	Category 3	Not applicable.	Narcotic effects
Isopropanol	Category 3	Not applicable.	Narcotic effects
Formaldehyde	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not applicable.

Aspiration hazard

Name	Result
Heavy aromatic naphtha	ASPIRATION HAZARD - Category 1

Section 11. Toxicological information

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis. Once sensitized; a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (vapors)	8.145 mg/l

Additional information

Testing of similar products provided rabbit dermal LD50's of >200mg/kg and <1000mg/kg.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Isopropanol	Acute LC50 1400000 µg/l Marine water	Crustaceans - Crangon crangon	48 hours
	Acute LC50 1400000 µg/l	Fish - Gambusia affinis	96 hours
Formaldehyde	Acute EC50 0.788 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute EC50 12.98 mg/l Fresh water	Crustaceans - Ceriodaphnia dubia	48 hours
Propargyl alcohol	Acute EC50 14000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 1.41 ppm Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 100 µg/l Marine water	Algae - Phyllospora comosa	96 hours
	EC50 98.1 mg/l	Algae	72 hours
Naphthalene	Acute EC50 3.36 mg/l	Daphnia	48 hours
	Acute LC50 4.64 mg/l	Fish	96 hours
Naphthalene	Acute EC50 1.6 ppm Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours
	Chronic NOEC 0.67 ppm Fresh water	Fish - Oncorhynchus kisutch	40 days

Persistence and degradability

Section 12. Ecological information












Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Propargyl alcohol	-	-	Readily

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	UN1992	UN1992	UN1992	UN1992
UN proper shipping name	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Isopropanol, Propargyl alcohol)
Transport hazard class(es)	3 (6.1)   	3 (6.1)   	3 (6.1)   	3 (6.1)  
Packing group	III	III	III	III
Environmental hazards	Yes.	Yes.	No.	No.
Additional information	-	-	Emergency schedules (EmS) F-E S-E	-

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 14. Transport information

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

DOT Reportable Quantity Formaldehyde, 167 gal of this product.
 Propargyl alcohol, 2535 gal of this product.
 Naphthalene, 837 gal of this product.

Marine pollutant Heavy aromatic naphtha
 Acetylenic alcohol

North-America NAERG : 131

Section 15. Regulatory information

U.S. Federal regulations : TSCA 12(b) one-time export: No products were found.
 TSCA 12(b) annual export notification: No products were found.
 United States inventory (TSCA 8b): All components are listed or exempted.
 Clean Water Act (CWA) 307: Naphthalene
 Clean Water Act (CWA) 311: Formaldehyde; Naphthalene; Potassium hydroxide
 Clean Air Act (CAA) 112 regulated toxic substances: Formaldehyde

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

SARA 302/304

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
Formaldehyde	5 - 10	Yes.	500	6.7	100	1.3

SARA 311/312

Classification : Fire hazard
 Immediate (acute) health hazard
 Delayed (chronic) health hazard

SARA 313

	Product name	CAS number	%
Supplier notification	Formaldehyde	50-00-0	5 - 10
	Propargyl alcohol	107-19-7	1 - 5
	Naphthalene	91-20-3	1 - 5

Canada

Canada (CEPA DSL): : At least one component is not listed in DSL but all such components are listed in NDSL.

Section 16. Other information

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



History

Date of printing : 1/8/2015.

Section 16. Other information

☑ Indicates information that has changed from previously issued version.

Notice to reader


NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

NE 1

NE-6 Material Safety Data Sheet

Section 1. Chemical Product and Company Identification			
Product Name	ARBREAK 8792 DEMULSIFIER	Code	ARB8792
Supplier	Aquaness Chemical A Division Of Baker Petrolite Corporation A Baker Hughes company 12645 W. Airport Blvd. (77478) P.O. Box 5050 Sugar Land, TX 77487-5050 For Product Information/MSDSs Call: 800-231-3606 (8:00 a.m. - 5:00 p.m. cst, Monday - Friday)	Version	1.0
Material Uses	Demulsifier.	Effective Date	12/14/2004
24 Hour Emergency Numbers	CHEMTREC 800-424-9300 (U.S. 24 hour) Baker Petrolite 800-231-3606 (North America 24 hour) CANUTEC 613-006-6866 (Canada 24 hours)	Print Date	12/14/2004
National Fire Protection Association (U.S.A.)			

Section 2. Composition and Information on Ingredients			
Name	CAS #	% by Weight	Exposure Limits
Light aromatic naphtha	64742-95-8	30-60	Not available.
1,2,4-Trimethylbenzene	95-63-6	10-30	Not available.
1,2,3-Trimethylbenzene	526-73-8	1-5	Not available.
1,3,5-Trimethylbenzene	108-67-8	5-10	Not available.
Xylene	1330-20-7	1-5	ACGIH (United States). TWA: 434 mg/m ³ 8 hour(s). STEL: 651 mg/m ³ 15 minute(s). TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). OSHA (United States). TWA: 100 ppm 8 hour(s). STEL: 150 ppm 15 minute(s). TWA: 435 mg/m ³ 8 hour(s). STEL: 655 mg/m ³ 15 minute(s).
2-Ethylhexanol	104-75-7	5-10	Manufacturer TWA: 20 ppm
While trimethylbenzene isomers do not have exposure limits, trimethylbenzene (mixed isomers)(CAS No. 25551-13-7) has TWA value of 25 ppm for both ACGIH and OSHA (revoked limit).			

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Section 3. Hazards Identification

Physical State and Appearance	State: Liquid., Color: Dark Brown., Odor: Acidic. Aromatic hydrocarbon.
CERCLA Reportable Quantity	Xylene 793 gal.
Hazard Summary	WARNING. May cause chronic effects. Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded. May be irritating to eyes, skin and respiratory tract. May cause central nervous system (CNS) effects if inhaled.
Routes of Exposure	Skin (Contact), Eyes, Inhalation.
Potential Acute Health Effects	Eyes May be severely irritating to the eyes. Skin May be irritating to skin. Inhalation May cause central nervous system (CNS) effects if inhaled. May be irritating to lungs. Ingestion Not considered a likely route of exposure, however, may be harmful or cause irritation if swallowed.
Medical Conditions aggravated by Exposure	Exposure to this product may aggravate medical conditions involving the following: blood system, kidneys, nervous system, liver, gastrointestinal tract, respiratory tract, skin/epithelium, eyes.
See Toxicological Information (section 11)	
Additional Hazard Identification Remarks	May be harmful if ingested. This product may be aspirated into the lungs during swallowing or vomiting of swallowed material. Aspiration into the lungs may produce chemical pneumonitis, pulmonary edema, and hemorrhaging. Repeated or prolonged contact may cause dermatitis (inflammation) and defatting of the skin (dryness).

Section 4. First Aid Measures

Eye Contact	Flush eyes with plenty of water for 15 minutes, occasionally lifting upper and lower eyelids. Get medical attention immediately.
Skin Contact	Remove and launder or clean contaminated clothing and shoes. Wash with soap and water for at least 15 minutes or until no evidence of material remains. Get medical attention if irritation occurs.
Inhalation	Remove to fresh air. Oxygen may be administered if breathing is difficult. If not breathing, administer artificial respiration and seek medical attention. Get medical attention if symptoms appear.
Ingestion	If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never induce vomiting or give anything by mouth to a victim who is unconscious or having convulsions. Get medical attention if symptoms appear.
Notes to Physician	Not available.
Additional First Aid Remarks	If product is ingested and vomiting occurs naturally, have person lean forward to reduce the risk of aspiration into the lungs. If breathing has stopped or the heart has stopped, trained personnel should immediately administer artificial respiration or cardiopulmonary resuscitation, as required.

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Section 5. Fire Fighting Measures

Flammability of the Product	Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded.
OSHA Flammability Class	II
Autoignition temperature	Not available.
Flash Points	Closed cup: 46.7°C (116°F). (PMCC)
Flammable Limits	L.E.L. Not available. U.F.L. Not available.
Products of Combustion	These products are carbon oxides (CO, CO ₂) nitrogen oxides (NO, NO _x ...) sulfur oxides (SO _x , SO ₂ ...).
Fire Hazards in Presence of Various Substances	Open Flames/Sparks/Static. Heat.
Fire Fighting Media and Instructions	In case of fire, use foam, dry chemicals, or CO ₂ fire extinguishers. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and public waterways. Note that flammable vapors may form an ignitable mixture with air. Vapors may travel considerable distances and flash back if ignited.
Protective Clothing (Fire)	Do not enter fire area without proper personal protective equipment, including NIOSH approved self-contained breathing apparatus.
Special Remarks on Fire Hazards	Not available.

Section 6. Accidental Release Measures

Spill	Put on appropriate personal protective equipment. Keep personnel removed and upwind of spill. Shut off all ignition sources; no flares, smoking, or flames in hazard area. Approach release from upwind. Shut off leak if it can be done safely. Contain spilled material. Keep out of waterways. Dike large spills and use a non-sparking or explosion-proof means to transfer material to an appropriate container for disposal. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container. Note that flammable vapors may form an ignitable mixture with air. Vapors may travel considerable distances from spill and flash back, if ignited. Waste must be disposed of in accordance with federal, state and local environmental control regulations.
Other Statements	If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.
Additional Accidental Release Measures Remarks	Not available.

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Section 7. Handling and Storage

Handling and Storage Put on appropriate personal protective equipment. Avoid contact with eyes, skin, and clothing. Avoid breathing vapors or spray mists. Use only with adequate ventilation. Store in a dry, cool and well ventilated area. Keep away from heat, sparks and flame. Keep away from incompatibles. Keep container tightly closed and dry. To avoid fire or explosion, ground container equipment and personnel before handling product.

Additional Handling and Storage Remarks Not available.

Section 8. Exposure Controls/Personal Protection

Engineering Controls Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors or particles below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection

Personal Protective Equipment recommendations are based on anticipated known manufacturing and use conditions. These conditions are expected to result in only incidental exposure. A thorough review of the job tasks and conditions by a safety professional is recommended to determine the level of personal protective equipment appropriate for these job tasks and conditions.

Eyes Chemical safety goggles.

Body Wear long sleeves to prevent repeated or prolonged skin contact.

Respiratory Respirator use is not expected to be necessary under normal conditions of use. In poorly ventilated areas, emergency situations or if exposure levels are exceeded, use NIOSH approved full face respirator.

Hands Chemical resistant gloves. Nitrile or Neoprene gloves. 4H gloves.

Feet Chemical resistant boots or overshoes.

Other Information Not available.

Additional Exposure Control Remarks Not available.

Section 9. Typical Physical and Chemical Properties

Physical State and Appearance	Liquid,	Odor	Acidic. Aromatic hydrocarbon.
pH	8.5 - 9.5 (5% of product in 75% isopropanol / 25% water solution)	Color	Dark Brown.
Specific gravity	0.952 - 0.964 @ 16°C (60°F)		
Density	7.93 - 8.03 lbs/gal @ 16°C (60°F)		
Vapor Density	>1 (Air = 1)		
Vapor Pressure	7.8 - mmHg @ 21°C (70°F). Calculated Value for all Components.		
Evaporation Rate	Not Available or Not Applicable for Solids.		
VOC	Not available.		
Viscosity	11 - 12 cps @ 38°C (100°F) Kinematic		
Pour Point	-40°C (-40°F)		
Solubility (Water)	Dispersible		
Boiling Point	Not available.		

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Physical Chemical	Not available.	
Comments		

Section 10. Stability and Reactivity	
Stability and Reactivity	The product is stable.
Conditions of Instability	Not available.
Incompatibility with Various Substances	Oxidizing material.
Hazardous Decomposition Products	Not applicable.
Hazardous Polymerization	Hazardous polymerization is not expected to occur.
Special Stability & Reactivity Remarks	Not available.

Section 11. Toxicological Information	
<u>Component Toxicological Information</u>	
Acute Animal Toxicity	
Light aromatic naphtha	ORAL (LD50): Acute: 2900 mg/kg [Rat]. 8400 mg/kg [Rat].
1,2,4-Trimethylbenzene	ORAL (LD50): Acute: 5000 mg/kg [Rat]. VAPOR (LC50): Acute: 18000 mg/m ³ 4 hour(s) [Rat].
1,2,3-Trimethylbenzene	Not available.
1,3,5-Trimethylbenzene	VAPOR (LC50): Acute: 24000 mg/m ³ 4 hour(s) [Rat].
Xylene	ORAL (LD50): Acute: 4300 mg/kg [Rat]. 3623 mg/kg [Male rat]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit]. VAPOR (LC50): Acute: 5000 ppm 4 hour(s) [Rat].
2-Ethylhexanol	ORAL (LD50): Acute: 3730 mg/kg [Rat]. 2500 mg/kg [Mouse]. DERMAL (LD50): Acute: 1970 mg/kg [Rabbit].
Chronic Toxicity Data	
1) Light aromatic naphtha	Ingestion has produced Central Nervous System effects in laboratory animals. (EPA/OTS 87-8214199 and 88-920000348)
2) 1,2,4-Trimethylbenzene	1,2,4-Trimethylbenzene, also known as pseudocumene, is a component of this product. Chronic pseudocumene exposure may provoke bronchospasm with cough and wheezing (Punkett, 1976; ACGIH, 1991; Battig et al, 1966). Respiratory distress was noted in experimental animals following sub acute inhalation exposure (Gage, 1970). Nervousness and anxiety were noted with chronic occupational exposure (Battig et al, 1966; ACGIH, 1991). At the time of this review, no studies were found on the potential adverse reproductive effects of pseudocumene in humans, but trimethylbenzenes (including pseudocumene) can cross the placental barrier (Clayton & Clayton, 1994; Doroly et al, 1976). In an experimental animal study, offspring born to pregnant rats exposed to pseudocumene were healthy at birth and grew normally (Cameron et al, 1938).
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Blood effects such as anemia and delayed clotting time have been noticed in workers chronically exposed to a solvent containing trimethylbenzene. The blood effects, however, may have been due to a contaminant in the solvent such as benzene (a known blood toxin).

3) 1,2,3-Trimethylbenzene

Not available.

4) 1,3,5-Trimethylbenzene

1,3,5-Trimethylbenzene (Mesitylene) is a component of this product. Chronic asthmatic-like bronchitis may be a delayed chronic hazard (EPA, 1985; Laham, 1987; HSDB, 1997). Nervousness, tension, and anxiety have been noted in chronically exposed workers with exposure to a mixture of solvents including mesitylene (HSDB, 1997). Elevated alkaline phosphates and SGOT (liver enzymes) levels have been noted in chronic animal inhalation studies (Clayton & Clayton, 1994). These effects have not been reported in exposed humans. (Reprotext)

Thrombocytopenia (a lack of platelets in the blood) with bleeding from the gums and nose and mild anemia may occur with chronic exposure to mesitylene as a component of the commercial solvent mixture, "Fleet-X-DV-99" (Plunkett, 1976; Finkel, 1963; HSDB, 1997). Coagulation (clotting of the blood) times were delayed by about 40% in a group of workers chronically exposed to a mixture of solvents containing about 30% mesitylene (Laham, 1987). These hematological disorders may have been due to a contaminant, such as benzene (Hathaway et al, 1996). Thrombocytosis (an increase of platelets in the blood) and thrombocytopenia have been noted in rabbits (Clayton & Clayton, 1994). (Reprotext)

1,3,5-Trimethylbenzene has been positive in a mutagenicity assay (Lewis, 1992). (Reprotext)

5) Xylene

Xylene (mixed isomers) is a component of this product. Effects of chronic exposure to xylene are similar to those of acute exposure, but may be more severe. Chronic inhalation reportedly was associated with headache, tremors, apprehension, memory loss, weakness, dizziness, loss of appetite, nausea, ringing in the ears, irritability, thirst, anemia, mucosal bleeding, enlarged liver, and hyperplasia, but not destruction of the bone marrow (Clayton & Clayton, 1994; ILO, 1983). Some earlier reports of effects of chronic exposure to xylene have been questioned, as exposures were not limited to xylene alone.

Effects on the blood have been reported from chronic exposure to as little as 60 mg/m³ (Pap & Varga, 1987). Repeated exposure can damage bone marrow, causing low blood cell count and can damage the liver and kidneys (NJ Department of Health, Hazardous Substance Fact Sheet). Chronic xylene exposure (usually mixed with other solvents) has produced irreversible damage to the CNS (ILO, 1983). CNS effects may be exacerbated by ethanol abuse (Savolainen, 1980). Xylene may damage hearing or enhance sensitivity to noise in chronic occupational exposures (Morata et al, 1994), probably from neurotoxic mechanism. Tolerance to xylene can occur over the work week and disappear over the weekend. (ACGIH, 1992).

Inhalation exposure has produced fetotoxicity and postnatal developmental toxicity in laboratory animals. (API, 1978; Kensington, MD, EPA/OTS Document No. 878210350 and Hass, U., et al, 1995, Neurotoxicology and Teratology 17: 341-349 and 1997, Neurotoxicology 18: 547-552)


6) 2-Ethylhexanol

2-Ethylhexanol (2EH) is a component of this product. Chronic overexposure has been suggested as a cause of the following effects in laboratory animals, and may aggravate pre-existing disorders of these organs in humans: liver abnormalities, kidney damage, lung damage, cardiac abnormality, blood abnormalities, and spleen damage. (Vendor MSDS)

In subchronic oral studies, 2EH has produced liver and kidney effects in laboratory animals. (RTECS)

2EH has produced developmental effects in oral studies in laboratory animals including teratogenicity at maternally toxic doses (Clayton & Clayton, 1994). (IIDD)

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Product Toxicological Information		
Acute Animal Toxicity	Not available.	
Target Organs	blood system, kidneys, nervous system, liver, gastrointestinal tract, respiratory tract, skin/epithelium, eyes.	
Other Adverse Effects	Not available.	
Section 12. Ecological Information		
Ecotoxicity	Not available.	
BOD5 and COD	Not available.	
Biodegradable/OECD	Not available.	
Toxicity of the Products of Biodegradation	Not available.	
Special Remarks	Not available.	
Section 13. Disposal Considerations		
Responsibility for proper waste disposal rests with the generator of the waste. Dispose of any waste material in accordance with all applicable federal, state and local regulations. Note that these regulations may also apply to empty containers, liners and rinsate. Processing, use, dilution or contamination of this product may cause its physical and chemical properties to change.		
Additional Waste Remarks	Not available.	
Section 14. Transport Information		
DOT Classification	FLAMMABLE LIQUID, N.O.S. (Contains: Light aromatic naphtha, 1,2,4-Trimethylbenzene), 3, UN1993, III	
DOT Reportable Quantity	Xylene 793 gal.	
Marine Pollutant	Not applicable.	
Additional DOT information	Not available.	
Emergency Response Guide Page Number	128	

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Section 15. Regulatory Information

HCS Classification	Target organ effects. Combustible liquid. At elevated temperatures, vapors can form an ignitable or explosive mixture with air. Can form explosive mixtures at temperatures at or above the flash point. Vapors can flow along surfaces to distant ignition sources and flash back. Static discharges can cause ignition or explosion when container is not bonded. Irritant.
U.S. Federal Regulations	
Environmental Regulations	Extremely Hazardous Substances: Not applicable to any components in this product. SARA 313 Toxic Chemical Notification and Release Reporting: 1,2,4-Trimethylbenzene; Xylene; SARA 302/304 Emergency Planning and Notification substances: Not applicable to any components in this product. Hazardous Substances (CERCLA 302): Xylene 793 gal.; SARA 311/312 MSDS distribution - chemical inventory - hazard identification: fire; immediate health hazard; delayed health hazard; Clean Water Act (CWA) 307 Priority Pollutants: Not applicable to any components in this product. Clean Water Act (CWA) 311 Hazardous Substances: Xylene; Clean Air Act (CAA) 112(r) Accidental Release Prevention Substances: Not applicable to any components in this product.
Threshold Planning Quantity (TPQ)	Not applicable.
TSCA Inventory Status	All components are included or are exempted from listing on the US Toxic Substances Control Act Inventory. This product contains the following components that are subject to the reporting requirements of TSCA Section 12(b) if exported from the United States: Xylene; Naphthalene.
State Regulations	State specific information is available upon request from Baker Petroleum.
International Regulations	
Canada	All components are compliant with or are exempted from listing on the Canadian Domestic Substance List.
WHMIS (Canada)	B-3, D-2A, D-2B
European Union	All components are included or are exempted from listing on the European Inventory of Existing Commercial Chemical Substances or the European List of Notified Chemical Substances. International inventory status information is available upon request from Baker Petroleum for the following countries: Australia, China, Korea (TCCL), Philippines (RA6969), or Japan.
Harmonized Tariff Code	Not available.
Other Regulatory Information	No further regulatory information is available.

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Section 16. Other Information

Other Special File 2634
Considerations

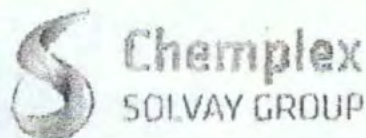
Baker Petrolite Disclaimer

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Petrolite, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

Safety Data Sheet



Section 1: Identification

Product identifier

Product Name • Plexbreak 134
Product Code • 00204

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Petrochemical industry

Details of the supplier of the safety data sheet

Manufacturer • Chemplex | Solvay USA Inc. | Novecare Division
 506 CR 137
 P.O. Box 1071 Snyder, TX 79550
 United States
 www.chemplex.net
 SDS@chemplex.net
Telephone (General) • 325.573.7298

Emergency telephone number

Manufacturer • 800.424.9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Flammable Liquids 3
 Skin Corrosion 1B
 Serious Eye Damage 1
 Specific Target Organ Toxicity Single Exposure 1
 Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects

Label elements

OSHA HCS 2012

DANGER



Hazard statements • Flammable liquid and vapour
 Causes severe skin burns and eye damage.
 Causes serious eye damage
 May cause drowsiness or dizziness

Causes damage to organs - Central Nervous System (CNS), Optic Nerve via Inhalation, Skin, Ingestion/Oral

Precautionary statements

- Prevention** • Keep container tightly closed.
 Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.
 Take precautionary measures against static discharge.
 Ground and/or bond container and receiving equipment.
 Use explosion-proof electrical/ventilating/lighting/equipment.
 Use only non-sparking tools.
 Do not eat, drink or smoke when using this product.
 Do not breathe dust, fume, gas, mist, vapours and/or spray.
 Wear protective gloves/protective clothing/eye protection/face protection.
 Use only outdoors or in a well-ventilated area.
 Wash thoroughly after handling.
 In case of fire: Use appropriate media for extinction.

- Response** • In case of fire: Use appropriate media Dry chemical, carbon dioxide, alcohol resistant foam, or water spray for extinction.
 IF exposed: Call POISON CENTER or doctor/physician.
 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 Wash contaminated clothing before reuse.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 Immediately call a POISON CENTER or doctor/physician.
 Specific treatment, see supplemental first aid information.

- Storage/Disposal** • Store locked up.
 Store in a well-ventilated place. Keep container tightly closed.
 Store in a well-ventilated place. Keep cool.
 Keep away from heat, ignition sources and strong oxidizing agents.
 Wear protective gloves/protective clothing/eye protection/face protection.
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
 Wash thoroughly after handling.

- HCS 2012 Other Information** • Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.

Other hazards

- OSHA HCS 2012** • Corrosive. Causes pain and severe burns to mouth, throat and stomach. Mists are irritating and corrosive to respiratory system.

Canada

According to: WHMIS

Classification of the substance or mixture

- WHMIS** • Flammable Liquids - B2
 Corrosive - E
 Other Toxic Effects - D2A

Label elements

WHMIS



- Flammable Liquids - B2
 Corrosive - E
 Other Toxic Effects - D2A

Other hazards

WHMIS

- No data available

Other information

- Very toxic to aquatic life
Toxic to aquatic life with long lasting effects



- Health Hazard: 3 - Warning: Corrosive or toxic. Avoid skin contact or inhalation.
Flammability: 3 - Warning: Flammable liquid flash point below 100°F
Reactivity: 0 - Stable: Not reactive under normal conditions
- **HMIS**
 - HMIS Health - 3: Serious Hazard
 - HMIS Flammability - 3: Serious Hazard
 - HMIS Physical Hazard - 0: Minimal Hazard

Section 3 - Composition/Information on Ingredients

Substances

- Not applicable. This material is a mixture.

Mixtures

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Composition			
Chemical Name	Identifiers	%	Hazardous
Isopropyl alcohol	CAS:67-63-0	20% TO 25%	Yes
Quaternary Ammonium Chloride	Proprietary	5% TO 10%	Yes
Methanol	CAS:67-56-1	1% TO 5%	Yes
Castor oil	CAS:8001-79-4	0.1% TO 1%	Yes

- This product is considered hazardous according to the OSHA Hazard Communication Standard 29 CFR 1910.1200. Under Canadian regulations (Workplace Hazardous Materials Information System (WHMIS) - Hazardous Products Act (HPA), this material is hazardous.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. If breathing is difficult, give oxygen. Get medical attention if symptoms occur.

Skin

- Rinse skin immediately with plenty of water for 15-20 minutes. Take off contaminated clothing and wash before reuse. Get medical attention immediately.

Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,

if present and easy to do. Continue rinsing. Hold eyelids open. Get medical attention immediately.

Ingestion

- Do not give anything by mouth to an unconscious person. Do NOT induce vomiting. Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side. Get medical attention immediately.

Most important symptoms and effects, both acute and delayed

- Pain, irritation, redness or blistering of skin. May cause severe irritation and eye damage. May cause drowsiness or dizziness. Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. There is no specific antidote available. Treat symptomatically. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media • LARGE FIRES: Dry chemical, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO2, water spray or alcohol-resistant foam.

Unsuitable Extinguishing Media • DO NOT use high volume water jet.

Special hazards arising from the substance or mixture

- **Unusual Fire and Explosion Hazards** • FLAMMABLE LIQUID AND VAPOR
Containers may explode when heated.
Vapors can spread a long distance to ignition source and ignite or flash back.
- **Hazardous Combustion Products** • Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes)
Carbon monoxide (CO), and Carbon dioxide (CO2)
Nitrogen Oxides.

Advice for firefighters

- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.
Standard procedures for chemical fires.
Collect contaminated fire extinguishing materials separately. This must be not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Cool closed containers exposed to fire with water spray.

