Delaware River Basin Commission (DRBC) Consolidated Administrative Hearing on Grandfathered Exploration Wells

Report to:

Delaware Riverkeeper Network
and
Damascus Citizens for Sustainability, Inc.

Prepared by:

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November 15, 2010

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A. Executive Summary

This report responds to the Delaware Riverkeeper Network's (DRN) and Damascus Citizens for Sustainability's (DCS) request to provide expert review and opinion on the Delaware River Basin Commission's (DRBC) decision to exclude 11 Pennsylvania state permitted wells in Wayne County from DRBC review of exploration wells under its June 14, 2010 and July 23, 2010 Supplemental Determinations. The findings contained in this report are based on the material provided by DRN and DCS, as shown in the attached exhibits. The opinions stated here are stated to a reasonable degree of scientific and professional certainty.

This report provides my opinion in response to five (5) questions. Each question is responded to more fully in Sections D1 through D5 of this report. An executive summary of each response is provided below:

(1) Do the wells listed by DRBC as grandfathered wells meet DRBC's definition of an exploration well eligible for grandfathered status?

It is my opinion that the 11 wells listed by DRBC as grandfathered wells, covered under its June 14, 2010 and July 23, 2010 Supplemental Determinations, do not meet DRBC's definition of an exploration well eligible for grandfathered status. DRBC defined a grandfathered exploration well as a well intended solely for exploratory purposes and one that is plugged and capped at the conclusion of exploratory activities, without future use for production. No information was provided for my review to show that the grandfathered wells were drilled exclusively for exploratory purposes and will be permanently plugged and abandoned after the wells are drilled. None of the grandfathered well permits specify the completion method or the final disposition of the wells, nor were the 30 day well completion reports available. None of the grandfathered wells appear to have submitted a Notice of Intent by Well Operator to Plug a Well, and/or a Certificate of Well Plugging. Instead, several of the grandfathered well documents confirm alternative plans for these wells, including gas production. Approval of an exploration well destined for production is in essence production well approval.

Well density and drilling pace are strong indicators of well type. True exploration wells are drilled on large spacing intervals to test hydrocarbon trap theories. The pace is slower than production well drilling, so data from preceding exploration wells can be used to avoid the economic risk of drilling several dry-holes in rapid succession. The density and pace of some of the grandfathered wells, especially Newfield's wells, are inconsistent with exploration well classification.

Most companies have exploration departments that are separate and distinct from production drilling departments. Exploration departments typically have higher levels of data security, dedicated exploratory budgets, and staff that specialize in finding new hydrocarbon sources. Very small companies may combine exploration and production drilling staff, however, funding documents for each well will clearly delineate the nature of the well and whether it was funded and located as a true exploration well and whether the well was planned to be a test well only, destined for plugging and abandonment.

(2) Do exploration wells pose lower risk than production wells?

It is my opinion that exploration wells are riskier than production wells, because drilling hazards are unknown. The risk of a well blowout or well control situation occurring is higher due to the increased difficulty in designing and constructing a well based on unknown data. DRBC's decision to forego

regulation of the grandfathered wells, because they are "exploration wells" and thereby "lower risk," is inconsistent with the known higher risk profile for an exploration well. The risk of an exploration well blowout is approximately 7 wells in every 1000 drilled.

True exploration wells, by definition, explore into previously unknown and unmapped hydrocarbon formations; therefore, an exploration well drilling Operator must be prepared to encounter both oil and gas. The grandfathered wells should have been equipped to deal with either a gas and/or oil well blowout. While an exploration well Operator may target gas, as is the stated intent in these grandfathered wells, it cannot rule out the potential to encounter oil enroute to the gas target, or instead of hitting a gas target. In a true exploration well, the type of hydrocarbons, depth of burial and whether they are present in commercial quantities are all unknown.

There was no material provided for my review to show that the risk of drilling an exploration well in the Delaware River Basin is less than that of a production well, nor that the possibility of oil being encountered during exploration drilling can be completely ruled out.

(3) Did DRBC's decision to grandfather 11 wells create the potential for increased risk to water quality and water resources of the Delaware River Basin?

It is my opinion that DRBC's decision to forego regulation of the grandfathered wells resulted in increased risk to water quality and water resources of the Delaware River Basin. This increased risk was created by:

- not stipulating additional site-specific mitigation measures to reduce environmental impacts above the minimum statewide standards required by PADEP to protect the waters of the Delaware River Basin;
- allowing wells to be drilled and sited in environmentally sensitive areas within the Delaware River Basin without adequate DRBC siting review;
- not requiring appropriate setbacks from sensitive locations; and
- creating a situation whereby an exploration well must be drilled and plugged (even if successful), such that drilling impacts are duplicated when a production well is re-drilled at the same or another location at a later date.

The DRBC's definition of an exploration well is inconsistent with industry practice. It is industry practice to convert successful exploration wells into production wells, if commercial quantities of hydrocarbons are found. DRBC's decision to forego review of the grandfathered wells if they are drilled solely to collect data, and then immediately plugged and abandoned, could result in two wells being drilled in the same area (first the exploration well and then later a production well). Drilling a well twice results in economic waste and increased impacts to air, land and water in the Delaware River Basin. Instead, the DRBC should have reviewed each exploration well to ensure it was properly sited and environmental impacts were mitigated. In this way, if Operators make a commercial find, DRBC would have already ensured the well was positioned at a low impact surface location and was drilled using the lowest impact methods. It is important to properly site and assess the impacts of any proposed exploration well in as much detail as is necessary for a production well, because a successful exploration well is in essence the first production well in the field.

DRBC should carefully examine the grandfathered wells that have been drilled to determine if they were properly sited and completed using technically sound well construction practices. Wells that were not properly sited or constructed should be plugged and abandoned.

DRBC grandfathered 11 wells based on economic and risk considerations, with no publicly available economic or risk assessments to support this decision. This decision appears to conflict with DRBC's mission to protect water resources in the Delaware River Basin. There is no evidence that the permit applications for each of the grandfathered wells confirm that they are in fact shale gas "exploration" wells or that the risk of these wells to the Delaware River Basin is low.

(4) Are there sufficient plans and protections included in PADEP's approval to mitigate and respond to the risks associated with exploration wells?

It is my opinion that the Pennsylvania Department of Environmental Protection (PADEP) permit materials and Preparedness, Prevention and Contingency Plans (PPC) provided for my review do not include sufficient plans and protections to mitigate and respond to the risks associated with exploration wells.

There are a number of risks posed by exploration wells, including air, water and land pollution, resulting from fuel and chemical spills, stray gas, well blowouts, water use, waste disposal, and other aspects of drilling operations. The most significant and potentially catastrophic risk of those listed is an uncontrolled blowout. An uncontrolled blowout must be considered when planning an exploration well. There is insufficient evidence to show that the grandfathered exploration wells are equipped to deal with either a gas and/or oil well blowout. Well permit applications filed with PADEP for the grandfathered wells do not include any explanation or evidence of blowout prevention or control capability.

While blowouts are very infrequent, they do occur, and are a reasonably foreseeable consequence of exploratory drilling operations. Blowouts can last for days, weeks, or months until well control is finally achieved. The most common method, and best technology, to control an on-land blowout is well capping, requiring large volumes of water to deluge the rig, allowing well control experts to work near a blowout. Water requirements can range from 500,000 to 6,000,000 gallons of water per day. Well control experts also use foam and dry chemicals to respond to blowouts. Deluge operations create large pools of water on the surface that drain away from the well blowout. This can transport oil, chemicals, fuels, and any other materials released during a blowout toward lower elevation drainage areas.

Newfield's PPC for the proposed Newfield grandfathered wells does not meet PADEP's requirements; the adequacy of the other grandfathered wells' PPCs is not known, because they were not provided for review. Exploration well operations require fuel to operate drilling and completion equipment, and the process of drilling a well requires numerous chemicals. Newfield's PPC lists the potential for both fuel and chemical storage tanks to leak and contaminate the nearby environment, water supplies or water resources. However, Newfield's PPC lists insufficient onsite resources to respond to the potential fuel and chemical spills it lists.

The PPC Plans provided for my review did not adequately identify the environmentally sensitive areas within the Delaware River Basin that should be protected during exploration drilling, and did not include adequate tactics and strategies to protect those areas.

Pennsylvania only requires a bond of $2,500 per well, or a blanket bond of $25,000 for all wells drilled in Pennsylvania by a single Operator. Neither amount would provide sufficient funds to control, clean up,

and/or remediate the damage caused by a well blowout, chemical spill or large fuel spill from an exploration well operation.

(5) Was DRBC's assumption the risk of the grandfathered wells was small because PADEP has sufficient human health, environmental and safety protections in place for exploration drilling projects in Pennsylvania well-founded?

It is my opinion that DRBC's assumption that the risks associated with the grandfathered wells is small because PADEP has sufficient human health, environmental and safety protections in place for exploration drilling projects in Pennsylvania is not well founded for the following reasons:

- PADEP's existing Chapter 78 Oil and Gas Well Regulations are known to be deficient;
- Grandfathered wells are not required to be constructed to industry best practices for shale gas wells in Pennsylvania;
- PADEP did not apply "Special Permit Conditions," requiring a Water Management Plan, to most of the grandfathered wells;
- Fracture treatment operations are planned for the B&E well;
- Drilling waste can result in environmental harm if not properly managed, and some waste has already been buried on-site and not transported out of the Basin;
- Stray gas migration associated with oil and gas wells can impact water supplies, if wells are not properly constructed and operated;
- PADEP's well siting criteria allows wells to be placed very close to water resources; and
- Air pollution impacts, and corresponding impacts to water resources, are not well understood or mitigated.

B. Introduction

This report responds to the Delaware Riverkeeper Network's (DRN) and Damascus Citizens for Sustainability's (DCS) request to provide expert review and opinion on the Delaware River Basin Commission's (DRBC's) decision to exclude 11 Pennsylvania state permitted wells in Wayne County from DRBC review of exploration wells under its June 14, 2010 and July 23, 2010 Supplemental Determinations. The opinions stated here are stated to a reasonable degree of scientific and professional certainty.

C. DRBC's Contested Decisions and Chronology

On May 19, 2009, the DRBC issued a "Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters" (**Exhibit 1**), directing natural gas extraction projects located in shale formations within the drainage area of Special Protection Waters to obtain DRBC approval for:

> *"…the drilling pad upon which a well intended for eventual production is located, all appurtenant facilities and activities related thereto and all locations of water withdrawals used or to be used to supply water to the project.*"

The May 19, 2009 determination exempted "wells intended solely for exploratory purposes."

On May 5, 2010, the DRBC issued a decision to finalize natural gas regulations before considering project approvals (**Exhibit 2**).

On June 14, 2010, the DRBC issued a "Supplemental Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters" (**Exhibit 3**), directing **all** natural gas extraction projects located in shale formations within the drainage area of Special Protection Waters to obtain DRBC approval. This determination withdrew the May 19, 2009 decision to exclude exploration wells. The DRBC wanted to remove:

> *"…any regulatory incentive for project sponsors to classify their wells as exploratory wells and install them without Commission review before the Commission's natural gas regulations are in place*."

However, the DRBC decided that:

> *"…where entities have invested in exploration well projects in reliance on [the] May 2009 Determination and information from staff, there are countervailing considerations that favor allowing these projects to move ahead*."

The DRBC determined that:

> *"[i]n contrast to the thousands of wells projected to be installed in the Basin over the next several years, the risk to Basin waters posed by only the wells approved by PADEP since May are comparatively small. Not only are these wells subject to state regulation as to their construction and operation, but they continue to require Commission approval before they can be fractured or otherwise modified for natural gas production*."

In other words, the DRBC determined that any exploration well that obtained a state natural gas well permit on or before June 14, 2010 was grandfathered, meaning DRBC review and approval was not required.

According to the DRBC's June 14, 2010 decision, there were no permits issued by the New York State Department of Environmental Conservation as of June 14, 2010, but there were a "limited" number of permits issued by the Pennsylvania Department of Environmental Protection (PADEP). The number and name of the PADEP permits issued were not listed in the DRBC decision. Later a spreadsheet was provided by DRBC listing the wells that DRBC thought qualified for "grandfather" status. According to the DRBC spreadsheet, 13 wells were approved by PADEP prior to June 14, 2010 (**Exhibit 4 and 4A**).

The notes that accompany DRBC's spreadsheet (**Exhibit 4**) state that three (3) wells of these 13 wells are not pertinent to the issue of grandfathered wells, because two wells were already drilled (Matoushek #1 OG Well, Stone Energy Corp and Robson 627528 #1 OG Well, Chesapeake Appalachia LLC) and the DL Teeple #1-2H OG Well, Newfield Appalachia PA LLC was designed as a horizontal well and does not meet the exploration well criteria. This left 10 wells subject to the June 14, 2010 grandfather provision.

1. HL Rutledge #1-1 OG well, Newfield Appalachia PA LLC, April 29, 2010, ("**Rutledge**");
2. VE Crum #1-1 OG Well, Newfield Appalachia PA LLC, April 30, 2010, ("**Crum**");
3. EM Schweighofer #1-1 OG Well, Newfield Appalachia PA LLC, May 7, 2010, ("**Schweighofer**");
4. Woodland Mgmt Partners #1-1 OG Well, Newfield Appalachia PA LLC, May 27, 2010, ("**Woodland**");
5. DL Teeple #1-1 OG Well, Newfield Appalachia PA LLC, April 23, 2010, ("**Teeple**");
6. Stockport Assn 1; Pennswood Oil & Gas LLC, July 22, 2009, ("**Stockport**");
7. Preston 38 LLC OG Well; Pennswood Oil & Gas LLC, July 22, 2009,("**Preston**");
8. Geuther #1 OG Well, Stone Energy Corp, April 28, 2008, ("**Geuther**");
9. Cabot #2 OG Well, Arbor Operating, LLC, April 13, 2010, ("**Cabot**"); and,
10. B&E Well #1 OG Well; Schrader Kevin E, March 5, 2009, ("**B&E**").

On July 23, 2010, the DRBC issued an "Amendment to Supplemental Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters" (**Exhibit 5**), allowing two additional Hess Corporation wells to be drilled that had not yet received PADEP permits, but had obtained Pennsylvania Erosion and Sediment Control General Permits (ESCGP-1). Hess argued that because these wells were in the final PADEP permit approval process, the wells represented a level of investment equivalent to the natural gas exploratory wells that were grandfathered by the DRBC June 14, 2010 decision. DRBC based its decision on economics and the need to obtain scientific data from the two exploration wells to plan future wells in the Delaware River Basin. DRBC noted in its decision that none of the other grandfathered wells had obtained Pennsylvania Erosion and Sediment Control General Permits, because the well pads fell below the five-acre threshold. Therefore, a total of 12 wells were grandfathered by DRBC, including:

11. Davidson 1V Well; Hess Corporation, July 13, 2010, ("**Davidson**"); and
12. Hammond 1V Well; Hess Corporation, July 20, 2010, ("**Hammond**").

On October 14, 2010, Arbor Operating, LLC withdrew its Cabot well permit (**Exhibit 6**), leaving 11 grandfathered wells that remain at issue in the Hearing.

According to DRBC's records, as of mid-October 2010, three (3) of the 11 grandfathered wells have been drilled:

1. Crum well (**Exhibit 7 and 7A**)[1];
2. Woodland well (**Exhibit 8 and 8A**)[2];
3. Teeple well (**Exhibit 9 and 9A**)[3];

[1] VE Crum# 1-1 OG Well, Newfield Appalachia PA LLC, permit documents, produced by Damascus Township pursuant to a subpoena issued in a federal court proceeding by the Damascus Citizens for Sustainability, et al v. Newfield Appalachia, LLC & Damascus Township, USDC, M.Pa., Civil Action No. 10-CV-1604 on August 9, 2010.
[2] Woodland Mgmt Partners #1-1 OG Well, Newfield Appalachia PA LLC, permit documents, produced by Damascus Township pursuant to a subpoena issued in a federal court proceeding by the Damascus Citizens for Sustainability, et al v. Newfield Appalachia, LLC & Damascus Township, USDC, M.Pa., Civil Action No. 10-CV-1604 on August 9, 2010.

As of mid-October, DRBC reports that eight (8) of the 11 grandfathered wells have not been drilled, but work has commenced on some wells, as noted below:

4. Rutledge well (**Exhibit 10 and 10A**)[4] – pad construction completed;
5. Schweighofer well (**Exhibit 11 and 11A**)[5];
6. Stockport well (**Exhibit 12**)[6];
7. Preston well (**Exhibit 13**)[7];
8. Geuther well (**Exhibit 14**)[8];
9. B&E well (**Exhibit 15**)[9];
10. Davidson well (**Exhibit 16**)[10] – site preparation underway; and
11. Hammond well (**Exhibit 17**)[11] – site preparation underway.

The Matoushek and Robson wells were drilled prior to the grandfathering decision. DRBC's information on these wells shows that the Matoushek well was "TAed" (presumably the code for temporary abandonment) and the Robson well was "PAed" (plugged and abandoned). Materials were provided for review on both the:

- Matoushek #1 OG Well, Stone Energy Corp, March 14, 2008, (**Exhibit 18 and 18A**)[12] ("**Matoushek**"); and,
- Robson #1 OG Well, Chesapeake Appalachia LLC, February 26, 2009, (**Exhibit 19**), ("**Robson**").

DRN explained that the DL Teeple #1-2H OG well application was determined to be a production well, and is pending DRBC production well review; therefore, it is not a grandfathered exploration well.

- DL Teeple #1-2H OG Well, Newfield Appalachia PA LLC, May 25, 2010, (**Exhibit 20**) [13], ("**Teeple 2H**").

D. Questions Responded to in this Report

This report provides my expert opinion on five (5) questions:

[3] Woodland Mgmt Partners #1-1 OG Well, Newfield Appalachia PA LLC, permit documents, provided by DRN on October 23, 2010.
[4] HL Rutledge #1-1 OG well, Newfield Appalachia PA LLC, permit documents, produced by Damascus Township pursuant to a subpoena issued in a federal court proceeding by the Damascus Citizens for Sustainability, et al v. Newfield Appalachia, LLC & Damascus Township, USDC, M.Pa., Civil Action No. 10-CV-1604 on August 9, 2010.
[5] EM Schweighofer #1-1 OG Well, Newfield Appalachia PA LLC, permit documents, provided by DRN on October 23, 2010.
[6] PADEP eFacts Information on Stockport Assn#1 well, retrieved October 23, 2010.
[7] PADEP eFacts Information on Preston 38 LLC OG Well, retrieved October 23, 2010.
[8] Geuther # 1 OG Well, Stone Energy Corp, permit documents, provided by DRN on October 20, 2010, only including two pages of the PADEP well permit application.
[9] B&E Wells #1 OG Well; Schrader Kevin E, permit documents, provided by DRN on October 20, 2010.
[10] Map of Davidson 1V Well Site.
[11] **Exhibit 17** is a map of the well location only. As of October 23, 2010 DRN confirmed that only E&S permits had been obtained for this well.
[12] Matoushek #1 OG Well, Stone Energy Corp, permit documents, provided by DRN on October 20, 2010.
[13] Robson 627528 1 OG Well, Chesapeake Appalachia LLC, permit documents, provided by DRN on October 23, 2010.

D.1 Do the wells listed by DRBC as grandfathered wells meet DRBC's definition of an exploration well eligible for grandfathered status?

D.2 Do exploration wells pose lower risk than production wells?

D.3 Did DRBC's decision to grandfather 11 wells create the potential for increased risk to water quality and water resources of the Delaware River Basin?

D.4 Are there sufficient plans and protections included in PADEP's approval to mitigate and respond to the risk associated with exploration wells?

D.5 Was DRBC's assumption that the risk associated with the grandfathered wells is small because PADEP has sufficient human health, environmental and safety protections in place for exploration drilling projects in Pennsylvania well founded?

D.1 Do the Grandfathered Wells Meet the Definition of Exploration Well?

The DRBC does not define the term "exploration well" in its regulations,[14] but uses the term "exploratory well" in its decisions to make a distinction between "exploration" and wells used for "production." DRBC clarified its definition of an exploration well in a May 19, 2009 news release that stated:

> *"Wells intended solely for exploratory purposes are not covered by this determination.* ***An exploratory well is one that the project sponsor intends to plug and cap at the conclusion of exploratory activities without use for production or fracking*** *[emphasis added]."* [15]

Later in August 2009, the DRBC wrote Arbor Operating, LLC regarding its Cabot #2 well further affirming that its exploration well definition included the requirement to be drilling the well "solely" for exploration purposes and the requirement for a "cap and plug plan."

> *"As Arbor has stated that they* ***propose to develop the well if a viable quantity of natural gas is discovered,*** *the* ***well is not therefore being drilled solely for exploratory purposes*** *and is again covered under the Executive Director's Determination. The well may not be covered under the determination* ***if a cap and plug plan is submitted to the Commission*** *and* ***it is affirmed that the well will be properly abandoned upon completion and collection of necessary exploratory data*** *[emphasis added]."*[16]

The Pennsylvania Code does not make a distinction between exploration and production wells. The Pennsylvania Code requires an Operator to obtain a permit for a well, but does not make a distinction between an exploration well and a production well for purposes of that application.[17] The Pennsylvania Code does define a Marcellus Shale Well as:

> *"A well that when drilled or altered produces gas or is anticipated to produce gas from the Marcellus Shale geologic formation*." [18]

[14] For example, DRBC, Ground Water Protected Area Regulations for Southeastern Pennsylvania, 1999.
[15] DRBC May 19, 2009 Press Release, "DRBC Eliminates Review Thresholds for Gas Extraction Projects in Shale Formations in Delaware's Basin's Special Protection Waters, (**Exhibit 26**).
[16] DRBC letter to Arbor Operating LLC, August 4, 2009, (**Exhibit 25**).
[17] 25 Pa.Code 78.11 Permit Requirements
[18] 25 Pa.Code 78.1 Definitions

The Pennsylvania Oil and Gas Act defines an "operating well" as any well not plugged and abandoned. Because there do not appear to be any plug and abandonment plans (P&A) for the grandfathered wells, these wells are "operating wells" under the Pennsylvania Oil and Gas Act.

The US Securities and Exchange Commission (SEC) governs oil and gas reserve reporting in the US. The SEC defines an exploratory well as:

> *"An exploratory well is a well drilled to find a new field or to find a new reservoir in a field previously found to be productive of oil or gas in another reservoir. Generally, **an exploratory well** is any well that **is not a development well, an extension well, a service well, or a stratigraphic test well** as those items are defined in this section [emphasis added]."*[19]

The SEC defines stratigraphic test wells as those wells that collect geologic data such as coring and expendable exploration holes, but this definition does not customarily include wells being drilled for hydrocarbon production:

> *"Stratigraphic test well is a drilling effort, geologically directed, to obtain information pertaining to a specific geologic condition. **Such wells customarily are drilled without the intent of being completed for hydrocarbon production**. The classification also includes tests identified as core tests and all types of expendable holes related to hydrocarbon exploration. **Stratigraphic tests are classified as ''exploratory type'' if not drilled in a known area or ''development type'' if drilled in a known area**.*[20]

The SEC also requires Operators to disclose the number of net productive and dry exploration wells drilled.[21] Therefore the Operator must identify the type of well that is being drilled as exploration or production for federal reporting purposes.

Therefore, both the DRBC definition and SEC definition of exploration well make it very clear that an exploration well is not a production well. The DRBC takes its exploratory well definition one step further by clearly articulating that an exploration well drilled in the Delaware River Basin, under grandfathered status, must be plugged and capped.

If DRBC's definition of an exploration well is applied to each of the 11 wells listed by DRBC as grandfathered, none of these wells would qualify as true "exploration wells" because none appear to be drilled "solely for exploration" and none appear to have a plug and cap plan.

For the three (3) wells already drilled (Crum, Woodland, and Teeple #1), there were no Well Records or Completion Reports[22] provided for my review to show the final well disposition, no Application for Inactive Well Status,[23] no Notice of Intent by Well Operator to Plug a Well,[24] and no Certificate of Well Plugging.[25] If those records exist they should be obtained and provided for review.

[19] 17 CFR Parts 210.4-10(a)(13); (**Exhibit 24**)
[20] 17 CFR Parts 210.4-10(a)(30); (**Exhibit 24**)
[21] 17 CFR Part 229.1205; (**Exhibit 25**)
[22] PADEP Form 5500-FM-0G0001
[23] PADEP Form 5500-FM-0G0056.
[24] PADEP Form 5500-FM-OG0005 or 5500-FM-OG0005A
[25] PADEP Form 5500-FM-0G0006.

For the remaining eight (8) wells that have not yet been drilled (Rutledge, Schweighofer, Stockport, Preston, Geuther, B&E, Davidson, and Hammond), there is no Notice of Intent by Well Operator to Plug a Well.[26] If these records exist they should be disclosed.

Absent documentation showing intent to plug the well, the well applications and supporting materials provided for my review were examined for Operator intent.

Newfield Appalachia PA, LLC is the Operator for a majority of the grandfathered wells. Newfield's permit application materials propose to explore for natural gas in the Marcellus Shale in Wayne County. Yet, the application also includes well **production** activities under the umbrella of exploration operations. Newfield's Preparedness, Prevention and Contingency (PPC) Plan states:

> *"Newfield Appalachia PA, LLC (Newfield) is a natural gas exploration company with operations planned for Wayne County, Pennsylvania. Operations will **involve natural gas exploration** of the Marcellus Shale formation, **which will include** site preparation, drilling and **well development and production activities** [emphasis added]."* [27]

Exploration and Production (E&P) operations are two separate and distinct activities. Production operations do not fall under exploration. The manner in which Newfield has blurred the line between exploration and production operations supports a reasonable assumption that their intent is to convert successful exploration wells into production wells. Unless Newfield submitted Notices of Intent to plug the grandfathered wells, Newfield's wells do not meet DRBC's definition of exploration wells.

April 1, 2010 letters from Newfield to PADEP explained the purpose of two wells, Teeple #1[28] and Schweighofer.[29] The same language was used in both letters:

> *"This permit [D.L. Teeple Well #1-1] is to develop a well which is **intended solely for exploration purposes**. A core is to be taken from several formations throughout the drilling process of this well and additional scientific study is to be performed on multiple formations including, but not limited to, geophysical logs, micro-seismic studies and fluid sampling. As permitted and configured, this well is not to be complete for production, not to be hydraulically fractured and is not to produce gas. **In the future, this wellbore will either** be plugged and abandoned per PADEP regulations, converted to inactive status and utilized as a monitoring well, **or reconfigured and converted to a production well**. Prior to either plugging and abandonment, conversion to inactive status **or reconfiguration and conversion to production**, we acknowledge that additional permitting will be necessary with approvals from the PADEP and other regulatory bodies with jurisdiction [emphasis added]."*

Both of Newfield's letters start off by stating that the Teeple #1 and Schweighofer wells are intended only for exploration purposes, yet leave the future utilization of the wells open, with a possibility to convert each well to a production well. Therefore, approval of these wells is de facto approval of production wells in the same location, because Newfield has not met DRBC's definition of an exploration well.

[26] PADEP Form 5500-FM-OG0005 or 5500-FM-OG0005A
[27] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency (PPC) Plan, May 2010, submitted with all its grandfathered wells.
[28] Newfield Appalachia PA, LLC, letter to PADEP, April 1, 2010 regarding D.L. Teeple Well #1-1, in **Exhibit 9**.
[29] Newfield Appalachia PA, LLC, letter to PADEP, April 1, 2010 regarding EM Schweighofer Well #1-1, in **Exhibit 11**.

Based on the data provided for my review, it is unclear how DRBC decided to include the 11 wells in its spreadsheet as grandfathered exploration wells (**Exhibit 4**), especially when these wells do not meet DRBC's own definition for an exploration well.

It is also unclear why DRBC included the Stockport and Preston wells in the list of grandfathered wells, because the renewal applications for the Stockport and Preston wells were not submitted until after June 14, 2010, and the renewal permits were not approved until July 20, 2010.[30] In other words, the currently approved permits were approved by PADEP after the June 14, 2010 DRBC cut-off date for grandfathered wells.

The main difference between an exploration well and a production well is that exploratory drilling, by definition, seeks to locate unknown subsurface hydrocarbons to determine if they exist and can be produced in commercial quantities. Most companies have exploration departments that are separate and distinct from production drilling departments. Exploration departments typically have higher levels of data security, designated exploratory budgets, and dedicated staff that specialize in finding new hydrocarbon sources. Very small companies may combine exploration and production drilling staff, however, funding documents for each well will clearly delineate the nature of the well and whether it was funded and located as a true exploration well. Additionally, as explained above, the Operator also has to designate the exploration well type and track findings in its SEC reporting. The organizational structure of each company, funding documents for each well, and any SEC reporting data that has been developed were not available for review.

Exploration wells are typically drilled on low density spacing to cover large areas, especially when drilled by a single Operator. True exploration wells test geologic hydrocarbon trap theories, attempting to locate hydrocarbons that have been trapped in commercial quantities. Typically a team of geologists, geophysicists and reservoir engineers select an exploration well location based on seismic data, geologic information in the region, offset well data and other information that may be available. Financially it is too risky for a single Operator to drill multiple exploration wells in rapid succession in a small area, testing the same hydrocarbon trap theory. Typically, a single Operator would spread its exploration budget and risk, testing several hydrocarbon trap theories in different exploration areas and carefully examining the data from each exploration well to determine if an additional well in that same geologic trend is a worthwhile investment. Data collected from one exploration well is used to pin-point future exploratory well targets. A successful exploration well in one area may lead to a recommendation for subsequent appraisal wells around the original exploration well to further delineate the size of a hydrocarbon reservoir, so that engineers can properly size surface production facilities and pipeline needs. Later, production wells are drilled on a more dense spacing around the successful exploration wells.