Other information

- Causes severe skin burns and eye damage.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions • Wear appropriate protective clothing. Ventilate the area. Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Emergency Procedures • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use only non-sparking tools. Avoid all contact. Strict hygiene. Stop leak if you can do it without risk. Ventilate closed spaces before entering.

Environmental precautions

- Spills may be reportable to the National Response Center (800-424-8802) and to state and or local agencies. Do not flush to sewer or allow to enter waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- Contain and recover liquid when possible.
Collect liquid with explosion proof pumps and/or non-combustible absorbent. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Wash remainder with plenty of water.
Water will make area slippery.
Repeat cleaning process until the contaminated surface is no longer slippery.
Refer to Section 13 - Disposal Considerations.

Prohibited Materials

- Avoid heat, sparks, fire, and oxidizing agents.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Keep away from fire. Keep away from sources of ignition – No Smoking. Keep away from fire, sparks and heated surfaces. Use explosion-proof electrical/ventilating/lighting/equipment. Avoid contact with skin and eyes. Wash thoroughly after handling. Do not breathe vapors or spray mist. DO NOT ingest.

Conditions for safe storage, including any incompatibilities

Storage

- Keep only in the original container/package in a cool well-ventilated place. Keep away from fire. Avoid contact with heat and ignition sources. Do not store with oxidizers. Store locked up.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines

- Use only with adequate ventilation. Avoid all contact. Strict hygiene.

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Methanol (67-56-1)	TWAs	200 ppm TWA	200 ppm TWA; 260 mg/m ³ TWA	200 ppm TWA; 260 mg/m ³ TWA
Isopropyl alcohol (67-63-0)	TWAs	200 ppm TWA	400 ppm TWA; 980 mg/m ³ TWA	400 ppm TWA; 980 mg/m ³ TWA

Exposure Control Notations

ACGIH

•Methanol (67-56-1): **Skin:** (Skin - potential significant contribution to overall exposure by the cutaneous route)

NIOSH

•Methanol (67-56-1): **Skin:** (Potential for dermal absorption)

Exposure controls

Engineering

Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

- When respirators are required, use NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate

Eye/Face

- regulatory standards and/or industrial recommendations.
- Wear eye/face protection - Safety Glasses with Side-Shields, - Face-shield. Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.

Skin/Body**General Industrial Hygiene Considerations**

- Wear protective gloves/protective clothing/eye protection/face protection.
- Avoid all contact. Strict hygiene. Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Keep away from food, drink and animal feeding stuffs.

Environmental Exposure Controls

- Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Additional Protection Measures

- The protective equipment must be selected in accordance with local standards and in cooperation with the supplier of the protective equipment. Selection of the appropriate personal protective equipment should be based upon an evaluation of the performance characteristics of the protective equipment relative to the tasks to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use. Emergency equipment should be immediately accessible, with instructions for use. Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use.

Section 9 - Physical and Chemical Properties**Information on Physical and Chemical Properties**

Material Description			
Physical Form	Liquid	Appearance/Description	Pale yellow liquid.
Color	Light Yellow.	Odor	Alcohol-like
Taste	No data available	Odor Threshold	No data available
General Properties			
Boiling Point	No data available	Melting Point	No data available
Decomposition Temperature	No data available	pH	Neutral
Specific Gravity/Relative Density	= 0.9739 Water=1	Density	8.12 lbs/gal
Water Solubility	Soluble	Viscosity	No data available
Volatility			
Vapor Pressure	No data available	Vapor Density	2.08 Air=1
Evaporation Rate	No data available		
Flammability			
Flash Point	82 F(27.7778 C) CC (Closed Cup)	UEL	No data available
LEL	No data available	Autoignition	No data available
Flammability (solid, gas)	Flammable Liquid.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity**Reactivity**

- Reactive with oxidizing agents.

Chemical stability

- This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Avoid heat, sparks, fire and sources of ignition.

Incompatible materials

- Store away from strong oxidizing agents.

Hazardous decomposition products

- Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes). Oxides of carbon, Nitrogen Oxides.

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Acute Toxicity - Dermal - Classification criteria not met; Acute Toxicity - Inhalation - Classification criteria not met; Acute Toxicity - Oral - Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	OSHA HCS 2012 • Skin Corrosion 1B
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 1; Specific Target Organ Toxicity Single Exposure 3: Narcotic Effects
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Serious Eye Damage 1

Potential Health Effects

Inhalation

- Acute (Immediate) • No data available
- Chronic (Delayed) • No data available

Skin

- Acute (Immediate) • Causes severe skin burns and eye damage. Methanol is a cumulative toxin readily absorbed.
- Chronic (Delayed) • No data available

Eye

- Acute (Immediate) • Causes serious eye damage.
- Chronic (Delayed) • No data available

Ingestion

- Acute (Immediate)**
 - Methanol ingestion may provoke dizziness, abdominal pain, vomiting, acidosis, central nervous system depression, and impairment of vision. At high levels, may cause breathing difficulties, coma, or death. Symptoms may be delayed.
- Chronic (Delayed)**
 - No data available

Other

- Acute (Immediate)**
 - The substance is classified as specific target organ toxicant, single exposure, category 1, central nervous system, optic nerve by ingestion, skin, or inhalation (vapour) routes. The substance is classified as specific target organ toxicant, single exposure, category 3, central nervous system. May cause drowsiness or dizziness.

Carcinogenic Effects		
	CAS	IARC
Isopropyl alcohol	67-63-0	Group 3-Not Classifiable

Section 12 - Ecological Information

Toxicity

- Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Persistence and degradability

- No data available

Bioaccumulative potential

- No data available

Mobility in Soil

- No data available

Other adverse effects

Section 13 - Disposal Considerations

Waste treatment methods

- Product waste**
 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations.
- Packaging waste**
 - Rinse with an appropriate solvent. Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN2920	Corrosive liquids, flammable, n.o.s.	3,8	II	Marine Pollutant
TDG	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	8,3	II	Marine Pollutant
IMO/MDG	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	3,8	II	Marine Pollutant

IATA/CAO	UN2920	CORROSIVE LIQUID, FLAMMABLE, N.O.S.	3,8	E	Acute Aquatic Toxicity, Chronic Aquatic Toxicity
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Special precautions for user • For personal protection see section 8. NOTE: The order in which classes appear in above table does not reflect precedence of classes. See UN number, proper shipping name, class(es) and packing group for each agency below.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code • No data available

Other information

- Transportation status: The listed Transportation Classification does not address all regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors. NOTE: The order in which classes appear in above table does not reflect precedence of classes. See UN number, proper shipping name, class(es) and packing group for each agency below.
- DOT • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT, RQ (METHANOL)

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101. The product quantity, in one package, which triggers the RQ requirements under 49 CFR for each ingredient is as follows:

Reportable quantities: RQ substance: Methanol RQ limit for substance: 5,000 lbs.

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 132.

- TDG • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 132.

- IMO/IMDG • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

- IATA/CAO • Dangerous Good Description: UN2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. (QUATERNARY AMINE CHLORIDE, ISOPROPANOL), 8(3), II, MARINE POLLUTANT

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute, Fire

United States

Environment

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	5000 lb final RQ; 2270 kg final RQ
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Isopropyl alcohol	67-63-0	1.0 % de minimis concentration (only if manufactured by the strong acid process, no supplier notification)
• Methanol	67-56-1	1.0 % de minimis concentration
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	Not Listed
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Isopropyl alcohol	67-63-0	Not Listed
• Methanol	67-56-1	developmental toxicity, initial date 3/16/12
• Quaternary Ammonium Chloride	Proprietary	Not Listed
• Castor oil	8001-79-4	Not Listed

Other Information

- All components of this product are listed on the following:

US TSCA Inventory

Australia Inventory of Chemical Substances (AICS)

China Inventory of Existing chemical Substances in China (IECSC)

Korea Existing Chemical Inventory (KECI)

Section 16 - Other Information

Last Revision Date

- 08/June/2015

Preparation Date

- 22/May/2015

Disclaimer/Statement of Liability

- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but does not replace them. Thus, the information only relates to the

designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

IARC = International Agency for Research on Cancer

MSHA = Mine Safety and Health Administration

NIOSH = National Institute of Occupational Safety and Health

NTP = National Toxicology Program

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1 Product identifier**

- Trade name Plexslick 957

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

- For industrial use only.

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

Chemplex, Solvay Group
506 CR 137
Snyder, TX 97549
Phone: (325) 573-7298

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CONTACT: CHEMTREC 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

SECTION 2: Hazards Identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture**HCS 2012 (29 CFR 1910.1200)**

- Not a hazardous product according to Globally harmonized System (GHS)

2.2 Label elements**HCS 2012 (29 CFR 1910.1200)**

- Not a hazardous product according to Globally harmonized System (GHS)

2.3 Other hazards which do not result in classification

- Slightly irritating to eyes.
- Aspiration of the swallowed or vomited product can cause severe pulmonary complications.
- No specific risk when handled in accordance with good occupational hygiene and safety practice.
- Does NOT present any particular fire hazard.
- Hazardous reactions may occur on contact with certain chemicals. (Refer to the list of incompatible materials section 10: "Stability-Reactivity").

SECTION 3: Composition/information on ingredients**3.1 Substance**

- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Emulsion of petroleum distillate and aqueous solution.

Hazardous Ingredients and Impurities

Chemical Name	Identification number CAS-No.	Concentration [%]
Distillates (petroleum), hydrotreated light	64742-47-8	14 - 19

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

- Show this material safety data sheet to the doctor in attendance.
- First responder needs to protect himself.
- Place affected apparel in a sealed bag for subsequent decontamination.

In case of inhalation

- Remove to fresh air.
- If breathing is difficult, give oxygen.
- If breathing has stopped, apply artificial respiration.
- Consult a physician if necessary.

In case of skin contact

- Wash off with soap and plenty of water.
- Remove contaminated clothing and shoes.
- Wash contaminated clothing before re-use.
- Call a physician if irritation develops or persists.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Consult a physician if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Do not give anything to drink.
- Seek medical advice.
- Do not leave the victim unattended.
- Vomiting may occur spontaneously
- Risk of product entering the lungs on vomiting after ingestion.
- Lay victim on side.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- No information available.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

SECTION 5: Firefighting measures

Flash point	> 200 °F (> 93 °C) closed cup
	Flammability class: Will burn
Autoignition temperature	no data available
Flammability / Explosive limit	no data available

5.1 Extinguishing media**Suitable extinguishing media**

- Water mist
- Carbon dioxide (CO₂)
- Foam
- Dry chemical

Unsuitable extinguishing media

- Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture**Specific hazards during fire fighting**

- Under fire conditions:
- Will burn
- (following evaporation of water)
- Harmful or toxic vapors are released.

Hazardous combustion products:

- Hazardous combustion products
- Carbon oxides
- Nitrogen oxides (NO_x)
- Sulfur oxides

5.3 Advice for firefighters**Special protective equipment for fire-fighters**

- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Specific fire fighting methods

- Cool closed containers exposed to fire with water spray.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures**

- Avoid contact with the skin and the eyes.
- Wear suitable protective equipment.
- For personal protection see section 8.
- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.

6.2 Environmental precautions

- Do not let product enter drains.
- Prevent product from entering sewage system.
- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up**Recovery**

- Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
- Sweep up and shovel into suitable containers for disposal.
- Never return spills in original containers for re-use.

Decontamination / cleaning

- Clean contaminated surface thoroughly.
- Wash off with plenty of water.
- Recover the cleaning water for subsequent disposal.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.

Disposal

- Dispose of in accordance with local regulations.

Additional advice

- Material can create slippery conditions.

6.4 Reference to other sections

- no data available

SECTION 7: Handling and storage**7.1 Precautions for safe handling**

- Avoid inhalation, ingestion and contact with skin and eyes.
- Handle in accordance with good industrial hygiene and safety practice.

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
- 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
- 3) Wash exposed skin promptly to remove accidental splashes or contact with material.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

- Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.
- Keep in a dry, cool and well-ventilated place.
- Keep container tightly closed.
- Do not freeze.
- Keep away from open flames, hot surfaces and sources of ignition.
- Keep away from incompatible materials to be indicated by the manufacturer

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

Components with workplace occupational exposure limits

Ingredients	Value type	Value	Basis
Distillates (petroleum), hydrotreated light	TWA	200 mg/m ³	American Conference of Governmental Industrial Hygienists
Danger of cutaneous absorption Expressed as total hydrocarbon vapor			
Distillates (petroleum), hydrotreated light	TWA	500 ppm 2,000 mg/m ³	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
The value in mg/m ³ is approximate.			

8.2 Exposure controls

Control measures

Engineering measures

- Effective exhaust ventilation system
- Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures :

Individual protection measures

Respiratory protection

- Use a respirator with an approved filter if a risk assessment indicates this is necessary.
- When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

Hand protection

- Where there is a risk of contact with hands, use appropriate gloves
- Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.
- Gloves must be inspected prior to use.

- Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection

- Safety glasses with side-shields
- Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.
- Eye contact should be prevented through the use of:

Skin and body protection

- Remove and wash contaminated clothing before re-use.
- Choose body protection according to the amount and concentration of the dangerous substance at the work place.
- Protective suit
- Boots

Hygiene measures

- Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this materials:
 - 1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
 - 2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
 - 3) Wash exposed skin promptly to remove accidental splashes or contact with material.

Protective measures

- Ensure that eyewash stations and safety showers are close to the workstation location.
- The protective equipment must be selected in accordance with current local standards and in cooperation with the supplier of the protective equipment.
- Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use.

SECTION 9: Physical and chemical properties

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product information phone number in Section 1 for its exact specifications.

9.1 Information on basic physical and chemical properties

<u>Appearance</u>	<u>Physical state:</u> liquid <u>Color:</u> white
<u>Odor</u>	oily
<u>Odor Threshold</u>	no data available
<u>pH</u>	not determined
<u>Boiling point/boiling range</u>	no data available
<u>Flash point</u>	> 200 °F (> 93 °C) closed cup

	Flammability class: Will burn
<u>Evaporation rate (Butylacetate = 1)</u>	no data available
<u>Flammability (solid, gas)</u>	no data available
<u>Flammability (liquids)</u>	no data available
<u>Flammability / Explosive limit</u>	no data available
<u>Autoignition temperature</u>	no data available
<u>Vapor pressure</u>	no data available
<u>Vapor density</u>	no data available
<u>Density</u>	1.02 - 1.11 g/cm ³ (25 °C)
<u>Solubility</u>	no data available
<u>Partition coefficient: n-octanol/water</u>	no data available
<u>Thermal decomposition</u>	no data available
<u>Viscosity</u>	no data available
<u>Explosive properties</u>	no data available
<u>Oxidizing properties</u>	no data available

9.2 Other Information

no data available

SECTION 10: Stability and reactivity**10.1 Reactivity**

- no data available

10.2 Chemical stability

- Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions**Polymerization**

- Hazardous polymerization does not occur.

10.4 Conditions to avoid

- Heat, flames and sparks.

10.5 Incompatible materials

- Strong oxidizing agents

10.6 Hazardous decomposition products

PRCO90088264
Version: 1.00 / US (Z8)
www.solvay.com

Developmental Toxicity/Teratogenicity no data available

STOT

STOT-single exposure no data available

STOT-repeated exposure no data available

Aspiration toxicity no data available

SECTION 12: Ecological Information

12.1 Toxicity no data available

12.2 Persistence and degradabilityBiodegradation

Biodegradability The product itself has not been tested.

12.3 Bioaccumulative potential no data available

12.4 Mobility in soil no data available

12.5 Results of PBT and vPvB assessment This mixture contains no substance considered to be persistent, bioaccumulating, and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects no data available

Ecotoxicity assessment

Acute aquatic toxicity This product has no known ecotoxicological effects.
According to the data on the components

Chronic aquatic toxicity This product has no known ecotoxicological effects.
According to the data on the components

SECTION 13: Disposal considerations**13.1 Waste treatment methods**Product Disposal

- Chemical additions, processing or otherwise altering this material may make the waste management information presented in this SDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.

Waste Code

- Environmental Protection Agency
- Hazardous Waste – NO

Advice on cleaning and disposal of packaging

- Completely empty the packaging prior to decontamination.
- Rinse with an appropriate solvent.
- Dispose of in accordance with local regulations.

Measure for waste avoidance or recovery

- Do not dispose of the product at a dump.

SECTION 14: Transport information**DOT**

not regulated

TDG

not regulated

NOM

no data available

IMDG

not regulated

IATA

not regulated

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory information	Status
United States TSCA Inventory	On TSCA Inventory
Canadian Domestic Substances List (DSL)	All components of this product are on the Canadian DSL.
Australia Inventory of Chemical Substances (AICS)	On the inventory, or in compliance with the inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	On the inventory, or in compliance with the inventory
Korea. Korean Existing Chemicals Inventory (KECI)	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	On the inventory, or in compliance with the inventory

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA HAZARD DESIGNATION SECTIONS 311/312 (40 CFR 370)

Fire Hazard	no
Reactivity Hazard	no
Sudden Release of Pressure Hazard	no
Acute Health Hazard	no
Chronic Health Hazard	no

Section 313 Toxic Chemicals (40 CFR 372.65)

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)

Ingredients	CAS-No.	Reportable quantity
Oxirane	75-21-8	10 lb
Formaldehyde	50-00-0	100 lb

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)

Ingredients	CAS-No.	Reportable quantity
Oxirane	75-21-8	10 lb
Formaldehyde	50-00-0	100 lb

US, EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

Ingredients	CAS-No.	Reportable quantity
Diethanolamine	111-42-2	100 lb
Oxirane	75-21-8	10 lb
1,4-Dioxane	123-91-1	100 lb
Formaldehyde	50-00-0	100 lb
Methanol	67-56-1	5000 lb
Acetaldehyde	75-07-0	1000 lb

15.3 State Regulations

US, California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

WARNING! This product contains a chemical known in the State of California to cause cancer.

Ingredients	CAS-No.
Diethanolamine	111-42-2
Oxirane	75-21-8
Acetaldehyde	75-07-0
1,4-Dioxane	123-91-1
Formaldehyde	50-00-0

WARNING: This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

Ingredients	CAS-No.
Methanol	67-56-1
Oxirane	75-21-8

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health 0 minimal
 Flammability 1 slight
 Instability or Reactivity 0 minimal

HMIS (Hazardous Materials Identification System (Paint & Coating)) - Classification

Health 0 minimal
 Flammability 1 slight
 Reactivity 0 minimal
 PPE Determined by User; dependent on local conditions

Further information

- Product classified under the US GHS format.

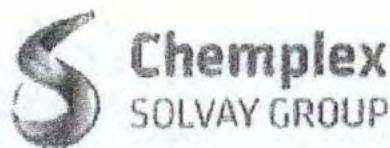
Date Prepared: 03/13/2015

Key or legend to abbreviations and acronyms used in the safety data sheet

- TWA 8-hour, time-weighted average
- ACGIH American Conference of Governmental Industrial Hygienists
- OSHA Occupational Safety and Health Administration
- NTP National Toxicology Program

- IARC International Agency for Research on Cancer
- NIOSH National Institute for Occupational Safety and Health

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Safety Data Sheet**Section 1: Identification****Product identifier****Product Name**

- Claymax

Synonyms

- Product number: 00601

Relevant identified uses of the substance or mixture and uses advised against**Recommended use**

- Potassium chloride substitute in oil well treatment

Details of the supplier of the safety data sheet**Manufacturer**

- Chemplex | Solvay USA Inc. | Novecare Division

506 CR 137
P.O. Box 1071 Snyder, TX 79550
United States
www.chemplex.net
SDS@chemplex.net

Telephone (General) • 325.573.7298

Emergency telephone number**Manufacturer**

- 800.424.9300 - CHEMTREC

Section 2: Hazard Identification**United States (US)**

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture**OSHA HCS 2012**

- Classification criteria not met

Label elements**OSHA HCS 2012**

Hazard statements • No label element(s) required

Other hazards**OSHA HCS 2012**

- This product is not considered hazardous under the U.S. OSHA 29 CFR 1910.1200 Hazard Communication Standard.

Canada

According to WHMIS

Classification of the substance or mixture**WHMIS**

- Classification criteria not met

Label elements

WHMIS

- No label element(s) required

Other hazards

WHMIS

- In Canada, the product mentioned above is not considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Other information

See Section 12 for Ecological Information.

Section 3 - Composition/Information on Ingredients**Substances****Mixtures**

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	CAS:67-48-1	40% TO 70%	Ingestion/Oral-Rat LD50 • 3400 mg/kg	OSHA HCS 2012: Not Classified - Criteria not met	NDA
Water	CAS:7732-18-5	15% TO 40%	Ingestion/Oral-Rat LD50 • >90 mL/kg	OSHA HCS 2012: Not Hazardous	NDA

- Material does not meet the criteria of a mixture.

See Section 11 for Toxicological Information.

Section 4: First-Aid Measures**Description of first aid measures****Inhalation**

- Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing.

Skin

- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention.

Eye

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes.

Ingestion

- Do NOT induce vomiting. Get medical attention immediately.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5: Fire-Fighting Measures

Extinguishing media

- Suitable Extinguishing Media** • LARGE FIRE: Water spray, fog or regular foam.
SMALL FIRES: Dry chemical, CO₂, water spray or regular foam.

- Unsuitable Extinguishing Media** • No data available.

Special hazards arising from the substance or mixture

- Unusual Fire and Explosion Hazards** • No unusual fire and explosion hazards known.

- Hazardous Combustion Products** • No data available.

Advice for firefighters

- Structural firefighters' protective clothing will only provide limited protection. Wear positive pressure self-contained breathing apparatus (SCBA).

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

- Personal Precautions** • Wear appropriate personal protective equipment. Do not walk through spilled material.

- Emergency Procedures** • ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Stay upwind. Ventilate closed spaces before entering.

Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

- Containment/Clean-up Measures** • Stop leak if you can do it without risk.
Prevent entry into waterways, sewers, basements or confined areas.
SMALL SPILLS: Take up with sand or other non-combustible absorbent material and place into containers for later disposal.
LARGE SPILLS: Dike far ahead of liquid spill for later disposal.

Section 7 - Handling and Storage

Precautions for safe handling

- Handling** • Wear appropriate personal protective equipment. Avoid contact with skin and eyes. DO NOT ingest. Wash thoroughly after handling.

Conditions for safe storage, including any incompatibilities

- Storage** • Keep away from heat, ignition sources and strong oxidizing agents. Store in a cool, dry, well-ventilated place. Keep container closed when not in use. Avoid storing at elevated temperatures and freezing temperatures. Optimal storage temperature: 41-81 F; Ground all equipment containing material.

Section 8 - Exposure Controls/Personal Protection

Control parameters

- Exposure Limits/Guidelines** • No applicable exposure limits have been established for the components or the

material.

Exposure controls

Engineering Measures/Controls

- Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use. Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment Pictograms



Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment.

Eye/Face

- Wear protective eyewear (goggles, face shield, or safety glasses).

Skin/Body

- Wear appropriate gloves.

General Industrial Hygiene Considerations

- Do not get in eyes or on skin or clothing. Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

Environmental Exposure Controls

- No data available

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Colorless to yellow liquid with slight fish odor.
Color	Colorless to pale yellow.	Odor	Slight fish odor.
Odor Threshold	Data lacking		
General Properties			
Boiling Point	> 212 F(> 100 C)	Melting Point	Data lacking
Decomposition Temperature	Data lacking	pH	Near neutral (1% solution with water)
Specific Gravity/Relative Density	1.0856 Water=1	Water Solubility	100 %
Viscosity	Data lacking		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	Not Defined
Evaporation Rate	Data lacking		
Flammability			
Flash Point	> 200 F(> 93.3333 C) Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- No data available.

Incompatible materials

- No data available.

Hazardous decomposition products

- No data available.

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride (40% TO 70%)	67-48-1	Acute Toxicity: Ingestion/Oral-Rat LD50 • 3400 mg/kg; <i>Sense Organs and Special Senses:Eye:Chromodacyroffhea; Behavioral:Excitement; Lungs, Thorax, or Respiration:Respiratory depression</i>

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	OSHA HCS 2012 • Classification criteria not met
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	OSHA HCS 2012 • Classification criteria not met

Route(s) of entry/exposure

- Inhalation, Skin, Eye, Ingestion

Potential Health Effects

Inhalation

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available.

Skin

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available.

Eye

- Acute (Immediate) • Under normal conditions of use, no health effects are expected.
- Chronic (Delayed) • No data available.

Ingestion

- Acute (Immediate) • Under normal conditions of use, no health effects are expected.
- Chronic (Delayed) • No data available.

Key to abbreviations
LD = Lethal Dose

Section 12 - Ecological Information

Toxicity

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations

Waste treatment methods

- Product waste** • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
- Packaging waste** • Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class (es)	Packing group	Environmental hazards
DOT	NDA	Not regulated	NDA	NDA	NDA
TDG	NDA	Not regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not regulated	NDA	NDA	NDA

- Special precautions for user** • None known.
- Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** • Not relevant.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • None

State Right To Know				
Component	CAS	MA	NJ	PA
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	No	No	No
Water	7732-18-5	No	No	No

Inventory				
Component	CAS	Canada DSL	Canada NDSL	TSCA
Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Yes	No	Yes
Water	7732-18-5	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Uncontrolled product according to WHMIS classification criteria (including 60%, 70%)
• Water	7732-18-5	Uncontrolled product according to WHMIS classification criteria

Canada - WHMIS - Ingredient Disclosure List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
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• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Developmental Toxicity		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

United States - Rhode Island

Labor

U.S. - Rhode Island - Hazardous Substance List

• Ethanaminium, 2-hydroxy-N,N,N-trimethyl-, chloride	67-48-1	Not Listed
• Water	7732-18-5	Not Listed

Section 16 - Other Information

Revision Summary

Date	MSDS No.	Changes
18/August/2014		• Section 1 changed. Changes include Company Name Change.