Newfield received permits for five (5) wells in a 6 by 10 mile area. This is unusually dense spacing for a single Operator to be drilling exploratory wells in rapid succession, with little or no opportunity to inform future exploration well locations (**Exhibit 29** provides a map showing the well density). The pace of Newfield's drilling program strongly indicates that several of these wells are akin to production wells, rather than true exploration wells.

[30] The original permits expired in July 2010. The July 20, 2010 permit renewal post-dates the June 14, 2010 grandfather cut-off date (**Exhibits 12 and 13**). The original Stockport and Preston well applications were approved by PADEP prior to June 14, 2010 but the Operator Pennswood Oil & Gas LLC did not act on either well.

Findings:

- DRBC defined a grandfathered exploration well as a well intended solely for exploratory purposes and one that is plugged and capped at the conclusion of exploratory activities without future use for production.
- No information was provided for my review to show that the grandfathered wells will be permanently plugged and abandoned after the wells are drilled.
- The grandfathered well permits do not specify the completion method, and the 30 day completion reports showing the final disposition of each well were not available for review.
- A Notice of Intent by Well Operator to Plug a Well and/or a Certificate of Well Plugging do not appear to have been submitted for any of the grandfathered wells.
- Absent any new data showing that the Operators of the "grandfathered" wells listed in Exhibit 4 provided clear written evidence that they meet DRBC's exploration well standard, these wells do not meet DRBC's grandfathered exploration well definition.
- Newfield's application data and supporting information confirms it has alternative plans for these wells, including gas production.
- Newfield's 2010 PPC Plan shows clear intent to produce successful exploration wells. Approval of an exploration well destined for production is in essence production well approval.
- The Stockport and Preston well permits were renewed July 20, 2010, after the cut-off date for grandfathered wells.
- Well density and drilling pace are strong indicators of well type. The density and pace of some of the exploration wells, especially Newfield's wells, are inconsistent with exploration well classification.
- Funding documents for each well will clearly delineate the nature of the well and whether it was funded and located as a true exploration well. Funding documents have not been available for review.

D.2 Do Exploration Wells Pose a Lower Risk Than Production Wells?

Exploration wells are riskier than production wells because factors such as pressures, temperatures and drilling hazards are not known or are uncertain. On average 7 out of every 1000 onshore exploration wells will result in a blowout. [31,32] Blowouts can eject drilling mud, gas, oil and/or formation water from the well and onto waters and lands adjacent to the well, within the radius of the blowout plume. Depending on the reservoir pressure, blowout circumstances, and wind speed these pollutants can be distributed hundreds to thousands of feet away from the well.[33] Pollutants that reach a water systems can be carried

[31] Rana, S., Environmental Risks- Oil and Gas Operations Reducing Compliance Cost Using Smarter Technologies, Society of Petroleum Engineering Paper 121595-MS, Asia Pacific Health, Safety, Security and Environment Conference, 4-6 August 2009, Jakarta, Indonesia, 2009.
[32] Rana, S., Facts and Data on Environmental Risks- Oil and Gas Drilling Operations, Society of Petroleum Engineering Paper 114993, October 2008.
[33] S.L. Ross Environmental Research Limited, Oil Deposition Modeling For Surface Oil Well Blowouts, 1998.

downstream and contaminate even larger areas. Pollutants that reach lands can migrate into groundwater resources.

The lack of information available to an exploration well driller increases the risk profile of a well. Exploration well design and planning is more difficult and typically requires more materials to be brought to the site, to deal with unknown pressures, depths, temperatures, casing needs, cementing needs, drilling mud needs, and other unknowns. Proper engineering design of drilling fluid and blowout preventer systems is critical to reducing the risk of a blowout. The inability to accurately predict pressures in an exploration well requires that mud and blowout prevention systems be designed with an adequate safety factor, to ensure unexpected pressures can be controlled while drilling.

> *"The uncontrolled eruption of a well is one of the most critical accidents that can occur both during exploration and exploitation of hydrocarbon fields. Significant HSE [health, safety and environmental] issues are associated to this event that introduces safety risks for the field operators, potential health injury for the population living in the area and impacts, mainly associated to the hydrocarbon contamination, on the environment."*[34]

Because true exploration wells, by definition, are exploring into previously unknown and unmapped hydrocarbon formations, an exploration Operator must be prepared to encounter both oil and gas. While an exploration Operator may seek gas, as is the stated intent in these grandfathered wells, it cannot rule out the potential to encounter oil enroute to the gas target, or instead of hitting a gas target. Exploration in other areas of Pennsylvania has resulted in finds of both oil and gas, therefore this is a reasonable assumption, unless the Operator has information to prove that no oil exists from offset well data. In that case, if there is sufficient information to rule out the presence of oil, there is likely sufficient information to make the case that the well is not a true exploration well.

In both Pennsylvania[35] and New York[36]oil has been found in the Upper Devonian Formations above the Marcellus Shale Therefore, the grandfathered exploration wells should have been equipped with detailed plans to prevent and respond to a gas and/or oil well blowout.

> *"Oil deposition in the area surrounding a blowout is one of the most visible consequences of the loss of control over well flow. Less visible, but equally serious, are the short- to medium-term effects of oil coverage on the environment… Apart from the* ***direct damage to*** *capital goods, crops, and* ***water basins*** *and the cost of subsequent cleanup operations, there are medium- to long-term effects, such as reduced tree growth over a period of many years following the incident…Hence, oil fallout, in the case of loss of well control, is a factor to be taken into account in decisions on well locations, emergency procedures, contingency planning, etc.* ***This requires an estimate of the area around the well likely to be affected by oil fallout, given the geomorphology of the terrain, prevailing winds, and expected outflow*** *conditions [emphasis added]."*[37]

[34] Blotto, P., ENI- Exploration & Production, Development of an Integrated Approach to the Risk Analysis of a Blow-out Accident, Society of Petroleum Engineers Paper 86704-MS, SPE International Conference on Health, Safety, and Environment in Oil and Gas Exploration and Production, 29-31 March 2004, Calgary, Alberta, Canada, 2004.
[35] Pennsylvania Department of Conservation and Natural Resources, Pennsylvania Geology, Vol 29, No.1, Spring 1998.
[36] New York State, Draft Supplemental Generic Environmental Impact Statement (DSGEIS) on the Oil, Gas & Solution Mining Regulatory Program Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, September 2009, Figure 4.2.
[37] Oudeman, P., Shell International E&P, Oil Fallout in the Vicinity of An Onshore Blowout: Observations on A Field Case, Society of Petroleum Engineers, Facilities & Construction Journal, Volume 1, Number 4, December 2006.

The Woodland, Teeple and Crum wells are all located very near designated High Quality tributaries of the Delaware River. For example, the Woodland well, is adjacent to Hollister Creek and is less than half a mile from the Delaware River itself. Hollister Creek flows into the River approximately 0.7 mile above a colony of Dwarf Wedge Mussels, a federally protected endangered species. Teeple is located adjacent to Shehawken/Rattlesnake Creek, and is approximately two miles from the River. The location of these wells in such sensitive areas increases the harms that might flow from these risks should a blowout occur. Instead, the surface location for these wells should have been sited in less sensitive locations with careful evaluation and planning.

DRBC's decision to forego regulation of these exploration wells because they are "lower risk" is inconsistent with the known higher risk profile for an exploration well. There was no data provided for this review to show that DRBC supported its lower risk finding with a written technical document.

Findings:

- Exploration wells are riskier than production wells, because drilling hazards are unknown. The risk of a well blowout or well control situation occurring is higher due to the increased difficulty in designing and constructing a well based on unknown data.
- DRBC's decision to forego regulation of these exploration wells because they are "lower risk" is inconsistent with the known higher risk profile for an exploration well.
- The grandfathered exploration wells should have been equipped to deal with a gas and/or oil well blowout.

D.3 Did DRBC's decision to grandfather 11 wells create the potential for increased risk to water quality and water resources of the Delaware River Basin?

DRBC's primary responsibility is to protect water resources in the Delaware River Basin. DRBC reports to the public that its mission is one of: "providing comprehensive watershed management; acting as a steward of the Basin's water resources particularly with respect to: surface water quality, including both point and nonpoint sources of pollution; ground and surface water quantity, including water demands, water withdrawals, water allocations, water conservation, and protected areas; drought management; and in-stream flow management; promoting effective inter-agency coordination to prevent duplication of efforts and seeking increased public involvement" (**Exhibit 22**).[38]

Shale gas drilling operations use water and create wastewater. The amount of water that is used and waste that is generated depends on the well construction technique used, the depth of the well, formations encountered while drilling, well control incidents and other factors.

This report does not examine the exact amounts of water use or waste from a shale gas well drilling operation because **DRBC determined that all shale gas wells, regardless of water use or waste amounts, are subject to DRBC review**. However, Chesapeake Energy reports that a Marcellus Shale gas well can require 100,000 gallons[39] of water to drill a well, even if fracturing operations are not planned. This water is used for mixing cement, drilling mud, dust control and other routine uses.

[38] DRBC Vision Statement, http://www.state.nj.us/drbc/vision.htm, retrieved October 24, 2010.
[39] Chesapeake Energy, Water Use in Marcellus Deep Shale Gas Exploration, March 2010 (**Exhibit 31**).

On June 14, 2010, DRBC determined that all shale gas wells, regardless of water use or waste amounts, are subject to DRBC review. The DRBC issued a "Supplemental Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters" (**Exhibit 3**), eliminating any water or wastewater threshold for DRBC review of shale gas extraction projects, and requiring all shale gas wells to obtain DRBC review.

> *In my Determination of May 2009, I exercised the authority conferred on the Executive Director by section 2.3.5 B.18 of the Commission's Rules of Practice and Procedure (RPP) by directing* ***all sponsors of natural gas extraction projects in shale formations within the drainage area of Special Protection Waters to obtain Commission approval*** *before commencing such projects,* ***notwithstanding that the thresholds for review established by the RPP were not exceeded*** *[emphasis added].*

DRBC's decision to eliminate any review threshold was reconfirmed in a January 19, 2010 DRBC Presentation (**Exhibit 21**)[40] that stated:

> ***Natural gas well activities*** *(NGWA)* ***[are] covered regardless of DRBC thresholds*** *in RPP[41] and Water Code [emphasis added].*[42]

In this finding, DRBC concluded that shale gas well drilling warranted DRBC review; it did not provide any technical or scientific support for exempting review of the grandfathered shale gas wells, except to say companies would suffer economic harm if the projects were delayed, and the risk was "comparatively small."[43] DRBC reasoned that the number of grandfathered wells constituted a small risk compared to the thousands of wells projected to be installed in the Basin over the next several years.

There does not appear to be any written economic assessment supporting the claim that the grandfathered well Operators would suffer economic harm or weighing the economic harm against the potential harm to the watershed from the proposed drilling operations.

There does not appear to be any written risk assessment to support the claim that the risk of drilling the grandfathered wells was small. Likewise, there does not appear to be any evidence to show that the 11 wells listed in DRBC's spreadsheet of "grandfathered wells" (**Exhibit 4**) meet DRBC's definition of an "**exploration**" well.

Exploration wells that find commercial hydrocarbons are typically converted into the first production wells of a commercial hydrocarbon reservoir development, once surface production facilities are installed. Additionally PADEP has no requirement to plug and abandon successful exploration wells.

DRBC's definition for an exploration well, which requires the well to be solely used for exploration data gathering and immediately plugged and abandoned, (per the May 2009 EDD and accompanying press release), does not reflect typical industry practice or state approval processes. Furthermore, DRBC's decision to allow unregulated drilling impacts in sensitive watershed areas sets an unfavorable precedent

[40] Muszynski, W.J., DRBC Manager Water Resources Management Branch, Presentation, DRBC Engagement in Natural Gas Exploration and Development, Marcellus Shale Meeting, January 19, 2010.
[41] DRBC's Rules of Practice and Procedure (RPP), Section 2.3.5.B.6.
[42] DRBC's Water Code Section 3.40.
[43] DRBC, Supplemental Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters, June 14, 2010.

by potentially doubling drilling impacts. There will be the initial impacts of the exploration well drilling, followed by repeated impacts when a production well is drilled to replace the plugged exploration well.

The more prudent approach would be for DRBC to review exploration wells to ensure they are properly sited, drilled, completed, tested, and suspended, using the best well construction and environmental practices, for potential later conversion to a production well.

The conversion of properly sited and robustly constructed exploration wells to production wells ensures the well is placed in the lowest environmental impact area, and eliminates the environmental impact of drilling a well into the same hydrocarbon target twice. For these reasons, it is important to properly site and assess the impacts of proposed exploration wells in as much detail as is needed for production wells. A successful exploration well is in essence the first production well in the field.

There are limited cases where exploration wells are drilled solely to obtain subsurface data (e.g. cores, well logs, drill stem tests), and in these cases the well is immediately and permanently plugged and abandoned after drilling. This approach is not common. Most Operators will convert a successful exploration well to a production well, unless there are unique circumstances preventing this from occurring. It is not economically attractive for an Operator to drill a well twice.

When an exploration well is destined to be a production well, it is cased and completed with production tubing and a producing wellhead. The well permits for the 11 grandfathered wells do not specify the completion method or the final disposition of the wells and the required 30 day well completion reports were not available for my review.

Findings:

- DRBC grandfathered wells based on economic and risk considerations, without the Operators providing any apparent written economic or risk assessments to support this decision, nor any analysis showing that these considerations trump DRBC's watershed protection obligations.
- There does not appear to be any evidence to show that the permit applications for each of the grandfathered wells are in fact shale gas "exploration" wells.
- DRBC's decision to forego regulation of the grandfathered wells resulted in greater harm to the Delaware River Basin. This harm was created by: allowing wells to be drilled without evaluating whether they are sited in environmentally sensitive areas within the Delaware River Basin; not requiring appropriate setbacks from sensitive locations; and creating a situation whereby an exploration well must be drilled and plugged (even if successful), such that drilling impacts are duplicated when a production well is re-drilled at the same or another location at a later date.
- The DRBC's definition of an exploration well is inconsistent with industry practice, because it is industry practice to convert successful exploration wells into production wells, if commercial quantities of hydrocarbons are found.
- DRBC's decision to forego review of the grandfathered wells, if they are drilled solely to collect data and immediately plugged and abandoned, does not provide the opportunity for DRBC to mitigate the impacts of exploratory operations on the Delaware River Basin. This decision also results in economic waste and creates increased impacts, by requiring successful wells to be drilled twice.

- DRBC should have reviewed each exploration well to ensure it was properly sited and environmental impacts were mitigated. In this way, if Operators make a commercial find, DRBC would have already ensured the well was positioned at a low impact surface location.
- It is important to properly site and assess the impacts of any proposed exploration well in as much detail as is necessary for a production well, because a successful exploration well is in essence the first production well in the field.

D.4 Are There Sufficient Plans and Protections Included in PADEP's Approval to Mitigate and Respond to the Risks Associated with an Exploration Well?

There are a number of risks posed by exploration wells, including air, water and land pollution, resulting from fuel and chemical spills, stray gas migration, well blowouts, water use, waste disposal, and other aspects of drilling operations. One of the most significant and potentially catastrophic risks posed by drilling is an uncontrolled blowout.

An uncontrolled blowout must be considered when planning an exploration well. The grandfathered wells should have been equipped to deal with a gas and/or oil well blowout. Well blowouts can release substantial amounts of oil, gas, drilling mud, and formation water, resulting in significant environmental damage to the surrounding air, water and land. Methods to control a well blowout can require significant water withdrawals and can create large volumes of waste. Well permit applications filed with the PADEP for these grandfathered wells do not include any explanation or evidence of blowout prevention or control capability.

The Pennsylvania Oil & Gas Act at § 601.209 requires a drilling Operator to use safety devices[44] and the 25 PA Code § 78.72 requires the use of blowout prevention equipment and trained personnel. The PA Code focuses on the testing and inspection of blowout preventers, and requires at least one person certified in well control to be on the drill floor. However, neither Pennsylvania law nor regulation requires Operators to demonstrate that they have the expertise, equipment and capability to actually control a blowout and minimize environmental damage, if one occurs.

While Pennsylvania currently requires a Pollution Prevention and Contingency (PPC) Plan to be submitted as part of a drilling application, that plan is inadequate for response to a blowout. PADEP's PCC Guidance[45] (**Exhibit 27**) does not specifically require a well control plan, a written well control barrier policy, a well blowout response plan, or well control experts on contract. This is in sharp contrast to other state and federal agencies, which do currently require response plans to deal with a worst-case blowout scenario. Additionally, the World Bank's Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development recommend comprehensive blowout planning, training and equipment as well as blowout modeling to ensure a well blowout plume radius is understood.[46]

To compound the problem, the Pennsylvania Oil & Gas Act at § 601.215 only requires a bond of $2,500 per well, or a blanket bond of $25,000 for all wells drilled in Pennsylvania by a single Operator. Neither

[44] Section 601.209 requires: "Any person engaged in drilling any oil or gas well shall equip the well with casings of sufficient strength and with such other safety devices, as may be necessary in a manner as prescribed by regulation of the department, and shall use every effort and endeavor effectively to prevent blowouts, explosions and fires."
[45] PADEP's PCC Guidance Document 400-220-001.
[46] World Bank's Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development, 2007.

amount would provide sufficient funds to control, clean up and/or remediate the damage caused by a well blowout. Nor would $2,500 go very far to meet PADEP's stated uses for the bond which is to:

> *…act as a penalty for failure to comply with the drilling, water supply replacement, restoration and plugging requirements of the Act.*[47]

Blowout response and control plans should not only include methods for controlling the well, but identify environmentally sensitive areas, and list tactics and strategies for protecting those areas during a response. For example, a plan should provide for special protection of waters in the Delaware River Basin. Absent these plans, the Delaware River Basin is at increased risk in the event of an uncontrolled blowout.

Newfield's PPC lists the potential for a fire or explosion from its well drilling operations,[48] but provides no blowout prevention or response plan to address an oil and /or gas well blowout, if it were to occur. Newfield's PPC provides no information on blowout preventer sizing, testing methods, or maintenance programs; it provides no information on methods to control a blowout or tactics, strategies or equipment to respond to a blowout.

By comparison, other state and federal agencies require much more detailed Preparedness, Prevention and Contingency Plans, defining the worst-case blowout scenario, a well control response plan, and well control experts and equipment. Most companies have a separate written well control and blowout response plan that is referenced as part of their emergency plan, but there is no evidence of such a plan in the Newfield PPC. The PPCs from other companies with grandfathered wells were not available for review.

A well-thought-out, written blowout prevention and response plan, with trained and experienced drilling staff able to rapidly identify well control problems and control them, has proven critical in reducing the number and severity of well control incidents across the US. Additionally, plans should be in place to immediately access well control experts and equipment, preferably staging well control equipment nearby, in the event a well control situation exceeds a drilling company's capacity or expertise. Access to well control experts is especially critical for small companies that may have little or no well control experience.

While, PADEP has made some attempt at improving Pennsylvania's blowout control capability by partnering with CUDD Well Control to locate a new facility in Canton Township in Bradford County in response to "recent high-profile accidents at nature gas wells in Pennsylvania"[49] the type of equipment located in Pennsylvania is still insufficient to cap a well. Equipment at CUDD's new Bradford County facility will include: a 2,000-gallon-per-minute pump; heat shields; pneumatic cutting devices; trained crews, and a "hot tap," but does not include an athey wagon or a well capping stack. An athey wagon and well capping stack are both large and critical pieces of equipment used in well control. Because this equipment must still be brought in from the Gulf of Mexico, Houston, Canada or Alaska, places where much of the North America well control equipment is located, this will delay well control, increasing a blowout's impacts.

The potential spill volume from a blowout is equal to the volume of the reservoir contents (gas, oil, and/or formation water) that can flow to the surface, plus the discharge of the drilling mud that is in the hole at

[47] PADEP, Oil and Gas Manual, Chapter 3, October 2001.
[48] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency Plan (PPCP), May 2010, submitted with all its grandfathered wells.
[49] PADEP, DEP Says Specialized Natural Gas Emergency Responders Locating in PA, Improving Response Times, PADEP News Bureau Press Release, August 9, 2010.

the time of a blowout. Hydrocarbon reservoirs can contain large quantities of gas, oil and/or formation water, which could continue to be released into the environment until the well naturally bridges on its own (e.g. plugged with sand or debris), is controlled by human/mechanical intervention (e.g. well capping, drilling a relief well, well ignition), or the subsurface reservoir pressure finally drops to a level that the well stops flowing. While blowouts are very infrequent, they do occur, and are a reasonably foreseeable consequence of exploratory drilling operations. Blowouts can last for days, weeks, or months until well control is finally achieved. A blowout in the Delaware River Basin could have significant and irreversible environmental impacts.

The most common method, and best technology, to control an on-land blowout is typically well capping. However, well ignition or drilling a relief well could be alternatives. Well capping requires large volumes of water to allow well control experts to work near the fire with dozers, wagons, and well capping equipment. Water requirements to cap a well depend greatly on the nature of the well blowout, and whether it has ignited.

Surface (lakes, rivers and streams) or subsurface (water wells) water supplies may be tapped to draw the large volumes of water needed for well capping operations, or water may be trucked in, if no nearby surface water or supply well is available. Well control experts use high volume pumps to deluge the rig. Well control experts recommend water supply sourcing and deluging equipment be incorporated in drilling plans. Water requirements can range from 9 barrels of water per minute (9 bpm) [50] to upwards of 100 bpm.[51] This equates to 500,000 to 6,000,000 gallons of water per day, with the average blowout taking days to weeks to control. Deluge operations create large pools of water on the surface that drain away from the well blowout. Deluge fluids can transport oil, chemicals, fuels, and other materials released during the blowout toward lower elevation drainage areas.

Well control experts also use foam and dry chemicals to respond to blowouts. John Wright Co., a well control expert company, explains:

> *Foam consists of water, foam concentrate and air. It is used on liquid hydrocarbon fires to smother the fuel surface (excludes oxygen), suppress vapor emissions (explosive vapor release is restricted), generate steam (removes heat and displaces oxygen), cool surface (heat absorption) and reflect radiant heat. Use on blowouts is restricted to gas condensate fires and oil wells where lateral flow has led to a large fire surface area. Foam can help contain fire near the source and allow work near the flow source. Generally, water alone is adequate for this, but with large, low velocity, lateral oil flow, foam may be required. Modern firefighting foam such as 3M Lightwater ATC is commonly used… Nozzles are available to handle up to 6,000 gpm, but the 2,000-bpm nozzle is most used on oil well fires. Dry chemical extinguishers work like water, but principally act as a smothering agent. Common compounds used are sodium bicarbonate, Purple K (potassium bicarbonate base) and Monnex (highest efficiency rating). Use is generally on methane well fires where explosives cannot be used and water supply is inadequate.*[52]

Additionally, deliberate well ignition or spontaneous combustion can result in large amounts of local air pollution, which can distribute particulate matter and other airborne combustion materials that will eventually deposit on downstream waters, and lands.

[50] John Wright Co., well control expert, http://www.jwco.com/technical-litterature/p09.htm, and (**Exhibit 28**)
[51] Grace, R. d., Blowout and Well Control Handbook, Gulf Professional Publishing, 2003.
[52] John Wright Co., well control expert, http://www.jwco.com/technical-litterature/p09.htm, and (**Exhibit 28**)

PADEP's PPC Guidance[53] (**Exhibit 27**) does require a PPC to include: maps showing the well site layout, boundaries, storage locations, high risk areas, drainage, and topography; location of stored chemicals at wellsite; drawings and plot plans showing sources and quantities of materials and wastes; specific countermeasures to be taken in the event of a spill, including strategies and tactics for responders to follow to contain and control the spill to prevent it reaching water sources, or environmentally sensitive areas; inspection and monitoring programs; security plans; and external factor planning. Yet, many PPCs in Pennsylvania that I have reviewed[54] do not include these components in practice. PADEP has on occasion required PPC Plans to be revised after large spills to remedy plan deficiencies, but this is of little assistance for the damaged environment, especially damaged water resources that are not easily remediated. A more thorough review of these plans prior to drilling is needed to ensure that they are adequate.

For example,[55] Newfield's May 2010 PPC (the only PPC available for this review) did not include many of the elements required by PADEP's PPC Guidance Document 400-220-001. These required elements are critical to preventing and responding to spills in areas and waters of concern to DRBC. Missing plan elements include:

- Drawings showing high-risk areas where spills and leaks most likely would occur;
- Drawings showing drains, pipes, and channels that lead away from potential leak or spill areas;
- Drawings showing outfall pipes that discharge to surface streams or drainage channels;
- Locations of surface drainage courses leading away from the site, and major surface streams and tributaries near the site;
- Locations of any known public and private surface water intakes downstream from the site;
- Descriptions of any existing plans previously developed for the project for the purpose of pollution incident prevention or emergency response preparedness;
- Descriptions of the sources and areas where potential spills and leaks may occur, the direction of flow of spilled materials, and the pollution incident prevention practices specific to the source or area;
- Separate drawings, showing sources and quantities of materials and wastes, sources and areas where potential spills may occur, and pollution incident prevention practices, including a prediction of the direction of the flow of materials spilled as a result of equipment failure, accident, or human error;
- Summary of the engineering practices followed with regard to material compatibility, such as the materials of tanks, piping and other equipment, including their contents and the reaction of materials or wastes when intentionally or inadvertently mixed or combined;
- Summary of the compatibility of a container such as a storage tank or pipeline with its environment;
- A preventive maintenance program for equipment and systems relating to conditions that could cause environmental degradation or endangerment of public health and safety;

[53] PADEP's PCC Guidance Document 400-220-001.
[54] In 2010, I completed a technical review of the Atlas Energy Inc., Cabot Oil & Gas Corporation, EOG Resources, Inc., Newfield Appalachia, and Range Resources PPC, none of which met the PADEP PPC guidelines requirements.
[55] Additional information on the other grandfathered wells PPC plans would be needed to determine the adequacy of the other plans.

- Detailed explanation of the employee training program to ensure that personnel are able to respond effectively to emergencies, by familiarizing them with emergency procedures and emergency equipment systems, including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communications and alarm systems; response to fires and explosions; site evacuation procedures; and shut down of operations procedures;
- Specific countermeasures which will be undertaken by facility personnel in the event of a release, including: valve activations, equipment isolations, flow diversions, boom deployment, and any other activities that will be undertaken to halt the migration of the contaminant off site and to mitigate the consequences of the release;
- A summary of the services of nearby contractors and pre-made arrangements for contractual services on short notice. (PADEP requires equipment suppliers to be contacted to determine the availability and delivery means of equipment needed for removing pollution or hazards to public health and safety).
- A list of available emergency equipment.[56] The list should include the location, a physical description, and a description of the intended use and capabilities of each item on the list. All installations should have equipment available to allow personnel to respond safely and quickly to emergency situations. Some examples of emergency equipment are portable fire extinguishers, fire control equipment (including special extinguishing equipment such as that using foam, inert gas, or dry chemicals), spill control equipment, decontamination equipment, self-contained breathing apparatus, gas masks, and emergency tool and patching kits.

Both exploration and production well operations require fuel to operate drilling and completion equipment and the process of drilling a well requires chemicals. Newfield's PPC lists the potential for both fuel and chemical storage tanks to leak and contaminate the nearby environment, water supplies, or water resources.[57] Newfield's PPCP states:

> *"**For large spills or spills of oils or hazardous materials which may reach surface water or impact the environment**, the employee who first discovers the spill should contact the Emergency Coordinator [emphasis added]."*[58]

TABLE 4

On-Site Emergency Response Equipment

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

Yet Newfield's PPC lists insufficient onsite resources to respond to the potential fuel and chemical spills it lists. Newfield's onsite resources are listed in Table 4[59] as shown to the right.

[56] Newfield's PPC lists spill response equipment but the type and amount is insufficient, and there is no explanation of its intended use or capability as required.
[57] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency Plan (PPCP), May 2010, included in **Exhibit 7**.
[58] http://www.epa.gov/radiation/tenorm/oilandgas.html#disposalpast.
[59] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency Plan (PPCP), May 2010, submitted with all its grandfathered wells.

Newfield's PPC, at Table 1, shown below, provides a list of materials that it plans to use at its exploratory drilling operations. This list shows there is a potential for hazardous materials to spill, including fuels, lubricants, drilling mud, and cement additives. To minimize environmental hazards, production chemicals should be selected carefully by taking into account their volume, toxicity, bioavailability, and bioaccumulation potential. There is no indication in the PPC that this work was completed.

The list provided by Newfield does not make a distinction between exploration or production drilling operations. And, Newfield's PPC does not contain sufficient information to verify whether it has trained and qualified staff able to respond to the potential fuel and chemical spills it lists in Table 1 of its PPC Plan.

TABLE 1

LIST OF MATERIALS & WASTES

CONSTUCTION

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

DRILLING

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

Findings:

- An uncontrolled blowout is a catastrophic risk, but one that must be considered when planning an exploration well. The grandfathered wells should have been equipped to deal with a gas and/or oil well blowout.
- Well blowouts and spills can release substantial amounts of oil, gas, drilling mud, and formation water, resulting in significant environmental damage to the surrounding air, water, and land.
- Well permit applications filed with the PADEP for these grandfathered wells do not include any explanation or evidence of blowout prevention or control capability.
- Pennsylvania requires a Preparedness, Prevention and Contingency (PPC) Plan but that plan does not require a written blowout control plan. Nor does the plan require evidence of trained and qualified personnel to respond to well control situations or evidence of contracts with experts to control well blowouts. In contrast, other state and federal agencies require response plans to deal with worst-case blowout scenarios.
- Pennsylvania only requires a bond of $2,500 per well, or a blanket bond of $25,000 for all wells drilled in Pennsylvania by a single Operator; neither amount would provide sufficient funds to control, clean up and/or remediate the damage caused by a well blowout.
- There are inadequate plans in place to identify environmentally sensitive areas, such as special protection waters of the Delaware River Basin. Tactics and strategies for protecting those areas during a spill response are also inadequate.
- The most common method, and best technology, to control an on-land blowout is typically well capping. Well capping requires large volumes of water to allow well control experts to work near the blowout. Water requirements can range from 500,000 to 6,000,000 gallons per day. Deluge operations create large pools of water on the surface that drain away from the well blowout. This water can transport oil, chemicals, fuels, and any other materials released during the blowout toward lower elevation drainage areas.
- Exploration well operations require fuel to operate drilling and completion equipment and the process of drilling a well requires chemicals.
- Newfield's PPC lists the potential for both fuel and chemical storage tanks to leak and contaminate the nearby environment, water supplies, or water resources; yet lists insufficient onsite resources to respond to the potential fuel and chemical spills it lists.

D.5 Was DRBC's assumption that the risk associated with the grandfathered wells is small because PADEP has sufficient human health, environmental and safety protections in place for exploration drilling projects in Pennsylvania well-founded?

DRBC's assumption that the risk associated with grandfathered wells is small because PADEP has sufficient human health, environmental and safety protections in place for exploration drilling projects in Pennsylvania is not well founded for the following reasons:

- PADEP's Chapter 78 Oil and Gas Well Regulations are known to be deficient;
- Grandfathered wells are not required to be constructed to industry best practices for shale gas wells in Pennsylvania;
- PADEP did not apply "Special Permit Conditions," requiring a Water Management Plan, to most of the grandfathered wells;
- Fracture treatment operations are planned for the B&E well;
- Drilling waste can result in environmental harm if not properly managed, and some drilling waste has already been buried on-site and not transported out of the Basin;
- Stray gas migration associated with oil and gas wells can impact water supplies, if wells are not properly constructed and operated;
- PADEP's well siting criteria allows wells to be placed very close to water resources; and
- Air pollution impacts are not well understood or mitigated.

D.5.1 PADEP's Chapter 78 Oil and Gas Well Regulations are known to be deficient

DRBC's June 14, 2010 decision to grandfather wells was based, in part, on the "existing safeguards" offered by PADEP permits issued under Chapter 78. DRBC concluded:

> *In contrast to the thousands of wells projected to be installed in the Basin over the next several years, **the risk to Basin waters posed by only the wells approved by PADEP since May 2009 are comparatively small**. **Not only are these wells subject to state regulation as to their construction and operation**, but they continue to require Commission approval before they can be fractured or otherwise modified for natural gas production. **In light of these existing safeguards** and the investment-backed expectations of the sponsors of these projects, this Supplemental Determination does not prohibit any exploratory natural gas well project from proceeding if the applicant has obtained a state natural gas well permit for the project on or before the date of issuance set forth below [emphasis added].*[60]

Yet PADEP's current regulatory initiative to substantially revise the Pennsylvania regulations at 25 PA Code Ch. 78 (Chapter 78) for Oil and Gas Wells is evidence that Pennsylvania itself acknowledges that the existing Chapter 78 regulations are not currently reflective of best practices, and do not go far enough to protect human health and the environment, especially for sensitive resources.

[60] DRBC, Supplemental Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters, June 14, 2010 (**Exhibit 3**).

The majority of PADEP's well construction and water supply replacement regulations were promulgated in July 1989 and remained largely unchanged until PADEP proposed revisions to Chapter 78 in 2009. Therefore, Pennsylvania's existing well construction standards are more than 20 years old and do not reflect best technology or practice. Several of the grandfathered wells have already been constructed using these out-dated rules.

PADEP summarizes the problems with the existing Chapter 78 regulations:

> *Many of the regulations governing well construction and water supply replacement were promulgated in July 1989 and remained largely unchanged until this rulemaking. Since that time, recent advances in drilling technology have attracted interest in producing natural gas from the Marcellus Shale, a rock formation that underlies approximately two-thirds of Pennsylvania. New well drilling and completion practices now employed to extract natural gas from the Marcellus Shale and other similar shale formations in Pennsylvania, as well as* ***several recent incidents of contaminated drinking water caused by traditional and Marcellus Shale wells resulted in the Department's decision to re-evaluate the existing well construction requirements.***
>
> ***It was determined that the existing regulations were not specific enough in detailing the Department's expectations of a properly cased and cemented well****, especially in light of the new techniques used by Marcellus Shale operators. The Department also determined that the* ***existing regulations did not address the need for an immediate response by operators to a gas migration complaint and did not require routine inspection of existing wells by the operator***
>
> *The final rulemaking contains* ***revised design, construction, operational, monitoring, plugging, water supply replacement, and hydraulic fracturing reporting requirements****. The final rulemaking also provides material specifications and performance testing to ensure the proper casing, cementing and operation of a well. Additionally, the final rulemaking contains new provisions that require routine inspection of wells and outline the actions an operator and the Department must take in the event of a gas migration incident [emphasis added].*[61]

Therefore, DRBC's lack of review of the grandfathered exploratory wells, as well as any other drilling that DRBC allows before the new PADEP Chapter 78 regulations are in place, will allow the current well construction deficiencies, known to be a problem in Pennsylvania, to be repeated in the DRBC watershed.

In 2009 PADEP proposed numerous revisions to Chapter 78 and sought industry and public comment to improve the regulations consistent with PADEP's stated goals of: minimizing public concerns associated with gas migration into public drinking water supplies; updating material specifications and performance testing requirements; and revising design, construction, operations, monitoring, plugging, water supply replacement, and gas migration reporting requirements.

The fact that Pennsylvania has acknowledged deficiencies in its own regulations, and the fact that the current, unimproved Chapter 78 regulations were used as criteria for review and approval of the grandfathered wells is evidence that the grandfathered wells do not have sufficient protections in place.

PADEP received more than 2,000 comments from industry and the public recommending Chapter 78 improvements, including comments written by HCLLC (**Exhibit 23)**.[62] PADEP has developed final

[61] PADEP Notice of Final Rulemaking, Department of Environmental Protection Environmental Quality Board, 25 Pa. Code, Chapter 78 Oil and Gas Well Cementing and Casing, 2010 (**Exhibit 30A**).
[62] Harvey Consulting, LLC, Recommendations for Pennsylvania's Proposed Changes to Oil and Gas Well Construction Regulations, Report to Earthjustice and Sierra Club, March 2010.

revisions to Chapter 78 (**Exhibit 30 and 30A**), but these changes will not be codified until early 2011. Chapter 78 regulatory changes still must undergo review by the Independent Regulatory Review Commission (planned for November 18, 2010) and then must be published in the *Pennsylvania Bulletin* as final rulemaking (planned for early 2011). [63]

Proposed Chapter 78 improvements that do not apply to the grandfathered wells include:

- Additional protections for water supplies (§ 78.51) including improvements to restoration or replacement of impaired water supplies due to oil and gas well operations;
- Additional requirements for waste control and disposal plans (§ 78.55);
- Improved instructions on when a blowout preventer and other well control safety control devices are required (§ 78.72);
- Improved well construction and operational standards (§ 78.73), including standards to ensure that: oil, brine, completion and well servicing fluids do not pollute groundwater; annular overpressuring does not cause gas migration into subsurface water supplies; and gas is safely flared, captured or diverted during well drilling operations;
- Improved well cementing and casing standards (§ 78.83-78.85) to: prevent subsurface infiltration of surface waters; establish more rigorous requirements to centralize casing, install cement, and verify the cement integrity to protect ground water; require the Operator to prepare and maintain a casing and cementing plan; and require use of new pipe and pressure testing and quality standards for that pipe;
- Improved mechanical integrity standards for operating wells (§ 78.88);
- Gas migration response (§ 78.89);
- Improved well plugging standards (§ 78.92-78.95); and
- A requirement for the Operator to certify that the well has been constructed to Pennsylvania's well construction standards (§ 78.122).

Three (3) of the eleven (11) grandfathered wells were drilled under the existing regulatory structure that is known to be inadequate. The remaining eight (8) grandfathered wells were permitted under the existing Chapter 78 regulatory scheme, and may not be required to comply with the new Chapter 78 regulatory requirements, depending on when the wells are actually drilled and when the Chapter 78 revisions are codified.

Findings:

- Existing PADEP oil and gas well regulations at Chapter 78 are known by PADEP to be inadequate to protect human health and the environment.
- PADEP is in the process of revising Chapter 78 with the stated goals of minimizing public concerns associated with gas migration into public drinking water supplies; updating material specifications and performance testing requirements; and revising design, construction, operations, monitoring, plugging, water supply replacement, and gas migration reporting requirements.

[63] November 3, 2010 phone conversation with Scott Perry, Director of Pennsylvania Bureau of Oil and Gas Management.

- PADEP has not yet promulgated Chapter 78 regulations that are adequate to protect human health and the environment; grandfathered wells are being drilled under regulations known to be deficient.

D.5.2. Grandfathered wells are not required to be constructed to industry best practices for shale gas wells in Pennsylvania

Because PADEP does not require well casing and cementing plans to be submitted, reviewed, and approved as part of a well permit application, there is insufficient information available on the grandfathered wells to verify the integrity of the planned or installed casing and cementing configuration. This problem will not be resolved as part of the proposed Part 78 revisions, because the proposed Part 78 rules still do not require a well construction plan to be submitted and approved as part of the permit to drill.

The permit to drill issued by PADEP approves the well location and directs the applicant to follow PADEP regulations, but does not include any PADEP engineering review of the proposed well construction plans.[64] Because there is no engineering review of the permit application prior to drilling, PADEP's process does not ensure that the well will be constructed to best industry/best technology practices at the time the well is drilled. Therefore, the grandfathered well applications at issue here did not include well construction plans, nor was there any engineering review completed by PADEP.

PADEP's proposed Chapter 78 regulations do include an improvement that requires an Operator to certify that the well has been constructed to Pennsylvania's well construction standards (§ 78.122) after the well has been drilled. However, major casing and cement design flaws are difficult to remedy once the well has been drilled.

Recognizing the importance of proper wellbore design prior to construction, the federal government and many states require wellbore construction plans as part of the permit application, subject to agency engineering review and approval prior to well construction.

PADEP does currently require an after-the-fact drilling completion report to be submitted providing information on the final well construction configuration. However, the well completion reports for the three grandfathered wells that have been drilled were not available for my review. Therefore, there was insufficient information available on the well construction method used for these wells to verify if the wells were drilled to best industry practice using best technology standards.

Wells being drilled in the Delaware River Basin, that may be later used as production wells, and subject to high-volume, high-pressure fracturing should be designed and constructed using best industry practice to protect ground water resources.

[64] November 3, 2010 phone conversation with Scott Perry, Director of Pennsylvania Bureau of Oil and Gas Management

Findings:

- PADEP's rules do not require mandatory use of robust well construction practices and designs for Marcellus Shale wells.
- PADEP's well permit application process does not include any engineering review of the proposed well construction plans. Because there is no engineering review of the permit application prior to drilling, PADEP's process does not ensure that the well will be constructed to best industry/best technology practices at the time the well is drilled.
- There is insufficient information available on the grandfathered wells to verify the planned or installed casing and cementing configurations and whether they have a robust design.

D.5.3 PADEP did not apply "Special Permit Conditions," requiring a Water Management Plan, to most of the grandfathered wells

Recognizing the increased water use associated with shale gas drilling and completions, PADEP typically adds a Special Permit Condition to shale gas wells requiring a Water Management Plan to be submitted. The Water Management Plan must describe water sources that will be used for the drilling operation, including safe yield calculations for surface water withdrawals for each new well. The Water Management Plan must include Best Management Practices (BMPs) and must verify that anti-degradation requirements are met and that designated uses of surface waters are protected.

PADEP required a Water Management Plan be submitted as a Special Permit Condition for the B&E well, but did not require a Water Management Plan be submitted for the Crum, Woodland, Teeple #1, Rutledge, Schweighofer, Geuther, and Robson wells. There was insufficient information available on the permit history for the remaining grandfathered wells to determine if Special Permit Conditions had or had not been applied to them.

Because the Crum, Woodland, Teeple #1, Rutledge, Schweighofer, Geuther, and Robson permits did not include a Water Management Plan Special Permit Condition, and there were no documents provided for my review showing that the Operators of these wells prepared a Water Management Plan, it appears that PADEP did not approve the method of water withdrawal, use, storage, or distribution for these wells. There is a lack of consistency in permit conditions applied to the grandfathered wells and a lack of Water Management Plans for many of the grandfathered wells.

Findings:

- PADEP did not require a Water Management Plan for the Crum, Woodland, Teeple #1, Rutledge, Schweighofer, Geuther, and Robson wells.
- There is a lack of consistency in permit conditions applied to the grandfathered wells and a lack of Water Management Plans for many of the grandfathered wells.

D.5.4. Fracture treatment operations are planned for the B&E well.

DRBC lists the B&E Well #1 as one of the 11 grandfathered wells. DRBC maintains that the grandfathered wells are limited to exploration shale gas wells that will not undergo fracture stimulation treatments; however, the B&E Well #1 permit issued by PADEP on March 5, 2009 includes a "Special Permit" condition that requires the Operator to:

> *…not drill the well until the permittee submits to the Department and the Department has approved the method by which the permittee will withdraw, use, store, distribute, process and dispose of water* ***for well drilling and hydraulic fracturing purposes*** *("Water Management Plan").*[65]

The fact that PADEP included a Water Management Plan requirement on the B&E Well #1 well is noteworthy because it must have had a reason to believe that the Operator, Kevin E. Schrader, was planning fracturing operations for this well, which are clearly prohibited under the grandfathering provisions.

Findings:

- PADEP permit indicates fracturing treatments are planned for the B&E Well #1 well. Fracture treatments are not allowed under the grandfathered well provisions.

D.5.5. Drilling waste can result in environmental harm if not properly managed

There is no assurance that a driller's waste management plan will meet DRBC's water protection requirements, because PADEP allows waste disposal methods that DRBC does not. For example, PADEP allows drill cuttings and residual waste to be disposed onsite, under certain circumstances (§ 78.61 disposal of drill cuttings, § 78.62 disposal of residual waste-pits, § 78.61 disposal of residual waste-land application and § 78.60 disposal of tophole water by land application).

For example, a September 8, 2010 PADEP inspection report at the Matoushek wellsite shows that drilling waste was left on-site and buried there. The Matoushek inspection report states that: drilling fluids were being removed from the drilling reserve pit; two workers were observed skimming an oil sheen off of the pit; and the pit's solid wastes would be encapsulated within liner and buried on site. Onsite waste burial within Delaware River Basin is inconsistent with DRBC's requirement to collect drilling waste to be treated at an approved DRBC facility, or transported out of the Delaware River Basin. Produced water from the Matoushek well was transported to a sewage treatment facility that was not approved for drilling waste.[66]

[65] B&E Well #1, PADEP Permit, March 5, 2009, in **Exhibit 15.**

[66] **Exhibit 18B** shows an email exchange between Stone Energy (Woodland Well Operator), DRBC and PADEP. This information was obtained from DRBC through a DRN March 15, 2010 FOIA request. This email exchange questioned whether Valley Joint Sewer Authority had accepted 270,000 gallons of Woodland produced water waste. PADEP confirmed with Valley Joint Sewer Authority that they had stopped taking drilling waste as of April 2009, but DRBC later confirmed that the drilling waste was sent to Valley Joint Sewer Authority prior to April 2009. This series of events was confirmed on November 4, 2010 via a phone call between DRN and DRBC staff.

Because the PPCs for some of the grandfathered wells were not available for my review, it is unclear what the waste management plan is/was for all of the wells. There was also no information provided for my review showing that DRBC had reviewed the waste management plans for the grandfathered wells to ensure that the waste management plans met the DRBC's water protection requirements.

Best waste management practices in other states do not allow onsite burial of drilling waste. For example, New Mexico requires all fluids be removed from the reserve pit and recycled or disposed of in accordance with state regulations.[67] New Mexico also requires the drill cuttings and reserve pit liners be sent to a disposal facility in accordance with state regulations, and the soil under the reserve pit be tested for benzene, total BTEX[68], TPH[69], the GRO,[70] and DRO[71] combined fraction, and chlorides.[72] If contamination is found, it must be excavated and remediated. If the soil is clean it can be backfilled. The City of Fort Worth, Texas, prohibits onsite burial of drilling muds and cuttings.[73] The reserve pits are temporary and all muds and cuttings must be removed and handled at an approved waste management facility.

Although large-volume, high pressure fracture treatments are not currently permitted for the grandfathered wells, in the future there will be requirements for very large impoundments that warrant careful design and limits.

The use of closed loop tank systems, instead of reserve pits and impoundment, is best practice. The Bureau of Land Management (BLM) recommends the use of closed loop tank systems as a best practice instead of reserve pits and impoundments, whenever technically feasible.[74] Texas requires closed looped mud systems with steel tanks. [75] It is much more efficient (from an energy standpoint) to collect waste in the container that will be used to transport it offsite to a waste disposal facility than it is to create an intermediate storage pit. The use of temporary reserve pits and impoundments results in surface disturbance. It also has the potential for leakage to occur through the liner, impacting groundwater. Impoundments also generate air pollution.

None of the other grandfathered wells include the Special Permit Condition applied to the Teeple #1-2H production well,[76] which requires an environmental assessment from PADEP for any impoundments and chemical analysis and characterization of drilling waste prior to processing or disposal. It is not clear why PADEP would have required a more stringent Special Permit Condition for the Teeple #1-2H production well than the other grandfathered exploration wells. There is inconsistency in permit conditions applied to wells subject to this Hearing.

Reported waste handling concerns at the Teeple[77] and Mastoushek[78] wells are strong indications that additional waste management oversight is needed.

[67] Alpha Environmental Consultants, Inc., Report for NYS on DSGEIS, September 2009
[68] BTEX= benzene, toluene, ethylbenzene, and xylene.
[69] THP= total petroleum hydrocarbons.
[70] GRO= gasoline range organics.
[71] DRO= diesel range organics.
[72] Alpha Environmental Consultants, Inc., Report for NYS on DSGEIS, September 2009.
[73] Alpha Environmental Consultants, Inc., Report for NYS on DSGEIS, September 2009.
[74] Bureau of Land Management, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book, 2007.
[75] Fort Worth Texas, Ordinance No. 18449-02-2009.
[76] See **Exhibit 20**, PADEP well permit for DL Teeple 1 2H for Special Permit Conditions.
[77] **Exhibit 9B** shows a May 26, 2020 violation at the Teeple well for an improperly lined pit.
[78] **Exhibit 18B**

The amount and type of waste generated during the drilling and completion of an exploration well varies based on: the drilling method (air or a drilling mud system), the completion and stimulation method, and the amount of well testing that is conducted.

Typical waste streams from an exploration drilling operation can include: domestic wastewater from on-site septic tanks and portable toilets; produced formation water during well drilling, testing, and stimulation; solids waste including drill cuttings, scrap metal, and debris; waste chemicals; waste oils; and materials associated with chemical and fuel spills. Newfield's PPC lists its expected waste streams from its "natural gas exploration of the Marcellus Shale formation" to include:

> *Wastes generated during these activities will be typical for gas drilling operations and will include **drill cuttings**, **produced water**, **drilling and frac fluids**, **waste oil** and **municipal waste** and **trash** [emphasis added].*[79]

According to the DRBC, there are no DRBC approved non-domestic wastewater treatment facilities in the Delaware River Basin at this time (**Exhibit 21**).[80] Absent DRBC review of exploration well permit applications, there is no process to limit the amount and type of waste generated at exploration wells in the Delaware River Basin, and there is no method to ensure that it is collected and shipped to a state approved waste treatment and storage facility outside of the Delaware River Basin, because PADEP is not providing this additional level of oversight and assurance. PADEP only assures that PADEP's standards are met, not incremental local standards.

Examples of significant wastes that could be generated by an exploration well includes drilling mud, cuttings and produced water. This is not an exhaustive list, but rather these drilling wastes are described in more detail below to highlight some of the more significant environmental concerns.

Drilling Muds & Drill Cuttings: Drilling muds are used to control the hydrostatic pressure in a wellbore.[81] The most common weighting agent used is barite. Barite can contain mercury and other heavy metals.

Drilling muds are not used in air drilling techniques; however, it must be assumed that drilling muds will be used, because there is no state statute in Pennsylvania limiting shale gas drilling to air drilling methods only, [82] and the PPCs provided for review include drilling mud.

U.S. Department of Energy studies show that barite contains mercury (1ppm-10ppm Hg, depending on its origin).[83] Mercury concentrations can be reduced by using thermal methods, leaching with dilute acids, or selecting barite with naturally occurring lower concentration levels of mercury.[84]

The U.S. Department of Interior estimates that 0.8 metric tons of mercury is discharged into the Gulf of Mexico (GOM) annually (1839 lb Hg/yr) from mud disposed from drilling operations.[85] This equates to approximately 1.69 lbs[86] of mercury per well for wells drilled to a total depth of approximately 12,000'.

[79] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency Plan (PPCP), May 2010, submitted with all its grandfathered wells.
[80] Muszynski, W.J., DRBC Manager Water Resources Management Branch, Presentation, DRBC Engagement in Natural Gas Exploration and Development, Marcellus Shale Meeting, January 19, 2010.
[81] DRN communication with HCLLC on October 23, 2010.
[82] While DRN reports that Newfield stated publically at a September 15, 2010 meeting that its wells use air drilling methods, Newfield's PPC documents plan for use of drilling muds, not air drilling. DRN reports that the top-hole section of some wells may be drilled with air, and the remaining section of the well drilled with mud.
[83] http://www.fossil.energy.gov, "Mercury Removal from Barite for the Oil Industry."
[84] http://www.fossil.energy.gov, "Mercury Removal from Barite for the Oil Industry."

Assuming that the top-hole of some of these wells is drilled using air drilling methods, an average wellbore length of 5,000' for the remaining section of the well is drilled with mud, and there is a lower barite use rate of 100 lbs/ft, to account for lower expected pressures, the mercury content in drilling mud is estimated at 0.5- 5.0 lbs[87] per well, depending on barite quality.

Drilling muds may also contain the heavy metal cadmium, leading the EPA to establish cadmium concentration limits in drilling muds.[88]

Drill cuttings can also contain Naturally Occurring Radioactive Material (NORM). Absent data to support otherwise, there is the potential for NORM content in drill cuttings in the Delaware River Basin. Gas shales are known to contain NORM in some regions. Shales can be heterogeneous and the NORM compositions can vary substantially. Recent studies on the Marcellus Shale in New York State acknowledge that drilling and production waste and equipment may contain NORM. The New York State Department of Environmental Conservation (NYSDEC) reports that the Marcellus Shale contains Uranium-238 and Radium-226, and that this NORM may be present in drill cuttings, produced water and stimulation treatment waste.[89] NYSDEC identified Radium-226 as the most significant NORM of concern, because it is water soluble and has a half-life of 1,600 years.[90] Radiation pathways can include external gamma radiation, injection, inhalation of particulates, and radon gas.[91] Therefore, exploration drill cuttings should be tested to determine NORM content and be disposed of accordingly at a licensed radioactive waste disposal facility. Other oil and gas states, such as Texas and Louisiana, have adopted stringent NORM regulations for E&P operations, including: occupational dose control, surveys, testing and monitoring, record keeping, signs and labeling, and treatment and disposal methods.

Best practice for managing drilling muds and cuttings includes the use of "closed loop tank systems," instead of a reserve pit, and transportation to an approved waste disposal facility. This avoids the impact of constructing a reserve pit and the potential for leakage into the environment.

Yet PADEP did not require the best practice of closed loop tank systems for these grandfathered wells. Instead, PADEP allows drilling muds and cuttings in Pennsylvania to be disposed of in a variety of methods, including subsurface injection into a disposal well, annular injection into the annulus[92] of a previously drilled well, burial on site in pits, or transportation to an offsite waste treatment and disposal facility. There is no assurance that exploration well waste handling will meet DRBC water protection standards. Because PADEP allows onsite burial of drilling cuttings and land spreading of other E&P wastes, we must assume that onsite burial may occur.

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[85] http://www.gomr.mms.gov/homepg/regulate/environ/Hg%20discharge%20estimate.pdf.

[86] (1,091 wells/yr drilled in GOM))* (12,038 ft/well)*(140 lbs barite/ft)*(1x10^{-6} Hg/g barite)= 1,839 lb Hg/yr. (1,839 lb/Hg)/(1,091 wells) = 1.69 lbs of mercury per well.

[87] 1ppm Hg in barite= (1 Marcellus well)* (5,000 ft/well)*(100 lbs barite/ft)*(1x10^{-6} Hg/g barite) = 0.5 lb Hg/well
10ppm Hg in barite= (1 Marcellus well)* (5,000 ft/well)*(100 lbs barite/ft)*(10x10^{-6} Hg/g barite) = 5.0 lb Hg/well

[88] U.S. Environmental Protection Agency, Development Document for Effluent Limitation Guidelines and New Source Performance Standards for the Offshore Subcategory of the Oil and Gas Extraction Point Source Category, EPA 821-R-93-003, 1993.

[89] New York State, 2009 Draft Supplemental Generic Environmental Impact Statement On the Oil, Gas & Solution Mining Regulatory Program Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, DSGEIS, p. 4-36.

[90] New York State, 2009 Draft Supplemental Generic Environmental Impact Statement On the Oil, Gas & Solution Mining Regulatory Program Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, DSGEIS, p. 6-129.

[91] US Department of Interior, Naturally Occurring Radioactive Materials (NORM) in Produced Water and Oil-Field Equipment- an Issue for the Energy Industry, USGS Fact Sheet FS-142-99.

[92] Annulus is the space between the wellbore and the casing.

The drilling permits issued by PADEP for the 11 grandfathered wells do not limit drilling method, do not set limits on drilling mud composition, and do not specify waste disposal method.

Produced Water Waste: Formation water (commonly referred to as "produced water") can be generated as a waste during exploration drilling and well testing operations. PADEP reports that air drilling operations can produce larger quantities of produced water than those wells drilled with mud.[93] Produced waters that are discharged to surface waters or lands of the US are regulated under the federal Clean Water Act, under a National Pollutant Discharge Elimination System (NPDES) permit. PADEP administers the NPDES program in Pennsylvania.[94]

The primary method for disposal of oil field wastewater in Pennsylvania is through pre-treatment facilities that clarify and filter the waste and dispose of it to surface water or sewage treatment plants.[95] A smaller amount of wastewater is disposed of into Class II injection wells.[96] Absent waste management plans for most of the grandfathered wells, it is unclear what the waste management plan is for produced water, because PADEP also allows produced water to be disposed of by land or road spreading, under some circumstances.

Produced water is typically rich in chloride, which enhances the solubility of other elements, including the radioactive element radium. This often makes produced water unsuitable for land application or surface water disposal, especially in sensitive areas such as the Delaware River Basin.[97]

Other states, such as Texas, require extensive produced water testing and specifically prohibit road spreading of waste containing NORM.[98] A study conducted by Argonne National Lab for the US Department of Interior (DOI) concluded that land spreading of diluted NORM waste presented the highest potential dose of exposure to the general public of all waste disposal methods studied.[99]

Furthermore, EPA identified produced water pits as an outdated practice if produced water contains NORM. EPA reports that:

> *Lined and/or earthen pits were previously used for storing produced water and other nonhazardous oil field wastes, hydrocarbon storage brine, or mining wastes. In this case, TENORM[100] in the water will concentrate in the bottom sludges or residual salts of the ponds.* ***Thus the pond sediments pose a potential radiological health risk****.…produced waters are now generally reinjected into deep wells…No added radiological risks appear to be associated with this disposal method as long as the radioactive material carried by the produced water is*

[93] PADEP Oil and Gas Manual Chapter 4, October 2001.
[94] PADEP Oil and Gas Manual Chapter 2, October 2001.
[95] Gaudlio, A.W., Paugh, L.O. (Range Resources) and Hayes, T.D. (Gas Technology Institute), Marcellus Shale Water Management Challenges in Pennsylvania, 2008.
[96] The Underground Injection Control Program (UIC) of the federal Safe Drinking Water Act governs control of the injection of flowback and produced waters to ensure that injected waste is confined to the injection zone in a manner that does not contaminate fresh water bearing formations that may serve as Underground Sources of Drinking Water (USDW).
[97] US Department of Interior, Naturally Occurring Radioactive Materials (NORM) in Produced Water and Oil-Field Equipment- an Issue for the Energy Industry, USGS Fact Sheet FS-142-99.
[98] Texas Railroad Commission (TXRRC), 16 Texas Administrative Code, Title 16, Part 1, Chapter 4, Subchapter F, §4.601 - 4.632. "Disposal of Oil and Gas NORM Waste". The TCEQ has jurisdiction over the disposal of other NORM wastes.
[99] Argonne National Laboratory, Radiological Dose Assessment Related to Management of Naturally Occurring Radioactive Materials Generated by the Petroleum Industry, Publication ANL/EAD-2, 1996.
[100] TENORM is Technologically Enhanced Natural Occurring Radioactive Material.

returned in the same or lower concentration to the formations from which it was derived [emphasis added].[101]

Newfield's Preparedness, Prevention and Contingency (PPC) Plan states:

> ***Produced water will be removed periodically from the tanks at each wellsite and transported by a licensed residual waste hauler to a permitted disposal facility*** *[emphasis added].* [102]

Newfield does not specify who the waste hauler is, nor does it name the permitted disposal facility. Therefore, it is not possible to confirm whether this waste handling plan conforms to DRBC's requirements for waste from industrial operations in the Delaware River Basin.