Last Revision Date

- 18/August/2014

Preparation Date

- 27/November/2013

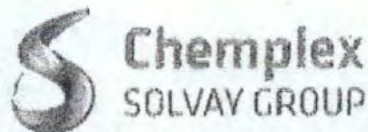
Disclaimer/Statement of Liability

- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

NDA = No data available

Safety Data Sheet



Section 1: Identification

Product Identifier

- Product Name** • **Ferriplex 66**
Synonyms • Acetic Acid Solution
Product Code • 00307
Chemical Category • Organic acids

Relevant identified uses of the substance or mixture and uses advised against

- Recommended use** • Petrochemical industry

Details of the supplier of the safety data sheet

- Manufacturer** • Chemplex | Solvay USA Inc. | Novocare Division
506 CR 137
P.O. Box 1071 Snyder, TX 79550
United States
www.chemplex.net
SDS@chemplex.net
Telephone (General) • 325.573.7298

Emergency telephone number

- Manufacturer** • 800.424.9300 - CHEMTREC

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

- OSHA HCS 2012** • Skin Corrosion 1A
Serious Eye Damage 1

Label elements

OSHA HCS 2012

DANGER



- Hazard statements** • Causes severe skin burns and eye damage.
Causes serious eye damage

Precautionary statements

- Prevention** • Keep container tightly closed.
 Keep only in original container.
 Wash thoroughly after handling.
 Wear protective gloves/protective clothing/eye protection/face protection.
 In case of inadequate ventilation wear respiratory protection.

- Response** • IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 Wash contaminated clothing before reuse.
 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 Immediately call a POISON CENTER or doctor/physician.

- Storage/Disposal** • Wash thoroughly after handling.
 Wear protective gloves/protective clothing/eye protection/face protection.
 Store in a well-ventilated place. Keep cool.
 Store locked up.
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Other hazards

OSHA HCS 2012

- Acetic acid concentrated at elevated temperature may be corrosive to metals and evolve flammable hydrogen gas. Mists of weak acid solution in water may be irritating to the respiratory system.

Canada

According to: WHMIS

Classification of the substance or mixture

WHMIS

- Corrosive - E
- Other Toxic Effects - D2B

Label elements

WHMIS



- Corrosive - E
- Other Toxic Effects - D2B

Other hazards

WHMIS

- No other WHMIS hazards than those reported above.

Other information

- One should be specifically trained before communicating or using the following National Fire Protection Association (NFPA) and or Hazardous Materials Identification System (HMIS) categories since the definition and scales applied do not match US OSHA GHS and HAZCOM 2012 definitions and rules.



- Health Hazard: 3 - Warning: Corrosive or toxic. Avoid skin contact or inhalation.
 Flammability: 1 - Combustible if heated
 Reactivity: 0 - Stable: Not reactive under normal conditions
- HMIS • HMIS Health - 2: Moderate Hazard
 HMIS Flammability - 1: Slight Hazard
 HMIS Physical Hazard - 0: Minimal Hazard

Section 3 - Composition/Information on Ingredients

Substances

- Not applicable. This material is a mixture.

Mixtures

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

Composition			
Chemical Name	Identifiers	%	Hazardous
Acetic acid	CAS:64-19-7	40% TO 50%	Yes
Citric acid	CAS:77-92-9	25% TO 30%	Yes

- This product is considered hazardous according to the OSHA Hazard Communication Standard 29 CFR 1910.1200. Under Canadian regulations (Workplace Hazardous Materials Information System (WHMIS) - Hazardous Products Act (HPA), this material is hazardous.

Section 4: First-Aid Measures

Description of first aid measures

- Inhalation**
 - Get medical attention immediately if symptoms occur. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Skin**
 - Get medical attention immediately if symptoms occur. Rinse skin immediately with plenty of water for 15-20 minutes. Take off contaminated clothing and wash before reuse.
- Eye**
 - Flush eyes with water for at least 15 minutes while holding eyelids open. Get medical attention immediately. If easy to do, remove contact lenses, if worn.
- Ingestion**
 - Vomiting may occur spontaneously. To prevent aspiration of swallowed product, lay victim on side. Do NOT induce vomiting. Get medical attention immediately. Give nothing to drink.

Most important symptoms and effects, both acute and delayed

- Pain, irritation, redness or blistering of skin. May cause severe irritation and eye damage.

Indication of any immediate medical attention and special treatment needed

- Notes to Physician**
 - All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. Treat symptomatically. There is no specific antidote available. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media • LARGE FIRES: Dry chemical, CO2, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO2, water spray or alcohol-resistant foam.

Unsuitable Extinguishing Media • DO NOT use high volume water jet.

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards • Corrosive
When heated to decomposition it emits acrid smoke and irritating fumes.

Hazardous Combustion Products • Carbon monoxide (CO), and Carbon dioxide (CO2)
Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acrid smoke and irritating fumes).

Advice for firefighters

- Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.
Standard procedures for chemical fires.
Collect contaminated fire extinguishing materials separately. This must be not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Cool closed containers exposed to fire with water spray.
Refer to Section 8 - Exposure Controls/Personal Protection.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

- Personal Precautions** • Contact may cause burns to skin and eyes. Wear suitable protective clothing. Ventilate the area. Refer to Section 8 - Exposure Controls/Personal Protection.
- Emergency Procedures** • Keep unauthorized personnel away. Avoid all contact. Strict hygiene. Ventilate closed spaces before entering. Stop leak if you can do it without risk.

Environmental precautions

- Spills may be reportable to the National Response Center (800-424-8802) and to state and or local agencies. Do not flush to sewer or allow to enter waterways. Take all necessary measures to avoid accidental discharge of products into drains and waterways due to the rupture of containers or transfer systems.

Methods and material for containment and cleaning up

- Containment/Clean-up Measures** • Dike to collect large liquid spills.
Contain and recover liquid when possible.
Neutralize the residue with dilute solution of sodium carbonate.
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Wash remainder with plenty of water.
Water will make area slippery.
Repeat cleaning process until the contaminated surface is no longer slippery.
Refer to Section 13 - Disposal Considerations.

- Prohibited Materials** • Strong alkalines and oxidizing materials. Sources of ignition - heat, sparks and open flames.

Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection.

Section 7 - Handling and Storage

Precautions for safe handling

- Handling** • Do not breathe (dust, vapor or spray mist). Avoid contact with skin and eyes. Wash thoroughly after handling. Use only in well ventilated areas. Do not breathe (dust, vapor or spray mist)

Conditions for safe storage, including any incompatibilities

- Storage**
- Store locked up. Keep only in the original container/package in a cool well-ventilated place. Store away from alkali(bases)and oxidizing agents. Avoid excessive heat.
- Incompatible Materials or Ignition Sources**
- Reactive with strong bases and oxidizing agents. May be corrosive to metals.

Refer to Section 8 - Exposure Controls/Personal Protection.

Section 8 - Exposure Controls/Personal Protection

Control parameters

- Exposure Limits/Guidelines**
- Use only with adequate ventilation. Avoid all contact. Strict hygiene.

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Acetic acid (64-19-7)	TWAs	10 ppm TWA	10 ppm TWA; 25 mg/m3 TWA	10 ppm TWA; 25 mg/m3 TWA

Exposure controls

- Engineering Measures/Controls**
- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

- Respiratory**
- When respirators are required, use NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

- Eye/Face**
- Wear tightly fitting safety goggles to protect from serious eye damage.

- Skin/Body**
- Wear protective gloves/protective clothing/eye protection/face protection.

- General Industrial Hygiene Considerations**
- Avoid all contact. Strict hygiene. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Keep away from food, drink and animal feeding stuffs.

- Environmental Exposure Controls**
- Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

- Additional Protection Measures**
- The protective equipment must be selected in accordance with local standards and in cooperation with the supplier of the protective equipment. Selection of the appropriate personal protective equipment should be based upon an evaluation of the performance characteristics of the protective equipment relative to the tasks to be performed, conditions present, duration of use, and the potential hazards, and/or risks that may occur during use. Emergency equipment should be immediately accessible, with instructions for use. Facilities using or storing this material should be equipped with an eyewash and safety shower in close proximity to areas of storage and use.

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Color	Clear Colorless .
Odor	Pungent, Vinegar-like.	Odor Threshold	0.48 ppm acetic acid
General Properties			
Boiling Point	None	Melting Point	None

Decomposition Temperature	None	pH	2 to 4
Specific Gravity/Relative Density	= 1.18 @ 25 C(77 F) Water=1	Density	9.67 lbs/gal
Water Solubility	Soluble	Viscosity	None
Volatility			
Vapor Pressure	None	Vapor Density	1.45 Air=1
Evaporation Rate	No data available		
Flammability			
Flash Point	> 200 F(> 93.3333 C) closed cup	UEL	None
LEL	None	Autoignition	463 C(865.4 F) acetic acid
Flammability (solid, gas)	None		
Environmental			
Octanol/Water Partition coefficient	None	Bioaccumulation Factor	None

Section 10: Stability and Reactivity

Reactivity

- Strong Bases, Strong oxidizing agents, Strong reducing agents.

Chemical stability

- This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excess heat.

Incompatible materials

- Strong alkalines and oxidizing materials. Acetic acid concentrated at elevated temperature may be corrosive to metals and evolve flammable hydrogen gas.

Hazardous decomposition products

- Carbon monoxide (CO), and Carbon dioxide (CO2) Hazardous combustion products may include a complex mixture of airborne solid and liquid particulates and gases (acid smoke and irritating fumes)

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Acute Toxicity - Dermal - Classification criteria not met; Acute Toxicity - Inhalation - Classification criteria not met; Acute Toxicity - Oral - Classification criteria not met
Aspiration Hazard	OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	OSHA HCS 2012 • Classification criteria not met

Skin corrosion/irritation	OSHA HCS 2012 • Skin Corrosion 1A
Skin sensitization	OSHA HCS 2012 • Classification criteria not met
STOT-RE	OSHA HCS 2012 • Classification criteria not met
STOT-SE	OSHA HCS 2012 • Classification criteria not met
Toxicity for Reproduction	OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	OSHA HCS 2012 • Classification criteria not met
Serious eye damage/irritation	OSHA HCS 2012 • Serious Eye Damage 1

Medical Conditions Aggravated by Exposure • None known.

Potential Health Effects

Inhalation

- Acute (Immediate)** • Classification criteria not met. Mists of weak acid solution in water may be irritating to the respiratory system.
- Chronic (Delayed)** • No data available

Skin

- Acute (Immediate)** • Causes severe skin burns and eye damage.
- Chronic (Delayed)** • No data available

Eye

- Acute (Immediate)** • Causes serious eye damage.
- Chronic (Delayed)** • No data available

Ingestion

- Acute (Immediate)** • May cause burns of the gastrointestinal tract if swallowed.
- Chronic (Delayed)** • No data available

Section 12 - Ecological Information

Toxicity

- No data available

Persistence and degradability

- No data available

Bioaccumulative potential

- No data available

Mobility in Soil

- No data available

Other adverse effects

- According to test data on the components and the classification criteria for mixtures, this product has no known adverse effects on aquatic organisms.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Please be advised that state and local requirements for

waste disposal may be more restrictive or otherwise different from federal laws and regulations.

Packaging waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Empty containers pose a fire risk, evaporate the residue under a fume hood. Rinse with an appropriate solvent.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class (es)	Packing group	Environmental hazards
DOT	UN2790	ACETIC ACID SOLUTION	8	II	NDA
TDG	UN2790	ACETIC ACID SOLUTION	8	II	NDA
IMO/MDG	UN2790	ACETIC ACID SOLUTION	8	II	NDA
IATA/ICAO	UN2790	ACETIC ACID SOLUTION	8	II	NDA

Special precautions for user • No data available

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code • No data available

Other information

- Transportation status: The listed Transportation Classification does not address all regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

DOT • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101. The product quantity, in one package, which triggers the RQ requirements under 49 CFR for each ingredient is as follows:

Reportable quantities: RQ substance: Acetic acid RQ limit for substance: 5,000 lbs.

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 153.

TDG • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

The Emergency Response Guidebook (ERG) number for the assigned proper shipping name is 153.

IMO/MDG • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

IATA/ICAO • Dangerous Good Description: UN 2790 ACETIC ACID SOLUTION, 8, II

Note: The above regulatory prescriptions are those valid on the date of the publication of this sheet. Given the possible evolution of transportation regulations for Hazardous materials, it would be advisable to check their validity with your sales office.

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute

United States

Environment

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Acetic acid	64-19-7	5000 lb final RQ; 2270 kg final RQ
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed
U.S. - CERCLA/SARA - Section 313 - Emission Reporting		
• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Acetic acid	64-19-7	Not Listed
• Citric acid	77-92-9	Not Listed

Section 16 - Other Information

Last Revision Date

- 03/March/2015

Preparation Date

- 03/March/2015

Other Information

- All components of this product are listed on the following:

US TSCA Inventory

Canada Domestic Substance List (DSL)

Australia Inventory of Chemical Substances (AICS)

China Inventory of Existing chemical Substances in China (IECSC)

Japan Inventory of Existing and New Chemicals (ENCS)

Korea Existing Chemical Inventory (KECI)

Disclaimer/Statement of Liability

- The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but does not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene
IARC = International Agency for Research on Cancer
MSHA = Mine Safety and Health Administration
NIOSH = National Institute of Occupational Safety and Health

NTP = National Toxicology Program
OSHA = Occupational Safety and Health Administration
STEL = Short Term Exposure Limits are based on 15-minute exposures
TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Attachment B

Heat and Cold Stress Guidelines

Attachment B Heat Stress Guidelines

1.1 Introduction

A majority of project activities are performed in outdoor locations and, as such, employees occasionally perform these activities in temperature extremes. In light of this, it's important that all employees understand the signs and symptoms of potential injuries associated with working in temperature extremes.

1.2 Heat Stress

Heat stress occurs when the body's physiological processes fail to maintain a normal body temperature because of excessive heat. The body reacts to heat stress in a number of different ways. The reactions range from mild, such as fatigue, irritability, anxiety, and decreased concentration, to severe, such as death. Heat related disorders are generally classified into four basic categories: heat rash, heat cramps, heat exhaustion, and heat stroke. Symptoms and treatment are described below:

Heat Rash

- Description: Heat rash is caused by continuous exposure to heat and humid air and is generally aggravated by coarse clothing. This condition decreases the ability to tolerate heat. Heat rash is the mildest of heat related disorders.
- Symptoms: Mild red rash which is generally more prominent in areas of the body in contact with PPE.
- Treatment: Decrease the amount of time in PPE and use powder to help absorb moisture.

Heat Cramps

- Description: Heat cramps are caused by perspiration that is not off-set with adequate fluid intake. This condition is the first sign of a situation that can lead to heat stroke.
- Symptoms: Acute, painful spasms occurring in the voluntary muscles (e.g., abdomen and extremities).
- Treatment: Remove victim to a cool area and loosen clothing. Have victim drink 1 to 2 cups of water immediately and every 20 minutes thereafter until the symptoms subside. Total water consumption should be 1-2 gallons per day. Consult with a physician.

Heat Exhaustion

- Description: Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is more severe than heat cramps.
- Symptoms: Pale, clammy, moist skin with profuse perspiration and extreme weakness. Body temperature is generally normal and the pulse is weak and rapid. Breathing is shallow. The victim may show signs of dizziness and may vomit.
- Treatment: Remove the victim to a cool, air conditioned atmosphere. Loosen clothing and require that the victim lay in a flat position with the feet slightly elevated. Have the victim drink 1 to 2 cups of water or other rehydrating fluid(s) (e.g., Gatorade) by taking frequent, small sips if not nauseated. Rehydrating fluids should be diluted in half before administering to workers experiencing heat exhaustion. Seek medical attention, particularly in severe situations.

Heat Stroke

- Description: Heat stroke is an acute and dangerous situation. The victim's temperature control system shuts down completely, resulting in a rise in body core temperature to levels that can cause brain damage and can be fatal if not treated promptly and effectively.
- Symptoms: Red, hot, dry skin, with no perspiring. Rapid respiration, high pulse rate, and extremely high body temperature are other symptoms.
- Treatment: Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death can result. The victim should be soaked in cool water. Get medical attention as soon as possible.

1.2.1 Preventive Measures

There are a number of steps that can be taken to minimize and/or eliminate the potential for heat stress disorders when working in hot atmospheres. Some of these are as follows:

- Acclimate employees to working conditions by slowly increasing workloads over extended periods of time. Do not begin site work activities with the most demanding physical expenditures.
- Where possible, conduct strenuous activities during cooler portions of the day, such as early morning or early evening.
- Provide and encourage all employees to drink lots of tempered water during the course of the work shift and discourage the use of alcohol during nonworking hours. It's essential that fluids lost due to perspiration get replenished.
- During hot periods, use administrative controls to limit exposure.
- Provide cooling devices when appropriate. Mobile showers and/or hose down facilities, powered air purifying respirators, and ice vests have all proven effective in reducing heat stress potential.

1.2.2 Heat Stress Monitoring

For strenuous HVHFF activities that are part of on-going site work activities in hot weather, the following procedures are used to monitor the body's physiological response to heat. These procedures are implemented when employees are required to wear impervious clothing in atmospheres exceeding 70 degrees Fahrenheit (°F).

- Monitor Heart Rate: Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The measurement at the beginning of the rest period should not exceed 110 beats/minute.

If the heart rate is in excess, the next work period should be shortened by 33 percent, with the length of the rest period remaining the same. If the heart rate is still in excess at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. This procedure continues until the rate is maintained below 110 beats/minute.

- **Monitor Body Temperature:** Body temperature is measured with an ear probe temperature sensor with a disposable probe cover as early as possible in the resting period. Temperatures should not exceed 99.6°F. If it does, the next work period should be shortened by 33 percent. If the oral temperature at the end of the next work period still exceeds 99.6°F, the following work cycle is shortened by another 33 percent. This procedure continues until the body temperature is maintained below 99.6°F.

The Wet-Bulb Globe Temperature (WBGT) Index is a method of monitoring environmental factors that most nearly correlate to an individual’s physiological response to heat. This method uses a black globe thermometer, a natural wet-bulb thermometer, and a dry-bulb thermometer. From measurements with these instruments, the WBGT can be calculated. The WBGT is then compared with work load categories with the result being the establishment of recommended work - rest regimens. Examples of permissible heat exposure TLV are described in the following table.

**Examples of Permissible Heat Exposure TLV
(Values are given in °C and (°F) WBGT)**

Work - Rest Regimen	Work Load		
	Light	Moderate	Heavy
Continuous Work	30.0 (86)	26.7 (80)	25.0 (77)
75% work - 25% rest, each hour	30.6 (87)	28.0 (82)	25.9 (78)
50% work -50% rest, each hour	31.4 (89)	29.4 (85)	27.9 (82)
25% work -75% rest, each hour	32.2 (90)	31.1 (88)	30.0 (86)

Notes: As workload increases, the heat stress impact on a worker is exacerbated. For workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 25 percent.

1.3 Cold Stress

Persons working outdoors in low temperatures, especially below freezing, or in wet or snowy weather are potentially subject to cold stress disorders. Factors that contribute to cold stress exposure include temperature, humidity, wind, sunlight, rain, snow, fog, exposure duration, clothing, and work activity. Individual susceptibility to cold stress disorders can vary widely. Individual physical factors that can affect a person’s response to cold work environments include a person’s general fitness and age. The following guidelines should be considered when working in ambient air temperatures below 40°F, especially when other contributing weather conditions such as snow, rain, or wind are present. The descriptions, symptoms, and treatment for cold related disorders are described as follows.

Hypothermia

Hypothermia results from a cooling of the body’s core temperature and if left unattended can become a serious condition. Hypothermia can result in the loss of physical skills and impair judgment thereby contributing to the potential for other accidents. Severe hypothermia can result in death. Hypothermia can occur at temperatures above freezing as well as below.

- Symptoms include shivering, teeth chattering, fumbling hands, slurred speech, and loss of coordination. Eventually, the pulse and respiratory rate may slow. The victim may appear blue or lose color in the face.
- Treatment for hypothermia is to catch symptoms early and move the individual to a warm environment indoors or in a vehicle. If a warm location is not immediately available, the victim should be sheltered from the wind and provided extra clothing such as coats or blankets and observed to determine if their condition is improving. If the victim continues to deteriorate and becomes colder, they should be transported to a medical facility for assistance.

Frostbite

Frostbite is a condition in which the fluids around cells of body tissue freeze. The condition can lead to body tissue damage. The most vulnerable parts of the body are the nose, ears, cheeks, fingers, and toes.

- Symptoms of frostbite include body parts becoming white, firm, cold to the touch, and may feel waxy. The victim will not feel pain in the affected area.
- Treatment of frostbite requires that the victim be brought to a warm environment and the affected areas be allowed to thaw and warm. If frostbite has progressed beyond small patches of skin and affects whole body parts such as a hand, foot, or ear, the victim should be transported to a medical facility for treatment and observation.

1.3.1 Cold Stress Monitoring

Personnel should monitor themselves and each other for signs and symptoms of frostbite and/or hypothermia. If symptoms are observed in an employee or subcontractor, steps should be taken to treat the symptoms by having the individual go to a warm environment either in a nearby structure or vehicle.

1.3.2 Cold Stress Control and Prevention

Cold stress can easily be prevented with proper planning and prevention. Some basic controls and preventative measures are listed below:

- Forecasted conditions. Consider the effect of wind chill (Table on following page).
- Dress in layers and stay dry. Avoid cotton clothing such as socks or T-shirts. Bring extra clothing.
- Wear hardhat liners and gloves. Wear rain gear in rain and snow.
- Curtail work if extreme weather conditions such as a blizzard, extreme wind chill (e.g., less than 0°F), torrential cold rains, or wind is expected.
- For long-term projects in cold environments, consider setting temporary structures with portable heaters.
- Take warming breaks as needed.
- Avoid beverages with caffeine, alcohol, or medications that restrict blood flow.
- Drink warm non-caffeine beverages such as hot chocolate or soups on breaks.

WIND CHILL FACTOR CHART												
COOLING POWER OF WIND EXPRESSED AS AN EQUIVALENT CHILL TEMPERATURE (UNDER CALM CONDITIONS)												
ESTIMATED WIND SPEED (IN MPH)	ACTUAL THERMOMETER READING (F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	EQUIVALENT TEMPERATURES (F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-21	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Winds greater than 40 MPH have little additional effect.	LITTLE DANGER			INCREASING DANGER				GREAT DANGER				
	(For properly clothed person) Maximum danger of false sense of security.			Danger from freezing of exposed flesh.								
Trench foot and immersion foot may occur at any point on this chart.												

Attachment C
Field Health and Safety Meeting Record

Field Safety and Health Meeting Record

Trainer: _____ **Date:** _____ **Time:** _____

Site: _____

Review:

- Health & Safety Plan - Buddy Teams - Hospital Route/Nearest Phone Location
- Weather Concerns - Potential Problems - Problems Previously Occurred

Protective Clothing/Equipment: _____

Special Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Emergency Actions: _____

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration - Fire Extinguisher/Communications
- First Aid Kit/Eye Wash Station - H&S Plan

Name (Print):

Signature:

Attachment D
Signature Form

Attachment E
Fugitive Dust Control Plan

**WOODROW #1H-310408-193
HYDRAULIC FRACTURING WELL**

**STATE OF ILLINOIS
HYDRAULIC FRACTURING PERMIT APPLICATION**

**FUGITIVE DUST PREVENTION
AND CONTROL PLAN**

**Prepared for Submittal to
Illinois Department of Natural Resources**

**Prepared by
Shawnee Professional Services**



**On behalf of
Woolsey Operating Company, LLC**



November 8th 2016

WOODROW #1H-310408-193 Fugitive Dust Control Plan

1.0 Introduction

This Fugitive Dust Prevention and Control Plan (FDPCP) was prepared in accordance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75) for controlling fugitive dust particles by request of Woolsey Operating Company (WOC). The purpose of the plan is to reduce short-term impacts to air quality during the mobilization, construction, and demolition activities needed to support the final design, construction, and operation of the Woodrow #1H-310408-193 Hydraulic Fracturing Well Site (Woodrow #1H). The Woodrow #1H Project includes work activities at two locations: the Woodrow #1H Well Site and the #1 Class 2 well operated by TrueFlo Solutions LLC (TrueFlo) at 987 IL Highway One. An alternate disposal site is located at the Rankin #1 well operated by Haggard Well Services near Calvin, IL. This FDPCP is submitted to the Illinois Environmental Protection Agency as Appendix X of the Hydraulic Fracturing Permit Application.

2.0 Definition

Fugitive dust is not emitted from a definable point source, but is emitted from several sources and escapes beyond the property boundary, right-of-way, or easement. In the case of the Woodrow #1H Project, fugitive dust may be emitted from the roadway, material storage piles, and other construction activities, including drilling operations and transportation activities. Other possible sources of fugitive dust and the associated dust control methods are summarized in Attachment E.1, Fugitive Dust Control Plan Matrix. This FDPCP is a tool to help prevent, reduce, control, and manage the production of fugitive dust in the project area during construction and operation. An environmental representative for Woolsey Operating Company will implement this FDPCP. This representative will be a member of the Woolsey Environmental Team listed in Table E.1. The inspection and monitoring requirements within the FDPCP are expected to fall under the responsibilities of the Woolsey Environmental Compliance Inspector (WECI), or designated representative, on fugitive dust control relative to specific work activities. The Woolsey Environmental Team recognizes that periodic review of construction activities and conditions are important to the success of implementing this plan and remaining in compliance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75). It is recognized that fugitive dust can be a nuisance that interferes with the enjoyment of life and property, and can be a safety hazard and harmful to human health or the environment. Procedures to address these issues are provided below.

2.0 Requirements for Dust Control

2.1 SITE INSPECTIONS, ASSESSMENTS, AND RECORDKEEPING: WOC staff will conduct weekly erosion control inspections (or more often as necessary, depending on rainfall) and dust control issues will be included as part of those inspections. Any observation of substantial fugitive dust will be noted as part of the regular inspections and recorded on the Fugitive Dust Control Monitoring Log (Attachment E.2). This log will also be used by the WECl to document other occurrences of fugitive dust witnessed outside of the regular inspections and any occurrences of fugitive dust reported by other construction personnel. In addition, the WECl, or other persons supervising the site, will conduct monthly effectiveness assessments of the project site, including all erosion and fugitive dust control issues.

2.2 PERSONNEL TRAINING: All project employees (including subcontractors) will be trained on the contents of this FDPCP, including potential dust sources and fugitive dust control measures, as summarized in the Fugitive Dust Control Plan Matrix (Attachment E.1). This training will occur at the start of the project. For any new subcontractors or new WOC employees that are hired, training will occur prior to starting work on-site.