Findings:

- Drilling waste can result in environmental harm if not properly managed.
- Because waste management plans were not available, it is unclear what the waste management plan is/was for most of the grandfathered wells.
- Reported waste handling concern at the Teeple and Mastoushek wells are strong indications that additional waste management oversight is needed.
- There is no assurance that a driller's waste management plan will meet DRBC's water protection requirements, because PADEP allows waste disposal methods that DRBC does not.
- Best waste management practices in other states do not allow onsite burial of drilling waste.
- The used of closed loop tank systems is a best practice, preferred over reserve pits and impoundments.
- Drilling waste can include Naturally Occurring Radioactive Material (NORM), mercury, cadmium and other heavy metals.

D.5.6. Stray gas migration associated with oil and gas wells can impact water supplies

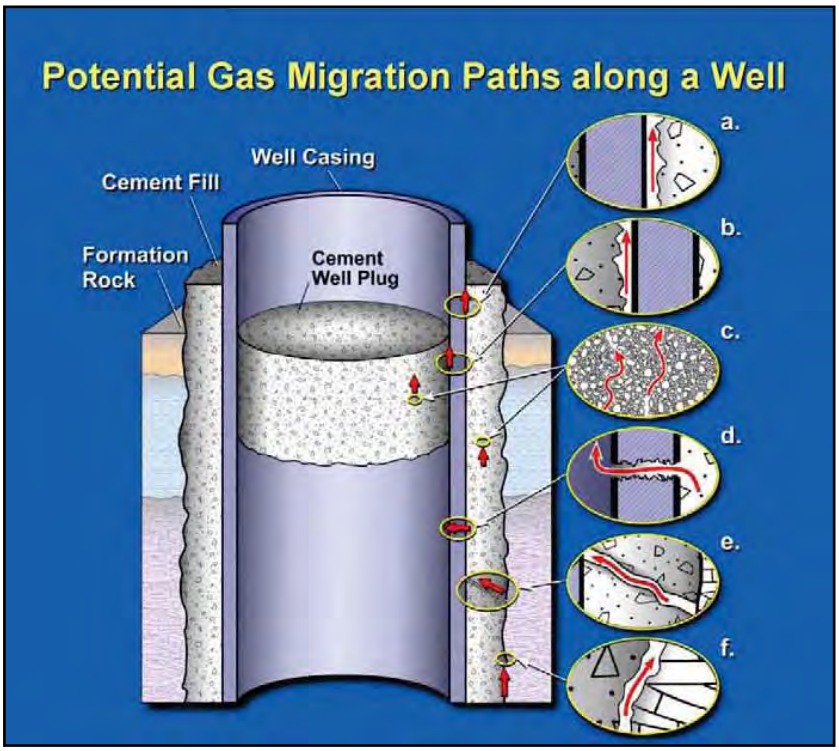
PADEP stresses the importance of proper well construction to mitigate stray gas, noting that these protections are not currently found in PADEP's regulations at Chapter 78, but will be when the rulemaking is finalized in 2011:

> ***Properly constructed and operated oil and gas wells are critical to protecting water supplies*** *and public safety.* ***If a well is not properly cased and cemented, natural gas in subsurface formations may potentially migrate from the wellbore through bedrock and soil. This stray gas may adversely affect water supplies****, as well as accumulate in or adjacent to structures such as residences and water wells. Under certain conditions,* ***stray gas has the potential to cause a fire or explosion. These situations present a serious threat to public health and safety as well as the***

[101] http://www.epa.gov/radiation/tenorm/oilandgas.html#disposalpast.
[102] Newfield Appalachia PA, LLC, Preparedness, Prevention and Contingency Plan (PPCP), May 2010, submitted with all its grandfathered wells.

> ***environment.*** *The purpose of this final rulemaking is to improve drilling, casing, cement, testing, monitoring and plugging requirements for oil and gas wells to minimize gas migration and protect water supplies [emphasis added].*[103]

In October 2009, PADEP released a draft report summarizing 65 cases of stray natural gas migration associated with oil and gas wells (**Exhibit 32**), where improperly constructed and operated oil and gas wells have reportedly introduced gas into drinking water wells, aquifers, top soils, and structures. Most of these cases were attributed to inadequate well design and construction, improper well operation, poor well abandonment procedures, or a failure to abandon a well that is no longer in use.



The risks associated with well annulus over-pressuring, well casing failure, improperly constructed wells, and improperly abandoned wells could result in stray natural gas migration in the Delaware River Basin, if these risks are not mitigated.

There is insufficient information available on the grandfathered wells to verify whether the planned or installed casing and cementing configuration is a robust design. Therefore, it is not possible to verify whether stray gas problems associated with well construction practices have been mitigated in the grandfathered wells. Because there are no plug and abandonment applications or approvals for the grandfathered wells, it is not possible to verify whether the wells have been plugged or will be plugged in a manner that mitigates stray gas. Stray gas mitigation is a design concern for all types of well construction, including vertical and horizontal wells.

As shown in the figure above,[104] there are a number of ways that gas can migrate in a wellbore through failed piping (e.g. casing damage, corrosion, erosion) or through poor quality or improperly placed cement.

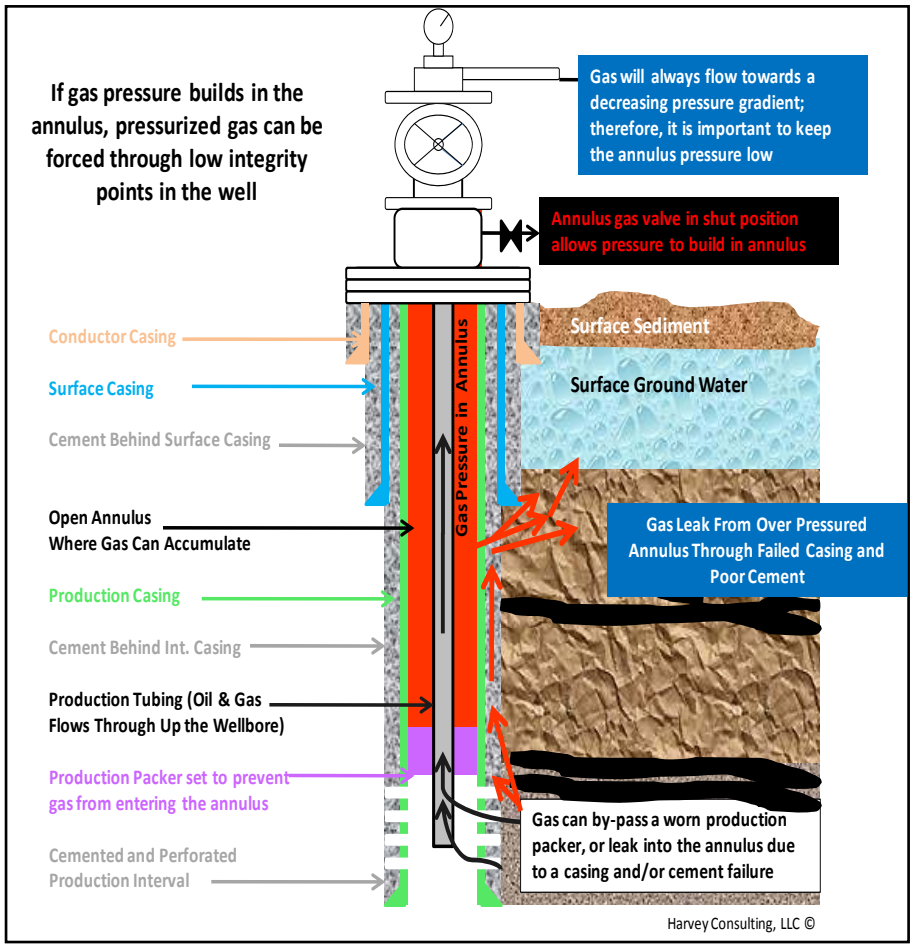
Open hole completions, where no cement or casing is installed across hydrocarbon bearing intervals, can increase the likelihood of gas migration.

[103] PADEP Notice of Final Rulemaking, Department of Environmental Protection Environmental Quality Board, 25 Pa. Code, Chapter 78 Oil and Gas Well Cementing and Casing, 2010 (**Exhibit 30A**).
[104] Potential Gas Migration Pathways Diagram, Alberta Energy Utilities Board.

Unmonitored annulus pressure in completed, temporarily suspended wells can also provide opportunities for stray gas problems. Over pressured well annulus (see diagrams on next pages) can force gas through low integrity points in the well.

For the grandfathered wells that have been drilled, but not yet plugged, it is important that the well is monitored to ensure that the annulus does not over-pressure, forcing high pressure gas from the well annulus into lower pressure ground water zones. This happens under certain circumstances, such as when a wellbore is not cased and cemented; casing failure occurs; cement is poorly bonded; or a production packer fails.

The diagrams shown in this report are simplified schematics showing the risk posed by gas migration due to annular over-pressuring (in a completed well) or a well that is left open hole (uncased) and uncompleted. These diagrams are not intended to show how the grandfathered wells may have been constructed, because those construction diagrams were not available for my review. Rather these diagrams are intended to show the types of stray gas problems that can occur in cased and completed wells, and in open hole completions.

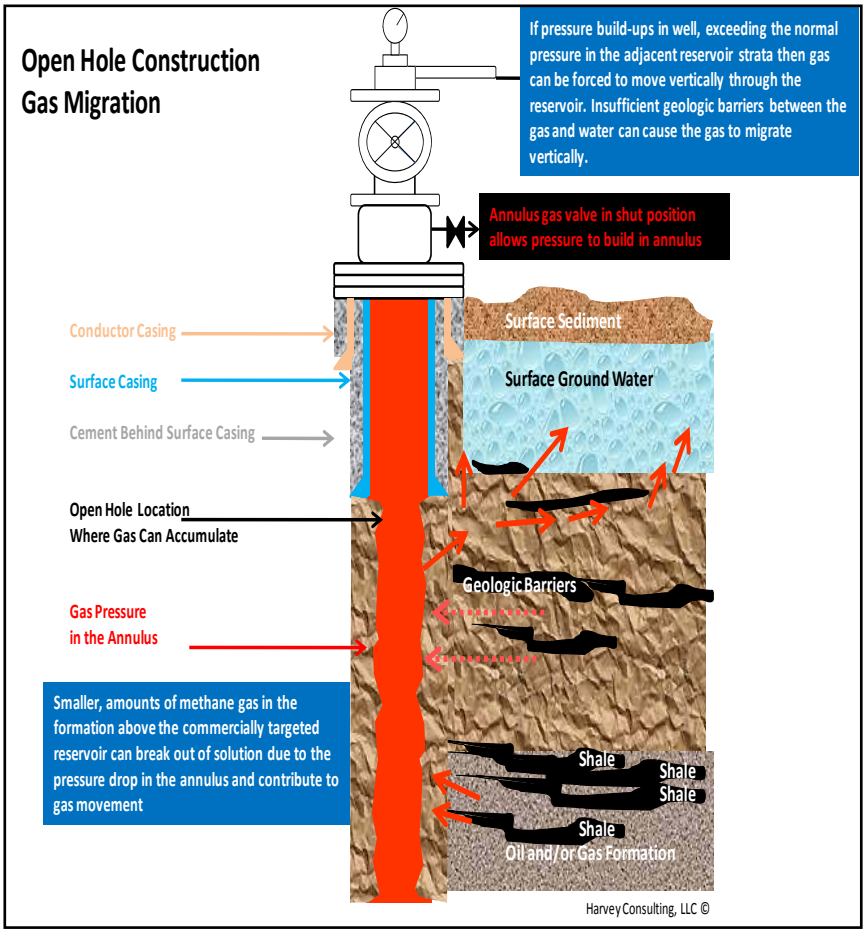


New construction practices do not guarantee stray gas migration will not occur, but these practices do significantly reduce risk. Over time production packers can wear out or casing can fail due to corrosive and erosive conditions in the wellbore, resulting in gas leaks into the annular space. Poor cementing practices can also result in gas movement.

Proper monitoring of the annulus pressure can help prevent gas migration. Even in wells constructed with more modern well construction techniques, gas pressure can build in the annulus. For example, gas can bypass a worn out production packer or leak into the annulus due to a casing and/or cement failure. Gas from a higher pressure oil and gas formation will move into the annulus through a leak because the annulus is of lower pressure. By the laws of physics, gas will always flow toward a decreasing pressure gradient. Therefore, the higher pressure gas will move from the oil and gas reservoir into the lower pressure annulus. As long as the annulus is not over pressured, this gas can be extracted at the surface. However,

if the annulus becomes over pressured, formation gas will take the path of least resistance, which may cause it to migrate into shallower formations.

An open-hole provides several pathways for gas to migrate from deeper, higher pressure formations to shallower, lower pressure formations. Gas can leak though poor cement placed at the bottom of the production casing. Smaller amounts of methane gas in the formation above the commercially targeted reservoir can break out of solution, and move toward the lower pressure open-annulus. An over-pressured annulus can cause gas to move from the higher pressure annulus into lower pressure, shallower zones.



The problem of ground water contamination by open-hole completions in Pennsylvania is well documented in two articles published in the Ground Water Journal by Samuel Harrison, a Professor of Geology and Environmental Science from Allegheny College, Meadville, Pennsylvania.[105,106]

Dr. Harrison concluded:

> *This annulus is a potential avenue of migration of contaminants from strata of higher hydrodynamic pressure into formations of lower hydrodynamic pressure.* ***If gas from the strata exposed to the annulus is not permitted to escape to the atmosphere, the annulus may become pressurized and a hydraulic gradient may be created between the potential contaminants in the annulus (e.g. brine and/or natural gas) and the overlying fresh-water aquifers.*** *If a permeability pathway exists between the pressurized annulus and an overlying fresh-water aquifer,* ***contamination of the aquifer will result*** *[emphasis added].”*[107]

Of note, Dr. Harrison’s article from 1985 stated that gas should be vented to atmosphere to relieve pressure on the annulus. However, best practices to mitigate greenhouse gas emissions, such as methane,

[105] Harrison, S.S., Evaluating System for Ground-Water Contamination Hazards Due to Gas-Well Drilling on Glaciated Appalachian Plateau, Groundwater, November-December 1983, Vol. 21, No.6.
[106] Harrison, S.S., Contamination of Aquifers by Overpressuring the Annulus of Oil and Gas Wells, Groundwater, May-June 1985, Vol. 23, No.3.
[107] Harrison, S.S., Evaluating System for Ground-Water Contamination Hazards Due to Gas-Well Drilling on Glaciated Appalachian Plateau, Groundwater, November-December 1983, Vol. 21, No.6.

now recommend collecting this gas in a low pressure gas system or using it as fuel at the well site, rather than venting it to atmosphere, where technically feasible.

Dr. Harrison goes on to write:

> *The risk of contaminating fresh ground water with the contents of a gas- or oil-well annulus could be greatly reduced by filling the annulus with cement.*

The oil and gas industry has learned from experience that casing and cementing the wells along the entire length of the hole provides added protection to ground water resources, as shown in the more current wellbore construction approaches used today.

Gas pressure buildup in the annulus can cause gas to move vertically in the reservoir toward the lower pressure ground water aquifer. This problem can be mitigated by opening the annulus valve and producing the gas to the surface, thereby decreasing the pressure in the annulus ("gas annulus de-pressuring"). An open-hole design does not guarantee that gas will migrate vertically to the lower pressure groundwater aquifer. It is just more likely to occur than in a more robust well construction design, with multiple barriers of cement and casing.

Geologic barriers to vertical flow, such as thick continuous shale layers, can trap gas and prevent vertical migration. Sealed faults and other sealed geologic unconformities can also provide barriers to vertical flow. Moreover, the pressure of the gas in the annulus must exceed the normal hydrostatic pressure gradient for it to flow vertically. Higher pressure gas will naturally seek equilibrium pressure and flow toward areas of lower pressure. If the gas pressure is sufficient enough to overcome the natural hydrostatic pressure gradient, and there are insufficient geologic barriers to prevent vertical gas migration, then gas may reach the ground water reservoir.

Pennsylvania has casing pressure regulations at Subchapter D, § 78.73 requiring Operators to monitor and prevent gas well annulus over-pressuring. The fact that gas well annulus over-pressuring is occurring, despite this rule being in place points to the need for additional agency monitoring and oversight to ensure the regulation is being complied with in the field.

Findings:

- Stray gas migration associated with oil and gas wells can impact water supplies.
- Well construction improvements to mitigate stray gas problems associated with oil and gas drilling have been proposed by PADEP for adoption in 2011, but will not apply to most of the grandfathered wells.
- Risks associated with well annulus over-pressuring, well casing failure, improperly constructed wells and improperly abandoned wells could result in stray natural gas migration in the Delaware River Basin, if these risks are not mitigated.
- Because there are no plug and abandonment applications or approvals for the grandfathered wells, it is not possible to verify whether the wells have been plugged or will be plugged in a manner that mitigates stray gas.
- Open hole completions and/or unmonitored annulus pressure in completed, temporarily suspended wells can provide opportunities for stray gas problems.

D.5.7. PADEP's well siting criteria allow wells to be placed very close to water resources

The Oil and Gas Act, §601.205(a) only requires oil and gas wells be located at least 200 feet from existing buildings and existing water wells, and allows for granting a variance[108] to place the well even closer.

The Oil and Gas Act, §601.205(b) only requires oil and gas wells be located at least 100 feet from any stream, spring or body of water, as identified on the most current 7½ minute topographic map, and at least 100 feet from any wetland greater than one acre in size, and allows for granting a variance[109] to place the well even closer.

These surface siting criteria do not provide sufficient setbacks from sensitive water resources in the Delaware River Basin. For example, blowouts can eject drilling mud, gas, oil and/or formation water from the well and onto waters and lands adjacent to the well, within the radius of the blowout plume. Depending on the reservoir pressure, blowout circumstances, and wind speed these pollutants can be distributed hundreds to thousands of feet away from the well.[110] Pressurized fluids can spray hundreds of feet, and spilled fluids can travel across surface terrain, or seep into the ground and travel towards water resources though the soil. For example, in September 2009 well chemicals spilled at the Cabot Heitsman 4H well flowed to the nearby Steven's Creeks located more than 100' away.[111]

The Crum well site is on the North Branch of Calkins Creek, a "High Quality" Creek, as classified by PADEP. It has high quality biota in the stream that will be impacted by influxes of sediment and pollution, and changes in stream flow. Calkins Creek supports brook trout, brown trout (both are temperature sensitive), merganser ducks, and great blue herons. It is also habitat for black bear and bald eagles that fish the river and roost the forest in this sub-watershed.[112] The Woodland well site is less than one-half mile from the river, on Hollister Creek, a "High Quality" stream, as classified by PADEP. Black bear and bald eagles use this area for hunting, foraging and nesting.

Findings:

- PADEP's setback requirements of 100' from a water body or 200' from a well are not sufficient to protect high-value water resources.

D.5.8 Air pollution impacts are not well understood or mitigated.

The 25 PA Code § 127.14 (38) exempts oil and gas drilling operations from air quality control requirements (**Exhibit 33**).

[108] Where the restriction would deprive the owner of the oil and gas rights, the right to produce or share in production, the Department may grant a variance upon submission and approval of form 5500-FM-OG0058, Request for Variance From Distance Restriction From Existing Building or Water Supply.
[109] The Department may waive distance requirements upon submission and approval of form 5500-FM-OG0057, Request for Waiver for Distance Requirements From Springs, Streams, Body of Water or Wetland.
[110] S.L. Ross Environmental Research Limited, Oil Deposition Modeling For Surface Oil Well Blowouts, 1998.
[111] Cabot Oil & Gas Corporation, Engineering Study, Prepared for PADEP, In Response to Order Dated September 24, 2009, prepared by URS Corporation for Cabot, October 9, 2009.
[112]Biological Information provided by DRN November 1, 2010.

> *"38. Oil and gas exploration and production facilities and operations that include wells and associated equipment and processes used either to: a) drill or alter oil and gas wells; b) extract, process and deliver crude oil and natural gas to the point of lease custody transfer; c) plug abandoned wells and restore well sites, or d) treat and dispose of associated wastes. This includes petroleum liquid storage tanks which are used to store produced crude oil and condensate prior to lease custody transfer."*

This exemption includes shale gas drilling; therefore, air pollution impacts from the grandfathered wells are currently unregulated and unmitigated.

PADEP is in the process of determining whether this air permitting exemption is warranted for Marcellus Shale Drilling Operations. PADEP is currently studying short-term air quality impacts and is expected to complete these studies in early 2011 (**Exhibit 33** includes a news report summarizing PADEP's study).

PADEP's study does not examine combined and cumulative impacts of multiple drilling operations, nor does PADEP's study examine the impacts of air pollutant transport and deposition on waters and lands downwind of drilling operations.

Components of atmosphere pollution caused by exploration drilling includes gaseous products of hydrocarbon evaporation and burning as well as aerosol particles of unburned fuel, including nitrogen oxide, sulfur oxides, carbon monoxide, particulate matter, and hazardous air pollutants. These airborne pollutants interact with atmospheric moisture, and transform in the presence of solar radiation and precipitate onto land and water surfaces causing both local and regional pollution.[113]

There are a number of potential air emission sources from drilling operations, including combustion source emissions (drilling engines and flares), direct venting of gas, and fugitive emissions from pits, impoundments and other leaks.

Since PADEP does not require a permit and there is no list of emission sources, or any assessment of the air pollution impact, it is not clear whether air pollution impacts from the grandfathered wells are significant and warrant mitigation to protect the Delaware River Basin airshed and associated waters. Air pollution can transport airborne pollutants downwind, depositing pollutants to water and land surfaces. These impacts are not well understood or mitigated for the grandfathered wells.

EPA explains the direct relationship between air pollution and water quality impacts:

> ***Airborne pollutants*** *from human and natural sources* ***can deposit back onto*** *land and* ***water bodies, sometimes at great distances from the source, and can be an important contributor to declining water quality.*** *Pollutants in waterbodies that may originate in part from atmospheric sources include nitrogen compounds, sulfur compounds, mercury, pesticides, and other toxics [emphasis added]."*[114]
>
> *Airborne pollution can fall to the ground in precipitation, in dust, or simply due to gravity. This type of pollution is called "atmospheric deposition" or "air deposition." Pollution deposited from the air can reach water bodies in two ways. It can either be deposited directly onto the surface of the water (direct deposition) or be deposited onto land and be carried to water bodies*

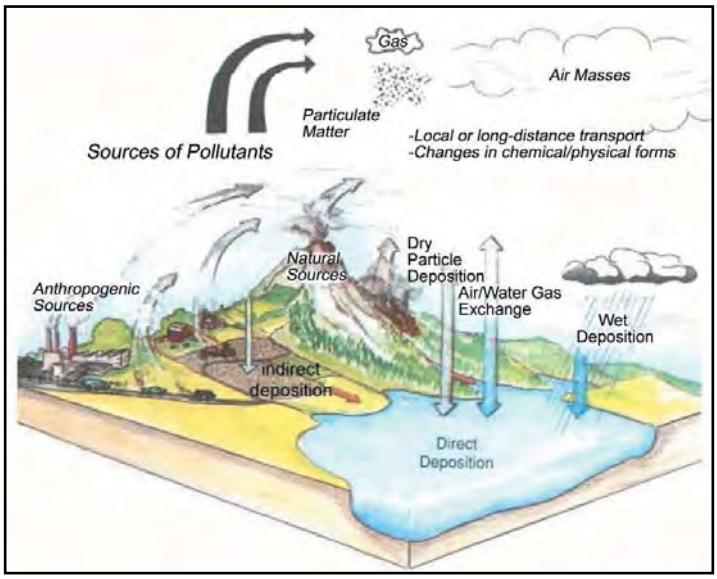
[113] Rana, S., Facts and Data on Environmental Risks- Oil and Gas Drilling Operations, Society of Petroleum Engineering Paper 114993, October 2008.
[114] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/airdeposition_index.cfm

through run off (indirect deposition). ***Once these pollutants are in the water, they can have undesirable health and environmental impacts, such as contaminated fish, harmful algal blooms, and unsafe drinking water*** *[emphasis added].*[115]

The diagram below shows the air pollution pathway from industrial sources to water resources. [116]

EPA explains that there are several pathways for air pollution to contaminate water resources, including:

- Direct deposition where air pollutants are directly deposited to the water resource;
- Indirect deposition where the air pollutant is deposited to the water resource, initially only impacting one part of the water resource, but later those pollutants are transported through runoff, rivers, streams and groundwater contaminating larger areas;
- Wet deposition where pollutants are deposited in rain, snow clouds or fog. Acid rain is an example of wet deposition of sulfur and nitrogen compounds associated with fossil fuel combustion;



- Dry deposition where air pollutant particles settle on water surfaces via gravity.

In many states, drilling equipment has been exempt from air permitting requirements because of its mobile, short-term nature, but upon further study regulators are finding that the air pollution impacts are more substantial than initially expected especially the amount of hazardous air pollution that is emitted, when large open-air impoundments are used to store fracture fluids and drilling chemicals.

A recent Environmental Impact Statement completed for Marcellus Shale drilling in New York State identified the potential for large amounts of hazardous air pollution (methanol[117]) may be present at central impoundments (32.5 tons per year).[118] A major source of hazardous air pollution is one that emits more than 10 tons/yr of any single hazardous air pollutant, or 25 tons/yr of multiple hazardous air pollutants, therefore New York's study found that shale drilling operations exceeded the hazardous pollutant threshold by more than three times.

[115] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/airdeposition_index.cfm
[116] EPA's Office of Air and Radiation (OAR) and Office of Water (OW), Frequently Asked Questions about Atmospheric Deposition Handbook: A Handbook for Watershed Managers, EPA-453/R-01-009, September 2001.
[117] EPA lists methanol as a hazardous air pollutant, but has not yet classified methanol with respect to carcinogenicity. http://www.epa.gov/ttn/atw/hlthef/methanol.html. Chronic inhalation or oral exposure may result in headache, dizziness, giddiness, insomnia, nausea, gastric disturbances, conjunctivitis, blurred vision, and blindness in humans. Neurological damage, specifically permanent motor dysfunction, may also result. The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals. 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.
[118] New York State, 2009 Draft Supplemental Generic Environmental Impact Statement On the Oil, Gas & Solution Mining Regulatory Program Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs, DSGEIS, p. 6-57.

The New York State Environmental Impact Statement did not estimate significant amounts of benzene emissions; however, recent reports indicate the Texas Commission on Environmental Quality is finding surprisingly high levels of benzene emitted from Barnett Gas Shale activities in Texas.[119] Benzene is a known, EPA-listed human carcinogen.

Air toxics do not just remain airborne when emitted from industrial operations, these toxins can deposit onto soils or surface waters where they are taken up by plants and ingested by animals and can be magnified through the food chain.[120]

Findings:

- PADEP exempts oil shale gas drilling operations from air quality control requirements, but has yet to complete a study to verify that short and long-term (cumulative impacts) meet the Clean Air Act requirements and are protective of human health and the environment.
- PADEP is in the process of determining whether this air permitting exemption is warranted for Marcellus Shale Drilling Operations. PADEP is currently studying short-term air quality impacts and is expected to complete these studies in early 2011.
- PADEP's study does not examine combined and cumulative impacts of multiple drilling operations, nor does it examine the impacts of air pollutant transport and deposition on waters and lands downwind of drilling operations.
- Shale gas drilling operations, when combined with use of fracture and drilling chemical impoundments, can be major sources of hazardous air pollutants.
- The use of closed looped collection and tank systems can mitigate water, land and air pollution impacts and are best pollution mitigation practices for shale gas drilling.
- Fuel and power selection options can also be considered to reduce air pollution impacts.

[119] Dr. Michael Honeycutt, Head of TCEQ's Toxicology Division, quoted in WFAA-TV new report, November 20, 2009. Dr. Michael Honeycutt "was shocked to see air sampling revealed high levels of benzene, a cancer-causing toxin, near some natural gas facilities."
[120] http://www.epa.gov/oar/toxicair/newtoxics.html

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Carol R. Collier
Executive Director

Robert Tudor
Deputy Executive Director

DETERMINATION OF THE EXECUTIVE DIRECTOR CONCERNING NATURAL GAS EXTRACTION ACTIVITIES IN SHALE FORMATIONS WITHIN THE DRAINAGE AREA OF SPECIAL PROTECTION WATERS

Technological advances in horizontal drilling and hydraulic fracturing have led to an increase in the number of active and planned natural gas extraction projects in shale formations within the Delaware River Basin. Each of these projects typically involves the construction of a well pad and associated roadways at or about surface elevations, the drilling of a well bore to depths of as much as 6000 feet or more, the withdrawal and transport of surface or ground water, the injection of the water and chemical fracturing mixtures into the wells to release the trapped gas, the recovery and storage of recovered fracturing fluid, water and associated leached constituents extracted with the gas, the storage and potentially the reuse of the recovered wastewater and chemicals and the eventual disposal of the water and chemicals. Each of these activities if not properly performed may cause adverse environmental effects, including effects on water resources.