2.3 GENERAL RESPONSIBILITIES FOR ON-SITE PERSONNEL: All project personnel have responsibility for fugitive dust control. Any WOC employee or subcontractor who notices fugitive dust will respond as appropriate based on their training. They will implement a defensive strategy by ceasing the activities generating the fugitive dust and immediately notify their supervisor who will respond based on his or her capabilities and who will notify the responsible Site Superintendent. The Site Superintendent will notify the WECl to complete the Self-Inspection Checklist: Fugitive Dust Control Monitoring Log (Attachment E.2), as required, to document the fugitive dust occurrence.

2.4 RESPONSIBILITIES OF THE CONSTRUCTION MANAGER: The designated person responsible for assessing fugitive dust and implementing this FDPCP at the Woodrow #1H well site with WOC. The alternate is the WECl. Incidents involving fugitive dust emissions shall be reported to the WECl.

2.5 GENERAL REQUIREMENTS: WOC is required to provide dust control measures for all areas disturbed by construction. The measures listed below will be required, as necessary, to control fugitive dust. Dust issues located outside of the project limits but identified as originating from the project will be handled similarly. Dust control will be implemented as appropriate by WOC within the project limits, regardless of whether active construction is occurring or not. Dust control is required any time dust is substantially visible in the air. Dust control will be achieved primarily through application of water, and by covering soils, stockpiled materials, and debris. The source of water may be from storm water, fire

hydrants, and/or proposed freshwater wells on the site or near the work area (as permits allow), supplied by a contracted sweeping/cleaning service, or other approved means.

2.6 ON-SITE DUST CONTROL ON UNPAVED ROADS: During mobilization, construction, operation, maintenance, and demobilization of the project, WOC will suppress dust by applying water. WOC will apply water to the active construction work area as needed and if applicable to the work site, without creating unnecessary muddy areas and problems with track-out. WOC will also construct stabilized construction entrances for ingress and egress points, such as County Road 1675 North, to prevent tracking of mud and soil onto paved roads. Use of process waters to control fugitive dust is strictly prohibited.

2.7 DUST CONTROL ON PAVED ROADS: WOC will implement the following requirements on paved roads:

- Construction entrances and exits will be established for all construction-related traffic in order to prevent tracking of mud and soil onto paved roads from the use of unstable ingress or egress points.
- Procedures for removing dirt from wheels and truck exteriors will be used, and will include a wheel wash at the entrance/exit from the site to County Road 1675 North if necessary. Dirt, dust, and debris will be removed from this area on a regular basis to prevent and minimize the transport of soils or dirt off-site.
- Spills of transported material onto public roads will be cleaned up immediately.

2.8 ON-SITE DUST CONTROL ON DISTURBED AREAS: During construction, operation, and maintenance of the project, WOC will suppress dust by applying water. WOC will apply water to active construction work areas, as needed, to control fugitive dust without creating unnecessary muddy areas and problems with track-out. Stabilization best management practices (BMPs; as listed in Attachment E.1) to be used for disturbed areas not supporting construction traffic or active work may also include vegetation, plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved. During grading, excavation, and other construction activities, water sprays will be used to keep the soil damp to minimize fugitive dust. Any trucks leaving the site locations with soils or materials that could result in fugitive dust will be covered with a tarpaulin to ensure that there are no emissions during transit. If materials are at any time stockpiled, they may be dampened by water sprays as needed or covered by secured tarpaulins to minimize fugitive dust, if necessary.

2.9 DUST CONTROL DURING DEMOLITION AND DEMOBILIZATION ACTIVITIES: Demolition and demobilization activities for the site locations will be limited to demolition and removal of site infrastructure improvements. Dust control methods during demolition activities include the same methods described above including general dust control methods, methods for disturbed areas, and unpaved roads. Additional BMPs may include the following, if necessary, to meet the general requirements listed above:

- Use of shop vacuums.
- During demolition, water will be used to dampen the area that is being demolished prior to starting the demolition. During the demolition process a water spray will be used to minimize the fugitive dust. The ground will be sprayed with water either by water truck or some type of water spray to minimize fugitive particulate emissions from haul trucks and demolition equipment.
- During the loading of trucks with demolition debris a water spray will be used to minimize fugitive particulate matter emissions. The trucks will have tarpaulins installed to cover their loads prior to leaving the site to ensure that there are no emissions while the trucks are in transit.

2.10 CONTROL OF OTHER AIR EMISSIONS: Other emission-generating activities related to operations and maintenance may include sandblasting or other abrasives, painting, and coating in contained areas shrouded either with plastic or fabric, and general operation of diesel equipment. The following BMPs may be implemented to limit unnecessary generation of air pollutants:

- Appropriate emission-control devices on equipment powered by gasoline or diesel fuel can reduce CO and NO_x emissions in vehicular exhaust. Low-sulfur diesel will be used when possible.
- Sandblasting materials will be stored inside a building.
- Non-slag (inert) sandblasting abrasives will be used when feasible.
- Sandblasting will be conducted on days when the wind will not transport the material off-site or in a confined area to limit emissions.
- Spent material will be immediately contained and disposed of at an appropriate facility.
- Lids will be kept on all containers of paints and coatings.
- Methods will be implemented for efficient paint application to reduce over spraying, including proper training for painters.
- When possible, paint types such as waterborne paints, powder coatings, ultraviolet light or electron beam curable coatings, or higher solids paints will be used.
- When possible, cleaners with low hazardous air pollutant and volatile organic compound content such as water-based, alkaline, or microbial cleaners may be used.

**Table E.1
WOC Environmental Compliance Team Duties and Responsibilities**

Team Member	Environmental Compliance Team Duties and Responsibilities
WOC Environmental Manager/ IL District Landman	
Ryan Kelley Phone: [REDACTED]	Coordinates with WECl, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECl • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:
WOC Environmental Manager/ Production Forman Illinois Basin	
Mike Lyke Phone: [REDACTED]	Coordinates with WECl, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECl • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:

**ATTACHMENT E.1
FUGITIVE DUST CONTROL PLAN MATRIX**

Potential Source	Applicable Dust Control Methods	Schedule/Rate of Application	Backup Plan
Temporary construction Haul Road (work site only)	<ul style="list-style-type: none"> • Water haul roads • Control haul routes • Control haul road speeds 	<ul style="list-style-type: none"> • As needed • Follow the Work Plan 	<ul style="list-style-type: none"> • Chemical dust suppressants or surfacing haul roads • Schedule construction trucks
Tracking	<ul style="list-style-type: none"> • Tire wash (drive-through, if needed) 	<ul style="list-style-type: none"> • Wash prior to leaving site 	<ul style="list-style-type: none"> • Wash road with water in compliance with TESC (i.e. only)

	<ul style="list-style-type: none"> Stabilized construction entrances Sweep roads 	<ul style="list-style-type: none"> Place per plan and adjust and maintain as necessary Sweep daily or as needed 	after sediment if removed)
Stockpiles	<ul style="list-style-type: none"> Cover piles Water stockpiles 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Wet stockpiles during active work
Sawing/Grinding	<ul style="list-style-type: none"> Use water assisted saws and grinders 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Use sweeper truck
Haul Trucks	<ul style="list-style-type: none"> Ensure adequate truck bed freeboard while on haul roads, including local public roads 	<ul style="list-style-type: none"> Always 	<ul style="list-style-type: none"> Cover loads on scheduled construction trucks
Grading Activities	<ul style="list-style-type: none"> Pre-wet soils before excavating Avoid activity during high winds Minimize time frames between operations Minimize areas of clearing and grubbing to manageable sizes 	<ul style="list-style-type: none"> As needed As weather dictates 	<ul style="list-style-type: none"> Post-wetting
Rain/Wind	<ul style="list-style-type: none"> Keep cleared areas covered for major rain/wind events During dry weather, spray exposed soil with water 	<ul style="list-style-type: none"> Prevent the mud-to-dust scenario 	<ul style="list-style-type: none"> Use sweeper truck
Exposed Soils	<ul style="list-style-type: none"> Apply BMPs such as: plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved 	<ul style="list-style-type: none"> For all areas not being worked and that contain erodible soils 	<ul style="list-style-type: none"> N/A

**ATTACHMENT E.2
SELF-INSPECTION CHECKLIST: FUGITIVE DUST CONTROL MONITORING LOG**

Date/Time	Location	Fugitive Dust Source	Control Method	Comments

*May be copied as needed

Attachment F
Respiratory Protection Program

Woolsey Operating Company Respiratory Protection Program

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1. General

It is necessary to protect employees who may be exposed to harmful mists, smoke, vapors, etc. or to an oxygen enriched or deficient atmosphere. Whenever possible, engineering controls should be utilized to provide this protection. When engineering controls are not possible, respiratory protection must be provided and used.

2. Purpose

Any person required to wear a respirator on the job needs instruction and training prior to using the equipment. In part, the training should include the nature, extent, and effects of the respiratory hazards to which a person may be exposed as well as signs and symptoms of exposure. Before a person is required to wear a respirator on the job, a determination should be made that he/she is physically fit and able to wear a respirator. The respiratory protective program should be evaluated annually to determine its effectiveness.

3. Definitions

Air Purifying Respirator – means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned Protection Factor – means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by OSHA 29 CFR 1910.134

Atmosphere Supplying Respirator – means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or Cartridge – means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Demand Respirator – means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

Emergency Situation – means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Employee Exposure – means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

End-of-service-life indicator (ESLI) – means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only Respirator – means a respirator intended to be used only for emergency exit.

Filter or Air Purifying Element – means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering Facepiece (Dust Mask) – means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit Factor – means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit Test – means the use of protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual

Helmet – means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High Efficiency Particulate Air (HEPA) Filter – means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter.

Hood – means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulder and torso.

Immediately Dangerous to Life and Health (IDLH) – means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Loose-fitting facepiece – means a respiratory inlet covering that is designed to form a partial seal with the face.

Negative Pressure Respirator – means a respirator in which the pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen Deficient Atmosphere – means an atmosphere with an oxygen content below 19.5% by volume.

Oxygen Enriched Atmosphere – means an atmosphere with an oxygen content above 23.5% by volume.

Positive Pressure Respirator – means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Qualitative Fit Test – means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative Fit Test – means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator

Self-Contained Breathing Apparatus (SCBA) – means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Supplied Air Respirator – means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

User Seal Check – means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

4. Responsibilities

Management will:

- a. Assist in determining if respiratory protection is needed
- b. Assist in the selection of appropriate respiratory protection
- c. Provide fit testing and respirator training
- d. Monitor program compliance

The department supervisors will:

- a. Determine if respiratory protection is needed
- b. Identify employees requiring respiratory protection
- c. Provide proper respirators
- d. Maintain fit test and training records

The employee will:

- a. Use the respirator in accordance with guidelines described in this policy
- b. Inform his/her supervisor if a respirator is lost or damaged
- c. Report to his/her supervisor any illness or change in physical condition that may interfere with the safe use of a respirator

5. Respirator Selection

Respiratory protection is only as good as the respirator in use. Therefore, it is very important to select the right respirator for the right job. The selection of a respirator will be made in accordance with the most current ANSI Z88.2 standard. Only respirators which are approved by NIOSH/MSHA or the U.S. Department of Interior, Bureau of Mines should be used.

a. Selection Considerations

The selection of a respirator is dependent on many factors.

- i. The characteristics of the hazardous operation:
 1. Work area characteristics
 2. Materials used
 3. Worker activities
- ii. The nature of the respiratory hazard:
 1. Type of hazard: a contaminant or an oxygen deficient atmosphere
 2. Physical and chemical properties of the contaminant
 3. Physiological effects on the body
 4. Actual concentration of the contaminant (as determined by sampling or actual knowledge of the concentration) established Permissible Exposure Limits (PELs) or Threshold Limit Values (TLVs)
 5. Immediately Dangerous to Life and Health (IDLH) concentration
 6. Warning properties of the contaminant

iii. The location of the hazardous area in relation to the nearest area having respirable air; this needs to be considered when planning for:

1. Emergency escape
2. Entry of workers
3. Rescue operations

iv. The period of time for which respiratory protection must be provided:

1. Routine use
2. Emergency use

v. The activities of workers in the hazardous area:

1. Light, medium, or heavy work rate
2. Intermittent or continuous work

vi. The physical characteristics, functional capabilities, and limitations of the various respirators: (certain conditions require a specific respirator)

1. An oxygen deficient atmosphere requires use of a respirator which provides an independent, respirable atmosphere, a Self-Contained Breathing Apparatus (SCBA) or airline; for breathing purposes, air must contain at least 19.5% oxygen; less than 19.5% oxygen is considered to be oxygen deficient.
2. An IDLH atmosphere requires use of a SCBA or an airline respirator with continuous flow and escape provisions.

vii. Respirator protection factor

1. A measure of the degree of protection which is provided by a respirator
2. Based on the concentration of the contaminant outside the mask divided by the concentration found inside the mask
3. Helps determine maximum concentration of the contaminant in which a particular respirator can be used
4. Takes into account the capabilities and limitations of the type of respirator

For example: the protection factor for a half-face piece air purifying respirator is 50; with proper cartridges, etc., this type of respirator is suitable in an atmosphere that contains a contaminant at a concentration that is 50 times higher than the TLV or PEL

b. Respirator Descriptions

There are many types of respirators. Respirators can be classified according to whether they use an air source or the ambient air; whether they operate under a negative or positive pressure; and the configuration of the mask. See Figure 1 for respirator illustrations.

i. Supply Air Respirators:

Self-contained breathing apparatus (SCBA)

1. Use supply air from a cylinder carried by the user airline
2. Use supply air from a source which is located away from the user

3. Require a compressor or cylinder(s) and an airline hose and must be used in an oxygen deficient atmosphere.

ii. Air Purifying Respirators:

1. Use ambient air; cannot be used in an oxygen deficient atmosphere.
2. Purify the ambient air by use of a chemical cartridge or canister, or a particulate filter.
3. Powered air-purifying respirators (PAPRs) operate in a positive-pressure continuous-flow mode utilizing filtered ambient air

iii. Disposable or single use respirators:

1. Cloth or paper construction
2. Primarily used as a particulate filter for nuisance dusts

iv. Air Flow:

Positive pressure respirators maintain positive pressure in the face piece during both inhalation and exhalation. Negative pressure respirators draw air into the face piece by the negative pressure created by inhalation (these are demand type respirators).

1. Pressure-demand respirators maintain the mask's positive pressure except during high breathing rates.
2. Continuous-flow respirators send a continuous flow of air into the mask at all times.

MASKS

Full facepiece mask covers the face from the hairline to below the chin; this type of mask does provide eye protection.

Half mask covers the face from above the nose to below the chin; this type of mask does not provide eye protection.

Quarter mask covers the face from above the nose to above the chin; this type of mask does not provide eye protection



Figure 1: Types of Respiratory Protection

c. Different Protection for Different Hazards

i. Filter respirators

1. Provide protection against particulate matter such as dust, fumes, mists, smoke, microorganisms, and asbestos.
2. Do not provide protection against chemical vapors or gases, or oxygen deficiency.

ii. Chemical cartridge/canister respirators

1. Provide protection against certain gases and vapors up to a particular concentration.
2. Do not provide protection against oxygen deficiency or particulate matter.

iii. Air supply respirators

1. Dependent on the type, can provide protection against particulates, chemical vapors and gases, as well as oxygen deficiency.

d. Selection Guidelines

To aid in the selection of an appropriate respirator consider the following:

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- iv. If the contaminant is of a biological nature, e.g., a spill of viable bacteria, a High Efficiency Particulate Air (HEPA) filter respirator must be used.
 - v. Identity and concentration of the contaminant should be known in order to select a respirator.
 - vi. If the identity and concentration of the contaminant is not known, then an air supply respirator must be used.
 - vii. When the identity and concentration is known, a respirator must be selected with a protection factor that is high enough to ensure that the user will not be exposed to a chemical level in excess of the PEL or TLV.
 - viii. If an oxygen deficient atmosphere is known or suspected to be present, an air supply respirator must be used.
 - ix. If an IDLH condition exists, an air supply respirator must be used.

Respirators are available in different sizes; the correct size for the wearer will be determined by a fit test (See Fit Testing Section).

If it is possible that an airline could be damaged or degraded by chemicals, then an SCBA should be used instead of an airline respirator.

6. Inspection

Prior to and after each use, the respirator should be inspected to ensure that it is in good operating condition. Inspect a respirator that is stored for emergency or rescue use at least monthly. A respirator inspection should be tailored to the type of respirator, as follows:

a. Disposable Respirators

1. Integrity of the filter - check for holes or tears
2. Elastic strips - check for loss of elasticity, tears, etc.
3. Metal nose clip - check for breakage

b. Air Purifying Respirators

i. Rubber face piece, check for:

1. Excessive dirt
2. Cracks, tears, or holes
3. Distortion from improper storage
4. Cracked, scratched or loose fitting lens
5. Broken or missing mounting clips
6. Worn threads in filter holder
7. Missing or worn gaskets in filter holder

ii. Head straps, check for:

1. Breaks
2. Loss of elasticity
3. Broken or malfunctioning buckles or attachments

iii. Inhalation and Exhalation Valve, check for:

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1. Detergent residue, dust particles, dirt
 2. Cracks, tears, or distortion
 3. Missing or defective valve cover

iv. Chemical canisters and/or particulate filters, check for:

1. Proper filter or canister for the hazard
2. Approval designation
3. Worn threads on filter housing
4. Cracks or dents in the filter housing
5. Deterioration of harness (gas mask canister)
6. Service life indicator, expiration date (if applicable)

v. Corrugated breathing tube (gas masks), check for:

1. Cracks
2. Missing or loose hose clamps
3. Broken or missing connectors

c. Atmosphere Supplying Respirators

i. Check facepiece, head straps, valves, and breathing tube as described for air purifying respirators

ii. Hood, helmet, blouse, or full suit (if applicable), check for:

1. Rips and torn seams
2. Headgear suspension
3. Cracks or breaks in face shield

iii. Air supply system, check for:

1. Low volume of air cylinders
2. Incorrect gas in cylinders
3. Breaks or kinks in air supply hoses and end fitting attachments
4. Loose connections
5. Improper setting of regulators and valves (consult manufacturer recommendations)
6. Incorrect operation of air purifying elements and carbon monoxide
7. High temperature alarms (for air compressors)

iv. Self-contained breathing apparatus (SCBA), check for:

1. Air or oxygen cylinders that may not be fully charged according to manufacturer's instructions

7. Cleaning and Disinfecting

Proper maintenance of respirator equipment is essential to ensure its effectiveness. Whenever possible, each individual should be assigned a respirator for his/her exclusive use. Proper cleaning of a respirator reduces the potential for contamination and dermatitis.

Proper cleaning guidelines include:

- a. Frequently clean and disinfect personal respirators
- b. Thoroughly clean and disinfect shared respirators between users
- c. Clean and disinfect emergency use respirators after each use
- d. Ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

Procedure for Cleaning Respirator:

- i. Remove filters, cartridges, or canisters. Disassemble facepiece by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- ii. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- iii. Rinse components thoroughly in clean, warm, preferably running water. Drain.
- iv. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 1. Hypochlorite solution (chlorine) made by adding approximately one milliliter of laundry bleach to one liter of warm water; or,
 2. Aqueous solution of iodine made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of warm water; or,
 3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- v. Rinse components thoroughly in clean, warm preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepiece may result in dermatitis. In addition, some disinfectants may cause premature deterioration of rubber or corrosion of metal parts if not completely removed.
- vi. Components should be hand-dried with a clean lint-free cloth or air-dried.
- vii. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
- viii. Test the respirator to ensure that all components work properly.

8. Storage

Respirators need to be stored properly to prolong their life and to maintain their effectiveness.

- a. Do not store around dust, sunlight, heat, extreme cold, excessive moisture, and chemicals.

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- b. Do not store respirators unprotected in lockers or tool boxes.
 - c. Store respirators with the facepiece and exhalation valve resting in a normal position.
 - d. Routinely used respirators may be placed in plastic bags.
 - e. Store emergency use respirators in an accessible, clearly marked compartment.

9. Proper Use of Equipment

It is essential that a person who is required to wear a respirator be informed and made aware of conditions and factors which might interfere with a respirator's performance. Listed below are some Do's and Don'ts regarding respirator use:

a. DO

- i. Make sure you have the correct respirator for the job.
- ii. Have an additional person present in dangerous atmospheres.
- iii. Determine a means of communication between respirator wearers prior to using the respirators in the field (hand signals are acceptable).
- iv. Use a respirator which has been approved by NIOSH/MSHA or U.S. Department of Interior, Bureau of Mines.
- v. Check a respirator each time before use.
- vi. Shave (if applicable) before wearing a respirator.
- vii. Be aware that some contaminants may enter or damage the body by means other than the respiratory tract (protective clothing may be required).
- viii. Return to fresh air if: the canisters or cartridges need replacing; you feel nauseous, dizzy, or ill; or if you experience difficulty breathing.
- ix. Wear eye protection if the contaminant concentration causes eye irritation (a full facepiece respirator may be used).
- x. Be aware that some environmental conditions can compromise a respirator's performance, i.e. high temperatures can cause a person to sweat, breaking the face to facepiece seal; freezing temperatures can ice clog an exhalation valve and regulator; at high breathing rates, positive pressure may not be maintained in positive pressure SCBAs.
- xi. Be alert to signs and symptoms of heat stress.

b. DON'T

- i. Remove a respirator in a contaminated atmosphere.
- ii. Use a respirator without the proper training.
- iii. Talk unnecessarily or chew gum while wearing a respirator.
- iv. Overexert yourself.
- v. Wear contact lenses while using a respirator.
- vi. Mistakenly use a filter respirator for protection against gases or vapors.
- vii. Allow hair or temple bars from glasses to pass between the face and facepiece of the respirator.

10. Air Purifying Respirators

Air purifying respirators remove specific contaminants from the air by passing the air through a filter, cartridge, or canister. Air purifying respirators are limited in the protection they provide, so it is necessary to understand their limitations, how to select the correct type, and how to use them.

a. Limitations of Air Purifying Respirators

The following limitations must be considered when using an air purifying respirator:

- i. Cannot be used in atmospheres containing less than 19.5% oxygen.
- ii. Cannot be used in IDLH atmospheres (except escape gas masks).
- iii. Cannot be used when the identity of the contaminant is not known.
- iv. Cannot be used when contaminant concentrations are unknown or when established maximum levels have been exceeded.
- v. Proper cartridge must be selected for the contaminant.
- vi. Relative humidity might reduce the effectiveness of the sorbent.
- vii. Cartridges/canisters should only be used for chemicals having adequate warning properties (odor, taste, or irritant effects are detectable below the TLV or PEL) or the cartridge/canister has an approved end-of-service-life indicator.
- viii. Cartridges/canisters are specific to the brand of respirator (e.g. 3M cartridges must be used with a 3M mask).

b. Classes of Air Purifying Respirators

- i. Disposable dust respirators
 1. Made of cloth or paper
 2. NIOSH/MSHA approved dust respirators provide protection against nuisance dusts (i.e. a TLV of 10 mg/cubic meter or greater)
 3. difficult to fit test and to obtain a good facepiece-to-face seal
- ii. Mouthpiece respirators
 1. Approved for escape only
 2. Mouthpiece held by teeth; clamp used to close nostrils
 3. Only used when hazard is identified and respirator is approved for that hazard
- iii. Quarter mask respirator
 1. Used with cartridges or particulate filters
 2. Not suitable for protection against dusts with TLVs less than 0.05 mg/cubic meter
- iv. Half mask respirator
 1. Uses one or two cartridges
 2. Approved for vapors, dusts, fumes, mists, gases, and combinations thereof
- v. Full-face mask respirator

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1. Provides more protection than half mask respirators (e.g. eye protection and a higher protection factor)
 2. Approved for same contaminants as half mask respirators, but at higher concentrations

vi. Powered respirators

1. Have no breathing resistance
2. Can be used with half masks, full-face masks, and helmets

c. Air Purifying Element Considerations

Air purifying elements must be properly selected, stored, maintained, and replaced in order to provide adequate protection to the user.

i. Canisters

1. Remove vapors and gases from the air
2. Have a large sorbent volume and provide protection against higher concentrations of vapors and gases
3. A component of gas masks

ii. Cartridges

1. Contain less sorbent than a canister
2. Lifetime is short

iii. Cartridge selection

1. Cartridges are color-coded to indicate the contaminants which they protect against
2. The cartridge selected must be made by the same manufacturer and be compatible with the respirator in use.
3. Chemical and HEPA filter cartridges can be combined to provide protection against particulates and gases and vapors.
4. Some cartridges can be combined to provide protection against more than one chemical.
5. If a worker is exposed to two or more chemicals and a combination cartridge is not available, then a supply air respirator should be used.

d. Cartridge/Canister must be replaced if any of the following conditions occur:

- i. Cartridge/canister develops an uncomfortably high temperature (due to chemical absorption reaction)
- ii. Wearer detects an odor or taste, or feels eye or throat irritation
- iii. Shelf-life date is expired
- iv. The end-of-service-life indicator changes color (if applicable)
- v. Cartridge/canister becomes wet or is grossly contaminated
- vi. Physical damage is noticed

vii. In addition, it is recommended to replace the cartridge/canister at the end of each day, especially if the respirator is not stored properly (clean and bagged to prevent exposure to humidity and chemical vapors).

e. Filters (HEPA Cartridges, Dust Pads, or Disposable Dust Respirators) must be replaced if any of the following conditions occur:

- i. Breathing becomes difficult
- ii. Filter or dust respirator becomes physically damaged (tears, holes, etc.)
- iii. Filter or dust respirator is visibly dirty
- iv. Filter or dust respirator becomes wet
- v. The inside of the dust respirator becomes contaminated
- vi. In addition, disposable dust respirators should be disposed of after use

11. AIR SUPPLY RESPIRATORS

Air supply respirators require a separate source for breathing air, this source could be a cylinder which is carried by the user (self-contained breathing apparatus), a compressor or cylinders which provide air to the user from a distant location via an airline (airline device), or breathing air from a distant location which is directed to the user via a hose (hose mask).

a. Self-Contained Breathing Apparatus (SCBA)