Section 3.8 of the Delaware River Basin Compact provides in part: "No project having a substantial effect on the water resources of the basin shall hereafter be undertaken by any person, corporation or governmental authority unless it shall have been first submitted to and approved by the Commission…." In section 2.3.5 of the Commission's *Rules of Practice and Procedure* ("RPP"), the Commission has defined those projects that may have a substantial effect on the water resources of the basin in part by establishing thresholds for the daily average gross water withdrawal during any 30 consecutive day period and by the daily average design capacity of domestic sewage treatment facilities. Some natural gas extraction projects may exceed these thresholds and therefore be subject to review pursuant to these provisions, while others may fall below the thresholds and therefore not be subject to review pursuant to these provisions. The RPP further require the sponsor of any project that involves any discharge of pollutants into surface or ground waters of the basin irrespective of quantity to obtain Commission approval. RPP section 2.3.5B.6. See also Commission Water Code section 3.40

In recognition of the importance of protecting high quality waters that are subject to the Commission's antidegradation regulations, the RPP also give the Executive Director the authority in her discretion to require a project sponsor to obtain Commission approval notwithstanding the fact that the thresholds in the RPP have not been exceeded. Section 2.3.5B.18 of the RPP includes as a reviewable project: "Any other project that the Executive Director may specially direct by notice to the project sponsor or land owner as having a potential substantial water quality impact on waters classified as Special Protection Waters." Most of the shale formations that may be subject to the new horizontal drilling and hydraulic fracturing techniques are located within the drainage area to Special Protection Waters. The Executive Director has considered and has now determined that as a result of water withdrawals,

wastewater disposal and other activities, natural gas extraction projects in these shale formations may individually or cumulatively affect the water quality of Special Protection Waters by altering their physical, biological, chemical or hydrological characteristics.

The Executive Director therefore specially directs by this notice to natural gas extraction project sponsors that they may not commence any natural gas extraction project located in shale formations within the drainage area of Special Protection Waters without first applying for and obtaining Commission approval. For this purpose a project encompasses the drilling pad upon which a well intended for eventual production is located, all appurtenant facilities and activities related thereto and all locations of water withdrawals used or to be used to supply water to the project. Wells intended solely for exploratory purposes are not covered by this Determination. Commencing a project encompasses performing any of the activities associated with the project, including the activities identified in the first paragraph above. The Commission recognizes that each natural gas extraction project will also be subject to the review of the environmental agency of the state or Commonwealth in which the project is located and in some cases, subject to federal agency review. The Commission intends to coordinate with and where feasible to utilize the review process and approvals of the applicable state or federal agency to minimize duplication of effort and redundant requirements imposed on project sponsors.

A copy of this Declaration will be posted on the Commission's website, and additional copies will be mailed directly to those project sponsors and potential project sponsors that the Commission has identified. The Commission intends to promulgate regulations pertaining to the subject matter of this Declaration after public notice and a full opportunity for public comment.

Any person adversely affected by this Determination may request a hearing by submitting a request in writing to the Commission Secretary within thirty (30) days of the date of this Determination in accordance with the RPP.

Carol R. Collier

Carol R. Collier, Executive Director
Dated: May 19, 2009

5500-FM-OG0001A Rev. 11/2007

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

COPY

CORRECTED WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 825419
Watershed Name:	Quality:

Permittee: NEWFIELD APPALACHIA PA LLC	OGO.#: OGO-67425		Permit Number: 37-127-20012-	Date Issued: 04/29/2010
Address: 363 N SAM HOUSTON PKWY E STE 2020			Farm Name & Well Number: HL RUTLEDGE 1 1	Well Serial #:
			Municipality: Damascus	County: Wayne
HOUSTON, TX 77060-2424			7½ ' Quadrangle Name: Galilee	Map Section #: 2
Phone: (281) 847-6031	Project #:		Latitude: 41-43-43.2000	Longitude: -75-11-32.1000
Surf Elev at Site: 1440 feet	Anticipated Total Depth: 8350 feet	Well Type: TE	Offset distances referenced to NE corner of map section. South 7820 feet West 6983 feet	

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

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

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

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

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

Special Permit Conditions:

This permit expires **04/29/2011** unless drilling is commenced on or before that date and prosecuted with due diligence.

S. Craig Lobb
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-FM-OG0001A Rev. 11/2007

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

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 825419
Watershed Name: N. Branch Culkins Creek	Quality HQ

WELL PERMIT COPY

Permittee	OGO.#	Permit Number	Date Issued
NEWFIELD APPALACHIA PA LLC	OGO-67425	37-127-20012-	04/29/2010
Address		Farm Name & Well Number	Well Serial #
363 N SAM HOUSTON PKWY E STE 2020		HL RUTLEDGE 1 1	
		Municipality: Damascus	County: Wayne
HOUSTON, TX 77060-2424		7½' Quadrangle Name: Galilee	Map Section #: 2
Phone: (281) 847-6031	Project #	Latitude: 41-43-43.2000	Longitude: -75-11-32.1000
Surf Elev at Site: 1440 feet	Anticipated Total Depth: 8350 feet	Well Type: GS	Offset distances referenced to NE corner of map section. South 7820 feet West 6983 feet

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

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

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

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

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

Special Permit Conditions:

This permit expires **04/29/2011** unless drilling is commenced on or before that date and prosecuted with due diligence.

Stacy Gustafson, for S. Craig Lobins
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-FM-OG0004 Rev. 1/2010

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

COPY

DEP USE ONLY	
Site ID	Primary Fac ID: 728266
Client Id: 277879	Subfacility Id

Well Record and Completion Report

ll Operator	DEP ID#	Well API # (Permit / Reg)	Project Number	Acres
NEWFIELD APPALACHIA PA LLC	277879	37-127-20012-		

Address	Well Farm Name & Well #	Serial #
363 N SAM HOUSTON PKWY E STE 2020,	HL RUTLEDGE 1 1	

City	State	Zip Code	County	Municipality
HOUSTON	TX	77060-2424	Wayne	Damascus

Phone	Fax	USGS 7.5 min. quadrangle map
(281) 847-6031		Galilee

Check all that apply: ☐ Original Well Record ☐ Original Completion Report ☐ Amended Well Record ☐ Amended Completion Report

WELL RECORD Also complete the Log of Formations on back (page 2)

Well Type ☐ Gas ☐ Oil ☐ Combination Oil & Gas ☐ Injection ☐ Storage ☐ Disposal

Drilling Method ☐ Rotary – Air ☐ Rotary – Mud ☐ Cable Tool

Date Drilling Started	Date Drilling Completed	Surface Elevation	Total Depth – Driller	Total Depth - Logger
		ft.	ft.	ft.

Casing and Tubing

Cement returned on surface casing? ☐ Yes ☐ No

Cement returned on coal protective casing? ☐ Yes ☐ No ☐ N/A

Hole Size	Pipe Size	Wt.	Thread / Weld	Amount in Well (ft)	*Material Behind Pipe* Type and Amount	*Packer / Hardware / Centralizers* Type	Size	Depth	Date Run

COMPLETION REPORT

Perforation Record

Date	Interval Perforated From	To

Stimulation Record

Date	Interval Treated	*Fluid* Type	Amount	*Propping Agent* Type	Amount	Average Injection

Natural Open Flow	Natural Rock Pressure	Hours	Days
After Treatment Open Flow	After Treatment Rock Pressure	Hours	Days

Well Service Companies -- Provide the name, address, and phone number of all well service companies involved,

Name	Name	Name
Address	Address	Address
City - State - Zip	City - State - Zip	City - State - Zip
Phone	Phone	Phone

5500-FM-OG0004 Rev. 1/2010

LOG OF FORMATIONS

Well API#: 37-127-20012--

(If you will need more space than this page, please photocopy the blank form before filling it in.)

Formation Name or Type	Top (feet)	Bottom (feet)	Gas at (feet)	Oil at (feet)	Water at (fresh / brine; ft.)	Source of Data

I do hereby certify to the best of my knowledge, information and belief that the well identified on this Well Record and Completion Report has been properly cased and cemented in accordance with the requirements of 25 Pa. Code Chapter 78 and any conditions contained in the permit for this well. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

5500-FM-OG0075 Rev. 8/2001

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

Well Site Restoration Report

DEP USE ONLY	
Site ID	Primary Fac ID: 728266
Client Id: 277879	Subfacility Id

A. Operator and Well Information

Please read instructions on back before completing this form.

Well Operator: NEWFIELD APPALACHIA PA LLC	DEP ID#: 277879	Well API # (Permit / Reg): 37-127-20012-	
Address: 363 N SAM HOUSTON PKWY E STE 2020,		Well Farm Name & Well #: HL RUTLEDGE 1 1	Serial #
City: HOUSTON	State: TX / Zip Code: 77060-2424	County: Wayne	Municipality: Damascus
Phone: (281) 847-6031	Fax		

B. Land Application of Tophole Water

Date applied	pH
Volume (bbls)	Spec. cond. (µmhos/cm)

C. Off-site Waste Disposal

Type: ☐ Driling Fluid (803) Amount: bbls

☐ Fracing Fluid (804) bbls

☐ Other, specify: Qty: bbls or tons

Method of disposal or reuse

☐ Sewage Treatment Plant (10)
☐ Disposal Well (04)
☐ Brine Treatment Plant (12)
☐ Landfill (05)
☐ Other (08)

Facility Information

Name | Permit #

Hauler Information

Name

Address

City | State | Zip Code

D. On-site Disposal – Drill Cuttings or Waste

Location of center of disposal area in relation to the well:

Course: degrees | Distance: feet

Describe the **material disposed**, including additives.

Specify disposal method

☐ Unlined pit, complete Section E.
☐ Lined pit, complete Section E.
☐ Land application, complete Section F.
☐ Dusting
☐ Solidification
☐ Other

E. Pit Disposal

Describe pit closure procedures.

Subbase, material: Thickness: inches

Pit liner, material: Thickness: mils

Pit dimensions (feet) Length: Width: Depth:

F. Land Application

Area: Length: feet Width: feet

Waste-to-soil ratio (by volume):

Chemical analysis of waste

Cadmium (Cd)	ppm	Nickel (Ni)	ppm
Copper (Cu)	ppm	Zinc (Zn)	ppm
Chromium (Cr)	ppm	Oil and Grease	%
Lead (Pb)	ppm	Spec. Cond.	µmhos/cm
Mercury (Hg)	ppm		

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

Instructions for Well Site Restoration Report

Form 5500-FM-OG0075

Use this form to file the Well Site Restoration Report as required under 25 Pa. Code § 78.65(3). This report is to be filed with the department within 60 days after the restoration of the well site.

Section A. Operator and Well Information

Enter the name, address and telephone number of the well operator/permittee.

Provide the requested well information.

Section B. Land Application Of Tophole Water

Land application of tophole water must be performed in accordance with 25 Pa. Code § 78.60.

Provide the date(s) when tophole water was applied to the land, the estimated volume discharged, and the pH and specific conductance readings of the tophole water.

Section C. Off-site Waste Disposal

If disposing of residual waste off-site, complete this section.

Check the box next to each type of waste taken off-site for disposal. More than one box may be checked. Identify the number of barrels of drilling or fracing fluid removed. If checking "other", identify the waste and show the amount in either barrels or tons. Circle the appropriate unit of measurement.

Check the box next to the type of facility or site receiving the waste. Provide the name and permit number of the facility.

Provide the name and address of the person or company hauling the waste.

Section D. On-site Disposal – Drill Cuttings or Waste

If disposing of drill cuttings and/or residual waste on-site in accordance with 25 Pa. Code § 78.61 (Disposal of drill cuttings), § 78.62 (Disposal of residual waste—pits), or § 78.63 (Disposal of residual waste—land application), complete this section.

Locate the approximate center of the disposal area by giving the course in degrees and the distance in feet from the wellhead.

Describe the types of materials that were disposed on-site. Include drill cuttings above the surface casing seat, drill cuttings below the surface casing seat, cement returns, drilling muds, frac sands, and any other material that is being disposed on-site. Indicate any additives that were in the materials being disposed.

Additives are usually present to modify the performance of cement, drilling muds or frac sands. An example might be salt or oil in drilling muds.

Check the box next to the on-site disposal methods used. If "other" is checked, briefly describe the method of disposal.

Section E. Pit Disposal

If disposing of drill cuttings under 25 Pa. Code § 78.61 (Disposal of drill cuttings) complete the pit dimensions part of this section. If disposing of drill cuttings and/or residual waste under 25 Pa. Code § 78.62 (Disposal of residual waste—pits), complete all of this section.

Describe the procedures used to close the pit. The procedures should conform to requirements in 25 Pa. Code § 78.62.

Describe the type of material and thickness used for the subbase and pit liner. The manufacturer should be identified when describing the type of material used for the pit liner.

Provide the dimensions of the pit, giving the appropriate length, width, and depth in feet.

Section F. Land Application

If disposing of drill cuttings and/or residual waste including contaminated drill cuttings under 25 Pa. Code § 78.63, complete this section.

Provide the approximate length and width of the land application area in feet. Indicate the ratio of waste to soil by volume. As an example, if a 3-inch layer of waste was mixed into a 6-inch layer of soil the ratio would be 1/2. In no case may the ratio exceed 1/1.

Complete the chemical analysis information if it is requested by the department. The analysis is to be performed on the waste soil mixture after land application has occurred. See the guidelines for land application in the "Oil and Gas Operators Manual" for taking samples and for analysis methods.

If more room is needed to complete any section, provide the information on 8 ½" by 11" sheets of paper and attach to this form. Indicate the sections the information applies to.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Dear Operator:

Enclosed please find well permit(s) issued for drilling or altering a well. Developing this resource in a safe and environmentally protective manner is of utmost importance. As you may be aware, there have been several recent incidences where water supplies have been affected by natural gas migration. In order to prevent future impacts to the Commonwealth's water resources and provide a mechanism for ensuring public safety, the Department is providing the following information as a reminder of the cementing requirements for oil and gas wells.

Cementing

Properly cementing the casing of a well is critical to protecting water resources, preventing gas migration, and ensuring well integrity. If the casing is improperly cemented or if insufficient cement is used, such as when cement is not returned to the surface, the operator should notify the Department pursuant to 25 Pa. Code § 78.86.

In addition, when cementing surface casing, 25 Pa. Code § 78.85 states that the cement must be allowed to set for at least 8 hours *and* until the cement attains a compressive strength of at least 350 psi. While the cement is setting, the casing must not be disturbed. This includes any activity that may cause movement or pressure changes to the casing or the cement sheath surrounding the casing. After the cement is set, care must be taken when drilling through the plug to prevent damaging the seal at the casing seat. Disturbing the casing while cement is setting or damaging the seal at the casing seat may provide a mechanism for gas and other fluids to escape from the well and contaminate groundwater and water supplies. If this occurs, the operator must notify the Department.

In addition, the Department also reminds you of the following reporting requirements for oil and gas wells.

Reporting

1. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(a) of Chapter 78 of the Oil and Gas Regulations, a **Well Record** must be submitted to the Department within thirty (30) days of cessation of drilling or altering a well.

2. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(b) of Chapter 78 of the Oil and Gas Regulations, a **Completion Report** must be submitted to the Department within thirty (30) days of completion of the well. A copy of the Well Record and Completion Report is enclosed with this letter. This is a newly revised form which requires the operator to certify that the well has been cased and cemented according to the requirements of 25 Pa. Code Chapter 78. Well Record and Completion Report forms that do not contain this certification will not be accepted by the Department. Additional copies of this form can be obtained from the Department's eLibrary at http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9841

3. Pursuant to Section 212(a) of the Oil and Gas Act, a report specifying the well status and production on the most well-specific basis available is to be provided to the Department. Section 78.121 of Chapter 78 details the reporting time frames required for various well types, waste reporting, and the acceptable format for the **Well and Waste Production Report** submissions.

4. Also note that pursuant to Section 212(b) of the Oil and Gas Act, the Department has the authority to request and does hereby request you submit a digital copy on CD of **ALL Well Logs** (temperature, electrical, radioactive, gamma ray, neutron, induction, resistivity, multi-arm caliper, acoustic, optical, etc.) that have been run on this well.

The above records and logs are to be submitted to the Department of Environmental Protections, Oil and Gas Management, 230 Chestnut St., Meadville, Pa 16335-3481 to the attention of the Regional Oil and Gas Manager.

Thank you for your cooperation in this matter.

Sincerely,

S. Craig Lobins
Regional Manager
Oil and Gas Management

Please note that the most recent revision of the Application for Drilling or Altering a Well must be submitted with all drilling applications. Please check the website below for the most recent revisions for all forms.
http://www.dep.state.pa.us/dep/deputate/minres/oilgas/o_gforms.htm

The Erosion,Sediment& Storm water Control Module is no longer being accepted for ESCGP-1 applications. Please submit the complete ESCGP-1 application for any projects. The most recent revisions must be submitted along with the application fee of $500.00

RUTLEDGE WELL PAD
NEWFIELD APPALACHIA PA LLC.

DAMASCUS TOWNSHIP, WAYNE COUNTY, PENNSYLVANIA

EROSION & SEDIMENT CONTROL PLAN

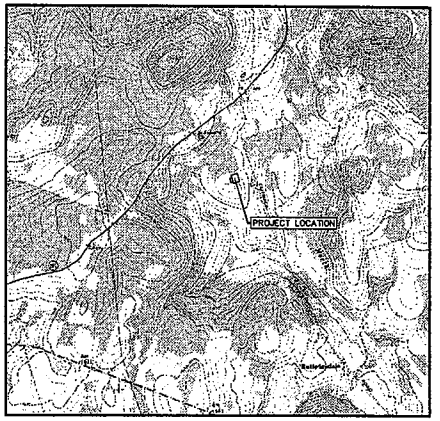
MAY 2010

DRAWING INDEX	
No.	DRAWING TITLE
C-1	EROSION & SEDIMENT CONTROL PLAN
C-2	EROSION & SEDIMENT CONTROL NOTES
C-3	EROSION & SEDIMENT CONTROL DETAILS
C-4	STAKEOUT & SITE GEOMETRY PLAN
C-5	SITE SECTIONS
C-6	CONSTRUCTION DETAILS & BID QUANTITIES
C-7	CONSTRUCTION SPECIFICATIONS

TETRA TECH

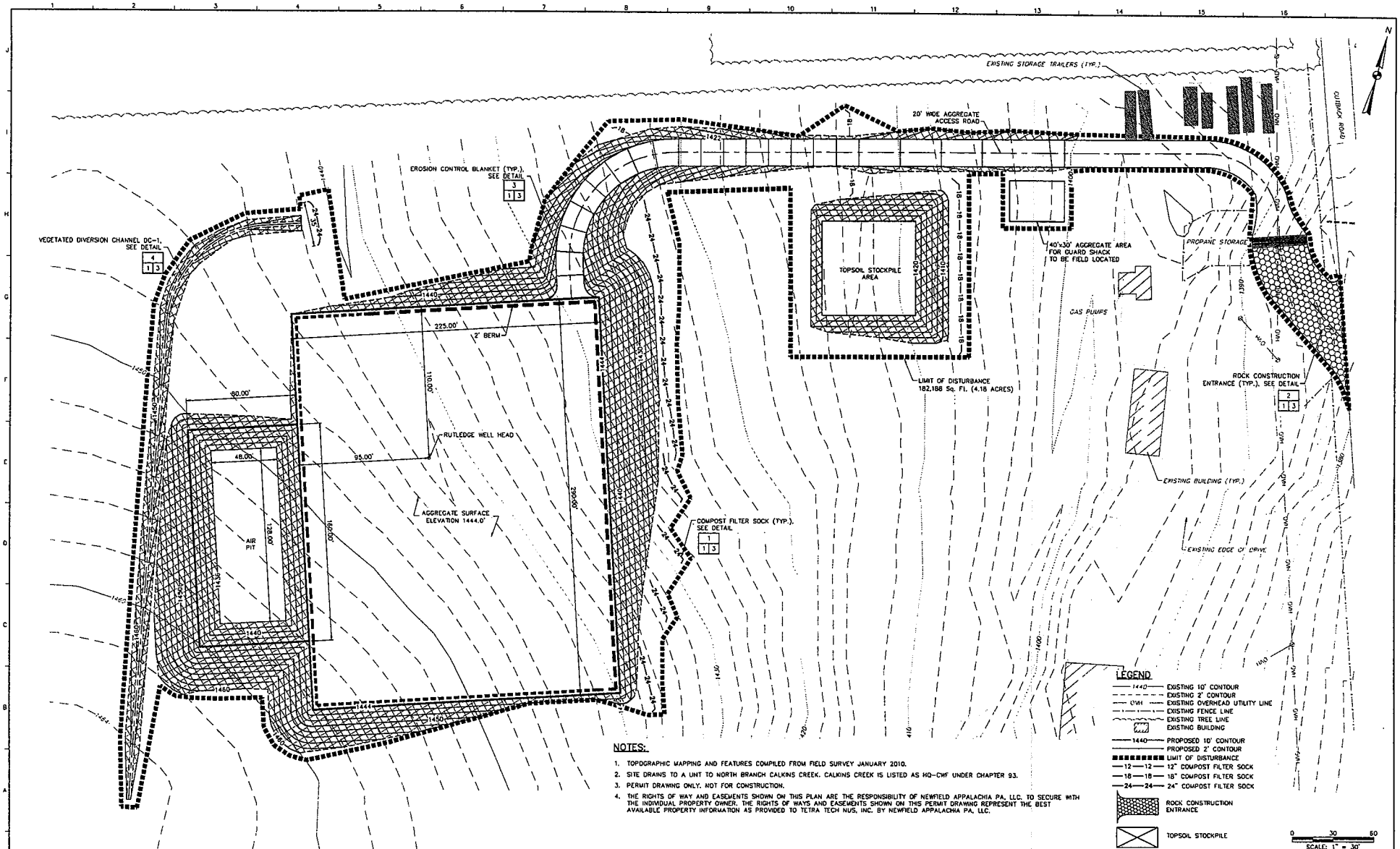
complex world | CLEAR SOLUTIONS™

661 ANDERSEN DRIVE – FOSTER PLAZA VII, PITTSBURGH, PA 15220
TEL: (412) 921-7090 | FAX: (412) 921-4040



LOCATION MAP
GALILEE, PA. – USGS 7.5' QUADRANGLE
RUTLEDGE WELL PAD
WAYNE COUNTY, PENNSYLVANIA
SCALE: 1" = 2000'

0 2000 4000
SCALE: 1" = 2000'



NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM FIELD SURVEY JANUARY 2010.
2. SITE DRAINS TO A UNT TO NORTH BRANCH CALKINS CREEK. CALKINS CREEK IS LISTED AS HQ-CWF UNDER CHAPTER 93.
3. PERMIT DRAWING ONLY. NOT FOR CONSTRUCTION.
4. THE RIGHTS OF WAY AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF NEWFIELD APPALACHIA PA, LLC. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS OF WAYS AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH NUS, INC. BY NEWFIELD APPALACHIA PA, LLC.

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
EROSION & SEDIMENT CONTROL PLAN

SCALE: 1" = 30'

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	1 OF 7

C-1

STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES

1. STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.
2. THE OPERATOR SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY IMPLEMENTED.
3. UNTIL THE SITE ACHIEVES FINAL STABILIZATION, THE OPERATOR SHALL ASSURE THAT THE BEST MANAGEMENT PRACTICES ARE IMPLEMENTED, INSPECTED, OPERATED, AND MAINTAINED. THE OPERATOR SHALL MAINTAIN AND MAKE AVAILABLE TO DEPARTMENT OF ENVIRONMENTAL PROTECTION, WRITTEN INSPECTION LOGS. ALL MAINTENANCE WORK, INCLUDING CLEANING, REPAIR, REPLACEMENT, REGRADING, AND RESTABILIZATION SHALL BE PERFORMED IMMEDIATELY UPON DISCOVERY OF DEFICIENCY.
4. ALL PUMPING OF SEDIMENT LADEN WATER SHALL BE THROUGH A SEDIMENT CONTROL BMP, SUCH AS A PUMPED WATER FILTER BAG DISCHARGING OVER NON-DISTURBED AREAS.
5. THE CONTRACTOR SHALL REVIEW THE PROVISIONS OF THE APPENDIX 64, EROSION CONTROL RULES AND REGULATIONS, TITLE 25, PART 1, DEPARTMENT OF ENVIRONMENTAL PROTECTION, SUBPART C. PROTECTION OF NATURAL RESOURCES, ARTICLE III, WATER RESOURCES, CHAPTER 102, EROSION CONTROL.
6. A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN MUST BE ON THE PROJECT SITE AT ALL TIMES.
7. EROSION AND SEDIMENT BMPS MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS WITHIN THE TRIBUTARY AREAS OF THOSE BMPS.
8. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS CONTROLS SHALL BE REMOVED. AREAS DISTURBED DURING REMOVAL OF THE BMPS MUST BE STABILIZED IMMEDIATELY.
9. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.
10. AT LEAST 3 DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES SHALL NOTIFY THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776 FOR BURIED UTILITIES LOCATIONS.
11. IN A TIMELY MANNER AFTER EARTH DISTURBANCE ACTIVITIES CEASE, THE OPERATOR SHALL STABILIZE ANY AREAS DISTURBED BY THE ACTIVITIES. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE SPECIFIED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY VEGETATIVE STABILIZATION SPECIFICATIONS. DISTURBED AREAS WHICH ARE AT FINISHED GRADE OR WHICH WILL NOT BE REDISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE PERMANENT VEGETATIVE STABILIZATION SPECIFICATIONS.
12. AT STREAM CROSSINGS, 50' BUFFER AREAS SHOULD BE MAINTAINED. ON BUFFERS, CLEARING, SOD DISTURBANCES, EXCAVATION, AND EQUIPMENT TRAFFIC SHOULD BE MINIMIZED. ACTIVITIES SHOULD AS STACKING LOGS, BURNING CLEARED BRUSH, DISCHARGING RAINWATER FROM TRENCHES, WELDING PIPE SECTIONS, REFUELING AND MAINTAINING EQUIPMENT SHOULD BE ACCOMPLISHED OUTSIDE OF BUFFERS.
13. MULCH OR EROSION CONTROL BLANKETS MUST BE INSTALLED ON ALL SLOPES 3:1 AND STEEPER.
14. SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.
15. THE OPERATOR SHALL REMOVE FROM THE SITE, RECYCLE, OR DISPOSE OF ALL BUILDING MATERIALS AND WASTES IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ. THE CONTRACTOR SHALL NOT ILLEGALLY BURY, DUMP, OR DISCHARGE ANY BUILDING MATERIAL OR WASTES AT THE SITE.

TEMPORARY EROSION AND SEDIMENT CONTROLS
INSPECTION AND MAINTENANCE SCHEDULE

BMP	INSPECTION FREQUENCY	MAINTENANCE TO BE PERFORMED
COMPOST FILTER SOCK	WEEKLY AND AFTER RAINFALL EVENTS	MAINTENANCE SHALL BE PERFORMED AS NEEDED . SEDIMENT SHALL BE REMOVED ONCE IT HAS ACCUMULATED TO ONE HALF THE ORIGINAL HEIGHT OF THE BARRIER. COMPOST FILTER SOCK SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT THE EFFECTIVENESS OF COMPOST FILTER SOCK IS REDUCED. COMPOST FILTER SOCKS SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED. ALL SEDIMENT ACCUMULATION AT THE COMPOST FILTER SOCK SHALL BE REMOVED AND PROPERLY DISPOSED OF BEFORE THE COMPOST FILTER SOCK IS REMOVED.
ROCK CONSTRUCTION ENTRANCE	DAILY	CONTRACTOR SHALL MAINTAIN/REPLACE MATERIAL AS NEEDED THROUGHOUT CONSTRUCTION TO MAINTAIN MINIMUM THICKNESS DURING USE OF ACCESS ROAD. A STOCKPILE OF ROCK WILL MAINTAINED ON SITE FOR THIS PURPOSE
MULCH STABILIZATION PEG AND TWINE	WEEKLY AND AFTER RAINFALL EVENTS	REPLACE MULCH, PEGS AND TWINE AS REQUIRED. RESTORE SEEDING IN AFFECTED AREA IF NECESSARY.

REVEGETATION

A. TEMPORARY GRASS COVER SHALL BE ESTABLISHED IN THE FOLLOWING AREAS:

1. WHERE SOIL STOCKPILES ARE TO BE EXPOSED FOR A PERIOD GREATER THAN THIRTY (30) DAYS, THE STOCKPILE SHALL BE SEEDED.
2. WHERE VEGETATIVE FILTERS MUST BE ESTABLISHED BELOW FILTER BAGS, A MINIMUM DISTANCE OF 10 FT SHALL BE SEEDED DOWNSLOPE OF THE TRAP OUTLET. TEMPORARY COVER - SEED MIXTURE FOR TEMPORARY COVER SHALL CONSIST OF 100% ANNUAL RYEGRASS. SEED SHALL BE APPLIED AT THE RATE OF 40 LB/ACRE OR AS RECOMMENDED BY A LOCAL RECOGNIZED SEED SUPPLIER APPROVED BY THE OWNER'S REPRESENTATIVE, PRIOR TO SEEDING, APPLY 1 TON OF AGRICULTURAL GRADE LIMESTONE PER ACRE PLUS FERTILIZER AT THE RATE OF 15-30-30 LB. PER ACRE AND WORK INTO SOIL.