There are two basic designs of self-contained breathing apparatus (SCBA):

- i. Closed circuit
 1. a.k.a. "re-breather"
 2. Mixes oxygen with exhaled breath which has had the carbon dioxide removed by a scrubber
 3. Have a longer service time than open circuit SCBA (1-4 hr use)
 4. During inhalation, a negative pressure is present in the facepiece
 5. Generally not acceptable for use in atmospheres immediately dangerous to life and health
 6. Not commonly used.
- ii. Open circuit
 1. Most common type used
 2. Requires a supply of compressed breathing gas (almost always air, but can be oxygen) which is in a cylinder carried on the user's back
 3. If using compressed oxygen, it CANNOT be used in a device designed for compressed air
 4. Air is exhaled, not recycled
 5. Amount of air is limited: generally allows for 30 or 60 minutes of air; 5 minute units are available for escape purposes
 6. Air must meet at least Grade D specifications

7. Consists of: cylinder, high-pressure hose, alarm, regulator, breathing hose, facepiece, backpack and harness

8. Principle of operation: air from a cylinder passes through a regulator where pressure is reduced, then through the breathing tube and into the facepiece where it is inhaled by the user

9. Function in one of two modes of operation: demand and pressure demand

10. Demand: air flows into facepiece only when user inhales; during inhalation there is a negative pressure inside the facepiece which could allow contaminants inside if a leak would develop; should not be used in atmospheres immediately dangerous to life and health

11. Pressure demand: maintains a positive pressure in the facepiece at all times; if a leak would develop in the facepiece, contaminants would not enter and harm the user; should be used in atmospheres immediately dangerous to life and health.

b. Airline Device

Airline devices deliver air to the wearer via a high pressure airline hose up to 300 feet in length. The air source can be a compressor or compressed air cylinders, thereby allowing longer use time than SCBAs. These devices can be equipped with a half or full-face mask, helmet, hood, or a complete suit. Airline devices cannot be used in atmospheres immediately dangerous to life and health because of the dependence on the air source and airline, which may become impaired. There are three types of airline devices:

i. Demand

1. Air only enters the facepiece when wearer inhales
2. A negative pressure is present in the facepiece during inhalation

ii. Pressure demand

1. Air flows continuously into facepiece
2. A positive pressure is maintained in the facepiece
3. Provides more protection than the demand type device

iii. Continuous flow

1. Uses an airflow control valve or orifice instead of a regulator
2. Air flows continuously into facepiece
3. A positive pressure is maintained in the facepiece

c. Hose Mask

i. Hose masks allow air to the wearer via a large diameter hose, but do not use compressed air.

ii. Hose masks are not widely used.

iii. The hose extends to a non-contaminated air space.

iv. The user either breathes with the aid of a blower or breathes against the resistance to airflow in the hose.

v. Depending on the manufacturer, a hose mask with a blower may have a hose length up to 300 feet and may have a facepiece, helmet, or hood.

vi. Depending on the manufacturer, a hose mask without a blower may have a hose length up to 75 feet and must have a tight fitting facepiece.

vii. With or without a blower, hose masks cannot be used in atmospheres immediately dangerous to life and health.

d. Limits of Air Supplying Respirators

The following limitations must be considered when using an air supply respirator:

i. SCBA

1. These respirators are bulky and heavy and may not be suitable for strenuous work or for working in constricted spaces
2. The use time is limited by the amount of air contained in the cylinder (normally 30 or 60 minutes)
3. The air in the cylinder must be at least Grade D as determined by the compressed Gas Association Commodity Specification for Air, G-7.1
4. Heat stress and worker fatigue need to be considered

ii. Airline device

1. The air supply line restricts the wearer's mobility
2. Protection may be lost due to: cutting, kinking, or crushing of the air supply line; air compressor failure; the depletion of the air in the cylinder(s)
3. Only an airline device with an additional self-contained air supply (which can be used for escape) is allowed for atmospheres that are immediately dangerous to life and health
4. If using a compressor: it must be located in a safe, non-contaminated environment; it must be equipped with in-line air purifying sorbent beds and filters; it must have alarms to indicate compressor failure and overheating; it must have an alarm that indicates the presence of carbon monoxide or the air must be tested for carbon monoxide
5. If using a cylinder(s): it must be tested and maintained as prescribed by the Department of Transportation (49 CFR 178); it must be marked in accordance with ANSI Z48.1-1954 or other applicable standard
6. Airline couplings must be incompatible with outlets for other gas systems

iii. Hose mask

1. Cannot be used in atmospheres immediately dangerous to life and health
2. The air supply hose limits mobility
3. The hose mask without a blower is limited to a 75 foot hose and the wearer must inhale against resistance to airflow which can cause worker fatigue
4. Source of contaminant free breathing air must be nearby

e. Donning a SCBA

There are different methods to don an SCBA. The wearer needs to find a method that feels comfortable. The following describes one method (from the Fire Protection Training Division, Texas Engineering Extension Service) which can be used to don a SCBA:

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- i. Remove SCBA from the case, open cylinder valve and check the air pressure.
 - ii. Position the SCBA with the cylinder down, arms toward the wearer, and cylinder control valve pointing toward the body (the SCBA can be placed on the ground or preferably on a table).
 - iii. Grasp shoulder strap on which the regulator is mounted with the right hand.
 - iv. Pick up SCBA, place left arm through the strap supported by the right hand, placing strap on left shoulder.
 - v. Remove right hand from the left shoulder strap, place right arm into the remaining strap.
 - vi. Grasp both shoulder straps near the shoulders and complete positioning of the SCBA, lock snaps, and adjust the straps.

f. The following method can be used to don the face mask:

- i. Position the adjustable straps (fully extended) to the outside of the mask
- ii. Place hands between the straps and the mask, with the straps laying on the back of the hands
- iii. Place mask on the face, inserting chin first, working the mask up on the face
- iv. Raise hands away from the mask, continue movement around the sides of the face until the straps are in place
- v. Adjust straps until the mask fits tightly on the face (this is done by pulling the straps straight back toward the ears), the bottom straps should be adjusted first
- vi. Test the mask by holding the end of the air tube against the palm of the hand, inhale, if a leak is noted, readjust the straps

g. Care and Use of an SCBA

In addition to the general requirements found in the Proper Use of Respirator Equipment and Proper Care of Respirator Equipment sections, there are specific requirements and considerations which must be followed by all SCBA wearers.

- i. OSHA requires that SCBA used for emergency use be inspected once a month and records must be maintained of the inspection.
- ii. NIOSH recommends all stored SCBA's be inspected weekly.
- iii. After each use, air or oxygen cylinders should be fully charged according to the manufacturer's instructions.
- iv. Determine at least monthly that the regulator and warning devices on the SCBA function properly.
- v. Follow the "Use and Care" instructions for the SCBA which are usually mounted inside the carrying case lid.
- vi. Frequently monitor the pressure gauge on the SCBA which indicates the volume of air remaining in the cylinder.
- vii. Warning devices will signal an alarm when 20-25% of service time remains.

12. Respirator Use in Dangerous Atmospheres

Only full-face pressure demand respirators are acceptable for use when toxic or oxygen deficient atmospheres may be present or if the identity of the contaminant is unknown. Personnel who may encounter dangerous atmospheres in normal operations or emergencies must be familiar with the following procedures:

- a. One additional person must be present in areas where, if a respirator fails, the respirator wearer could be overcome by a toxic or oxygen deficient atmosphere.
- b. Communications must be maintained between the individuals present; the communications can include visual, voice, or signal line.
- c. An additional person equipped with rescue equipment including a SCBA must be in a nearby safe area where he can assist the others in case of an emergency.
- d. When a SCBA is used in an atmosphere immediately dangerous to life and health, standby personnel must be present with rescue equipment.
- e. Any respirator wearers in an atmosphere immediately dangerous to life and health must be equipped with safety harnesses and safety lines so they can be removed if they are overcome.

13. Fit Testing

There is not one style or size of respirator available which will properly fit every person who needs to wear one. This is why it is so important that every respirator be fit tested before it is used. The OSHA Standard, 29 CFR 1910.134 states that respirators shall be fitted properly and shall be tested for their facepiece-to-face-seal. Fit testing can be accomplished by one of two methods: quantitative or qualitative. Both methods are described below.

a. Quantitative Fit Test

This method of fit testing is very accurate, but costly. This method exposes the respirator wearer to a test atmosphere, e.g. an aerosol, vapor, or gas. An instrument is used to measure the test atmosphere as well as the air inside the respirator. A quantitative fit factor is calculated which indicates how well the respirator fits the wearer. This test is expensive and requires highly trained personnel to administer.

b. Qualitative Fit Test

This method of fit testing is inexpensive, fast, and easily performed. It is the most commonly used method. The test atmosphere is an easily detected substance such as isoamyl acetate (banana oil) and/or an irritant smoke. The respirator used for the test must provide protection against the test substance (e.g. an organic vapor chemical cartridge must be used for the isoamyl acetate and a HEPA cartridge must be used for the irritant smoke test). Please note:

- i. Disposable dust masks cannot be fit tested.
- ii. Refer to the Respirator Training and Fit Test Form (Figure 3).
- iii. Test will be performed annually or when a different respirator is used.
- iv. Records must be kept for every fit test performed.

The qualitative fit test involves having the test subject don a respirator, exposing the employee to the test substance, requiring him to perform some task (such as reciting the

alphabet), moving head from side to side and determining whether the test subject can detect the test substance:

1. If the test substance is detected, then the respirator does not fit well and the test is repeated after some adjustments have been made to the respirator, or a new respirator may be tested.
2. If the test substance is not detected, then a satisfactory fit is assumed to be achieved.

14. Training

Any person assigned a task requiring respiratory protection must receive adequate training regarding the safe and proper use of the respirator. This training should include the following:

- a. Reasons for the need for respiratory protection
- b. Nature, extent and effects of respiratory hazards to which the person may be exposed
- c. Selection of appropriate respirator for the hazard
- d. Explanation of the operation, capabilities, and limitations of the selected respirator
- e. Instructions in inspecting, donning, fit testing and wearing the respirator
- f. Directions for maintenance and storage of the respirator
- g. Hands-on training to allow actual handling of the respirator
- h. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- i. Choose respirators certified for use to protect against the contaminant of concern. A label or statement of certification should appear on the respirator or respirator packaging.
- j. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against.
- k. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

RESPIRATOR TRAINING COMPLETION FORM

Company: _____

Location: _____

Fit Test Conducted By: _____
(Print) (Signature)

Name: _____

Signature: _____

	SCBA Size: S M L Brand: Model:	Cartridge Full-face Size: S M L Brand: Model:	Cartridge Half-face Size: S M L Brand: Model:
1. I understand why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.			
2. I understand what the limitations and capabilities of the respirator are.			
3. I understand how to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.			
4. I understand how to inspect, put on and remove, use, and check the seals of the respirator.			
5. I understand what the procedures are for maintenance and storage of the respirator.			
6. I wore this respirator equipment in a test atmosphere generated by smoke or other means.			
7. I know how to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.			

15. Medical Evaluations

Woolsey will provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. Administration of the medical questionnaire and examination shall be provided confidentially during the employee's normal working hours or at a time and place convenient to the employee.

a. Initial medical examination procedures

- i. Woolsey has designated ____TBD____ as the PLHCP.
- ii. ____TBD____ will use the OSHA Respirator Medical Evaluation Questionnaire and Physician Approval Form (refer to Appendix A).

b. Follow-up medical examinations

- i. The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of the OSHA Respirator Medical Evaluation Questionnaire or whose initial medical examination demonstrates the need for a follow-up medical examination.
- ii. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

c. Additional medical examinations

At a minimum, the employer shall provide additional medical evaluations if:

- i. employee reports medical signs or symptoms that are related to ability to use a respirator;
- ii. A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- iii. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- iv. A change occurs in workplace conditions that may result in a substantial increase in the physiological burden placed on an employee.

Woolsey will discontinue the employee's medical evaluations when the employee is no longer required to use a respirator.

APPENDIX A
OSHA Respirator Medical Evaluation
Questionnaire
And
Physician Approval Form

OSHA Respirator Medical Evaluation Questionnaire (Appendix C to 29 CFR 1910.134)

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1 (Mandatory): The following information must be provided by every employee who has been selected to use any type of respirator (please print).

Can you read?Yes No

Date: _____

Name: _____

Age: _____ Height: _____ Weight: _____ Sex: Male Female

Job title: _____

A phone number where you can be reached by the licensed health care professional (LHCP) who is reviewing this questionnaire (include area code): _____

What is the best time to reach you at this number: _____ a.m. _____ p.m.

Has your employer told you how to contact the LHCP reviewing this questionnaire:Yes No

What type of respirator will you use? (select all that apply):

a. N, R or P disposable respirator (filter-mask, non-cartridge type only)

b. Half or full-face type, powered air-purifying, self-contained breathing apparatus or supplied air

Have you ever worn a respirator?Yes No

If "yes", what type(s)? _____

Part A. Section 2 (Mandatory): Every employee selected to use any type of respirator must answer questions 1 through 9 below (please select yes or no).

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month?Yes No

2. Have you *ever* had any of the following conditions?

a. Seizures (fits).....Yes No

b. Diabetes (sugar disease).....Yes No

c. Allergic reactions that interfere with your breathingYes No

d. Claustrophobia (fear of closed in places).....Yes No

e. Trouble smelling odorsYes No

3. Have you *ever* had any of the following pulmonary or lung problems?

a. AsbestosisYes No

b. SilicosisYes No

c. AsthmaYes No

d. Pneumothorax (collapsed lung)Yes No

- e. Chronic bronchitis Yes No
- f. Lung cancer Yes No
- g. Emphysema Yes No
- h. Broken ribs..... Yes No
- i. Pneumonia Yes No
- j. Any chest injuries or surgeries Yes No
- k. Tuberculosis Yes No
- l. Any other lung problem that you have been told about Yes No

4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?

- a. Shortness of breath Yes No
- b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline
..... Yes No
- c. Shortness of breath when walking with other people at an ordinary pace on level ground
..... Yes No
- d. Have to stop for breath when walking at your own pace on level ground Yes No
- e. Shortness of breath that interfered with your job Yes No
- f. Shortness of breath when washing or dressing yourself Yes No
- g. Coughing that produces phlegm Yes No
- h. Coughing that wakes you early in the morning Yes No
- i. Coughing that occurs mostly when you are lying down Yes No
- j. Coughing up blood in the last month Yes No
- k. Wheezing Yes No
- l. Wheezing that interferes with your job Yes No
- m. Chest pain when you breathe deeply Yes No
- n. Any other symptoms that you think may be related to lung problems Yes No

5. Have you *ever* had any of the following cardiovascular or heart problems?

- a. Heart attack Yes No
- b. Stroke Yes No
- c. Angina Yes No
- d. Heart failure Yes No

- e. Swelling in your legs or feet (not caused by walking) Yes No
- f. Heart arrhythmia (irregular heart beat) Yes No
- g. High blood pressure Yes No
- h. Any other heart problems that you have been told about Yes No

6. Have you *ever* had any of the following cardiovascular or heart symptoms?

- a. Frequent pain or tightness in the chest Yes No
- b. Pain or tightness in the chest during physical activities Yes No
- c. Pain or tightness in the chest which interfered with your job Yes No
- d. Have you noticed you heart skipping or missing a beat in the last 2 years Yes No
- e. Heartburn or indigestion that is not related to eating Yes No
- f. Any other symptoms that you think may be related to heart or circulation problems Yes No

7. Do you *currently* take medication for any of the following problems?

- a. Breathing or lung problems Yes No
- b. Heart trouble Yes No
- c. Blood pressure Yes No
- d. Seizures (fits) Yes No

8. If you have used a respirator, have you *ever* had any of the following problems? (If you have *never* used a respirator continue to question 9)

- a. Eye irritation Yes No
- b. Skin allergies or rashes Yes No
- c. Anxiety Yes No
- d. General weakness or fatigue Yes No
- e. Any other problem that interferes with your respirator use Yes No

9. Would you like to discuss your answers with the health care professional who will review your questionnaire Yes No

Questions 10 – 15 must be answered if you will use either a self-contained breathing apparatus (SCBA) or full-face respirator.

10. Have you *ever* lost vision in either eye temporarily or permanently Yes No

11. Do you *currently* have any of the following vision problems?

- a. Wear contact lenses Yes No
- b. Wear glasses Yes No

-
- c. Color blind Yes No
- d. Any other eye or vision problem Yes No
12. Have you ever had an injury to your ears, including a broken ear drum?..... Yes No
13. Do you currently have any of the following hearing problems?
- a. Difficulty hearing Yes No
- b. Wear a hearing aid Yes No
- c. Any other hearing or ear problems Yes No
14. Have you ever had a back injury? Yes No
15. Do you currently have any of the following musculoskeletal problems?
- a. Weakness in any of your arms, hands, legs, or feet Yes No
- b. Back pain Yes No
- c. Difficulty fully moving your arms or legs Yes No
- d. Pain or stiffness when you lean forward or backward at the waist Yes No
- e. Difficulty fully moving your head up and down Yes No
- f. Difficulty fully moving your head side to side Yes No
- g. Difficulty bending at your knees Yes No
- h. Difficulty squatting to the ground Yes No
- i. Climbing a flight of stairs or ladder with 25 pounds..... Yes No
- j. Any other muscle or skeletal problem that interfered with using a respirator Yes No

Part B. Section 1. The health care professional who will review this questionnaire may add these questions and any other questions not listed at their discretion.

1. In your job are you working at high altitudes (5,000 ft.) or in a place that has lower than normal amounts of oxygen Yes No

If "yes", do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you are working under these conditions Yes No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g. gases, fumes, or dust), or have you come into contact with hazardous chemicals Yes No

If "yes", name the chemicals if you know them:

3. Have you ever worked with any of the materials, or under any of the conditions listed below?

- a. Asbestos Yes No
- b. Coal (for example, mining) Yes No

- c. Silica (e.g. sandblasting) Yes No
- d. Iron Yes No
- e. Tungsten/cobalt (grinding or welding this material) Yes No
- f. Tin Yes No
- g. Dusty environments Yes No
- h. Beryllium Yes No
- i. Any other hazardous exposures Yes No
- j. Aluminum Yes No

If "yes", describe the exposure(s):

4. List any second jobs or side businesses you have:

5. List your previous occupations:

6. List your current and previous hobbies:

7. Were you ever in the military service? Yes No

If "yes", were you exposed to biological or chemical agents (training or combat)? Yes No

8. Have you ever worked on a HAZMAT team? Yes No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications) Yes No

If "yes", name the medications:

Part B. Section 2. Supplemental information for the health care professional filled out by the employer.

10. Will the employee use any of the following items with your respirator?

a. HEPA filter Yes No

b. Canisters (i.e. gas masks) Yes No

c. Cartridges Yes No

11. How often will the employee use the respirator(s)? Mark all that apply

a. Escape only (no rescue) Yes No

b. Less than 2 hrs. per day Yes No

c. Emergency rescue only Yes No

d. 2 to 4 hrs. per day Yes No

e. Less than 5 hrs. per week Yes No

f. Over 4 hrs. per day Yes No

12. When the employee uses the respirator(s), is their work effort:

a. Light (less than 200 kcal per hour) Yes No

If "yes", how long does this period last per shift _____ hrs. _____ min.

Examples of light work are sitting while writing, typing, drafting, performing light assembly work, or standing while controlling machines

b. Moderate (200 to 350 kcal per hour) Yes No

If "yes" how long does this period last per shift _____ hrs. _____ min.

Examples of moderate work are sitting while nailing or filing, driving a truck, drilling, nailing, performing assembly work, transferring a moderate load (about 35 lbs.) at trunk level, or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. Heavy (above 350 kcal per hour) Yes No

If "yes", how long does this period last per shift _____ hrs. _____ min.

Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder, working on a loading dock, shoveling, standing while bricklaying or chipping casting, or climbing stairs with a heavy load (about 50 lbs.).

13. Will the employee wear protective clothing and /or equipment (other than the respirator) while using the respirator Yes No

14. Will they be working in hot conditions (above 77 degrees F) Yes No

15. Will they be working in humid conditions Yes No

16. Describe the work they will be doing while using the respirator:

17. Describe any special or hazardous conditions they may encounter when using a respirator:

18. Provide the following information, if you know it, for each toxic substance that they will be exposed to when using their respirators:

Name of the first toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the second toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of third toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of any other toxic substance that they will be exposed to while wearing their respirator:

19. Describe any special responsibilities they will have while using their respirator that may affect the safety and wellbeing of others (i.e. rescue, security):

Physician Approval Form

Date: _____

To whom it may concern:

I have performed a standard medical evaluation for _____. It is my medical opinion that this individual shall be able to wear a respirator:

Without any limitations: _____

With limited restrictions (Note Below): _____

Not authorized for use: _____

(Print)

(Signature)



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: ContainmentPlan

Please save attachment and use the file name above.

Containment Plan §1-35(b)(13); 245.210(a)(13), 245.820, 245.825, 245.830.

Describe the containment practices and equipment to be used and the area of the well site where containment systems will be employed. If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, identify measures you will take to protect the components in this plan against earthquakes of M4.5 or more. *NOTE: review 245.820; also locate the containment systems on the overhead sketch required under section (g) of the WellSiteSetbackPlan.*



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Containment Plan

The operator plans to have a minimum amount of “fracturing fluid” within the common containment area. The fracturing fluid will be mixed on-the-fly just ahead of the well head. The constituent chemicals used in the makeup of the “fracturing fluid” will be stored in above ground tanks which meet the requirements set out in 245.825, 245.910 and Section 1-75(c)(4) of the Act. Tanks containing these chemicals will be stored within a diked containment capable of holding 150% of the total volume of the single largest container or tank within a common containment area. No stationary fueling tanks will be used.

During flow back operations the tanks located within the area of the wellsite will also be surrounded by a dike capable of holding 150% of the total volume of the single largest container or tank within a common containment area.

The wellsite lies outside of the area identified by the U.S. Geological Survey as having a 2% or greater probability of exceedance in 50 years of ground acceleration of 0.4 standard gravity or more.



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Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10

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Attachment: CasingandCementingPlan

Please save attachment and use the file name above.

Casing and Cementing Plan §1-35(b)(14); 245.210(a)(14), 245.530, 245.560, 245.570.

NOTE: review 245.530, 245.560 and 245.570, surface casing requirements, intermediate casing requirements, and production casing requirements.

Describe the casing and cementing practices to be employed, including, at minimum,

- (a) The casing and cementing practices used
- (b) The size of each string of pipe
- (c) The starting point
- (d) The depth to which each string is to be set, and
- (e) The extent to which each string is cemented
- (f) If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, identify measures you will take to protect the components in this plan against earthquakes of M4.5 or more.



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(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Casing & Cementing Plan

Surface Casing:

A 17 1/2" hole will be drilled to +/-800' or such depth to be 100' below the base of the deepest fresh water. The hole will be conditioned prior to running casing. 13 3/8", 54.5#/ft. J-55 grade steel casing will be set to bottom using approved centralizers at the bottom of the string and through the fresh water zone(s) and every 4th joint to the last joint. The hole will then be circulated and a pre-flush pumped ahead of the cement slurry consisting of 775 sacks of Class A Cement, 500# of Calcium Chloride, 3 sacks of Flake. Cement will be circulated to surface with an estimated 65% excess. No operations will be conducted for a minimum of 8 hrs. to allow for the cement to cure. A mechanical integrity test will be run in accordance with 245.540(b) prior to drilling ahead. Cementing activities will conform to Section 245.520 including a compressive strength test.

7" Frac String/Intermediate Casing/Production Casing:

A 9 7/8" hole will be drilled from the base of surface casing to a point where the wellbore is at or near 90°. This is estimated to be 5,800' MD / 5,280' TVD. At that point the well will be conditioned in preparation for running casing. 7", 26#/ft. P-110 grade casing will be run to TD using approved centralizers from the base of the verticle portion of the hole (KOP) to base of surface casing on every 4th joint. This casing will be cemented to the surface and thus, fulfills the requirement of intermediate casing and will serve as both the frac and production string casing. During different phases of the drilling, completion and production process, this casing will be used as intermediate casing, frac string and production casing. The hole will again be conditioned and a pre-flush spacer pumped ahead of the cement slurry. Due to the depth there will be two different slurry's pumped. The lead will be 65-35-10 Blend – 11.4 to 11.6 ppg with a yield of 2.5 ft³ / sack. The tail slurry will be ESC 10-10 L.F.L Blend – 14.6 to 14.8 ppg "Schwartz Class A Equivalent" with a yield of 1.6 ft.³ / sack. The tail slurry will be raised to a depth of 2,900' or 600' above the shallowest hydrocarbon producing zone. The cement will be brought to surface. After allowing the cement to set a temperature survey will be conducted to verify cement placement. Following this the casing will be

tested as a production string in accordance with 245.540(c). Cementing activities will conform to Section 245.520 including a compressive strength test.

4 ½" Liner (also to be used as production casing): A 6 1/8" hole will be drilled from the 7" casing shoe to RTD (10,580' MD). At RTD the hole will be conditioned in preparation for running casing. 4 ½", 11.6 #/ft N-80 grade casing will be run to TD with rigid solid turbulizing centralizers spaced along the lateral portion on the hole. The casing will be secured into the cemented 7" intermediate casing with a liner hanger assembly positioned approximately 150' above the 7" shoe (5,550'MD). The hole will once again be circulated and conditioned and followed by a flush and cement slurry consisting of 550 sacks of Class H 3% KCL L.F.L with Gilsonite and 2.5 sacks of Flake. Prior to HVHF operations the liner will be tested tested as a production string in accordance with 245.540(c). Cementing activities will conform to Section 245.520 including a compressive strength test.



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Attachment: TrafficManagementPlan

Please save attachment and use the file name above.

Traffic Management Plan §1-35(b)(15), 245.210(a)(15).

- (a) Identify anticipated roads, streets, and highways that will be used during construction, drilling operations, HVHF operations, production, and operations of the site
- (b) Attach a scaled map of the routes listed above, including but not limited to any access roads, for at least a 10 mile radius, identifying all highway jurisdictions impacted, as well as any structures or property lines relevant to demonstrating compliance with Section 245.410 and 765 ILCS 530;
- (c) state the anticipated start and end dates for construction of the well site, the drilling operations, the HVHF operations, and any other high traffic operations;
- (d) identify the management measures used to minimize, mitigate, or compensate for stress to local roads and/or impact on regular traffic flow;
- (e) provide the contact information for a person responsible for the traffic management plan;
- (f) provide contact information for a representative of each impacted highway authority;
- (g) did you submit copies of the traffic management plan to the impacted highway authorities?
 YES NO

NOTE: A copy of the traffic management plan will be sent to White County and any impacted highway authorities identified in the plan within 15 calendar days of submitting the permit application pursuant to Section 245.210(a)(15) of the Adm. Code and Section 1-35(b)(15) of the act.

 SHAWNEE PROFESSIONAL SERVICES Title: Traffic Management Plan (TMP)	Well ID: Woodrow #1H-310408-193
	Authorized By: Woolsey Operating Company
Issue Date:	Page Number: 1 of 6

Traffic Management Plan:

Well Site:	Woodrow 1H-310408-193
Site Manager:	Ryan Kelley
Health and Safety Representative:	Ryan Kelley
Company preparing TMP:	Shawnee Professional Services
Date of Plan:	10-31-2016
Date of Plan Review:	5-1-2017

INTRODUCTION

This Traffic Management Plan has been prepared for Woolsey Operating Company to describe how they will safely and effectively control, maintain and minimize impacts during the drilling and construction of the Woodrow 1H-310408-193 the area of the well site and also along vehicular routes utilized for material and equipment delivery, employee commutes, and hauling of brine waters from the well site. This plan has also been developed to satisfy requirements of the Hydraulic Fracturing Regulatory Act (Section 1-35(b)(15)). A copy of this plan will be kept on site for periodic review and training of site personnel with route maps given to all drivers to minimize adverse impact on roadways and to local users in the vicinity of the site and haul routes.

TRAFFIC MITIGATION MEASURES

Motorist Information and Construction Area Signs

Informing the road users is one way to help reduce the impacts from construction. Drivers would be informed about the construction and any major delays and/or detours, allowing them to modify their travel choices. Static signs can be used to inform users coming from each direction that there may be increased traffic due to drilling operations, HVHFF operations, or other high traffic operations to the north and south of County Road 1675N along U.S. Route 45.

Construction Staging

To mitigate any traffic impacts attributable to the construction workforce during the project, construction start times could be staggered during peak times such that the entire workforce required for each day could arrive/leave at different times.

Carpooling

While not expected, if needed, carpooling could be used during peak construction periods to reduce the total number of trips entering/leaving the site, and in turn, reduce any traffic congestion. The site manager can coordinate with the workforce to determine the best location and time to coordinate carpooling if needed. Another possible option would be to organize a shuttle that could take the workers from a centralized point.

Public Information and the Media

Updates to the local communities through the local newspaper could provide information to the current local users who could be impacted by construction of the Proposed Project. Newspaper bulletins could also provide information on the upcoming work and areas of impact to local users. Stakeholders such as Illinois Department of Transportation, White County Highway Department, and the Village of Enfield will be informed with outreach letters prior to construction. The letter will provide a description of the project and the time frame as well as outline any short-term restrictions that may impact the stakeholders. The letters will also provide contact information for any stakeholders who may have questions.

Off-Peak Hour Activities

To minimize adding trips during the daily workforce commute, deliveries would attempt to be scheduled during the off-peak hours as feasible.

POTENTIAL ADVERSE EFFECTS TO THE PUBLIC

Noise

County Road 1725 N, County Road 125 E, and County Road 1675 N will be travelled for access from the well site to U.S. Route 45. There are no residences along these roads so there will be minimal noise impact to local residents. The site manager shall ensure that all vehicles are fitted with well-maintained engine mufflers. Engine breaking is also prohibited for all haul trucks to and from the site.

Bicycles and Pedestrians

Bicycles and pedestrians are rare in the vicinity of the Proposed Project but could occasionally be present. The existing routes can accommodate bicycles or pedestrians during construction similarly as the current condition.

Delivery and Service Vehicles

US Route 45 is classified as a minor arterial roadway. It serves commercial trucking and delivery and service vehicles (approximately 525 trucks per day) with a full traffic count of 2000 vehicles per day. Most traffic is from the local area using it as the main connector to the I-64 corridor and the City of Fairfield. The Proposed Project may cause increased traffic volumes on US route 45, but delays are not expected. If delays were to occur, they would be expected to have a minor effect on delivery and service vehicles and local commuters.

Emergency Services

Emergency vehicles dispatched through 911 services for ambulance, sheriff, State Highway Patrol, and the local Fire Departments use the routes within the Project vicinity. The Village of Enfield Fire Department provides fire protection and White County Ambulance Department provides emergency medical services in the vicinity of the well site. Emergency services will not be interrupted by the proposed project. Both entities can be kept informed of construction progress at the site.

Roadway Conditions

During times of high truck traffic to and from the site, roadway condition can deteriorate quickly and cause unsafe conditions for users. Roadway conditions along County Road 1725 N, County Road 125 E, and County Road 1675 N will be monitored periodically by visual inspection of the site manager. Periodic videoing of the road surfaces will also be performed by an outside party to document roadway conditions throughout the project. Any roadway deficiencies caused by traffic related to the drilling operations or HVHFF operations will be addressed by the site operator (or its contractor) and/or the local jurisdiction.

School Transportation

Local elementary and high schools utilize the roadways for bus transportation to and from their facilities. Drivers shall be extra cognizant and aware of the need to take extreme caution during the hours of 7:00 to 8:00 AM and 2:00 to 4:30 PM when the presence of bus transportation is most possible. There shall be no overtaking of school busses unless flagged to do so by the driver of the bus.

RESPONSIBILITY

Site Manager Responsibilities

- Educating all transport operators the requirements of this transportation management plan.
- Enforcing the requirements of this transportation management plan.
- Investigating any community complaints.
- Recording and investigating any transport related accidents, incidents, or near misses.
- After proper investigation, inform transport operators of legitimate community complaints, and modified procedures to be followed to prevent repeat complaints.
- Make changes to procedures, transportation management plan, and/or signage to prevent repeat transport related accidents, accidents, or near misses.
- Following inspection of road and safety signage, undertake maintenance as necessary.

Transport Operators (Driver) Responsibilities

- Understanding and following the transportation management plan.
- Reporting any accidents, incidents or near misses to the Site Manager.

ADDITIONAL TRANSPORTATION ITEMS

Roadway information for Primary Route to/from Well Site

The following information is intended to ensure that the transportation of materials to/from the well site is undertaken in a manner that is not excessively harmful to local and state roadways:

- County Road 1725 N (Woodrow #1H-310408-193 to County Road 125 E)
 - Gravel road, local/agriculture traffic only. Weight restrictions: None Posted
- County Road 125 E (County Road 1725 N to County Road 1675 N)
 - Gravel road, local/agriculture traffic only. Weight restrictions: None Posted
- County Road 1675 N (County Road 125 E to U.S. Route 45)
 - Gravel road, local/agriculture traffic only. Weight restrictions: None Posted
- U.S. Route 45 (County Road 1675 N to IL Route 1)
 - Paved road, local and non-local traffic. Weight restrictions: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs.
- Illinois Route 1 (U.S. Route 45 to Tru Flow Facility)
Bituminous (High Type), local and non-local traffic. Weight restrictions: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs

Pick up/drop off points for materials and speed restrictions (e.g. vehicles, trucks, etc):

The following safety features are recommended to ensure that the collection and disposal of materials to/from the well site is undertaken in a safe manner:

- Truck entry and exit signage to the well site should be located at:
 - Entry location to County Road 1675 N on U.S. Route 45.
- Designated loading and unloading areas are located at:
 - Well Site (Woodrow #1H-310408-193)
 - Tru Flo #1 Class II Injection Well (987 Illinois Highway 1, Carmi, IL)
- Speed restriction signage is clearly displayed at the following locations:
 - Upon entering the city limits of Enfield
 - Within Enfield just south of Logan Street
 - School Zone restriction from E Hosick Street to E Main Street
 - Within Enfield: Designated Pedestrian Crossing at E North Street
 - Four-Way stop intersection within Enfield city limits
 - Four-Way stop intersection with Illinois Route 14
 - Upon entering the city limits of Norris City
 - Norris City south of Orchard Street
 - Four-Way stop intersection within Norris City limits.

Bridge information for Primary Route to/from Well Site.

The following information is intended to ensure that the transportation of materials to/from the well site is undertaken in a manner that is not excessively harmful to local and state bridge structures:

- Bridge #097-3242:
 - Located 1.5 miles north of Enfield on County Road 125 N; prestress concrete structure; maximum roadway width 24.0 feet; crosses drainage ditch; weight limit:
- Bridge #097-0024:
 - Located in the town of Enfield on U.S. Route 45; steel structure; maximum roadway width 32.0 feet; crosses L & N Railroad; weight limit: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs
- Bridge #097-2012:
 - Located 1.5 miles south of Enfield on U.S. Route 45; concrete structure; maximum roadway width 32.0 feet; crosses Seven Mile Creek; weight limit: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs
- Bridge #097-2007:
 - Located in the town of Sacramento on U.S. Route 45; concrete structure; approx. roadway width 24.0 feet; crosses stream; weight limit: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs
- Bridge #097-0012:
 - Located 3 miles south of Brownsville on Illinois Route 1; concrete structure; maximum roadway width 33.0 feet; crosses Lick Creek; weight limit: Single Axle: 20,000 lbs; Tandem Axle: 34,000 lbs

Special Events Along the Haul Routes (e.g. Fairs, Church Gatherings, Sporting Events etc)

Traffic control requirements for special events may vary. Specific control measures will need to be determined through a risk assessment process taking into consideration learning's from previous special events.

The following broad safety arrangements and features are in place to minimize the risks associated with special events in conjunction with previously documented control measures:

- Appropriate numbers of traffic controllers will be in place for all special events to restrict/direct traffic along the haul routes;
- Additional signage.
- Additional public notice through local newspaper or other means.

Affected Road Jurisdictions

Name	Address	Phone	Point of Contact
IDOT Region 4 District 7	400 W. Wabash Effingham, IL 62401	(217) 342-3951	Jeffrey M. South
IDOT Region 5 District 9	2801 W. Murphysboro Rd. Carbondale, IL 62901	(618) 549-2171	n/a
Hamilton Co. Highway Dept.	100 S. Jackson St. Rm 2 McLeansboro, IL 62859	(618) 643-2714	Kevin Phillips
Beaver Township (Hamilton)		618-383-1387	Vuel York
Crook Township (Hamilton)		618-516-2096	Gene Wheeler
Crouch Township (Hamilton)		618-927-7709	James Coy
Mayberry Township (Hamilton)		618-926-4559	Leeroy Sarris
White Co. Highway Dept.	1103 E. Main St. Carmi, IL 62821	(618) 382-4811	Brian Ray
Mill Shoals Township (White)		618-384-9690	Dennis Woodrow
Enfield Township (White)		618-262-1263	Joe Allen
Indian Creek Township (White)		618-384-7610	Jimmy Hoskins
Wayne Co. Highway Dept.	1309 E. Main St. Fairfield, IL 62837	(618) 847-7343	Dennis Seidel
Barnhill Township		618-842-3123	Ray Smuthers
Big Mound Township		618-847-5404	John Jones

CERTIFICATION

[Redacted]

Site Manager

5-4-17
Date

[Redacted]

Health & Safety Representative

5-4-17
Date

Prepared by: Shawnee Professional Services

[Redacted]
Billy J. Abernathy, PE – License No. [Redacted]

5-2-17
Date





WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316)-267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Traffic Management Plan (c)

The following is anticipated start and end dates:

ACTIVITY	START DATES	END DATES
Well Site Construction	July 1, 2017 to Sept. 30, 2017	Aug. 1, 2017 to Oct. 31, 2017
Drilling Operations	Aug. 1, 2017 to Nov. 30, 2017	Oct. 1, 2017 to Dec. 31, 2017
HVHHF Operations	Oct. 1, 2017 to Dec. 1, 2017	Oct. 15, 2017 to Dec. 31, 2017

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: OwnerPermitteeInformation

Please save attachment and use the file name above.

Owner/Permittee Information §1-35(b)(16); 245.210(a)(16).

Provide the names and addresses of all owners of any real property within 1,500 feet of the proposed well site as disclosed by records in the office of the recorder of the county or counties.



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Owner Permittee Information

ATTACHMENT: OWNER PERMITTEE INFORMATION

Alice Woodrow



Scott L. & Bobby Woodrow



Kent Woodrow



Raymond A. York



Inez Taylor



John C. Carter



Horn Joint Primary Trust





Illinois Department of Natural Resources
Office of Oil and Gas Resource Management

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov (217) 558 - 2028



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING
GENERAL PUBLIC NOTICE HVHFF-27

PERMITTEE: ADDRESS:
WELL NAME: HVHFF REGISTRATION #:
LOCATION: HVHFF REVIEW #:
COUNTY: SECTION: TOWNSHIP: RANGE:
COMPANY:
DRILLING CONTRACTOR:
DATE PERMIT APPLICATION WAS RECEIVED BY IDNR:
PUBLIC COMMENT PERIOD BEGINS: PUBLIC COMMENT PERIOD ENDS:

All Comments, Objections, and recommendations about any portion of the above named applicant's request for a HVHFF permit must be received by the Illinois Department of Natural Resources by the end of the above listed comment period. SPECIFIC LOCATION PER SURVEY (legal description, GPS latitude and longitude, and ground elevation):

Note: Any person having an interest that is or may be adversely affected, any government agency that is or may be affected, or the county board of a county to be affected under a proposed permit, may file written objections to a permit application and may request a public hearing pursuant to The Hydraulic Fracturing Regulatory Act 62 Ill.Adm.Code 245.270

CERTIFICATION

"I certify, under penalty of perjury as provided by law and under penalty of refusal, suspension, or revocation of a high volume horizontal hydraulic fracturing permit, that this application and all attachments are true, accurate, and complete to the best of my knowledge." The Hydraulic Fracturing Regulatory Act 62 Ill.Adm.Code 245.210(f).

Signature
Company Name and Job Title

If necessary, a public hearing is scheduled for the day of , 20 at
Hearing Location Hearing Officer Assigned

Information filed by the applicant in its application for a high volume horizontal hydraulic fracturing permit is available from the Department through its website. The Hydraulic Fracturing Regulatory Act 62 Ill.Adm.Code 245.250(a)(5)(E). IDNR can be reached at (217) 558 - 2028, http://www.dnr.illinois.gov, e-mailed at DNR.HFPublicComments@illinois.gov or at Office of Oil and Gas Resource Management, One Natural Resources Way, Springfield, Illinois 62702-1271. Please note that all public comments must be submitted in writing. No public comments will be accepted by phone.



Illinois Department of Natural Resources
Office of Oil and Gas Resource Management

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov (217) 558 - 2028



HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING
SPECIFIC PUBLIC NOTICE HVHFF-28

PERMITTEE: ADDRESS:
WELL NAME: HVHFF REGISTRATION #:
LOCATION: HVHFF REVIEW #:
COUNTY: SECTION: TOWNSHIP: RANGE:
COMPANY:
DRILLING CONTRACTOR:
DATE PERMIT APPLICATION WAS RECEIVED BY IDNR:
PUBLIC COMMENT PERIOD BEGINS: PUBLIC COMMENT PERIOD ENDS:

All Comments, Objections, and recommendations about any portion of the above named applicant's request for a HVHFF permit must be received by the Illinois Department of Natural Resources by the end of the above listed comment period. SPECIFIC LOCATION PER SURVEY (legal description, GPS latitude and longitude, and ground elevation):

Note: Any person having an interest that is or may be adversely affected, any government agency that is or may be affected, or the county board of a county to be affected under a proposed permit, may file written objections to a permit application and may request a public hearing pursuant to The Hydraulic Fracturing Regulatory Act 62 Ill.Adm.Code 245.270

CERTIFICATION

"I certify, under penalty of perjury as provided by law and under penalty of refusal, suspension, or revocation of a high volume horizontal hydraulic fracturing permit, that this application and all attachments are true, accurate, and complete to the best of my knowledge." The Hydraulic Fracturing Regulatory Act 62 Ill.Adm.Code 245.210(f).

Signature
Company Name and Job Title

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	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: PluggingandRestorationPlan

Please save attachment and use the file name above.

Plugging and Restoration Plan §1-35(b)(18),(20); 245.210(a)(18), 245.815, 245.1010, 245.1020, 245.1030.
Attach your plan for

- (a) (before beginning HVHFF operations) plugging all previously abandoned unplugged or insufficiently plugged well bores within 750 feet of any part of the horizontal well bore that penetrated within 400 vertical feet of the geologic formation that will be stimulated.
- (b) restoring lands used, and
- (c) plugging the well itself.



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC



Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Plugging & Restoration Plan

- (a) There are no wells that meet this requirement
- (b) Within six (6) months of abandonment the operator will remove off all equipment and materials involved in site preparation, drilling, and high volume horizontal hydraulic fracturing operations, including tank batteries, rock and concrete pads, oil field debris, injection and flow lines at or above the surface, electric power lines and poles extending on or above the surface, tanks, fluids, pipes at or above the surface, secondary containment measures, rock or concrete bases, drilling equipment and supplies, and any and all other equipment, facilities, or materials used during any stage of site preparation work, drilling, or high volume horizontal hydraulic fracturing operations at the well site and the surface restored back to as close to pre-drilling condition as reasonably possible or to the satisfaction of the surface owner. This will include putting the stored topsoil back to its original location and repairing any terraces and drain tile. The restoration process will comply with Sections 245.1020 and 245.1030 of the Hydraulic Fracturing Regulatory Act.
- (c) The well itself will be plugged in accordance with 62 Ill. Admin Code 240.1140 & 240.1150 as directed by the State Inspector.

	<p style="text-align: center;">ILLINOIS DEPARTMENT OF NATURAL RESOURCES</p> <p style="text-align: center;">Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271</p>	
<p>HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10</p>		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: Proof of Insurance

Please save attachment and use the file name above.

Proof of Insurance §1-35(b)(19); 245.210(a)(19), 245.210(d), 245.210(e).

Attach proof of insurance for yourself and any contractor performing HVHFF operations at the well to cover injuries, damages, or loss related to pollution in the amount of at least \$5,000,000 per occurrence.

Is any part of the well or well site in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more? If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, the insurance policy must have an earthquake damage clause or rider. See 245.210(d). If any part of the well or well site is in an area identified as a floodplain under 17 Ill. Adm. Code 3700 or 3706, the insurance policy must have a clause or rider providing coverage against loss or claims resulting from impacts from any aspect of the permitted operations following floods. See 245.210(e).



CERTIFICATE OF LIABILITY INSURANCE

Page 1 of 3

DATE (MM/DD/YYYY)
10/06/2016

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Willis of Texas, Inc. c/o 26 Century Blvd. P.O. Box 305191 Nashville, TN 37230-5191	CONTACT NAME:		
	PHONE (A/C, NO, EXT):	877-945-7378	FAX (A/C, NO): 888-467-2378
	E-MAIL ADDRESS:	certificates@willis.com	
	INSURER(S) AFFORDING COVERAGE	NAIC#	
	INSURER A:	Underwriters at Lloyd's London (IL)	
INSURED Basic Energy Services, LP 801 Cherry Street Suite 2100 Ft. Worth, TX 76102	INSURER B:	ACE American Insurance Company	
	INSURER C:		
	INSURER D:		
	INSURER E:		
	INSURER F:		

COVERAGES CERTIFICATE NUMBER: 24834170 REVISION NUMBER: See Remarks

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			11563J16	8/1/2016	8/1/2017	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 1,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS-COMP/OP AGG \$ Included \$
B	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS			ISAH0904324A	8/1/2016	8/1/2017	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> DED <input checked="" type="checkbox"/> RETENTION \$ 100,000			11570J16	8/1/2016	8/1/2017	EACH OCCURRENCE \$ 5,000,000 AGGREGATE \$ 5,000,000 \$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? <input checked="" type="checkbox"/> Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below		N/A	WLRC48607172	8/1/2016	8/1/2017	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
THIS VOIDS AND REPLACES PREVIOUSLY ISSUED CERTIFICATE DATED: 7/27/2016 WITH ID: [REDACTED]

See Attached for Named Insured List:

CERTIFICATE HOLDER Woolsey Operating Company Attn: Geri Cooper 125 North Market, Suite 1000 Wichita, KS 67202	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE [REDACTED]



ADDITIONAL REMARKS SCHEDULE

AGENCY Willis of Texas, Inc.		NAMED INSURED Basic Energy Services, LP 801 Cherry Street Suite 2100 Ft. Worth, TX 76102	
POLICY NUMBER See First Page		EFFECTIVE DATE: See First Page	
CARRIER See First Page	NAIC CODE		

ADDITIONAL REMARKS

**THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
FORM NUMBER: 25 FORM TITLE: CERTIFICATE OF LIABILITY INSURANCE**

Named Insured List:

- Basic Energy Services, L.P.
- Basic Energy Services, Inc. (dba BES Holding Co.)
- Basic Energy Services GP, LLC
- Basic Energy Services LP, LLC
- Basic ESA, Inc.
- Basic Marine Services, Inc.
- First Energy Services Company
- Globe Well Service, Inc.
- JetStar Energy Services, Inc.
- JetStar Holdings, Inc.
- LeBus Oil Field Service Co.
- Oilwell Fracturing Services, Inc.
- SCH Disposal, LLC.
- Sledge Drilling Corp.
- Xterra Fishing & Rental Tools Co.
- Permian Plaza, LLC.
- Hennessey Rental Tools, Inc.
- Chaparral Service, Inc.
- JS Acquisition, LLC.
- Wildhorse Services, Inc.
- Taylor Industries, LLC.
- Platinum Pressure Services, Inc.
- Admiral Well Service, Inc.
- The Maverick Companies, LLC.
- Maverick Stimulation Company, LLC.
- Maverick Coil Tubing Services, LLC.
- Maverick Solutions, LLC.
- MCM Holdings, LLC.
- MSM Leasing, LLC.
- Maverick Thru-Tubing Services, LLC.
- Acid Services, LLC.
- Robota Energy Equipment, LLC.

Additional insured on General Liability in favor of certificate holder as required by written contract per policy clause CGU130T.

Additional Insured in favor of Certificate Holder on Automobile Liability as required by written contract regarding work performed by the named insured(s).

CGL WAIVER OF SUBROGATION ENDORSEMENT (CGU12L)

Underwriters agree to waive their rights of subrogation against any principal where waiver is required by written contract but only in respect of liability for Bodily Injury and/or Property Damage arising out of operations performed by you and only to the extent required under contract.

Waiver of Subrogation in favor of Certificate Holder on Automobile and Workers Compensation as required by written contract regarding work performed by the named insured(s).

General Liability

Policy No: [REDACTED]
Security: 100% - Lloyds Syndicate [REDACTED]

Sudden & Accidental Pollution coverage is provided as per the following policy provision:
THE FOLLOWING ENDORSEMENT REPLACES THE TERMS OF ANY OTHER SEEPAGE AND POLLUTION EXCLUSION(S) CONTAINED IN THIS POLICY (CGU12B & Amendatory #3)

- This policy does not apply to any actual or alleged liability for Bodily Injury, Property Damage, or Advertising Injury directly or indirectly caused by or arising out of seepage, pollution, or contamination however caused whenever or wherever happening;
This exclusion shall not apply where all of the following conditions are shown by the "Insured" to have been met:
- a. the seepage, pollution or contamination was caused by an occurrence; and,
 - b. the occurrence first commenced on an identified specific date during the period of this policy; and,
 - c. the occurrence was first discovered by the insured within 45 days of such first commencement;





ADDITIONAL REMARKS SCHEDULE

AGENCY Willis of Texas, Inc.		NAMED INSURED Basic Energy Services, LP 801 Cherry Street Suite 2100 Ft. Worth, TX 76102	
POLICY NUMBER See First Page		EFFECTIVE DATE: See First Page	
CARRIER See First Page	NAIC CODE		

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
 FORM NUMBER: 25 FORM TITLE: CERTIFICATE OF LIABILITY INSURANCE

and,
 d. written notification of the occurrence was first received from the insured by us within 90 days of the insured's first discovery of the occurrence; and,
 e. the occurrence did not result from the insured's intentional violation of any statute, rule, ordinance or regulation.
 Even if the above conditions a. to e. are satisfied, this policy does not apply to any actual or alleged liability:
 (i) to abate or investigate any threat of seepage onto or pollution or contamination of the property of a third party;
 (ii) for seepage, pollution or contamination of property which is or was, at any time, owned, leased, rented or occupied by any insured, or which is or was, at any time, in the care, custody or control of any insured (including the soil, minerals, water or any other substance on, in or under such owned, leased, rented, occupied or controlled property or property in such care, custody or control);
 As used in sub-paragraph (ii), oil and gas leasehold properties are not considered owned, leased, rented or occupied properties or properties in the insured's care, custody or control.
 In consideration of this extension of coverage, coverage is always subject to conditions a. to e. of this endorsement.
 (iii) arising out of the handling, processing, treatment, storage, disposal or dumping of any waste materials or substances, or arising out of such waste materials or substances during transportation.
 This sub-paragraph (iii) shall not apply to Bodily Injury or Property Damage generated from the insured's operations involving the transportation and handling of salt water or brine water or frac fluid, cutting(s) or waste products.
 Notwithstanding the above, this Policy shall not indemnify the Insured for liability in respect of the disposal and dumping of any waste materials or substances.
 Excess Liability policy is follow form to scheduled underlying subject to policy terms, conditions, and exclusions.

	<p style="text-align: center;">ILLINOIS DEPARTMENT OF NATURAL RESOURCES</p> <p style="text-align: center;">Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271</p>	
<p>HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10</p>		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: TopsoilPreservationPlan

Please save attachment and use the file name above.

Topsoil Preservation Plan §1-35(b)(20); 245.210(b)(2), 245.410(d).

Please detail the plan to stockpile, stabilize, store, and segregate any topsoil and subsoil stripped from the site, as well as the proposed timeframe during which the site will be disturbed.