B. PERMANENT COVER:

RECOMMENDED PERMANENT SEED MIXTURES
COOL AND WARM SEASON GRASS

MIXTURE NUMBER	SEASON	SEASON [SEEDING RATE LB/AC.]
1	COOL	TALL FESCUE*[79], OR FINE FESCUE[45], PLUS REDTOP[4], OR PERENNIAL RYEGRASS[15], PLUS BIRDSFOOT TREFOIL[6]
2	COOL	BIRDSFOOT TREFOIL[8], PLUS TALL FESCUE*[40]
3	COOL	ORCHARDGRASS[26], OR SMOOTH BROMEGRASS[33], PLUS BIRDSFOOT TREFOIL[8]
4	WARM	FLATPEA[27], PLUS TALL FESCUE*[26], OR PERENNIAL RYEGRASS[25]
5	WARM	DEERTOUNGE[21], PLUS BIRDSFOOT TREFOIL[8]
6	WARM	SWITCHGRASS[15], OR BIG BLUESTEM[15], PLUS BIRDSFOOT TREFOIL[8]

RECOMMENDED PERMANENT SEED MIXTURES
FOR STABILIZING DISTURBED AREAS

SITE CONDITION	SEED MIXTURE
CUT SLOPES & FILLS (NOT MOWED)	
WELL-DRAINED	2, 4 OR 6
VARIABLE DRAINAGE	2
CUT SLOPES & FILLS (MOWED)	1
CUT SLOPES & FILLS (GRAZED/HAY)	1, 2 OR 3
GULLIES & ERODABLE AREAS	2 OR 6
EROSION CONTROL BMP'S	
CHANNELS, DRAINAGE DITCHES, TRAP EMBANKMENTS, ETC	1 OR 2
FOR HAY OR SILAGE	2 OR 3
RIGHT-OF-WAY	
WELL-DRAINED	4 OR 6
VARIABLE DRAINAGE	2
WELL-DRAINED AREAS FOR GRAZING/HAY	2 OR 3
STRIP MINED AREAS	
SPOILS, WASTE AREAS, FLY ASH, SLAG, ETC. (LIME TO SOIL TEST)	2, 4 OR 5
FOR GRAZING/HAY	2, 3 OR 6

CONSTRUCTION SEQUENCE

REFER TO THE E&SC PLAN DRAWINGS FOR THE LOCATION OF THE PROPOSED WORK AND THE ASSOCIATED BMPS. A GENERALIZED CONSTRUCTION SEQUENCE IS PROVIDED BELOW. THE CONSTRUCTION SEQUENCE IS INTENDED TO PROVIDE A GENERAL COURSE OF ACTION IN ORDER TO CONFORM TO THE APPLICABLE REGULATORY AGENCY REQUIREMENTS FOR TEMPORARY AND PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL. ALL NECESSARY PARTS FOR PROPER AND COMPLETE EXECUTION OF WORK PERTAINING TO THIS PLAN, WHETHER SPECIFICALLY MENTIONED OR NOT, ARE TO BE PERFORMED BY THE CONTRACTOR. IT IS NOT INTENDED THAT THE DRAWINGS AND THIS REPORT SHOW EVERY DETAILED PIECE OF MATERIAL OR EQUIPMENT. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS LISTED IN THIS SECTION. THE CONTRACTOR MAY BE REQUIRED TO ALTER CONTROLS BASED ON EFFECTIVENESS OF CONTROLS OR DIFFERING CONDITIONS ENCOUNTERED IN THE FIELD.

1. LOCATE STAGING AREAS AND ACCESS POINTS INCLUDING CONSTRUCTION ENTRANCES. INSTALL COMPOST FILTER SOCKS DOWN SLOPE OF THESE AREAS.
2. INSTALL ROCK CONSTRUCTION ENTRANCE. REFER TO THE ROCK CONSTRUCTION ENTRANCE DETAIL ON DRAWINGS FOR SUGGESTED DIMENSIONS.
3. INSTALL COMPOST FILTER SOCKS ALONG THE PERIMETERS OF THE SITE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
4. INSTALL THE DIVERSION CHANNEL AROUND THE PROJECT AREA AND INSTALL 24" COMPOST FILTER SOCK AT CHANNEL DISCHARGE LOCATION. LOCATIONS ARE MARKED ON PLAN SHEET C-1.
5. CLEAR AND GRUB THE SITE.
6. STRIP AND STOCKPILE TOPSOIL. CONSTRUCT STOCKPILES AS SHOWN IN THE DETAILS ON THE CONSTRUCTION DRAWINGS.
7. MINIMIZE TOTAL AREA OF DISTURBANCE. MAINTAIN ALL TEMPORARY SOIL STOCKPILES WITHIN EXISTING SOIL EROSION AND SEDIMENT CONTROLS.
8. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE.
9. INSTALL EROSION CONTROL BLANKET ON ALL SLOPES GREATER THAN 3:1 AS SHOWN ON THE CONSTRUCTION DRAWINGS.
10. AS FINAL GRADES ARE REACHED, IMMEDIATELY SEED AND MULCH DISTURBED AREAS OR PREPARE FOR AGGREGATE PAVING ON ACCESS ROAD OR PAD AREA.
11. MAINTAIN ALL EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER AND AGGREGATE STABILIZATION IS ESTABLISHED.
12. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATIVE COVER AND AGGREGATE STABILIZATION OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATIVE COVER AND AGGREGATE STABILIZATION OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS.
13. WITHIN 9 MONTHS FROM THE COMPLETION OF DRILLING, RESTORE SITE AS PER SECTION 3.6 (SITE RESTORATION) OF THIS E&S PLAN.

SITE RESTORATION

AREAS AT FINAL GRADE ARE TO BE SEEDED, MULCHED AND STABILIZED IMMEDIATELY AS SPECIFIED ABOVE. WITHIN NINE MONTHS AFTER COMPLETION OF DRILLING THE WELL, THE OIL AND GAS WELL OWNER OR OPERATOR MUST RESTORE THE LAND SURFACE WITHIN THE AREA DISTURBED IN SITING, DRILLING, COMPLETING AND PRODUCING THE WELL. THIS INCLUDES:

a. REMOVING OR FILLING THE PIT USED TO CONTAIN PRODUCED FLUIDS OR INDUSTRIAL WASTES AND DRILL CUTTINGS. PROCEDURES FOR PROPER WASTE HANDLING AND DISPOSAL SHALL BE IN ACCORDANCE WITH DEP ACCEPTED PRACTICES AND STANDARDS.

b. REMOVING ALL DRILLING SUPPLIES NOT NEEDED FOR PRODUCTION. DRILLING SUPPLIES AND EQUIPMENT NOT NEEDED FOR PRODUCTION MAY BE STORED AT THE WELL SITE IF THE EXPRESS WRITTEN CONSENT OF THE SURFACE LANDOWNER IS OBTAINED.

c. REMOVING ALL DRILLING SUPPLIES NOT NEEDED FOR PRODUCTION. DRILLING SUPPLIES AND EQUIPMENT NOT NEEDED FOR PRODUCTION MAY BE STORED AT THE WELL SITE IF THE EXPRESS WRITTEN CONSENT OF THE SURFACE LANDOWNER IS OBTAINED.

d. IMPLEMENT TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES TO MINIMIZE THE POTENTIAL FOR ACCELERATED EROSION AND SEDIMENTATION DUE TO EARTH DISTURBANCES NECESSARY FOR SITE RESTORATION. THESE AREAS ARE TO BE SEEDED AND MULCHED UPON COMPLETION

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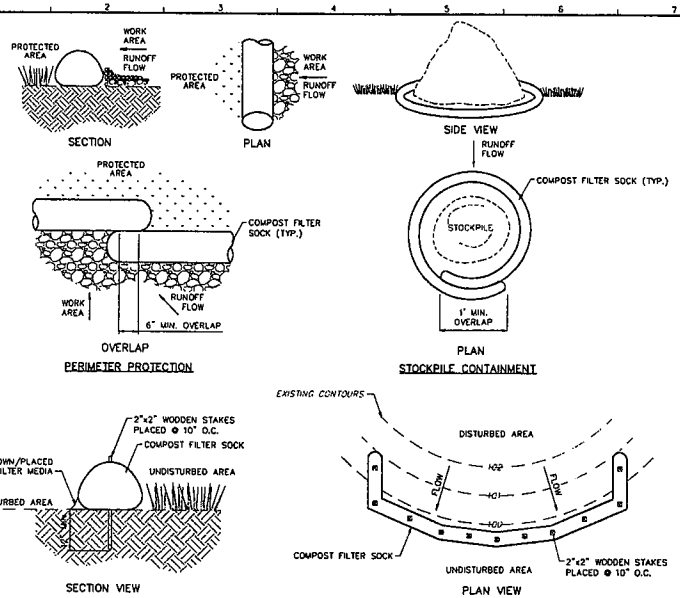
MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
EROSION & SEDIMENT CONTROL NOTES
SCALE: NOT TO SCALE

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	2 OF 7

C-2



COMPOST STANDARDS	
ORGANIC MATTER CONTENT	80%-100% (DRY WEIGHT BASIS)
ORGANIC	FIBROUS & ELONGATED
pH	5.5-8.0
MOISTURE CONTENT	35%-55%
PARTICLE SIZE	98% PASS THROUGH 1" SCREEN
SOLUBLE SALT CONCENTRATION	5.0 dS MAXIMUM

MAXIMUM SLOPE LENGTHS FOR COMPOST FILTER SOCK			
% SLOPE	12" DIAMETER	18" DIAMETER	24" DIAMETER
2 (OR LESS)	150	500	1000
5	100	250	550
10	50	150	325
15	35	100	215
20	25	70	175
25	20	55	135
30	15	45	100
35	15	40	85
40	15	35	75
45	10	30	60
50	10	25	50

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY 18" DIAMETER SOCK SHALL NOT EXCEED THAT SHOWN ON ABOVE TABLE FOR REINFORCED SILT FENCE. MAXIMUM SLOPE LENGTH FOR A 24" DIAMTERE SOCK SHALL NOT EXCEED THAT FOR SUPER SILT FENCE.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.

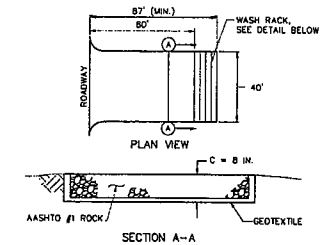
ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

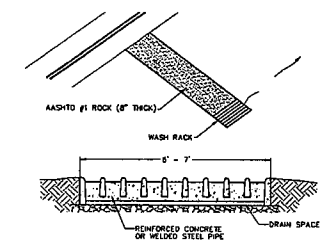
UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

COMPOST FILTER SOCK | 1 | 1 | 3
NOT TO SCALE



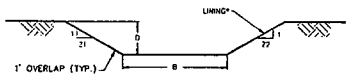
MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

ROCK CONSTRUCTION ENTRANCE | 2 | 1 | 3
NOT TO SCALE



MAINTENANCE:
ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FUTHER USE OF THE RACK. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

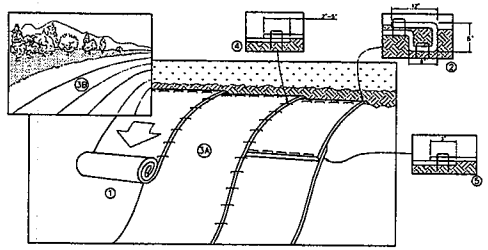
WASH RACK DETAIL
NOT TO SCALE



CHANNEL NO.	BOTTOM WIDTH B (FT)	DEPTH D (FT)	Z1 (FT)	Z2 (FT)	LINING*
DC-1	2.0	1.5	2:1	2:1	VEGETATED

* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, AND VEGETATION STABILIZATION SPECIFICATIONS FOR SOIL AMENDMENTS, SEED MIXTURES, AND MULCHING INFORMATION.

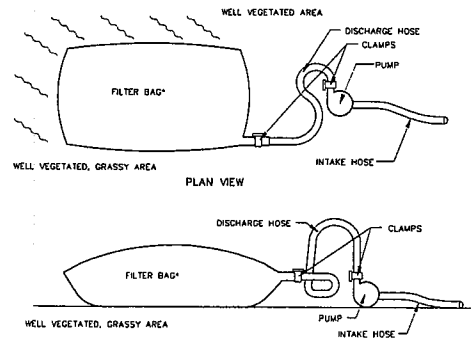
VEGETATED CHANNELS | 4 | 1 | 3
NOT TO SCALE



NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
   NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" - 3" (5 CM - 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.
   NOTE:
   *IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

EROSION CONTROL BLANKET - SLOPE INSTALLATION | 3 | 1 | 3
NOT TO SCALE



NOTES:

1. FILTER SHALL BE MADE OF NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE-STITCHED "J" SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
2. SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FULL.
3. BAGS SHALL BE LOCATED IN WELL VEGETATED (GRASSY) AREAS, AND DISCHARGE INTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED.
5. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.

PUMPED WATER FILTER BAG
NOT TO SCALE

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MARK	DATE	DESCRIPTION	BY

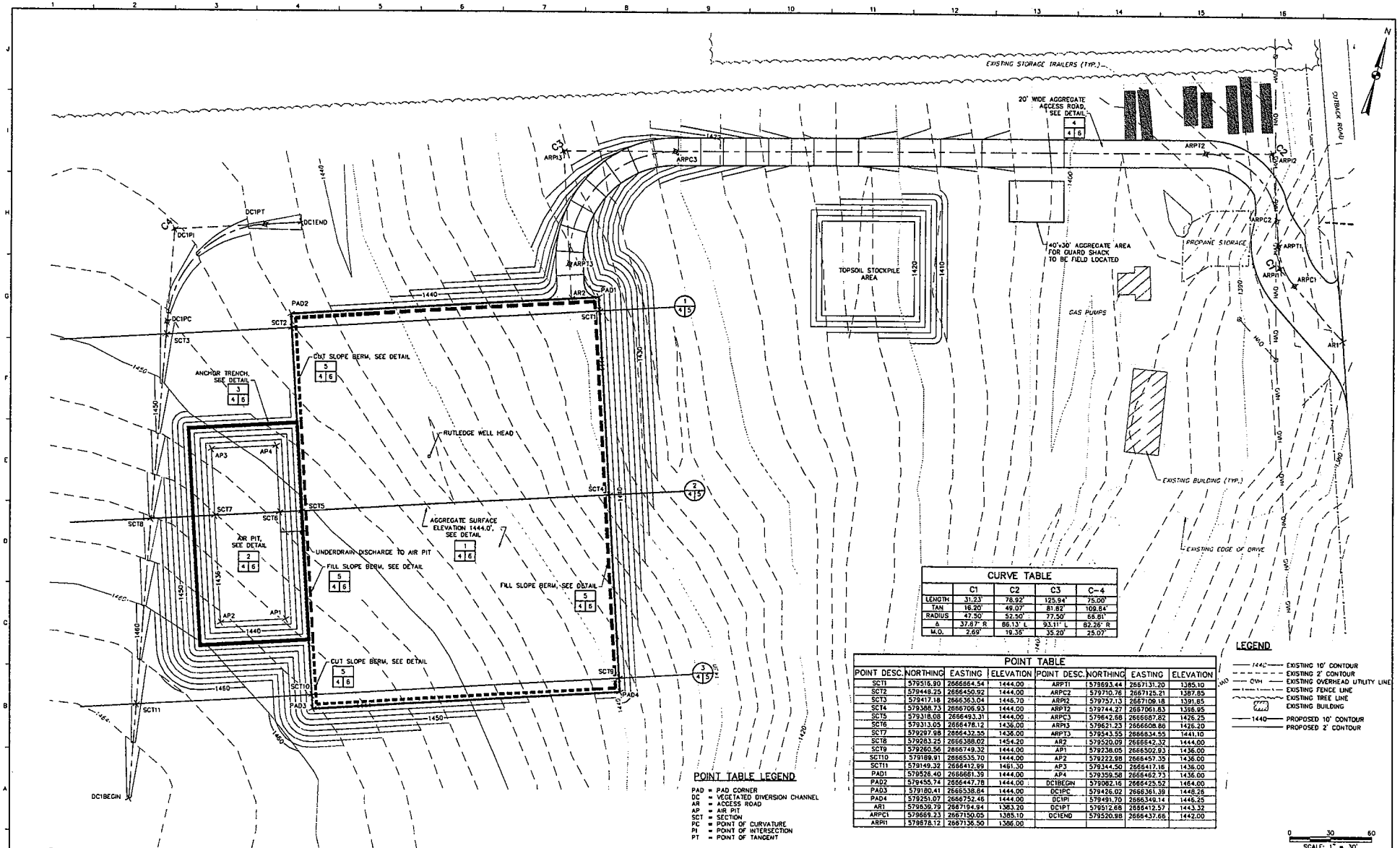
NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
EROSION & SEDIMENT CONTROL DETAILS

SCALE: AS NOTED

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	3 OF 7

C-3



CURVE TABLE				
	C1	C2	C3	C-4
LENGTH	31.23'	78.92'	125.94'	75.00'
TAN	16.20'	49.07'	81.82'	109.84'
RADIUS	47.50'	52.50'	77.50'	66.81'
Δ	37.67° R	86.13° L	93.11° L	82.26° R
M.O.	2.69'	19.38'	35.20'	25.07'

POINT TABLE							
POINT DESC.	NORTHING	EASTING	ELEVATION	POINT DESC.	NORTHING	EASTING	ELEVATION
SCT1	579516.90	2666864.54	1444.00	ARPT1	579693.44	2667131.20	1385.10
SCT2	579448.25	2666450.92	1444.00	ARPC2	579710.76	2667125.21	1387.85
SCT3	579417.18	2666363.04	1445.70	ARPI2	579757.13	2667109.18	1391.85
SCT4	579388.73	2666706.93	1444.00	ARPT2	579744.27	2667061.83	1396.95
SCT5	579318.08	2666493.31	1444.00	ARPC3	579642.66	2666687.82	1426.25
SCT6	579313.05	2666478.12	1436.00	ARPI3	579621.23	2666608.86	1426.20
SCT7	579297.98	2666432.55	1436.00	ARPT3	579543.55	2666834.55	1441.10
SCT8	579283.25	2666388.02	1454.20	AR2	579520.09	2666842.32	1444.00
SCT9	579260.56	2666749.32	1444.00	AP1	579238.05	2666502.93	1436.00
SCT10	579189.91	2666535.70	1444.00	AP2	579222.98	2666457.35	1436.00
SCT11	579149.32	2666412.99	1461.30	AP3	579344.50	2666417.16	1436.00
PAD1	579526.40	2666681.39	1444.00	AP4	579359.58	2666462.73	1436.00
PAD2	579455.74	2666447.78	1444.00	DC1BEGIN	579082.16	2666425.52	1464.00
PAD3	579180.41	2666538.84	1444.00	DC1PC	579426.02	2666361.39	1448.26
PAD4	579251.07	2666752.46	1444.00	DC1PI	579491.70	2666349.14	1446.25
AR1	579639.79	2667194.94	1383.20	DC1PT	579512.66	2666412.57	1443.32
ARPC1	579669.23	2667150.05	1385.10	DC1END	579520.98	2666437.66	1442.00
ARPI1	579878.12	2667136.50	1386.00				

POINT TABLE LEGEND

PAD = PAD CORNER
DC = VEGETATED DIVERSION CHANNEL
AR = ACCESS ROAD
AP = AIR PIT
SCT = SECTION
PC = POINT OF CURVATURE
PI = POINT OF INTERSECTION
PT = POINT OF TANGENT

LEGEND

- 1440 EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- OVH EXISTING OVERHEAD UTILITY LINE
- EXISTING FENCE LINE
- EXISTING TREE LINE
- EXISTING BUILDING
- 1440 PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR

SCALE: 1" = 30'

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MARK	DATE	DESCRIPTION	BY

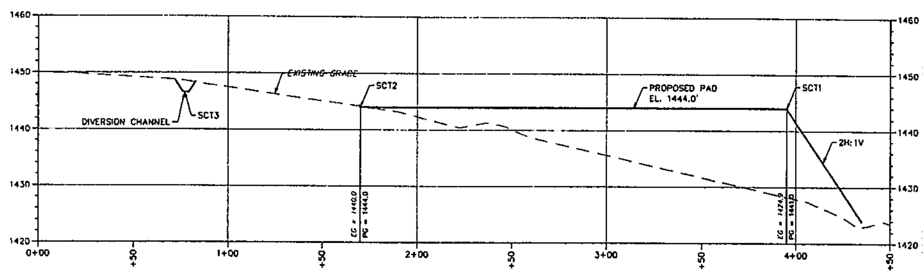
NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
STAKEOUT & SITE GEOMETRY PLAN

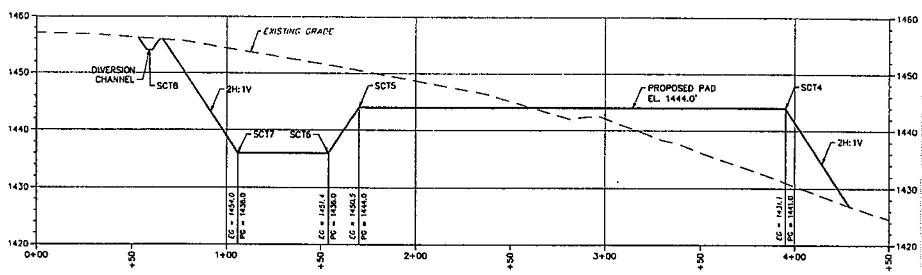
SCALE: 1" = 30'

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	4 OF 7

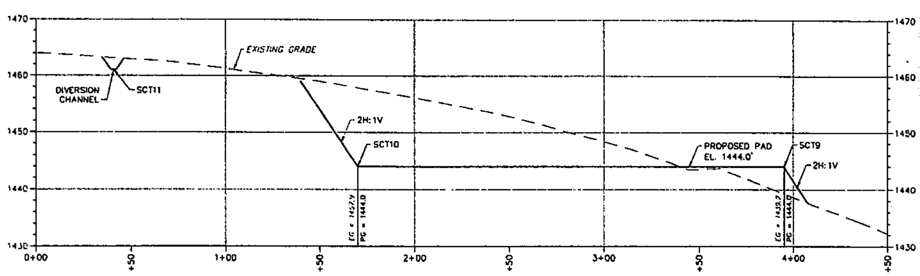
C-4



SECTION 1/4|5
SCALE: HORIZ: 1" = 30'
VERT: 1" = 10'



SECTION 2/4|5
SCALE: HORIZ: 1" = 30'
VERT: 1" = 10'



SECTION 3/4|5
SCALE: HORIZ: 1" = 30'
VERT: 1" = 10'

SCALE: 1" = 30'

SCALE: 1" = 10'

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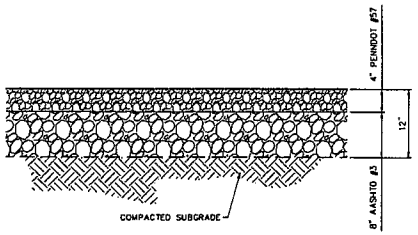
MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

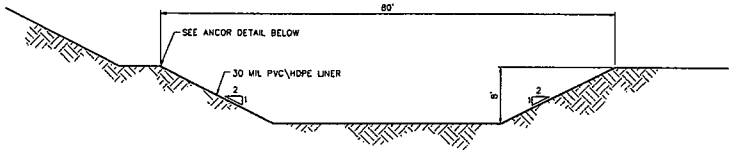
RUTLEDGE WELL PAD
SITE SECTIONS
SCALE: AS NOTED

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	5 OF 7

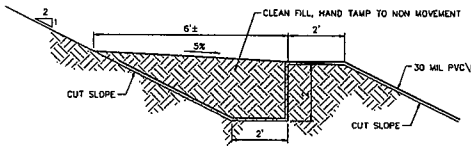
C-5



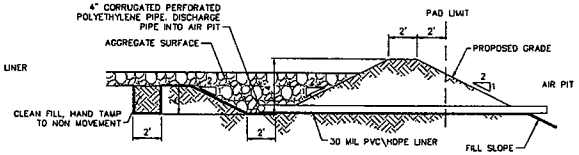
AGGREGATE SURFACE FOR WELL PAD & ACCESS ROAD 1 | 4 | 6
NOT TO SCALE



AIR PIT DETAIL 2 | 4 | 6
NOT TO SCALE

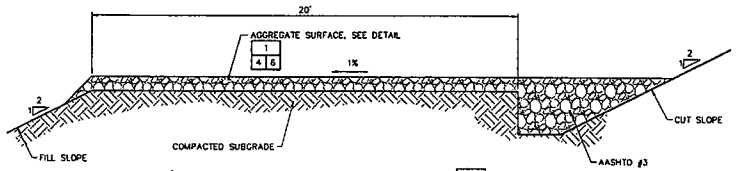


CUT SLOPE INSTALLATION

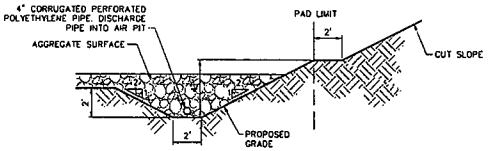


FILL SLOPE INSTALLATION

ANCHOR TRENCH DETAIL 3 | 4 | 6
NOT TO SCALE

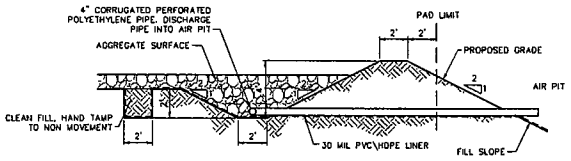


20' WIDE AGGREGATE ACCESS ROAD DETAIL 4 | 4 | 6
NOT TO SCALE



CUT SLOPE INSTALLATION

BERM DETAIL 5 | 4 | 6
NOT TO SCALE



FILL SLOPE INSTALLATION

PROJECT BID QUANTITIES

ITEM	DESCRIPTION	UNITS	QUANTITY
1	MOBILIZATION/DE-MOBILIZATION	LUMP SUM	1
2	CLEARING & GRUBBING	ACRE	4.08
3	STRIP & STOCKPILE TOPSOIL	CUBIC YARD	2,000
4	COMPOST FILTER SOCK - 12" DIAMETER	LINEAR FOOT	0
5	COMPOST FILTER SOCK - 18" DIAMETER	LINEAR FOOT	200
6	COMPOST FILTER SOCK - 24" DIAMETER	LINEAR FOOT	390
7	AGGREGATE FOR WELL PAD, ACCESS ROAD & 30'x40' GUARD SHACK AREA	CUBIC YARD	2,870
8	ROCK CONSTRUCTION ENTRANCE	EACH	1
9	EARTHWORK (INCLUDES ACCESS ROAD, WELL PAD & DIVERSION DITCHES)	CUBIC YARD	15,750
10	ROCK CUT	CUBIC YARD	N/A
11	TEMPORARY SEED, SUPPLEMENTS & MULCH	ACRE	1.11
12	RIPRAP	CUBIC YARD	10
13	EROSION CONTROL BLANKET	SQUARE YARD	5,400
14	TIRE WASH RACK	EACH	1
15	30 MIL PIT LINER	SQUARE YARD	3,000
16	4" CORRUGATED POLYETHYLENE PIPE	LINEAR FOOT	1,050
17	SITE RESTORATION - AGGREGATE REMOVAL, SPREADING TOPSOIL, PERMANENT SEEDING	LUMP SUM	N/A
18	TEMPORARY CHAIN LINK FENCE DURING CONSTRUCTION	LINEAR FOOT	N/A
19	CULVERT PIPE FOR ACCESS ROAD CROSSING	LINEAR FOOT	N/A
20	MAINTENANCE AND REPAIR OF EROSION CONTROL DEVICES	LUMP SUM	1

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
CONSTRUCTION DETAILS & BID QUANTITIES

SCALE: AS NOTED

DATE:	5/6/10
PROJECT NO.:	112C02879
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	6 OF 7

C-6

GENERAL

CONSTRUCTION ACTIVITIES WILL BE PERFORMED IN ACCORDANCE WITH PENN DOT PUBLICATION 408 SPECIFICATIONS – LATEST EDITION. THE FOLLOWING CONSTRUCTION OPERATIONS ARE INCLUDED IN THE BID PACKAGE FOR THE SITE AND ARE SUMMARIZED BELOW: SHOULD A CONFLICT BE DISCOVERED, CONTACT THE OWNER FOR A FINAL DECISION. THE OWNER IS DEFINED AS NEWFIELD APPALACHIA PA LLC.

THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND OR MANUFACTURERS MATERIAL CATALOG CUTS TO THE OWNER FOR REVIEW.

THE CONTRACT TERMS AND CONDITIONS SHALL BE IN ACCORDANCE WITH THE GENERAL AND SPECIAL PROVISIONS AND THE AGREEMENT AS PROVIDED BY THE OWNER.

TECHNICAL SPECIFICATIONS

1.0 CLEARING AND GRUBBING –

1.1 DESCRIPTION

REMOVAL OF TOPSOIL TO THE LIMITS OF GRADING AND STOCKPILE ON SITE AT A LOCATION DESIGNATED BY THE OWNER.