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Topsoil Preservation Plan

ATTACHMENT: Topsoil Preservation Plan

At the time of construction, topsoil will be stripped following vegetation removal, be stored separately from subsoil or other excavated material to avoid mixing during construction, storage and restoration. Topsoil will include all suitable growth medium present at site, as indicated by color or texture or supporting any sprigs of vegetation.

Topsoil will be wind-rowed to shallowest practical depth around the entire perimeter of well pad to create a berm that infiltrates/redirects/manages storm water while extending the viability of the topsoil.

Erosion control will be installed if necessary to ensure soil stays within the stockpile footprint. Stockpiles will be stabilized to avoid erosional losses using re-established native grasses and/or erosion mats. If topsoil stockpiles will remain longer than a growing season, the pile will be seeded with a cover crop.

Topsoil, subsoil, and underlying materials will be stored in separate piles.

The site will be disturbed from between 6 months and one year

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Attachment: FugitiveDustControlPlan

Please save attachment and use the file name above.

Fugitive Dust Control Plan §1-35(b)(20); 245.210(b)(3), 245.410(c).

Please detail the plan to control fugitive dust emissions from the site. Be sure to include the name and contact information for the responsible person(s) to whom fugitive dust emissions may be reported for immediate control measures to be enacted in case of need.

**WOODROW #1H-310408-193
HYDRAULIC FRACTURING WELL**

STATE OF ILLINOIS
HYDRAULIC FRACTURING PERMIT APPLICATION

**FUGITIVE DUST PREVENTION
AND CONTROL PLAN**

Prepared for Submittal to
Illinois Department of Natural Resources

Prepared by
Shawnee Professional Services



On behalf of
Woolsey Operating Company, LLC



November 8th 2016

WOODROW #1H-310408-193 Fugitive Dust Control Plan

1.0 Introduction

This Fugitive Dust Prevention and Control Plan (FDPCP) was prepared in accordance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75) for controlling fugitive dust particles by request of Woolsey Operating Company (WOC). The purpose of the plan is to reduce short-term impacts to air quality during the mobilization, construction, and demolition activities needed to support the final design, construction, and operation of the Woodrow #1H-310408-193 Hydraulic Fracturing Well Site (Woodrow #1H). The Woodrow #1H Project includes work activities at two locations: the Woodrow #1H Well Site and the #1 Class 2 well operated by TrueFlo Solutions LLC (TrueFlo) at 987 IL Highway One. An alternate disposal site is located at the Rankin #1 well operated by Haggard Well Services near Calvin, IL. This FDPCP is submitted to the Illinois Environmental Protection Agency as Appendix X of the Hydraulic Fracturing Permit Application.

2.0 Definition

Fugitive dust is not emitted from a definable point source, but is emitted from several sources and escapes beyond the property boundary, right-of-way, or easement. In the case of the Woodrow #1H Project, fugitive dust may be emitted from the roadway, material storage piles, and other construction activities, including drilling operations and transportation activities. Other possible sources of fugitive dust and the associated dust control methods are summarized in Attachment E.1, Fugitive Dust Control Plan Matrix. This FDPCP is a tool to help prevent, reduce, control, and manage the production of fugitive dust in the project area during construction and operation. An environmental representative for Woolsey Operating Company will implement this FDPCP. This representative will be a member of the Woolsey Environmental Team listed in Table E.1. The inspection and monitoring requirements within the FDPCP are expected to fall under the responsibilities of the Woolsey Environmental Compliance Inspector (WECI), or designated representative, on fugitive dust control relative to specific work activities. The Woolsey Environmental Team recognizes that periodic review of construction activities and conditions are important to the success of implementing this plan and remaining in compliance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75). It is recognized that fugitive dust can be a nuisance that interferes with the enjoyment of life and property, and can be a safety hazard and harmful to human health or the environment. Procedures to address these issues are provided below.

2.0 Requirements for Dust Control

2.1 SITE INSPECTIONS, ASSESSMENTS, AND RECORDKEEPING: WOC staff will conduct weekly erosion control inspections (or more often as necessary, depending on rainfall) and dust control issues will be included as part of those inspections. Any observation of substantial fugitive dust will be noted as part of the regular inspections and recorded on the Fugitive Dust Control Monitoring Log (Attachment E.2). This log will also be used by the WECl to document other occurrences of fugitive dust witnessed outside of the regular inspections and any occurrences of fugitive dust reported by other construction personnel. In addition, the WECl, or other persons supervising the site, will conduct monthly effectiveness assessments of the project site, including all erosion and fugitive dust control issues.

2.2 PERSONNEL TRAINING: All project employees (including subcontractors) will be trained on the contents of this FDPCP, including potential dust sources and fugitive dust control measures, as summarized in the Fugitive Dust Control Plan Matrix (Attachment E.1). This training will occur at the start of the project. For any new subcontractors or new WOC employees that are hired, training will occur prior to starting work on-site.

2.3 GENERAL RESPONSIBILITIES FOR ON-SITE PERSONNEL: All project personnel have responsibility for fugitive dust control. Any WOC employee or subcontractor who notices fugitive dust will respond as appropriate based on their training. They will implement a defensive strategy by ceasing the activities generating the fugitive dust and immediately notify their supervisor who will respond based on his or her capabilities and who will notify the responsible Site Superintendent. The Site Superintendent will notify the WECl to complete the Self-Inspection Checklist: Fugitive Dust Control Monitoring Log (Attachment E.2), as required, to document the fugitive dust occurrence.

2.4 RESPONSIBILITIES OF THE CONSTRUCTION MANAGER: The designated person responsible for assessing fugitive dust and implementing this FDPCP at the Woodrow #1H well site with WOC. The alternate is the WECl. Incidents involving fugitive dust emissions shall be reported to the WECl.

2.5 GENERAL REQUIREMENTS: WOC is required to provide dust control measures for all areas disturbed by construction. The measures listed below will be required, as necessary, to control fugitive dust. Dust issues located outside of the project limits but identified as originating from the project will be handled similarly. Dust control will be implemented as appropriate by WOC within the project limits, regardless of whether active construction is occurring or not. Dust control is required any time dust is substantially visible in the air. Dust control will be achieved primarily through application of water, and by covering soils, stockpiled materials, and debris. The source of water may be from storm water, fire

hydrants, and/or proposed freshwater wells on the site or near the work area (as permits allow), supplied by a contracted sweeping/cleaning service, or other approved means.

2.6 ON-SITE DUST CONTROL ON UNPAVED ROADS: During mobilization, construction, operation, maintenance, and demobilization of the project, WOC will suppress dust by applying water. WOC will apply water to the active construction work area as needed and if applicable to the work site, without creating unnecessary muddy areas and problems with track-out. WOC will also construct stabilized construction entrances for ingress and egress points, such as County Road 1675 North, to prevent tracking of mud and soil onto paved roads. Use of process waters to control fugitive dust is strictly prohibited.

2.7 DUST CONTROL ON PAVED ROADS: WOC will implement the following requirements on paved roads:

- Construction entrances and exits will be established for all construction-related traffic in order to prevent tracking of mud and soil onto paved roads from the use of unstable ingress or egress points.
- Procedures for removing dirt from wheels and truck exteriors will be used, and will include a wheel wash at the entrance/exit from the site to County Road 1675 North if necessary. Dirt, dust, and debris will be removed from this area on a regular basis to prevent and minimize the transport of soils or dirt off-site.
- Spills of transported material onto public roads will be cleaned up immediately.

2.8 ON-SITE DUST CONTROL ON DISTURBED AREAS: During construction, operation, and maintenance of the project, WOC will suppress dust by applying water. WOC will apply water to active construction work areas, as needed, to control fugitive dust without creating unnecessary muddy areas and problems with track-out. Stabilization best management practices (BMPs; as listed in Attachment E.1) to be used for disturbed areas not supporting construction traffic or active work may also include vegetation, plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved. During grading, excavation, and other construction activities, water sprays will be used to keep the soil damp to minimize fugitive dust. Any trucks leaving the site locations with soils or materials that could result in fugitive dust will be covered with a tarpaulin to ensure that there are no emissions during transit. If materials are at any time stockpiled, they may be dampened by water sprays as needed or covered by secured tarpaulins to minimize fugitive dust, if necessary.

2.9 DUST CONTROL DURING DEMOLITION AND DEMOBILIZATION ACTIVITIES: Demolition and demobilization activities for the site locations will be limited to demolition and removal of site infrastructure improvements. Dust control methods during demolition activities include the same methods described above including general dust control methods, methods for disturbed areas, and unpaved roads. Additional BMPs may include the following, if necessary, to meet the general requirements listed above:

- Use of shop vacuums.
- During demolition, water will be used to dampen the area that is being demolished prior to starting the demolition. During the demolition process a water spray will be used to minimize the fugitive dust. The ground will be sprayed with water either by water truck or some type of water spray to minimize fugitive particulate emissions from haul trucks and demolition equipment.
- During the loading of trucks with demolition debris a water spray will be used to minimize fugitive particulate matter emissions. The trucks will have tarpaulins installed to cover their loads prior to leaving the site to ensure that there are no emissions while the trucks are in transit.

2.10 CONTROL OF OTHER AIR EMISSIONS: Other emission-generating activities related to operations and maintenance may include sandblasting or other abrasives, painting, and coating in contained areas shrouded either with plastic or fabric, and general operation of diesel equipment. The following BMPs may be implemented to limit unnecessary generation of air pollutants:

- Appropriate emission-control devices on equipment powered by gasoline or diesel fuel can reduce CO and NOx emissions in vehicular exhaust. Low-sulfur diesel will be used when possible.
- Sandblasting materials will be stored inside a building.
- Non-slag (inert) sandblasting abrasives will be used when feasible.
- Sandblasting will be conducted on days when the wind will not transport the material off-site or in a confined area to limit emissions.
- Spent material will be immediately contained and disposed of at an appropriate facility.
- Lids will be kept on all containers of paints and coatings.
- Methods will be implemented for efficient paint application to reduce over spraying, including proper training for painters.
- When possible, paint types such as waterborne paints, powder coatings, ultraviolet light or electron beam curable coatings, or higher solids paints will be used.
- When possible, cleaners with low hazardous air pollutant and volatile organic compound content such as water-based, alkaline, or microbial cleaners may be used.

**Table E.1
WOC Environmental Compliance Team Duties and Responsibilities**

Team Member	Environmental Compliance Team Duties and Responsibilities
WOC Environmental Manager/ IL District Landman	
Ryan Kelley Phone: [REDACTED]	Coordinates with WECl, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECl • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:
WOC Environmental Manager/ Production Forman Illinois Basin	
Mike Lyke Phone: [REDACTED]	Coordinates with WECl, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECl • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:

**ATTACHMENT E.1
FUGITIVE DUST CONTROL PLAN MATRIX**



Potential Source	Applicable Dust Control Methods	Schedule/Rate of Application	Backup Plan
Temporary construction Haul Road (work site only)	<ul style="list-style-type: none"> • Water haul roads • Control haul routes • Control haul road speeds 	<ul style="list-style-type: none"> • As needed • Follow the Work Plan 	<ul style="list-style-type: none"> • Chemical dust suppressants or surfacing haul roads • Schedule construction trucks
Tracking	<ul style="list-style-type: none"> • Tire wash (drive-through, if needed) 	<ul style="list-style-type: none"> • Wash prior to leaving site 	<ul style="list-style-type: none"> • Wash road with water in compliance with TESCP (i.e. only

	<ul style="list-style-type: none"> Stabilized construction entrances Sweep roads 	<ul style="list-style-type: none"> Place per plan and adjust and maintain as necessary Sweep daily or as needed 	after sediment if removed)
Stockpiles	<ul style="list-style-type: none"> Cover piles Water stockpiles 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Wet stockpiles during active work
Sawing/Grinding	<ul style="list-style-type: none"> Use water assisted saws and grinders 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Use sweeper tuck
Haul Trucks	<ul style="list-style-type: none"> Ensure adequate truck bed freeboard while on haul roads, including local public roads 	<ul style="list-style-type: none"> Always 	<ul style="list-style-type: none"> Cover loads on scheduled construction trucks
Grading Activities	<ul style="list-style-type: none"> Pre-wet soils before excavating Avoid activity during high winds Minimize time frames between operations Minimize areas of clearing and grubbing to manageable sizes 	<ul style="list-style-type: none"> As needed As weather dictates 	<ul style="list-style-type: none"> Post-wetting
Rain/Wind	<ul style="list-style-type: none"> Keep cleared areas covered for major rain/wind events During dry weather, spray exposed soil with water 	<ul style="list-style-type: none"> Prevent the mud-to-dust scenario 	<ul style="list-style-type: none"> Use sweeper truck
Exposed Soils	<ul style="list-style-type: none"> Apply BMPs such as: plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved 	<ul style="list-style-type: none"> For all areas not being worked and that contain erodible soils 	<ul style="list-style-type: none"> N/A

ATTACHMENT E.2
SELF-INSPECTION CHECKLIST: FUGITIVE DUST CONTROL MONITORING LOG

Date/Time	Location	Fugitive Dust Source	Control Method	Comments

*May be copied as needed

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271	
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

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Attachment:WaterQualityMonitoringWorkPlan

Please save attachment and use the file name above.

Water Quality Monitoring Work Plan §1-80(a); 245.210(a)(20), 245.600(a). 245.610.

(a) Identify all water sources within the range of testing under §1-80(a)(1) of the Act

See Attachment

(b) Attach the work plan to ensure accurate and complete water quality sampling and testing as set forth in §1-80(a) and 245.600(a), reviewed and certified by a professional engineer or professional geologist. The plan must notify the Department at least 7 calendar days before sample collection and must at minimum provide the following:

- i. the name and contact information of the independent third party, under the supervision of a professional engineer or professional geologist, designated to conduct sampling to establish a baseline per §1-80(a)(3);
- ii. the name and contact information of the independent third party, under the supervision of a professional engineer or professional geologist, designated to conduct sampling to establish compliance with monitoring per §1-80(a)(4);
- iii. the name and contact information of an independent testing laboratory accredited or certified by the Agency to perform the required laboratory method and to conduct the analysis required under Section 1-80(a)(5). When no laboratory has been accredited or certified by the Agency to analyze a particular substance requested, the laboratory must be accredited or certified by another State agency

or an agency of the federal government, if the standards used for the accreditation or certification of that laboratory are substantially equivalent to the accreditation standard under Section 4(o) of the Illinois Environmental Protection Act [415 ILCS 5];

- iv. proof of access to (and the right to test within) the area for testing prescribed within subsections (b) and (c) (Section 1-80(a)(6) of the Act)
 - v. copies of any non-disclosure agreements made with landowners, if applicable
 - vi. any documentation, if applicable, that a landowner of private property declines, expressly and in writing, to provide access or permission for sampling; if this documentation is unavailable, provide logs, copies of communications, and any other evidence of the good faith efforts made to secure such documentation
 - vii. proof that you provided each landowner referenced in subsections iv, v, and vi, above with a notice of water sampling rights under the Act pursuant to a form prescribed by the Department and prior to the landowner's execution of any document regarding water sampling
 - viii. identification of practicable contingency measures, including provision for alternative drinking water supplies, which could be implemented in the event of pollution or diminution of a water source.
- (c) Identify the professional engineer or professional geologist who has reviewed and certified this plan: Gerald E. Quindry, P.E., Sigma Plus Engineering, LLC

Water Quality Monitoring Work Plan

This Water Quality Monitoring Work Plan is submitted to identify the surface water bodies and underground aquifers that will be monitored as required by the HVHWF regulations, to describe the monitoring to be conducted, and the assessment process for the evaluation of analytical results.

(a) Identify all water sources within the range of testing under §1-80(a) of the Act

Existing water sources within the range of testing include one surface impoundment used for stock watering, and one water well, reportedly used to supply the stock watering surface impoundment. Community water systems in the vicinity of the proposed HVHWF well supply water through interconnections with regional water suppliers, with those supplied from surface water storage in Rend Lake, some 30 miles west of the oil well location, or water wells along the Wabash River, more than 10 miles east of the proposed oil well. None of the community water supply sources are within the range of testing under §1-80(a) of the Act. Three water supply wells are planned for installation as part of the oil well drilling and hydraulic fracturing program, and these wells will be within the range of testing required by the Act. A single residence is located within the range of testing, but the house does not have a private well, and is served with piped-in water by the local water district.

(b) Attach the work plan to ensure accurate and complete water quality sampling and testing as set forth in §1-80(a) and 245.600(a), reviewed and certified by a professional engineer or professional geologist. The plan must notify the Department at least 7 calendar days before sample collection and must at a minimum provide the following:

- i. The name and contact information of the independent third party, under the supervision of a professional engineer or professional geologist, designated to conduct sampling to establish a baseline per §1-80(a)(3).**

Sampling will be conducted by:

Shawnee Professional Services

104 South 4th St.; P.O. Box 125
Vienna, Illinois 62995-0125
618.658.6065

Professional Engineer supervising:

Billy Abernathy, P.E.
Shawnee Professional Services
104 South 4th St.; P.O. Box 125
Vienna, Illinois 62995-0125
618.658.6065

ii. The name and contact information of the independent third party, under the supervision of a professional engineer or professional geologist, designated to conduct sampling to establish compliance with monitoring per §1-80(a)(4).

The sampling program extends over a period of years. Initial sampling will be conducted by the firm named below, but it may be necessary to substitute the firm or supervising engineer during the program compliance period. Any substitution shall be with a similarly qualified firm or professional engineer/geologist.

Sampling will be conducted by:

Shawnee Professional Services
104 South 4th St.; P.O. Box 125
Vienna, Illinois 62995-0125
618.658.6065

Professional Engineer supervising:

Billy Abernathy, P.E.
Shawnee Professional Services
104 South 4th St.; P.O. Box 125
Vienna, Illinois 62995-0125
618.658.6065

iii. The name and contact information of an independent testing laboratory accredited by the Agency to perform the required laboratory method and to conduct the analysis required under §1-80(a)(5).

The analytical program extends over a period of years. Initial analyses will be conducted by the laboratories named below, but it may be necessary to substitute different companies during the program compliance period. Any substitution shall be with a similarly qualified laboratory approved by the Illinois EPA or another State agency, or an agency of the federal government, if the standards used for the accreditation or certification of that laboratory are substantially equivalent to the accreditation standard under Section 4(0) of the Illinois Environmental Protection Act (415 ILCS 5).

No individual laboratory within timely sample delivery range of the HVHHF drilling site is qualified to conduct all of the required analyses. The primary laboratory designated below will conduct all those analyses for which they are accredited, and distribute samples to subcontract laboratories for the remaining analyses. In any case, all analyses will be conducted by a laboratory properly accredited to perform the analyses required.

Laboratory Name	Status	Location
ARDL, Inc.	Primary Laboratory	Mt. Vernon, Illinois
tbd	Subcontract Laboratory	
tbd	Subcontract Laboratory	
tbd	Subcontract Laboratory	
ECS Lab Sciences	Primary Laboratory Alternate	Mt. Juliet, Tennessee

iv. Proof of Access to (and the right to test within) the area for testing prescribed within subsections (b) and (c) (Section 1-80a of the Act)

Landowner declines to provide permissions for sampling.

v. copies of any non-disclosure agreements made with landowners, if applicable.

Not Applicable

vi. any documentation, if applicable, that a landowner of a private property declines, expressly and in writing, to provide access or permission for sampling; if this documentation is unavailable, provide logs, copies of communications, and any other evidence of the good faith efforts made to secure such documentation.

vii. Proof that you provided each landowner referenced in subsections iv, v, and vi, above with a notice of water sampling rights under the Act pursuant to a form prescribed by the Department and prior to the landowner's execution of any document regarding water sampling.

viii. Identification of practicable contingency measures, including provision for alternative drinking water supplies, which could be implemented in the event pollution or diminution of a water source.

The area is served by a public water supply agency and water distribution system. There is no drinking water supply that uses the local surface or groundwater, thus no need to provide any alternate human drinking water supplies. In the unlikely event that the surface impoundment stock pond, or the water well supplying that stock pond, were to be polluted or otherwise diminished, a stock watering tank could be provided, using the public water system as the supply.

(c) Identify the professional engineer or professional geologist that has reviewed and certified this plan:

Gerald E. Quindry, P.E.
Sigma Plus Engineering, LLC
P.O. Box 554
Fairfield, Illinois 62837

Water Quality Monitoring Work Plan

The water sources included under this plan include both underground aquifers (one existing, and three proposed HVHWF water supply wells) and a surface water body (a stock pond). A fourth potentially required water supply well may be drilled, and, if completed, will be included in this monitoring program. No perennial streams are within the applicable range of the testing program. Analytes for each well and the surface impoundment shall include the following:

Table 1. Groundwater Analyses to be Performed

<u>Analyte</u>	<u>Method</u>	<u>Bottle Requirements</u>	<u>Preservative</u>	<u>Holding Time</u>
Arsenic	6010	500 mL Plastic	Nitric	6 Months
Barium	6010	--	--	6 Months
Cadmium	6010	--	--	6 Months
Calcium	6010	--	--	6 Months
Chromium	6010	--	--	6 Months
Iron	6010	--	--	6 Months
Lead	6010	--	--	6 Months
Magnesium	6010	--	--	6 Months
Manganese	6010	--	--	6 Months
Selenium	6010	--	--	6 Months
Silver	6010	--	--	6 Months
Mercury	7470	--	--	28 days
BTEX	8260	3 x 40 mL	Hydrochloric	14 days
Dissolved propane	RSK-175	3 x 40 mL	Hydrochloric	14 days
Dissolved methane	RSK-175	--	--	14 days
Dissolved ethane	RSK-175	--	--	14 days
Chloride	300.0	500 mL Plastic	Unpreserved	28 days
Sulfide	376.x / SM4500 S2-F	250 mL Plastic	NaOH & ZnOAc	7 days
Sulfate	300.0	--	--	28 days
Gross Alpha particles	900.0	500 mL Plastic	Nitric	na
Gross Beta particles	900.0	--	--	na
Total Dissolved Solids	160.1 / SM2540C	1 L Plastic	Unpreserved	7 days
Alkalinity	310.x / SM2320B	--	--	14 days
Specific conductance pH (at time of collection)	120.1 / SM 2510B	--	--	28 days immediate

Table 2. Surface Water Analyses to be Performed

<u>Analyte</u>	<u>Method</u>	<u>Bottle Requirements</u>	<u>Preservative</u>	<u>Holding Time</u>
Arsenic	6010	500 mL Plastic	Nitric	6 Months
Barium	6010	--	--	6 Months
Cadmium	6010	--	--	6 Months
Calcium	6010	--	--	6 Months
Chromium	6010	--	--	6 Months
Iron	6010	--	--	6 Months
Lead	6010	--	--	6 Months
Magnesium	6010	--	--	6 Months
Manganese	6010	--	--	6 Months
Selenium	6010	--	--	6 Months
Silver	6010	--	--	6 Months
Mercury	7470	--	--	28 days
VOCs (including BTEX)	8260	3 x 40 mL	Hydrochloric	14 days
Dissolved propane	RSK-175	3 x 40 mL	Hydrochloric	14 days
Dissolved methane	RSK-175	--	--	14 days
Dissolved ethane	RSK-175	--	--	14 days
Chloride	300.0	500 mL Plastic	Unpreserved	28 days
Sulfide	376.x / SM4500 S2-F	250 mL Plastic	NaOH & ZnOAc	7 days
Nitrate	300.0	500 mL Plastic	Unpreserved	48 Hours
Nitrite	300 / SM 4500 NO3 F	500 mL Plastic	Unpreserved	48 Hours
Sulfate	300.0	500 mL Plastic	Unpreserved	28 days
Gross Alpha particles	900.0	500 mL Plastic	Nitric	na
Gross Beta particles	900.0	--	--	na
Total Dissolved Solids	160.1 / SM2540C	1 L Plastic	Unpreserved	7 days
Total Suspended Solids	160.2 / SM2540D	1 L Plastic	Unpreserved	7 days
Turbidity	110.1 / SM 2130B	--	--	48 Hours
Alkalinity	310.x / SM2320B	--	--	14 days
Specific conductance	120.1 / SM 2510B	--	--	28 days
pH (at time of collection)				immediate

IDNR shall be notified of sampling events with 7 calendar days prior notice. Sampling procedures will comply with the following field procedures:

Surface Water:

To the extent possible, the sample location shall be located such that the water is representative of the overall water body being sampled. The location shall be surveyed to allow repeated sampling from the same location in follow-on sampling events. The location shall be photographed as an additional means of location in future sampling events.

Groundwater:

Groundwater shall be sampled at a point as close to the source as is feasible. In the case of water wells with down-hole pumps, the existing pumping system shall be employed, and a sample collected before any water softening, ion exchange, chemical addition, filtering, or pressure tank that could alter water quality. If no water sampling port is available that meets this criterion, a professional engineer shall be consulted to establish an appropriate sampling point, or a sampling port meeting the criterion may be installed with the owner's permission.

Wells that are open for subsurface sampling shall be sampled by use of bailers or down-hole sampling pump and tubing. Any sampling equipment to be used (including sample bailer cable or string and sample tubing) shall be either be clean and unused, or cleaned and decontaminated on-site prior to use. Wells shall be purged by bailing/pumping at least three well volumes prior to collection of samples if bailers or temporary sampling pumps are used.

Sampling Procedure:

Water Sample bottles shall be provided by the analytical laboratory with preservatives included in the bottles. Prior to sampling, all necessary water sample bottles will be clearly labeled in indelible ink, with identification of the project, sample location, date, time, analytical method(s), and initials of the individual collecting the samples. Water shall be retrieved from the water source in a clean, unused bailer or similar device such that the water is representative of the water quality with as little disturbance or aeration as possible. The water will then be distributed to the sample bottles in a manner that minimizes the potential for aeration or contamination. Sample bottles, with the exception of volatile organic samples, shall be filled to approximately 90 percent of full, to allow for expansion of the contents. Samples collected for volatile organics analysis (including dissolved gasses) shall be collected in VOA bottles and filled completely, with no headspace. Immediately after collection, the individual samples bottles shall be placed in individual zipper-lock plastic bags which shall be labeled with their contents. The bagged sample bottles shall then immediately be placed in a cooler or ice chest containing either bagged ice or 'blue ice' type coolants. The chain of custody documents shall be filled out in the field as the samples are collected, and accompany the samples

throughout their journey from the field to the analytical laboratory. At all times until surrender to the analytical laboratory, the samples shall be in the positive control of the original sampler as listed on the sample bottle, or the listed recipient as acknowledged on the chain-of-custody document.

Sampling Frequency:

Prior to HVVHF operations each source shall be sampled a minimum of three times to establish baseline conditions. After HVVHF operations have been completed, all sources shall be sampled repeatedly, per the schedule described below:

Sample Event	Timing
Prior to HVVHF operations	A minimum of 3 events after permit approval and before HVVHF operations
First Post-HVVHF samples	6 months after HVVHF operations ¹
Second Post-HVVHF samples	18 months after HVVHF operations ¹
Third Post-HVVHF samples	30 months after HVVHF operations ¹

¹ Source sampling in the previous month can be substituted for the scheduled sampling event

Data Analysis Procedure:

Water quality in naturally occurring sources varies with season and other natural conditions. Also, water sampling and analysis have unavoidable variances in results, even if actual water quality is unchanged. For these reasons, it is necessary to employ multiple sampling events, and statistical methods to assess whether or not a water source has been degraded or diminished because of some external force, such as nearby hydraulic fracturing conducted beneath the surface. A baseline is established by sampling before the HVVHF events thus clearly not influenced by future events. Post-HVVHF sampling is then conducted and compared to the baseline.

There are a number of different ways to assess the data resulting from a sampling program. An appropriate method of statistical comparison needs to be established prior to conducting the assessment. Otherwise, it would be possible to select a method that achieves the desired result, rather than one providing a fair assessment of the data. The method to be used under this plan is based on U.S. EPA methodology established for the assessment of contaminants in environmental samples, and is

described in Chapter 9 of USEPA publication 846.¹ We propose to use a data analysis plan based on that methodology. That methodology can be used to establish:

- A statistically valid range for the mean value of baseline sample data, based on a presumed level of confidence. (We propose using a 90 % level of confidence, the same as USEPA.)
- A statistically valid range for the mean value of post-HVHHF operations samples.
- If the confidence interval for the mean baseline results, compared to the mean post-HVHHF results do not overlap, the conclusion to be drawn is that the two sampling periods have different sample results. Thus forming a conclusion that the HVHHF operations may have impacted water quality; and further investigation is warranted. Such further investigation may include additional sampling or data gathering.

It should be noted that the methodology described above leaves doubt as to the actual results. No statistical method is perfect. In this case, we are assuming a 90 percent confidence level, which is the same as selected by USEPA for similar assessments. That means, that for any specific comparison, there is a 90 percent possibility of an accurate result, a 5 percent possibility of a false positive result, and a 5 percent chance of a false negative result. But increasing the confidence level would broaden the range of each mean such that they would be nearly meaningless and allow findings of impairment or degradation to go undetected. Reducing the confidence level would have similar, but opposite results, and lead to many more false positives, where the sampling results would indicate environmental degradation that, in reality, did not occur. As a middle ground, we have chosen the USEPA standard range.

A finding of a potential environmental impairment shall be reported to IDNR. The permit applicant shall then assist IDNR and IEPA in evaluating the issue by conducting a thorough review of well operations, sample collection and analysis history, and, if requested, collecting additional samples from the potentially impacted sources. Thus, a more detailed examination of available data shall be made by IDNR and IEPA, allowing other factors other than the three baseline and post-HVHHF samples to be considered.

¹ Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846), US EPA, available online at <https://www.epa.gov/hw-sw846/sw-846-compendium>

FEB 02 2017



WOOLSEY OPERATING COMPANY, LLC

125 N. MARKET STREET, SUITE 1000, WICHITA, KANSAS 67202-1729 (316) 267-4379

FAX (316) 267-4383

woolsey@woolseyco.com

January 25, 2017

Alice, Scott and Kent Woodrow

Re: IDNR HVHFACT & Rules Water Sampling 62 III
Code 245.600(a)(6)
1,500 Ft of Woodrow #1H Horizontal Well
W/2 E/2 Section 31-T4South, R8East White County, IL

Dear Woodrow's:

This letter is sent requesting your election as to the IDNR Requirements pertaining to the above Rules has been prepared to satisfy said IDNR Water Sampling Requirements.

As a Landowner, the above referenced Act, which is enclosed for your review, provides you the following rights:

- . Right to allow access or permission for water quality sampling with no conditions; or
- . Right to deny access or permission for water quality sampling; or
- . Right to condition access or permission under a non-disclosure agreement with the permittee

We are respectfully asking that you make your election as to one of the above by marking in the that box to the right of that certain Landowner Right.

Further, please sign your individual names where indicated and return one original to me in the enclosed return envelope.

Sincerely,
WOOLSEY OPERATING COMPANY, LLC

Garry D. Walker, CPL
VP Land and Legal

LANDOWNERS:

Alice Woodrow

Scott Woodrow

Kent Woodrow

Signed this 30 day of JAN., 2017



ILLINOIS DEPARTMENT OF NATURAL RESOURCES
Office of Oil and Gas Resource Management



(217) 558-2028

1 Natural Resources Way
Springfield, Illinois 62702-1271

WATER SAMPLING RIGHTS HVHFF-32

PERMITEE: Woolsey Operating Company, LLC REGISTRATION #: HVHFF- 00003
WELL NAME: Woodrow 1H-310408-4193 PERMIT #: TBD
LOCATION: 1,990' South and 1,650' West of the NE NE NE NE Quarter REFERENCE # TBD
COUNTY: White SECTION: 31 TOWNSHIP: 4S RANGE: 8E
COMPANY: Woolsey Operating, LLC
CONTRACTOR / DESIGNEE NAME: NA
CONTRACTOR / DESIGNEE SIGNATURE: NA DATE:

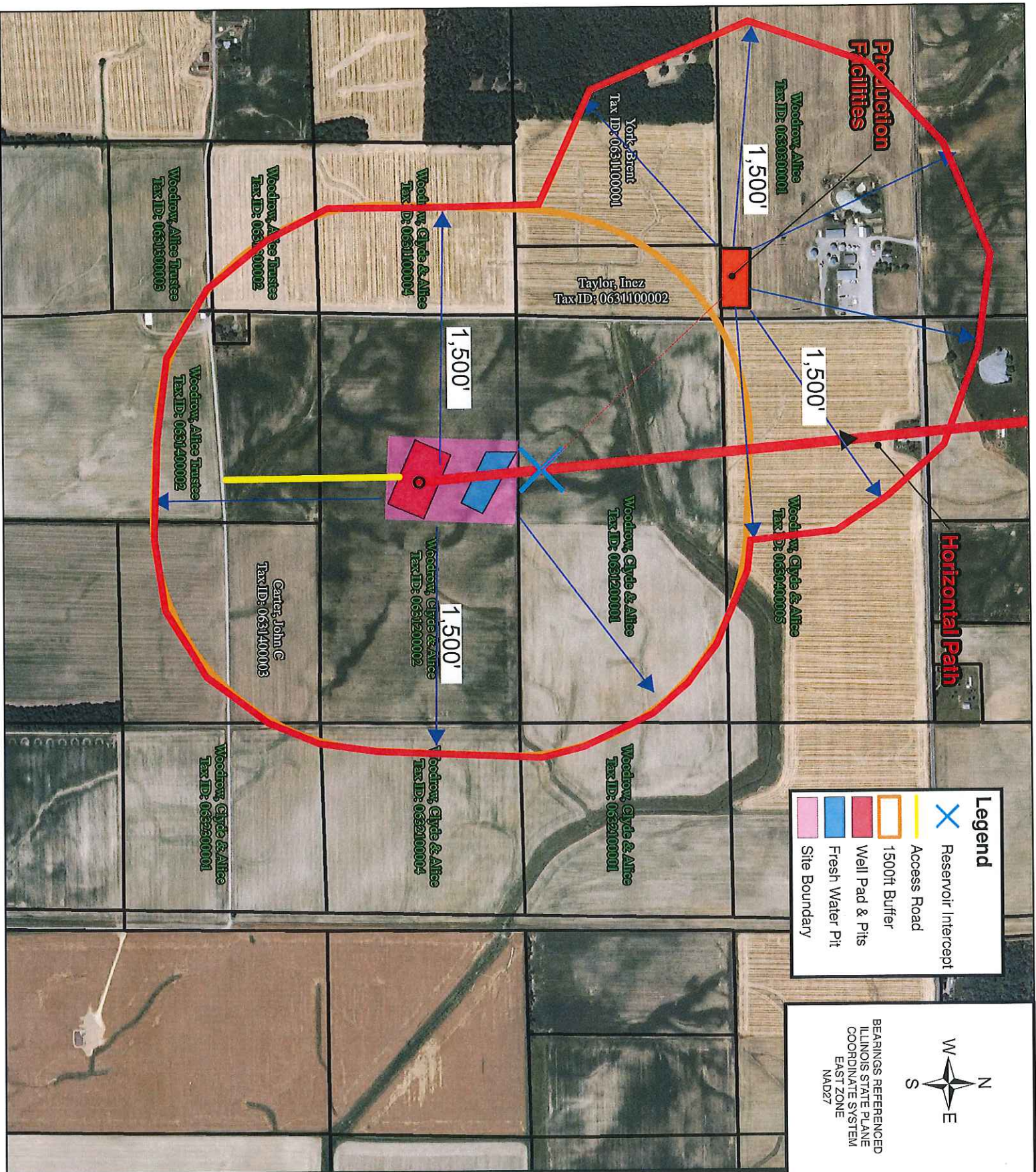
CERTIFICATION

"I certify, under penalty of perjury as provided by law and under penalty of refusal, suspension, or revocation of a high volume horizontal hydraulic fracturing permit, that I have provided each landowner with notice of their water sampling rights, using the form (provided by the Department) known as the Notice of Water Sampling Rights under the Hydraulic Fracturing Regulatory Act and pursuant to 62 Ill. Adm. Code §245.600(a)(6)."



Woolsey Operating Company, LLC
Company Name

Manager
Job Title



Legend

- Reservoir Intercept
- Access Road
- 1500ft Buffer
- Well Pad & Pits
- Fresh Water Pit
- Site Boundary

BEARINGS REFERENCED
 ILLINOIS STATE PLANE
 COORDINATE SYSTEM
 EAST ZONE
 NAD27

104 S. 4th St.
 P.O. Box 125
 Vienna, IL 62995
 618-658-6065

**WELL SITE SETBACK PLAN
 PARCEL MAP
 WHITE COUNTY, ILLINOIS**

Path: S:\2016\Ameren N.Decatur-Latham-1342\Access Maps

Revisions	
#	Note

Drafted by:	K. FIELD
Date:	9/26/2016
Reviewed by:	B. ABERNATHY
Scale:	1" = 800'
Job Number:	2016-968
Sheet:	1 of 1

Drawing Status:

Preliminary Drawing

Final Drawing

Requested By: _____

This Professional Service Conforms to
 The Current Illinois Minimum Standards
 of Practice Applicable To Boundary
 Survey

	<p style="text-align: center;">ILLINOIS DEPARTMENT OF NATURAL RESOURCES</p> <p style="text-align: center;">Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271</p>	
<p>HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10</p>		

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively

Attachment: ViolationsReport

Please save attachment and use the file name above.



Violations Report §1-60; 245.210, 245.210(b)(5).

(a) List and explain any conviction, adjudication, or finding of fraudulent, coercive, or dishonest practices, or demonstrating incompetence, untrustworthiness, or financial irresponsibility in the conduct of business, in Illinois or elsewhere.

(b) List and explain any revocation of a high volume horizontal hydraulic fracturing permit, or its equivalent, for incurring a material or major violation or using fraudulent or dishonest practices.

(c) List any pending Notices of Violations or Director's Decisions under the Hydraulic Fracturing Regulatory Act, the Illinois Oil and Gas Act, or the administrative rules promulgated under either of those Acts, issued against you or any parent, subsidiary or affiliate .

- (a) None
- (b) None
- (c) None

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
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Attachment: ContractorStatement

Please save attachment and use the file name above.

Contractor Statement §1-35)b)(20); 245.210(b)(4).

State whether you or a contractor will be performing the HVHFF operations, and identify any such contractor by name, address, telephone number, and the direct telephone number of the person responsible for HVHFF operations at the well site for the contractor. **If any information is not known about the contractor at this time, the application must be supplemented as soon as possible and in all events before the HVHFF operations begin.**

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
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Attachment: EmissionManagementStatement

Please save attachment and use the file name above.

Emissions Management Statement §1-35)b)(20); 245.210(b)(6).

Section 1-75 of the Act and Sections 245.845, 245.900, and 245.920 of the rules seek to minimize direct release of fluids or gases into the environment, to prevent waste, to minimize emissions and releases associated with venting hydrocarbon fluids and natural gas, and to safely maximize resource recovery.

(a) Describe which of the methods listed in 245.845 and 245.900 you will use for managing natural gas and hydrocarbon fluids produced during flowback and production. If none, state "none" and state how you plan to manage hydrocarbon fluids and natural gas during flowback and production:

(b) Are you claiming technical infeasibility of complying with 245.845, 245.900, and/or 245.920? If so, (i) state which Section you claim is technically infeasible to comply with, and (ii) attach a statement providing all the information required by 245.845(d), or 245.900(e), as applicable:

(c) Are you claiming economic unreasonableness of complying with 245.845, 245.900, and/or 245.920? If so, (i) state which Section you claim is economically unreasonable to comply with, and (ii) attach a statement providing all the information required by 245.845(d), or 245.900(e), as applicable:



WOOLSEY OPERATING COMPANY, LLC

125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775

(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC

Woodrow #1H-310408-193

White County, Illinois

High Volume Horizontal Hydraulic Fracturing Permit Application

HVHHF-10: Emission Management Statement

- a) All liquid hydrocarbons separated and collected during flow back operations and production shall be stored in approved tanks. The Woodrow #1H-310408-193 is a wildcat well and natural gas, if produced in significant volumes during flow back operations and production, will be separated from the flow back fluid and flared in a completion combustion device that conforms with Sections 245.845 and 245.900.
- b) No
- c) No

	ILLINOIS DEPARTMENT OF NATURAL RESOURCES	
Office of Oil and Gas Resource Management One Natural Resources Way Springfield, Illinois 62702-1271		
HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10		

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Attachment: RadioactiveMaterialsManagement

Please save attachment and use the file name above.

Radioactive Materials Management §1-35)b)(20); 245.210(b)(7).

Attach a plan explaining how you will test for and identify, manage, transport, and dispose of radioactive materials used or generated during your operations. The strategy at minimum must:

(a) Confirm that the initial site sampling will determine concentrations of the following:

	Total Dissolved Solids	Gross Alpha	Gross Beta	Radium-226	Radium-228	Potassium-40
Soil						
Private wells						
Surface water						

- (b) Describe what you plan for radiation testing of drill cuttings from the black shale
- (c) Describe what you plan for radiation testing of flowback
- (d) Describe what you plan for radiation testing of the well site during site restoration, including reserve pits and any surface waters within 1500 feet of the well site.
- (e) Describe the frequency and components of surveys of equipment and waste streams prior to disposal, maintenance or recycling.

Radioactive Materials Management

This Radioactive Materials Management Program provides the procedures that will be followed to test for, identify, manage, transport, and dispose of any radioactive materials utilized or generated during the course of High Volume Horizontal Hydraulic Fracturing (HVHFF) operations. This document should be employed in conjunction with the Well Site Safety Plan also provided for the Site. Radioactive material management is also regulated by the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Transportation (DOT).

(a) Baseline Site Sampling

Initial site conditions will be assessed through the collection and analysis of five soil samples from the drill pad location. The sample locations latitudes and longitudes shall be recorded so that the baseline samples can be compared to subsequent site restoration samples described below. Since there are no existing private wells in the vicinity of the proposed oil well, nor any surface water bodies, there are, as yet, no water sources to sample under this permit requirement. (Water bodies and sources are covered in the Water Source Management Plan and the Water Quality Management Plan for non-radioactive constituents.) The water supply wells constructed for purposes of oil well drilling and hydraulic fracturing are to be located in the vicinity of the proposed oil well, and shall be sampled and analyzed after completion of their construction, but before hydraulic fracturing takes place. The analysis for radioactive particles and isotopes will be conducted by an Illinois EPA approved laboratory in accordance with the analytical methods described in the attached table. Sample collection methods are described in the Well Site Safety Plan in Section 3.2.10.3.

(b) Radiation Testing of Drill Cuttings from Black Shale

In addition to baseline sampling at the Site prior to drilling, samples of the target black shale drill cuttings will be collected and submitted for analysis for Naturally Occurring Radioactive Materials (NORM) as Identified in the table below. The number of samples to be collected for analysis will be consistent with one sample per 1,000 feet of horizontal drilling in the black shale. The analysis for radioactive particles and isotopes will be conducted by an Illinois EPA approved laboratory in accordance with the analytical methods described in the attached table. Sampling methods and equipment are described in the Well Site Safety Plan in Section 3.2.10.3.

(c) Testing for Radiation in Flowback Water and Solids

Flowback fluids will be returned to the surface from each stage of the hydraulic fracturing procedure. That fluid will contain some of the injected hydraulic fracturing fluids and solids as well as water, oil, and solids from the shale formation. The solids and liquids will be separated in a settling tank, and samples from the solid and liquid fractions will be collected and analyzed for radioactive particles and isotopes by the same methods used for other materials potentially containing NORM. Sampling methods and equipment are described in the Well Site Safety Plan in Section 3.2.10.3.

Table of Radionuclide Sampling and Analysis

Media	Schedule	TDS	Gross Alpha	Gross Beta	Radium-226	Radium-228	Potassium-40
Baseline Soils	Prior to Well Pad Construction	Not Applicable	EPA 900	EPA 900	SM 7500 Ra B M	EPA 904	EPA 6010B
Drill Cuttings from black Shale	During drilling of black shale	Not Applicable	EPA 900	EPA 900	SM 7500 Ra B M	EPA 904	EPA 6010B
Private wells	After Water Well Drilling	EPA 160.1	EPA 900	EPA 900	SM 7500 Ra B M	EPA 904	EPA 6010B
Surface water	No surface water bodies near the well						
Flowback Water	One sample per 1000 feet of horizontal well in black shale	EPA 160.1	EPA 900	EPA 900	SM 7500 Ra B M	EPA 904	EPA 6010B
Flowback Solids	One sample per 1000 feet of horizontal well in black shale	Not Applicable	EPA 900	EPA 900	SM 7500 Ra B M	EPA 904	EPA 6010B

(d) Well Site Testing During Site Restoration

Site restoration is intended to return the Site to near the original Site conditions. In that regard, the original five baseline sample locations shall be re-sampled after Site restoration activities



and analyzed for the same analytes. In addition, any area where discharge of suspect NORM material has occurred during drilling or hydraulic fracturing activities shall be sampled and compared to the baseline data for the overall Site.

(e) Equipment and Waste Stream Disposal, Maintenance, or Recycling

The level of NORM accumulation can vary substantially from one petroleum or gas production facility to another, depending on geological formation and operational conditions, and will also change over the lifetime of a single well.ⁱ Since there is little data available regarding NORM potential at the Site to determine whether or not the subject facility is accumulating NORM, a NORM survey with sampling and analysis will be conducted to provide sufficient information to assess the risk. As more fully described in the Well Site Safety Plan, workers at risk of exposure to NORM include those handling pipes and equipment that might have been contaminated by well materials. Sludge, drilling mud, and pipe scales can contain elevated levels of NORM, and the radioactive materials might be removed from the site as wastes or within equipment as the equipment is moved from one site to another. To prevent excess exposure to workers, Section 3.2.10 of the Well Site Safety Plan describes field testing procedures that will be employed and the equipment to be used prior to maintenance activities on equipment that may be suspected of accumulating NORM at the Site during drilling and hydraulic fracturing work. Suspect equipment would include piping, valves and tanks where scale may accumulate on the inside of the equipment .

Prior to disposal or recycling, materials that are suspected of containing NORM materials will be subjected to field testing and/or laboratory analysis to assess the possible requirement to be managed as radioactive wastes. If warranted, the appropriate NRC and DOT requirements shall be followed.

ⁱ *Managing Naturally Occurring Radioactive Material (NORM) in the oil and gas industry*, International Association of Oil & Gas Producers, Report 412, March, 2016.

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<p>HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHFF-10</p>		

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Attachment: WasteDisposal

Please save attachment and use the file name above.

Waste Disposal §1-53(a)(7); 245.300(c)(7).

Provide the well name, location and permit and reference number for all Class II injection wells to be used for disposal of hydraulic fracturing flowback.

The Class II injections wells that we plan to use for disposal of hydraulic fracturing flowback are:
Trueflow #1, Reference #216072, SE SW SW, Sec. 6-6S-9E, White County, IL.
Rankin #1 SWD, Reference #11947, SE N/2 NE, Sec. 31-3S-11E, White County, IL.



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271



**HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING
PERMIT APPLICATION HVHFF-10**

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively.

Attachment: BondMunicipalConsentRegistration

Please save attachment and use the file name above.

(1) Bond §1-65; 245.210(f), 245.220.

Please provide proof of bond as required by 245.220(b) and/or (c)

(2) Municipal Consent 245.210(c).

Will the well site be located within the limits of any city, village, or incorporated town YES NO
If "Yes," what city, village, or incorporated town? _____

If "Yes," attach a certified copy of the official consent for the high volume horizontal hydraulic fracturing operations to occur from the municipal authorities where the well site is proposed to be located.

(3) Registration Update 245.210(b)(1).

Do you certify that the applicant registration information previously provided to the Department pursuant to Section 245.200 is accurate and up to date? YES NO initial: _____

(4) Additional Information §1-53(a)(4); 245.300(c)(4).

Attach any other information you wish the Department to consider that will demonstrate you're your operations will be conducted in a manner that will protect the public health, public safety, property, wildlife, aquatic life and environment, and will prevent pollution or diminution of any water source.

ATTESTATION § 1-35(f) ; 245.210(h).

I, Scott Fraizer, affirm that I am the applicant or the applicant's designee who has been vested with the authority to act on behalf of the applicant, and that I have direct knowledge of the information contained in the application and its attachments. I certify, under penalty of perjury as provided by law and under penalty of refusal, suspension, or revocation of a high volume horizontal hydraulic fracturing permit, that this application and all attachments are true, accurate, and complete to the best of my knowledge.

SIGNATURE: _____ DATE: 5/5/17

Title

UNDER PENALTIES OF PERJURY, WE DECLARE THAT WE ARE EXECUTING THE FOREGOING INDIVIDUAL COLLATERAL BOND FOR THE USES AND PURPOSES THEREIN SET FORTH.

IN WITNESS WHEREOF, WE HAVE HEREUNTO SET OUR RESPECTIVE HANDS AND SEALS THIS _____ DAY OF _____, _____.

PERMITTEE:

SIGNATURE

Manager

TITLE

October

DATE

APPROVED BY:

DIVISION OF OIL AND GAS

DATE



Division of Oil and Gas
 One Natural Resources Way
 Springfield, IL 62702-1271
 (217) 782-7756

**ASSIGNMENT OF
 CERTIFICATE OF DEPOSIT**

For value received, Woolsey Operating Company, LLC (Permittee) hereby assigns, sets over and transfers to the Illinois Department of Natural Resources, Office of Mines and Minerals, its successors and assigns the Illinois Department of Natural Resources, Office of Mines and Minerals, all right, title, and interest of Woolsey Operating Company, LLC (Permittee) in and to the principal amount of \$50,000.00 on deposit in Woolsey Operating Co, LLC (Permittee) account in Peoples National Bank (Bank), evidence by Certificate of Deposit number [REDACTED] (in the amount of \$50,000.00) and all sums now or at any time hereafter on deposit in such account, for the purpose of securing payment of each and every debt, liability or obligation under: (choose one)

1. Section 8c of the Oil and Gas Act (225 ILCS 725/8c) concerning operation of a Liquid Oilfield Waste Transportation System; or
2. Section 6 of the Oil and Gas Act (225 ILCS 725/6) concerning the drilling and operation of oil and gas and Class II wells; or
3. Section 2 of the Oil and Gas Act (225 ILCS 725/2) concerning the drilling of geological, structure, coal or other mineral test holes, or monitoring wells in connection with any activity regulated by the Department.

which Woolsey Operating Co, LLC (Permittee) may now or any time hereafter owe to the Illinois Department of Natural Resources, Office of Mines and Minerals, whether such debt, liability or obligation now exists or is hereafter created or incurred and whether it is direct or indirect, due or to become due, absolute or contingent or joint and/or several ("Obligations"). The foregoing assignment shall be construed as a grant of a security interest, subject to the extent applicable to the Uniform Commercial Code as enacted in the State of Illinois.

Woolsey Operating Company, LLC (Permittee) hereby irrevocably authorizes and empowers the Illinois Department of Natural Resources, Office of Mines and Minerals at any time, whether or not at such time the Obligations or any part thereof are due and payable, in its own name or in Woolsey Operating Co, LLC (Permittee) name to demand, apply for withdrawal, receipt and give acquittance for any and all sums which are or will become due and payable under said account, to exercise any and all rights and privileges and receive all benefits accorded to said account, to execute any and all instruments required therefor, and to apply such moneys towards payment of the Obligations in such order of application as the Illinois Department of Natural Resources, Office of Mines and Minerals may determine, all without notice to Woolsey Operating Co, LLC (Permittee). Peoples National Bank (Bank) is hereby specifically authorized and directed, on demand of the Illinois Department of Natural Resources, Office of Mines and Minerals, to pay said account and all moneys hereby assigned directly to the Illinois Department of Natural Resources, Office of Mines and Minerals and to transfer said account into the name of the Illinois Department of Natural Resources, Office of Mines and Minerals on the books of Peoples National Bank (Bank). Until this assignment has been released by a writing delivered by the Illinois Department of Natural Resources, Office of Mines and Minerals to Peoples National Bank (Bank), Woolsey Operating Company, LLC (Permittee) shall have no right to make any withdrawals from said account (except interest earned thereon which shall be payable to Woolsey Operating Company, LLC (Permittee) from time to time) or to the issuance of any new certificate evidencing such account.

ATTEST

 Title: Manager

Woolsey Operating Company, LLC
 Permittee
 By: _____
 Signature of Permittee
 Title: Manager