REMOVAL OF ORGANIC MATERIAL TO THE LIMITS OF GRADING AND DISPOSE OF OFF SITE

REMOVAL OF TRASH OR DEBRIS WITHIN THE GRADING LIMITS

1.2 CONSTRUCTION

INSTALL EROSION AND SEDIMENT CONTROL FEATURES PRIOR TO THE START OF CLEARING AND GRUBBING OPERATIONS

CUT TREES AND SHRUBS AND DISPOSE OF OFFSITE UNLESS DIRECTED BY THE OWNER

BURNING IS NOT PERMITTED

REMOVE STUMPS WITHIN THE GRADING AREA TO A DEPTH AT LEAST 2 FEET BELOW THE SUBGRADE ELEVATION AND OR SLOPE ELEVATIONS

DO NOT DAMAGE TREES OR AREAS BEYOND THE LIMIT OF GRADING. DAMAGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2.0 EROSION AND SEDIMENT CONTROLS

2.1 DESCRIPTION

PROVIDE, FURNISH, INSTALL AND MAINTAIN THE EROSION AND SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND OR THE APPROVED EROSION AND SEDIMENT CONTROL PLAN

2.2 MATERIAL

COMPOST FILTER SOCKS SHALL BE COMMERCIALLY MADE USING 5 MIL CONTINUOUS HDPE FILAMENT WOVEN INTO A TUBULAR MESH NETTING WITH 3/8 INCH WOVEN OPENINGS. COMPOST FILTER SOCK DIAMETERS ARE 12 INCH, 18 INCH AND 24 INCHES.

COMPOST – SEE SHEET C-3

WOODEN STAKES – 2 INCH BY 2 INCH BY 42 INCH

ROCK CONSTRUCTION ENTRANCE

AASHTO #1 LIMESTONE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION703 – AGGREGATE

GEOTEXTILE – CLASS 4 SEPARATION IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 735

TRUCK WASH RACK

CONCRETE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 704 CEMENT CONCRETE – CLASS C.

WELDED STEEL PIPE – MINIMUM 4 INCH DIAMETER

EROSION BLANKET

100% BIODEGRADABLE EROSION CONTROL BLANKET, MACHINE-PRODUCED MAT OF 100% COCONUT FIBER WITH A FUNCTIONAL LONGEVITY OF UP TO 24 MONTHS.

THE BLANKET SHALL BE OF CONSISTENT THICKNESS WITH THE COCONUT EVENLY DISTRIBUTED OVER THE ENTIRE AREA OF THE MAT. THE BLANKET SHALL BE COVERED ON THE TOP AND BOTTOM SIDES WITH 100% BIODEGRADABLE WOVEN, NATURAL, ORGANIC FIBER NETTING. THE TOP NETTING SHALL CONSIST OF MACHINE DIRECTIONAL STRANDS FORMED FROM TWO INTERTWINED YARNS WITH CROSS DIRECTIONAL STRANDS INTERWOVEN THROUGH THE TWISTED MACHINE STRANDS TO FORM AN APPROXIMATE 0.50 X 1.00 (1.27 X 2.54 CM) MESH. THE BLANKET SHALL BE SEWN TOGETHER ON 1.50 INCH (3.81 CM) CENTERS WITH DEGRADABLE THREAD.

MATERIAL SHALL MEET REQUIREMENTS ESTABLISHED BY THE EROSION CONTROL TECHNOLOGY COUNCIL (ECTC).

MATERIAL CONTENT

MATRIX – 100 PERCENT COCONUT FIBER 0.5 LBS/YD2

NETTINGS – 100 PERCENT BIODEGRADABLE ORGANIC JUTE FIBER 9.3 LB/1000 FT2

THREAD – BIODEGRADABLE

TEMPORARY SEED AND MULCH

SEE SHEET C-2

PENNDOT PUBLICATION 408 SECTION 805 – MULCHING – HAY, STRAW OR WOOD FIBER

RIP RAP

IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 850 – ROCK LINING: R-4

2.3 CONSTRUCTION

INSTALL THE ROCK CONSTRUCTION ENTRANCE AND TIRE WASH FACILITY PRIOR TO THE START OF EARTHWORK OPERATIONS. MAINTAIN THE ROCK THICKNESS BY ADDING ROCK FROM AN ADJACENT STOCKPILE.

REMOVE SEDIMENT DEPOSITS ON A DAILY BASIS FROM THE ROCK ENTRANCE AND PUBLIC STREETS AND RETURN THE SEDIMENT TO THE CONSTRUCTION SITE.

INSTALL FILTER SOCKS AT THE LOCATIONS SHOWN ON THE CONTRACT DRAWINGS IN ACCORDANCE WITH THE DIAMETER SPECIFIED.

INSTALL 2 INCH BY 2 INCH WOODEN STAKE AT TEN FEET ON CENTER THROUGH THE FILTER SOCK.

INSTALL EROSION BLANKET UPON COMPLETION OF EARTH DISTURBANCE AND EMBANKMENT CONSTRUCTION. APPLY TEMPORARY SEED AND MULCH.

MAINTENANCE AND REPAIR:

INSPECT AND REPAIR DAMAGED OR DISLODGED EROSION AND SEDIMENT CONTROL DEVICES. INSPECT THE CONTROL DEVICES AFTER EACH RAIN EVENT AND OR AT A MINIMUM OF WEEKLY. IMMEDIATELY REPAIR, RE-STAKE, EXTEND OR REPLACE DAMAGED CONTROL DEVICES.

REMOVE SEDIMENT BUILD UP OR DEBRIS WHEN THE BUILD UP REACHES ONE HALF THE HEIGHT OF THE CONTROL DEVICE. DISPOSE OF THE SOIL MATERIAL ON SITE. DISPOSE OF TRASH AND DEBRIS OFF SITE.

INSTALL ROCK LINING AT THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

3.0 DEMOLITION

3.1 DESCRIPTION

REMOVAL OF BUILDINGS, WALLS, STRUCTURES AS INDICATED ON THE CONTRACT DRAWINGS.

3.2 CONSTRUCTION

REMOVE AND DISPOSE OF OFF SITE BUILDINGS, WALLS, STRUCTURES AS INDICATED.

ONSITE DISPOSAL IS NOT PERMITTED.

4.0 EARTHWORK – EXCAVATION AND EMBANKMENT

4.1 DESCRIPTION

EXCAVATE SOIL AND ROCK TO THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

CONSTRUCT EMBANKMENTS TO THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

4.2 CONSTRUCTION

EXCAVATE SOIL AND ROCK BY MECHANICAL MEANS.

BLASTING IS NOT PERMITTED.

PREPARED THE EMBANKMENT FOUNDATION AREA IN ACCORDANCE WITH SECTION 1.0 CLEARING AND GRUBBING.

PLACE SOIL MATERIAL IN NOT MORE THAN EIGHT INCH LOOSE LIFTS FOR THE FULL WIDTH AND COMPACT TO NOT LESS THAN 95% OF ASTM D698 STANDARD PROCTOR. THE CONTRACTOR SHALL SAMPLE, TEST AND SUBMIT THE RESULTS TO THE OWNER PRIOR TO THE START OF EMBANKMENT OPERATIONS. MAINTAIN SOIL OPTIMUM MOISTURE WITHIN PLUS OR MINUS TWO PERCENTAGE POINTS.

DO NOT PLACE SOIL MATERIAL THAT IS FROZEN, WET OR CONTAINING OBJECTIONABLE MATERIAL.

PLACE ROCK MATERIAL IN UNIFORM LAYERS. MAXIMUM ROCK SIZE PERMITTED IN THE EMBANKMENT IS EIGHT INCHES IN ANY DIMENSION.

PREPARE THE PAD SUBGRADE AND ACCESS ROAD SUBGRADE BY COMPACTING THE TOP TWO FEET OF THE EMBANKMENT OR CUT SURFACE TO 100% OF ASTM D698 STANDARD PROCTOR.

SHOULD NON RIPABLE ROCK BE ENCOUNTERED, IMMEDIATELY CONTACT THE OWNER FOR DIRECTION ON EXCAVATION.

5.0 PIT LINER

5.1 DESCRIPTION

FURNISH, PROVIDE AND INSTALL A 30 MIL PVC LINER AND ANCHOR SYSTEM IN THE PIT AREA AS INDICATED ON THE CONTRACT DRAWINGS.

5.2 MATERIAL – 30 MIL PVC

5.2.1

CERTIFIED PROPERTIES	TEST METHOD	REQUIREMENT
THICKNESS ±5%	ASTM D 5199	.030"
TENSILE – LB. FORCE/IN. WIDTH, MIN.	ASTM D 882	73
ELONGATION AT BREAK (% MIN.)	ASTM D 882	380
100% MODULUS– LB. FORCE/IN. WIDTH, MIN.	ASTM D 882	30
TEAR STRENGTH (LB./IN., MIN.)	ASTM D 1004	8
DIMENSIONAL STABILITY (% CHANGE MAX.)	ASTM D 1204	3
IMPACT COLD CRACK (°C)	ASTM D 1790	-29
INDEX PROPERTIES		
SPECIFIC GRAVITY (MIN.)	ASTM D 792	1.20
WATER EXTRACTION (%, MAX.)	ASTM D 1239	0.15
VOLATILE LOSS (%, MAX.)	ASTM D 1203(A)	0.70
RESISTANCE TO SOIL BURIAL (% CHANGE MAX.)	ASTM G 160	
1. BREAKING FACTOR		5
2. ELONGATION AT BREAK		20
3. MODULUS AT 100% ELONGATION		20
HYDROSTATIC RESISTANCE (PSI, MIN.)	ASTM D 751(A)	100
PLASTICIZER MIN. AVE. MOLECULAR WEIGHT	ASTM D 2124	400

5.3 CONSTRUCTION

INSTALL PVC LINER TO THE LINE AND GRADE OF THE PIT.

THERMAL WELD THE SEAMS.

OVERLAP THE PERIMETER AND ANCHOR THE EDGES WITH SOIL TO STABILIZE THE LINER FROM PULLING, TEARING, FLOATING AND MOVEMENT DURING FILLING OPERATIONS.

PROVIDE TO THE OWNER AN INSPECTION REPORT OF SEAM WELDS AND INTEGRITY OF THE LINER INSTALLATION.

6.1 CULVERT PIPE

6.1.1 DESCRIPTION

FURNISH, PROVIDE AND INSTALL DUCTILE IRON OR WELDED STEEL CULVERT PIPE AT ROAD CROSSINGS AT THE DIAMETER, LINE AND GRADE INDICATED ON THE CONTRACT DRAWINGS.

6.1.2 MATERIAL

WELDED STEEL CULVERT PIPE IN ACCORDANCE WITH A53, TYPE S.

DUCTILE IRON PIPE IN ACCORDANCE WITH ASTM A716

6.1.3 CONSTRUCTION

INSTALL AND MAINTAIN CULVERT PIPE DURING CONSTRUCTION. KEEP THE PIPE CLEAR OF DEBRIS AND SEDIMENT BUILDUP.

6.2 UNDERDRAIN PIPE

6.2.1 DESCRIPTION

FURNISH, PROVIDE AND INSTALL HIGH DENSITY CORRUGATED POLYETHYLENE (PE) PIPE AT LOCATIONS INDICATED ON THE CONTRACT DRAWINGS.

6.2.2 MATERIAL

HIGH DENSITY CORRUGATED POLYETHYLENE (PE) PIPE IN ACCORDANCE WITH AASHTO M 252 (PIPES 4 INCHES THROUGH 10 INCHES).

6.2.3 CONSTRUCTION

INSTALL PIPE ON A 4 INCH LAYER OF AGGREGATE AND HAND PLACE THE AGGREGATE AROUND THE PIPE.

7.0 WELL PAD AND ACCESS ROAD

7.1 DESCRIPTION

PROVIDE, FURNISH AND INSTALL AGGREGATE FOR THE WELL PAD SURFACE AND THE ACCESS ROAD SURFACE.

7.2 MATERIAL

AGGREGATE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 703 AGGREGATE

SIX INCHES OF AASHTO # 3

SIX INCHES OF PENNDOT # 57

PERFORATED CORRUGATED POLYETHYLENE CULVERT UNDERDRAIN PIPE

FOUR INCH DIAMETER IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 601 – PIPE CULVERTS

7.3 CONSTRUCTION

COMPACT AND SHAPE SUBGRADE TO THE LINES AND GRADES ON THE CONTRACT DRAWINGS.

COMPACT THE SUBGRADE TO 100% OF ASTM D698 STANDARD PROCTOR. REMOVE AND REPLACE ANY SUBGRADE THAT IS SOFT OR DISPLAYS VISUAL MOVEMENT WITH CLEAN FILL.

INSTALL THE AGGREGATE IN TWO LIFTS. COMPACT LIFTS TO NON-MOVEMENT.

INSTALL THE CORRUGATED CULVERT PIPE TO THE LINE AND GRADE SHOWN ON THE CONTRACT DRAWINGS.

8.0 SITE RESTORATION

8.1 DESCRIPTION

UPON COMPLETION OF THE WELL DRILLING AND AT THE NOTIFICATION BY THE OWNER, RETURN TO THE SITE AND REMOVE AND DISPOSE OF LOOSE AGGREGATE, COVER THE SITE WITH TOPSOIL FROM THE CURRENT STOCKPILE AND APPLY PERMANENT SEED, SUPPLEMENTS AND MULCH.

8.2 MATERIAL

TOPSOIL FROM THE EXISTING STOCKPILE

PERMANENT SEED AND SOIL SUPPLEMENTS SEE SHEET C-2

MULCH IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 805 – MULCHING – HAY, STRAW OR WOOD FIBER

8.3 CONSTRUCTION

REMOVE AND DISPOSE OF OFF SITE LOOSE AGGREGATE FROM THE WELL PAD.

SPREAD TOPSOIL EVENLY ACROSS THE WELL PAD AND APPLY PERMANENT SEED, SOIL SUPPLEMENTS AND MULCH

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
CONSTRUCTION SPECIFICATIONS

SCALE: AS NOTED

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	ARB
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	7 OF 7

C-7

M-945P (12/93)

AUDIT CONTROL NO. 711723

COMMONWEALTH OF PENNSYLVANIA

HIGHWAY OCCUPANCY PERMIT

Permit No.	04016278
Organization	046
Date Issued	090195
Permit Fees	25.00
Account No.	
County	63
Township/Boro	206

PERMITTEE: HAROLD & JEANNE RUTLEDGE

ADDRESS: R R 1 BOX 220

POST OFFICE: EQUINUNK PA ZIP CODE 18417-

County WAYNE

Township/Boro DAMASCUS

Bond/Agreement Number

ALL WORK UNDER THIS PERMIT MAY BE STARTED ON 09/01/95

AND SHALL BE COMPLETED ON OR BEFORE 09/01/96

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

	1	2	3	4
Description	511			
State Route No.	1025			
Segment(s)	0050 0050			
Offset To Offset	1584 1584			
Township/Boro				

DESCRIPTION OF WORK

INSTALL MINIMUM USE DRIVEWAY AT
SR 1025 SEG 0050 OFFSET 1584 TO SEG 0050 OFFSET 1584
THIS PERMIT AUTHORIZES WORK ONLY IN DEPARTMENT HIGHWAY RIGHT OF WAY. SURFACE DRAINAGE MAY NOT BE DIRECTED ONTO STATE RIGHT OF WAY.
IT IS THE PERMITTEE'S RESPONSIBILITY TO KEEP VEGETATION TRIMMED IN ORDER TO MAINTAIN MINIMUM SIGHT DISTANCE. NO OBJECTS MAY BE PLACED WITHIN THE LINE OF SIGHT.
MINIMUM WORK ZONE TRAFFIC CONTROL TO BE IN ACCORDANCE WITH PUB 203 FIGURE(S) 5, 7, 10A.
PLANS DEPICTING THE HIGHWAY OCCUPANCY ARE FILED AS PUBLIC DOCUMENTS IN THE DEPARTMENT OF TRANSPORTATION, ENGINEERING DISTRICT 4-0 PERMIT OFFICE.
ALL DISTURBED AREAS OUTSIDE THE PAVEMENT OR SHOULDER SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL TO THAT WHICH EXISTED BEFORE THE START OF WORK.
SHOULDERS MUST BE RESTORED IN ACCORDANCE WITH APPROPRIATE SECTION OF PUB. 408 AND ROADWAY CONSTRUCTION STANDARD RC-25.
DEPARTMENT MUST BE NOTIFIED IN WRITING UPON COMPLETION OF WORK.
X
X
X

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

FOR BRADLEY L. MALLORY, SECRETARY OF TRANSPORTATION

BY CHARLES N. MATTEI, P.E., DISTRICT ENGINEER

Acknowledgment of Completion

Permitted work has been completed

Date 9-10-96 By

RECORDING COPY/COUNTY COMPLETION REPORT

M-950A (10/93)
Central Permit Office

APPLICATION FOR MINIMUM USE DRIVEWAY

A Minimum Use Driveway Is a Residential or Other Driveway Which Is Expected to Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T)

APPL. NO. 943295

READ INSTRUCTIONS ON REVERSE

Applicant / Property Owner: Harold + Jeanne Ruttedge
Address: RR 1 Box 228 Equinunk Pa
Post Office: EQuinunk Zip Code: 18417
Phone: 224-4776 Fee: 25.00 Check No. 919

LOCATION OF PROPOSED DRIVEWAY

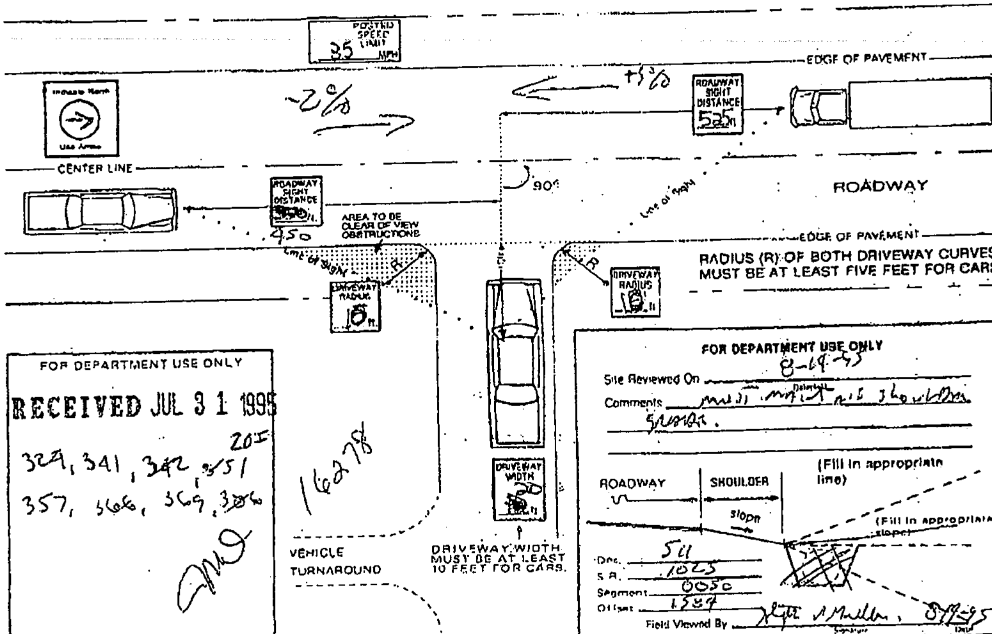
County: Wayne (63)
Township/Boro: Damascus (206)
Route No.: SR 1025
Name of Nearest Intersection: SR 1012 / SR 1025
Distance to Nearest Intersection In Feet: 1725 FT

APPLICATION IS MADE TO

☒ CONSTRUCT A NEW DRIVEWAY ☐ ALTER AN EXISTING DRIVEWAY

DATE WORK SCHEDULED TO BEGIN: 9-95
DATE WORK SCHEDULED TO BE COMPLETED: 10-95

For the purpose of measuring sight distance, the drivers' eye height shall be 3.50 feet above the proposed access surface and highway pavement surface and the vehicles' height shall be 4.25 feet above the proposed access surface and highway pavement surface.



FOR DEPARTMENT USE ONLY

RECEIVED JUL 31 1995

329, 341, 342, 351, 205
357, 366, 369, 386

16278

FOR DEPARTMENT USE ONLY

Site Reviewed On: 8-14-95
Comments: must maintain shoulder slope.

ROADWAY | SHOULDER | (Fill in appropriate line) | Slope | (Fill in appropriate slope)

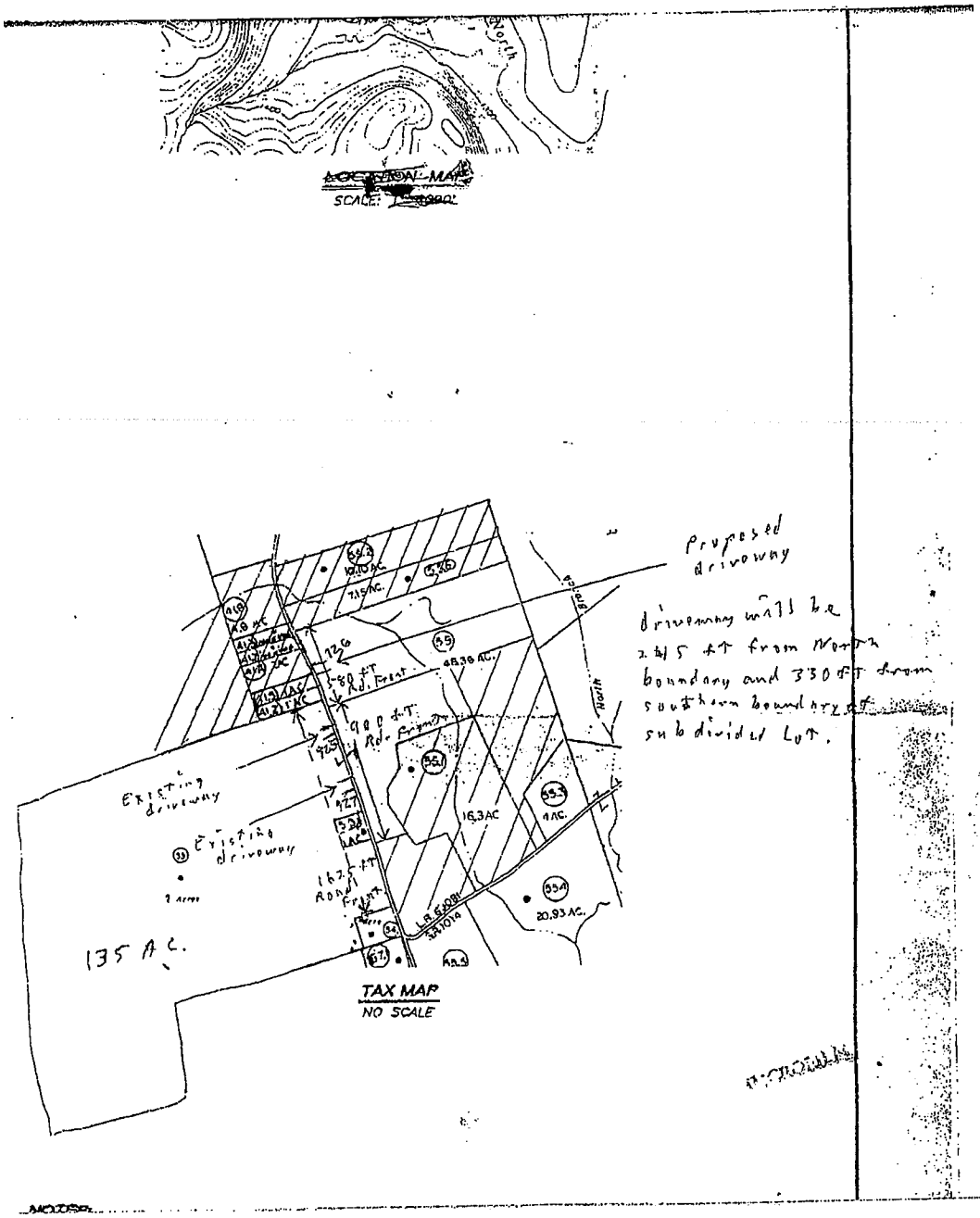
Dist. 5U
S.R. 1025
Segment 0050
Offset 1584
Field Viewed By: [signature] 8-14-95

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

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

By X Harold R. Ruttedge Jr / Jeanne G. Ruttedge SIGNATURE(S) 7/25/95 DATE

HAVE YOU READ INSTRUCTIONS ON REVERSE?
HAVE YOU COMPLETED ALL BLANKS?


North
ACCESS MAP
SCALE:
Proposed driveway
driveway will be 245 ft from North boundary and 330 ft from southern boundary of sub divided Lot.
North
1326 ft
1-68 Rd. Front
68.39 AC.
900 ft
Rd. Frontage
Existing driveway
Existing driveway
16.3AC
9 AC.
20.93 AC.
1625 ft
Road Frontage
LLR 5108
135 AC.
TAX MAP
NO SCALE

M-946P (12/93)

AUDIT CONTROL NO. 711724

COMMONWEALTH OF PENNSYLVANIA

HIGHWAY OCCUPANCY PERMIT

Permit No.	04016279
Organization	046
Date Issued	090195
Permit Fees	25.00
Account No.	
County	63
Township/Boro	206

PERMITTEE: HAROLD & JEANNE RUTLEDGE

ADDRESS: R R 1 BOX 228

POST OFFICE: EQUINUNK PA ZIP CODE 18417-

County: WAYNE

Township/Boro: DAMASCUS

Bond/Agreement Number:

ALL WORK UNDER THIS PERMIT MAY BE STARTED ON 09/01/95

AND SHALL BE COMPLETED ON OR BEFORE 09/01/96

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

	1	2	3	4
Description	512			
State Route No.	1025			
Segment(s)	0050			
Offset To Offset	1056	1056		
Township/Boro				

DESCRIPTION OF WORK

INSTALL MINIMUM USE DRIVEWAY WITH DRAINAGE FACILITIES AT SR 1025 SEG 0050 OFFSET 1056 TO SEG 0050 OFFSET 1056
DRAINAGE INSTALLED BY THIS PERMIT IS THE RESPONSIBILITY OF THE PERMITTEE TO CONTINUALLY MAINTAIN OR REPLACE.
THIS PERMIT AUTHORIZES WORK ONLY IN DEPARTMENT HIGHWAY RIGHT OF WAY.
IT IS THE PERMITTEE'S RESPONSIBILITY TO KEEP VEGETATION TRIMMED IN ORDER TO MAINTAIN MINIMUM SIGHT DISTANCE. NO OBJECTS MAYBE PLACED WITHIN THE LINE OF SIGHT.
MINIMUM WORK ZONE TRAFFIC CONTROL TO BE IN ACCORDANCE WITH PUB. 203 FIGURE(S) 5, 7, 10A.
PLANS DEPICTING THE HIGHWAY OCCUPANCY ARE FILED AS PUBLIC DOCUMENTS IN THE DEPARTMENT OF TRANSPORTATION, ENGINEERING DISTRICT 4-0 PERMIT OFFICE.
ALL DISTURBED AREAS OUTSIDE THE PAVEMENT OR SHOULDER SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL TO THAT WHICH EXISTED BEFORE THE START OF WORK.
SHOULDERS MUST BE RESTORED IN ACCORDANCE WITH APPROPRIATE SECTION OF PUB. 408 AND ROADWAY CONSTRUCTION STANDARD RC-25.
DEPARTMENT MUST BE NOTIFIED IN WRITING UPON COMPLETION OF WORK.
X
X

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

Acknowledgment of Completion

Permitted work has been completed

Date 9-30-96 By Stephen L. Rutledge

Richard D Cook

FOR BRADLEY L. MALLORY
SECRETARY OF TRANSPORTATION

BY CHARLES M. MATTEI, P.E.
DISTRICT ENGINEER

RECORDING COPY/COUNTY COMPLETION REPORT

M-950A (10/93)
Central Permit Office

APPLICATION FOR MINIMUM USE DRIVEWAY

A Minimum Use Driveway is a Residential or Other Driveway Which Is Expected to Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T.)

READ INSTRUCTIONS ON REVERSE

APPL. NO 948297

Applicant / Property Owner: Harold + Jeanne Rutledge

Address: RR1 Box 228 Equinunk Pa

Post Office: Equinunk

Zip Code: 18417

Phone: 224-4776

Fee: 25.00

Check No: 919

LOCATION OF PROPOSED DRIVEWAY

County: Wayne (63)

Township/Boro: Damascus (206)

Route No.: SR 1025

Name of Nearest Intersection: SR 1014 / SR 1025

Distance to Nearest Intersection in Feet: 925 feet

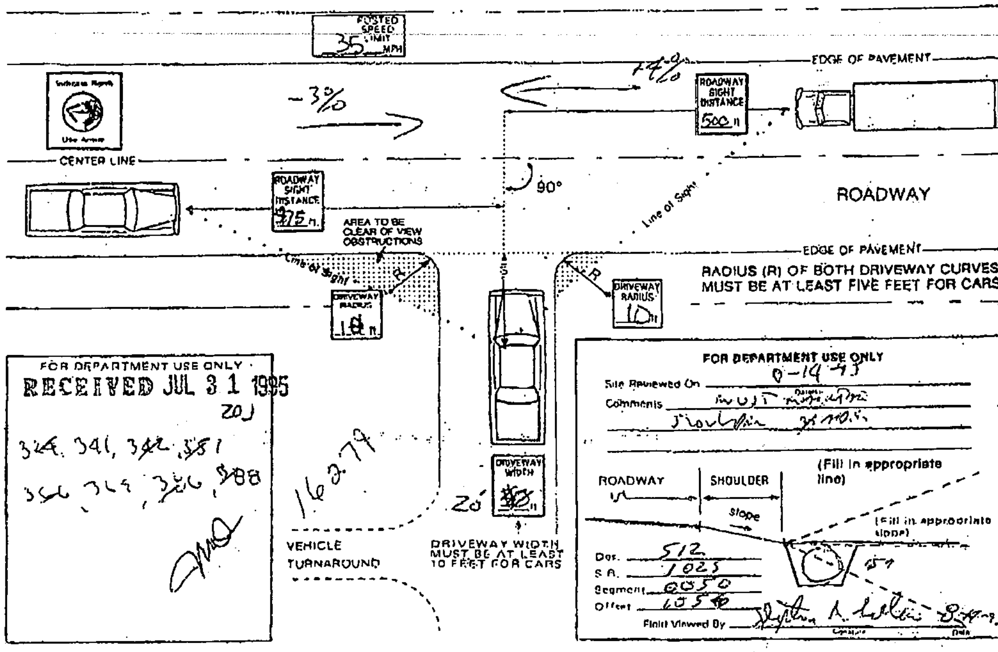
APPLICATION IS MADE TO

☐ CONSTRUCT A NEW DRIVEWAY ☐ ALTER AN EXISTING DRIVEWAY

DATE WORK SCHEDULED TO BEGIN ______

DATE WORK SCHEDULED TO BE COMPLETED ______

For the purpose of measuring sight distance, the drivers' eye height shall be 3.50 feet above the proposed access surface and highway pavement surface and the vehicles' height shall be 4.25 feet above the proposed access surface and highway pavement surface.



FOR DEPARTMENT USE ONLY

RECEIVED JUL 31 1995

20J

324, 341, 342, 351
356, 359, 386, 388

FOR DEPARTMENT USE ONLY

Site Reviewed On: 8-14-95

Comments: [illegible]

ROADWAY | SHOULDER | (Fill in appropriate line)

Slope

(Fill in appropriate slope)

Dot. 512
S.R. 1025
Segment 0050
Offset 1056

Field Viewed By: [signature] Date: 8-?-95

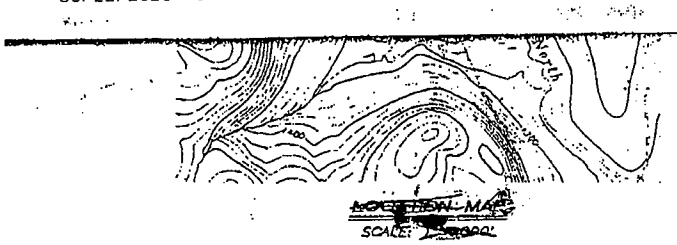
Under and subject to all the conditions, restrictions and regulations prescribed by the Pennsylvania Department of Transportation and on the issued Permit, Form M-945P.

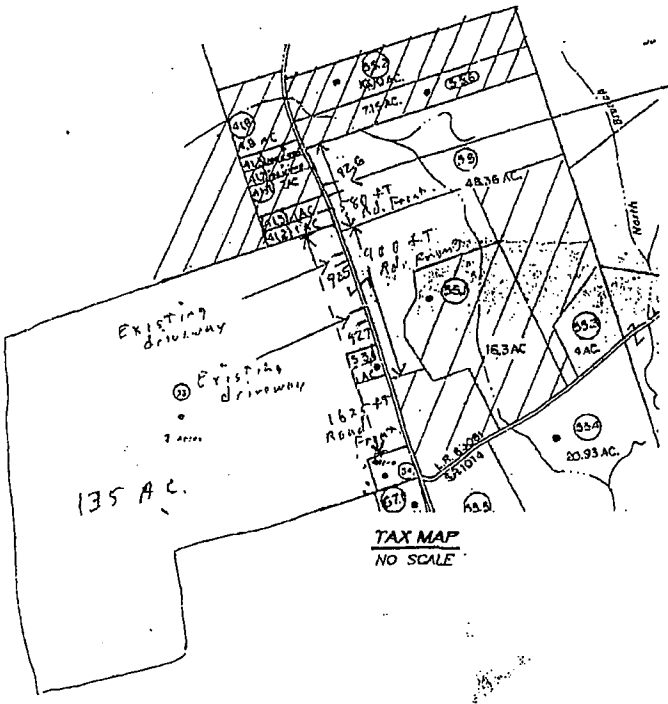
The applicant certifies that all statements contained herein are true and correct.

By X Harold E. Rutledge / Jeanne S. Rutledge (SIGNATURE(S)) 7/25/95 (DATE)

HAVE YOU READ INSTRUCTIONS ON REVERSE?
HAVE YOU COMPLETED ALL BLANKS?

DISTRICT PERMIT OFFICE – CENTRAL OFFICE [illegible]





Proposed Driveway

Driveway will be 245 ft from North boundary and 330 ft from southern boundary of subdivided Lot.

MICROFILM

NOTES

AUDIT CONTROL NO. 711725

M-945P (12/93)

COMMONWEALTH OF PENNSYLVANIA

HIGHWAY OCCUPANCY PERMIT

Permit No.	04016280
Organization	046
Date Issued	090195
Permit Fees	25.00
Account No.	
County	63
Township/Boro	206

PERMITTEE: HAROLD & JEANNE RUTLEDGE

ADDRESS: R R 1 BOX 226

POST OFFICE: EQUINUNK PA ZIP CODE 18417-

County: WAYNE

Township/Boro: DAMASCUS

Bond/Agreement Number:

ALL WORK UNDER THIS PERMIT MAY BE STARTED ON 09/01/95

AND SHALL BE COMPLETED ON OR BEFORE 09/01/96

	1		2		3		4	
Township/Boro								
Description	511							
State Route No.	1025							
Segment(s)	0050	0050						
Offset To Offset	2000	2000						

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

DESCRIPTION OF WORK

INSTALL MINIMUM USE DRIVEWAY AT
SR 1025 SEG 0050 OFFSET 2000 TO SEG 0050 OFFSET 2000
THIS PERMIT AUTHORIZES WORK ONLY IN DEPARTMENT HIGHWAY RIGHT OF WAY. SURFACE DRAINAGE MAY NOT BE DIRECTED ONTO STATE RIGHT OF WAY.
IT IS THE PERMITTEE'S RESPONSIBILITY TO KEEP VEGETATION TRIMMED IN ORDER TO MAINTAIN MINIMUM SIGHT DISTANCE. NO OBJECTS MAY BE PLACED WITHIN THE LINE OF SIGHT.
MINIMUM WORK ZONE TRAFFIC CONTROL TO BE IN ACCORDANCE WITH PUB. 203 FIGURE(S) 5, 7, 10A.
PLANS DEPICTING THE HIGHWAY OCCUPANCY ARE FILED AS PUBLIC DOCUMENTS IN THE DEPARTMENT OF TRANSPORTATION, ENGINEERING DISTRICT 4-0 PERMIT OFFICE.
ALL DISTURBED AREAS OUTSIDE THE PAVEMENT OR SHOULDER SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL TO THAT WHICH EXISTED BEFORE THE START OF WORK.
SHOULDERS MUST BE RESTORED IN ACCORDANCE WITH APPROPRIATE SECTION OF PUB. 408 AND ROADWAY CONSTRUCTION STANDARD RC-25.
DEPARTMENT MUST BE NOTIFIED IN WRITING UPON COMPLETION OF WORK.
X
X
X

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

Richard D. Cook

FOR BRADLEY L. MALLORY
SECRETARY OF TRANSPORTATION

BY CHARLES M. MATTEI, P.E.
DISTRICT ENGINEER

Acknowledgment of Completion

Permitted work has been completed

Date 9-3-96 By [signature]

RECORDING COPY/COUNTY COMPLETION REPORT

M-950A (10/93)
Central Permit Office

APPLICATION FOR MINIMUM USE DRIVEWAY

A Minimum Use Driveway Is a Residential or Other Driveway Which Is Expected to Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T.)

APPL. NO. 548296

READ INSTRUCTIONS ON REVERSE

Applicant / Property Owner: Harold + Jeanne Ruttedge

Address: RR 1 Box 228 Equinunk Pa.

Post Office: Equinunk   Zip Code: 18417

Phone: 224-4776   Fee: 25.00   Check No.: 919

LOCATION OF PROPOSED DRIVEWAY

County: Wayne (64)

Township/Boro: Damascus (26)

Route No.: SR 1025

Name of Nearest Intersection: SR 1014 / SR 1025

Distance to Nearest Intersection in Feet: 1325 ft

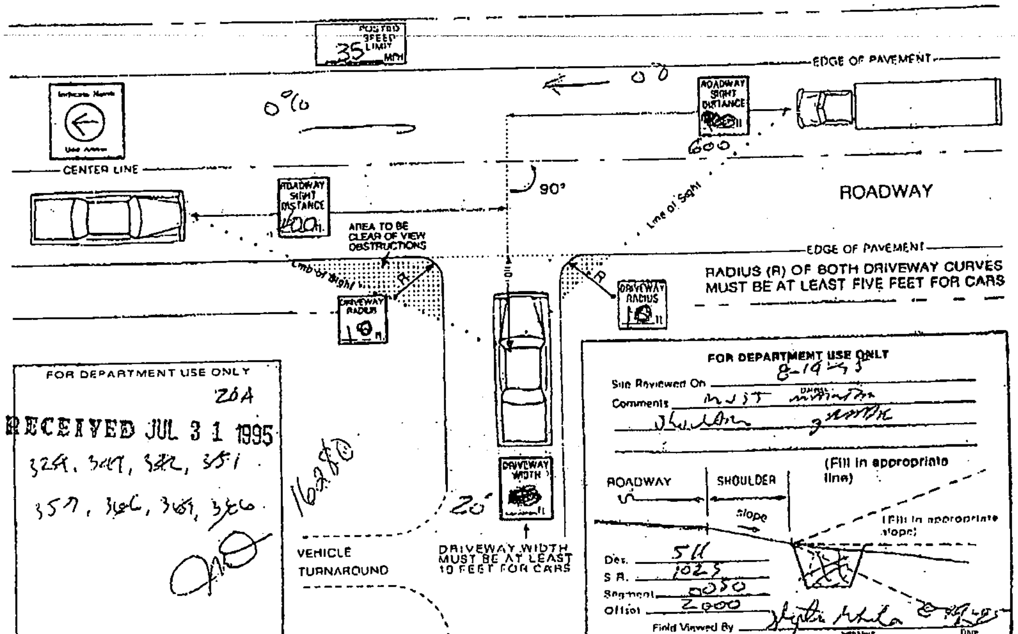
APPLICATION IS MADE TO

☐ CONSTRUCT A NEW DRIVEWAY   ☐ ALTER AN EXISTING DRIVEWAY

DATE WORK SCHEDULED TO BEGIN ______

DATE WORK SCHEDULED TO BE COMPLETED ______

For the purpose of measuring sight distance, the drivers' eye height shall be 3.50 feet above the proposed access surface and highway pavement surface and the vehicles' height shall be 4.25 feet above the proposed access surface and highway pavement surface.



FOR DEPARTMENT USE ONLY

26A

RECEIVED JUL 31 1995

329, 347, 382, 351, 357, 366, 369, 386

FOR DEPARTMENT USE ONLY

Site Reviewed On: 8-14-95

Comments: Must maintain shoulder grade

ROADWAY | SHOULDER | (Fill in appropriate line) | slope | (Fill in appropriate slope)

Dist.: 5-11

S.R.: 1025

Segment: 0050

Offset: 2000

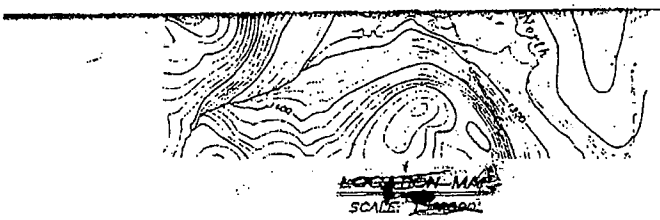
Field Viewed By: ______ Date: ______

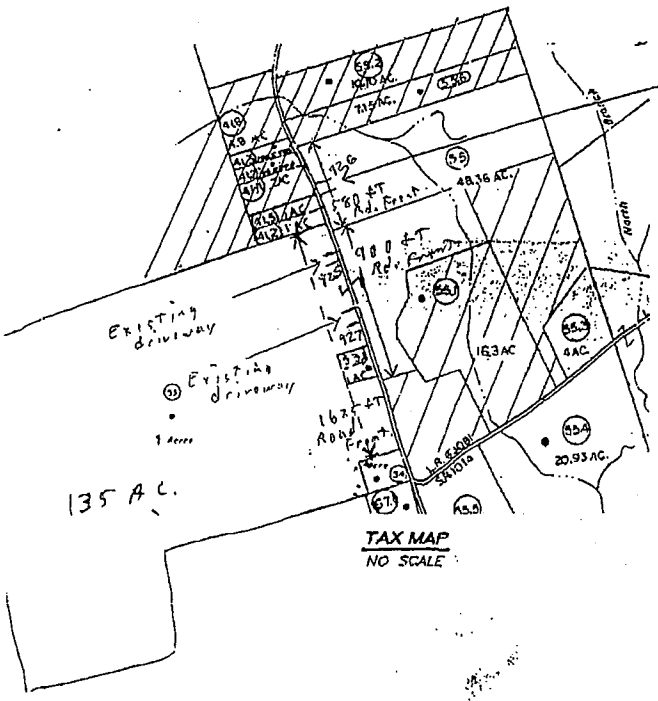
Under and subject to all the conditions, restrictions and regulations prescribed by the Pennsylvania Department of Transportation and on the issued Permit, Form M-945P.

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

By X Harold L. Ruttedge / Jeanne G. Ruttedge   7/25/95
SIGNATURE(S)   DATE

HAVE YOU READ INSTRUCTIONS ON REVERSE?
HAVE YOU COMPLETED ALL BLANKS?





Proposed driveway

driveway will be 245 ft from North boundary and 330 ft from southern boundary of subdivided Lot.

Driveway Address for the Rutledge 1-1 Well Site

Address was assigned by GIS and is on file with county Emergency Management office and 911 dispatch.

Rutledge 1-1
455 Rutledgedale Rd
Equinunk PA, 18417

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

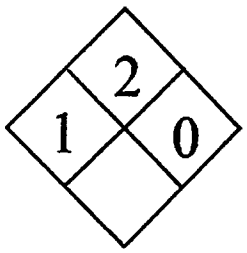
For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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

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

INTEGRITY
INDUSTRIES INC.



****

MATERIAL SAFETY DATA SHEET

****

SECTION I - MANUFACTURER

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

Revised Date: 06/05/2008
Supercedes: new

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

SECTION II - MATERIAL IDENTIFICATION

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

Component	CAS Number	Weight
Paraffin/Olefin blend	Mixture	100%

SECTION III - PHYSICAL & CHEMICAL DATA

Boiling Point: IBP > 300 °F
Specific Gravity (H2O=1): 0.766
Vapor Density (Air=1): n/a
Appearance: Clear, oily liquid

Pour Point: ND
Vapor Pressure (mm Hg @ 68 °F): 0.135
Solubility in H2O: Insoluble
Viscosity (cSt @104 °F): 1.4

SECTION IV - REACTIVITY

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

SECTION V - FIRE & EXPLOSION DATA

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

SECTION VI - EMERGENCY & FIRST AID DATA

Inhalation: Move to well ventilated area; if breathing difficulties persist after 15 minutes seek medical assistance.
Eye Contact: Wash eye thoroughly for 15 minutes; if irritation persists seek medical assistance.
Skin Contact: Wash affected area with soap & water for 15 minutes; if irritation persists seek medical assistance.
Ingestion: Do not induce vomiting and seek medical advice.

SECTION VII - HEALTH HAZARDS DATA

Acute: May irritate eyes, skin, respiratory, & gastrointestinal tract. Chronic: Repeated/prolonged skin contact may irritate/redden skin, progressing to dermatitis.

SECTION VIII - SPILL & DISPOSAL DATA

Accidental Spill Procedures: Absorb in inert material and dispose of according to local, state & federal regulations. Spill into water should be contained to avoid runoff into waterways.
Handling & Storage: Keep container closed and store in cool dry place. Emptied container still contains material which may ignite with explosive violence if exposed to open flame.

SECTION IX - SPECIAL PROTECTION DATA

Respiratory Protection: Respirator in confined areas.
Ventilation: Desired Exhaust: Mechanical
Protective Gloves: Solvent/chemical resistant gloves
Eye Protection: Safety glasses, goggles.
Other Protection: As required to avoid skin contact.

SECTION X - TRANSPORT INFORMATION

The following may not apply to all shipping situations. Consult 49 CFR for more mode-specific or quantity-specific data.
DOT Proper Shipping Name: Not regulated
DOT Hazard Class or Division: Not regulated
DOT Identification Number: N/A
DOT Packaging Group: III
Type Label(s) Required. none
Placard: Not applicable
*For Limited Quantity requirements see DOT regulation 49 CFR.

SECTION XI - DISCLAIMERS

* SOME INFORMATION PROVIDED HEREIN WAS DRAWN FROM SOURCES OTHER THAN INTEGRITY INDUSTRIES.
THE INFORMATION PROVIDED HEREIN IS BELIEVED BY INTEGRITY INDUSTRIES, INC. TO BE CORRECT & RELIABLE; NO EXPRESSED OR IMPLIED WARRANTY IS PROVIDED HOWEVER.
* INTEGRITY INDUSTRIES, INC. ASSUMES NO RESPONSIBILITY AND DENIES ALL LIABILITY FOR ANY LOSS, DAMAGE, OR EXPENSE CONNECTED WITH CUSTOMERS' METHOD OF HANDLING, STORAGE, USE, AND DISPOSAL OF THIS PRODUCT.
* THE MSDS INFORMATION PROVIDED HEREIN IS APPLICABLE ONLY TO THIS PRODUCT.

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 50**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	72-112
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID®**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Barium sulfate	7727-43-7	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

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

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

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Pink to tan to gray
Odor:	Odorless
pH:	8-9-
Specific Gravity @ 20 C (Water=1):	4.2
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	100- 155
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	233.4

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact None known.

Eye Contact May cause mild eye irritation.

Ingestion May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: 7500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 132.6 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LIME**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

Skin
Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

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

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

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not Determined

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

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

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

Storage Information Store away from acids. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.2
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.1

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Causes severe skin irritation. May cause skin burns on prolonged contact.
Eye Contact	Causes severe eye irritation May cause eye burns.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 7340 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 100-500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: 478,520 ppm (Mysidopsis bahia) SPP @ 8 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

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

Contaminated Packaging Empty container completely. Transport with all closures in place. Return for reuse or dispose in a sanitary landfill according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WALNUT HULLS**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.07
Flammability Limits in Air - Upper (%):	Not Determined

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Safety glasses.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.1
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

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

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 10 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

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

Prepared for:

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

Prepared by:

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

May 2010

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LIST OF APPENDICES

1.0 DESCRIPTION OF FACILITY

1.1 DESCRIPTION OF THE INDUSTRIAL OR COMMERCIAL ACTIVITY

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

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

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

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

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

1.2 DESCRIPTION OF EXISTING EMERGENCY RESPONSE PLANS

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

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

1.3 MATERIAL AND WASTE INVENTORY

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

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

1.4 POLLUTION INCIDENT HISTORY

Newfield has not had any reportable incidents for this facility.

1.5 IMPLEMENTATION SCHEDULE FOR PLAN ELEMENTS NOT CURRENTLY IN PLACE

All plan elements are in place.

1.6 PURPOSE AND IMPLEMENTATION OF PPC PLAN

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

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

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

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

1.7 PLAN REVISIONS

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

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

2.0 IMPLEMENTATION OF PPC PLAN

2.1 ORGANIZATIONAL STRUCTURE OF FACILITY FOR IMPLEMENTATION

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

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

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

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

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

2.2 LIST OF EMERGENCY COORDINATORS

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

Primary Emergency Coordinator

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

Secondary Emergency Coordinator

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

2.3 DUTIES AND RESPONSIBILITIES OF THE EMERGENCY COORDINATOR

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

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

4. Assess the health or environmental hazards and how this problem or condition will affect employees or its affect on the surrounding community.

5. Take all reasonable measures to stabilize the situation. The Emergency Coordinator will take all reasonable measures to ensure that the fire, explosion, emission, or discharge does not reoccur or spread to other materials at the site. These measures can include, when appropriate, stopping operations, collecting and containing released materials or wastes, and removing or isolating containers.

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

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

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

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

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

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

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

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

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

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

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

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

The report should include the following information:

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

2.4 CHAIN OF COMMAND

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

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

2.5 DISTRIBUTION OF THIS PPC PLAN

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

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

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

3.0 SPILL AND LEAK PREVENTION AND RESPONSE

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

3.1 PRE-RELEASE PLANNING

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

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

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

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

- Emergency response personnel will be familiar with procedures to follow in the case of a spill; and

- In cases where there may be leaking equipment or operations where oil or oil-related compounds are leaked, spilled, or otherwise released, containment booms or absorbent materials shall be used and equipment shall be repaired.

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

3.2 MATERIAL COMPATIBILITY

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

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

3.3 INSPECTIONS AND MONITORING PROGRAM

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

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

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

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

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

3.4 PREVENTIVE MAINTENANCE

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

3.5 HOUSEKEEPING PROGRAM

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

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

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

3.6 SECURITY

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

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

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

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

3.7 EXTERNAL FACTOR PLANNING

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

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

3.8 EMPLOYEE TRAINING PROGRAM

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

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

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

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

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

4.0 COUNTERMEASURES

4.1 COUNTERMEASURES TO BE UNDERTAKEN BY FACILITY

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

4.1.1 Spill Clean-Up Procedures - General

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

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

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

4.1.2 Spill Clean-Up Procedures - Specific

The employee should do the following:

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

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

4.1.3 Fire or Explosion

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

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

4.2 COUNTERMEASURES TO BE UNDERTAKEN BY CONTRACTORS

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

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

4.3 INTERNAL AND EXTERNAL COMMUNICATIONS AND ALARM SYSTEM

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

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

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

4.4 EVACUATION PLAN

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

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

1. The Emergency Coordinator will provide evacuation instructions to facility personnel via the construction site communications network, as appropriate.

2. Personnel evacuation will typically proceed as follows:

   a. If downwind of incident: Evacuate via the most accessible route perpendicular to the prevailing wind direction.
   b. If upwind of incident: Evacuate in an upwind direction.

3. Personnel will reassemble at the public road at the facility entrance as shown on Figure 3 or an alternate assembly point identified by the Emergency Coordinator, that is upwind of the incident location, and remain at this location until the Emergency Coordinator has accounted for all personnel.

4. The names of employees and the destination of employees transported to hospitals, etc. for treatment will be recorded by the Emergency Coordinator, first aid personnel or fire officials.

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

4.5 EMERGENCY EQUIPMENT AVAILABLE FOR RESPONSE

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

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

(1) Mobile telephones are provided to the Drilling and Production Mangers and are immediately available at the scene of operations for summoning emergency assistance from local police departments, fire departments or State or local emergency response teams.

(2) Portable fire extinguishers, fire control equipment, spill control equipment and decontamination equipment. This equipment is detailed in Table 4 of Appendix C.

5.0 EMERGENCY SPILL CONTROL NETWORK

5.1 ARRANGEMENTS WITH LOCAL EMERGENCY RESPONSE AGENCIES AND HOSPITALS

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

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

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

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

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

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

5.2 NOTIFICATION LISTS

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

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

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

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

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

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

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

6.0 WASTE DISPOSAL PRACTICES

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

7.0 STORMWATER MANAGEMENT PRACTICES

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

8.0 SEDIMENT AND EROSION PREVENTION

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

APPENDIX A

INSPECTION FORMS

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Facility:	Inspector Name:
Date of Inspection:	

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

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

Processing Equipment		
• Equipment appears adequately supported	Yes ☐	No ☐
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes ☐	No ☐
• Coating condition appears satisfactory	Yes ☐	No ☐
• Corrosion appears acceptable	Yes ☐	No ☐
Observations:		

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

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Secondary Containment		
• Passive containment (berm) has adequate capacity and integrity as intended	Yes ☐	No ☐
• Active containment measures are adequate	Yes ☐	No ☐
• No evidence of active or past leaks (i.e., staining, sheen)	Yes ☐	No ☐
• Any valves are closed and plugged	Yes ☐	No ☐
• Active containment is free from a significant quantity of rain/snow	Yes ☐	No ☐
Observations:		

Security		
• Lighting is adequate to observe leaks, spills, and vandalism	Yes ☐	No ☐
• Pumps, valves, nozzles are locked	Yes ☐	No ☐
Observations:		

Spill Response		
• Spill response kits are stocked and located in readily accessible areas	Yes ☐	No ☐
Observations:		

Signature:	Date:

E&S INSPECTION FORM

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

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

Facility: _____ **Inspector:** _____ **Signed:** _____ **Date:** _____

Print *Signature*

Tank Truck Loading and Unloading Checklist

Date: _____ Material being loaded/unloaded: _____

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

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

_____ Fill hose inspected for condition prior to loading.

_____ Wheel chocks in place prior to loading.

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

_____ The loading of the tanker was monitored.

_____ Hoses were replaced and capped after loading.

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

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

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

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

Burl Eakle
Cell: 918-448-1296

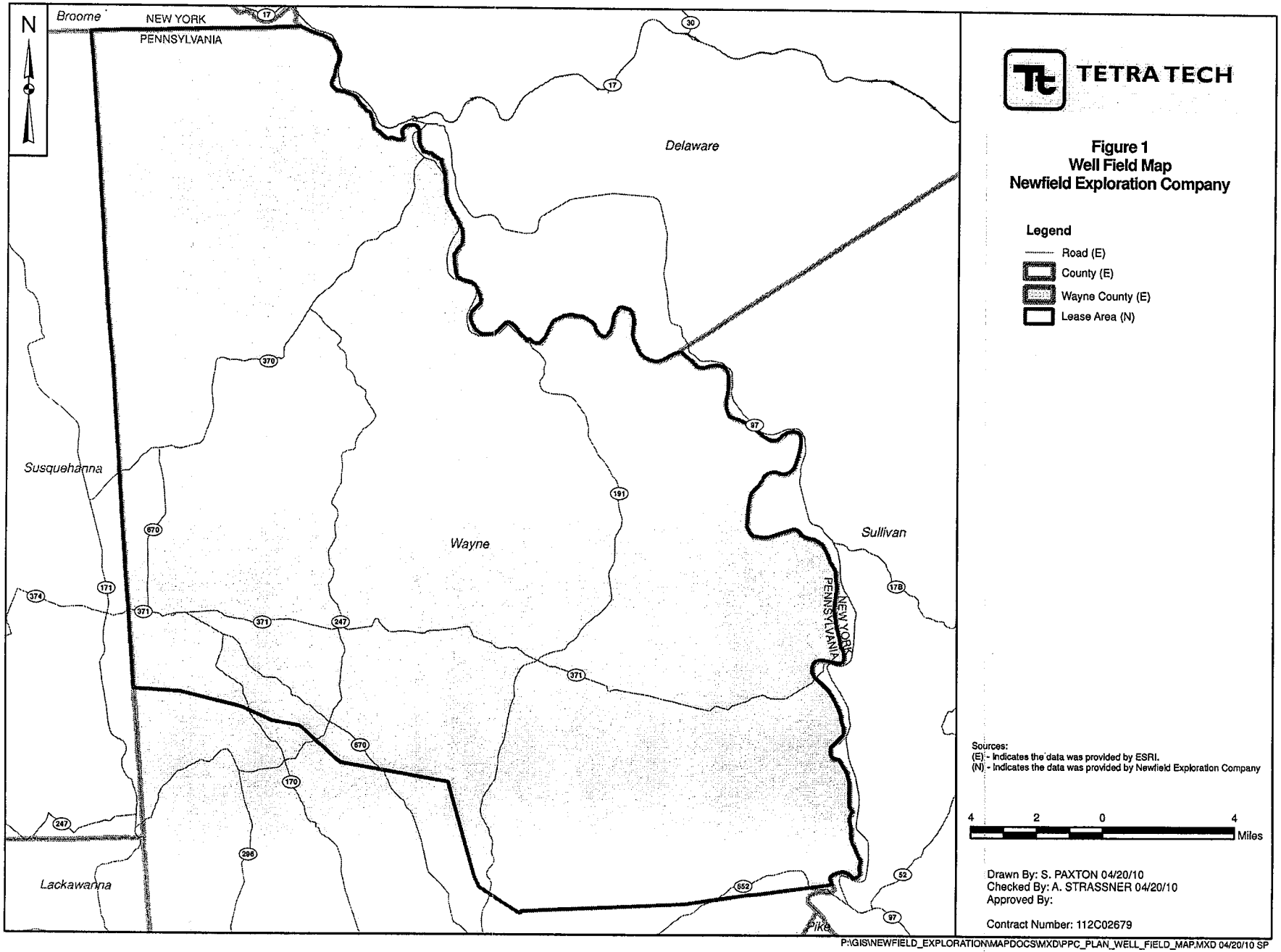
Delivery Information

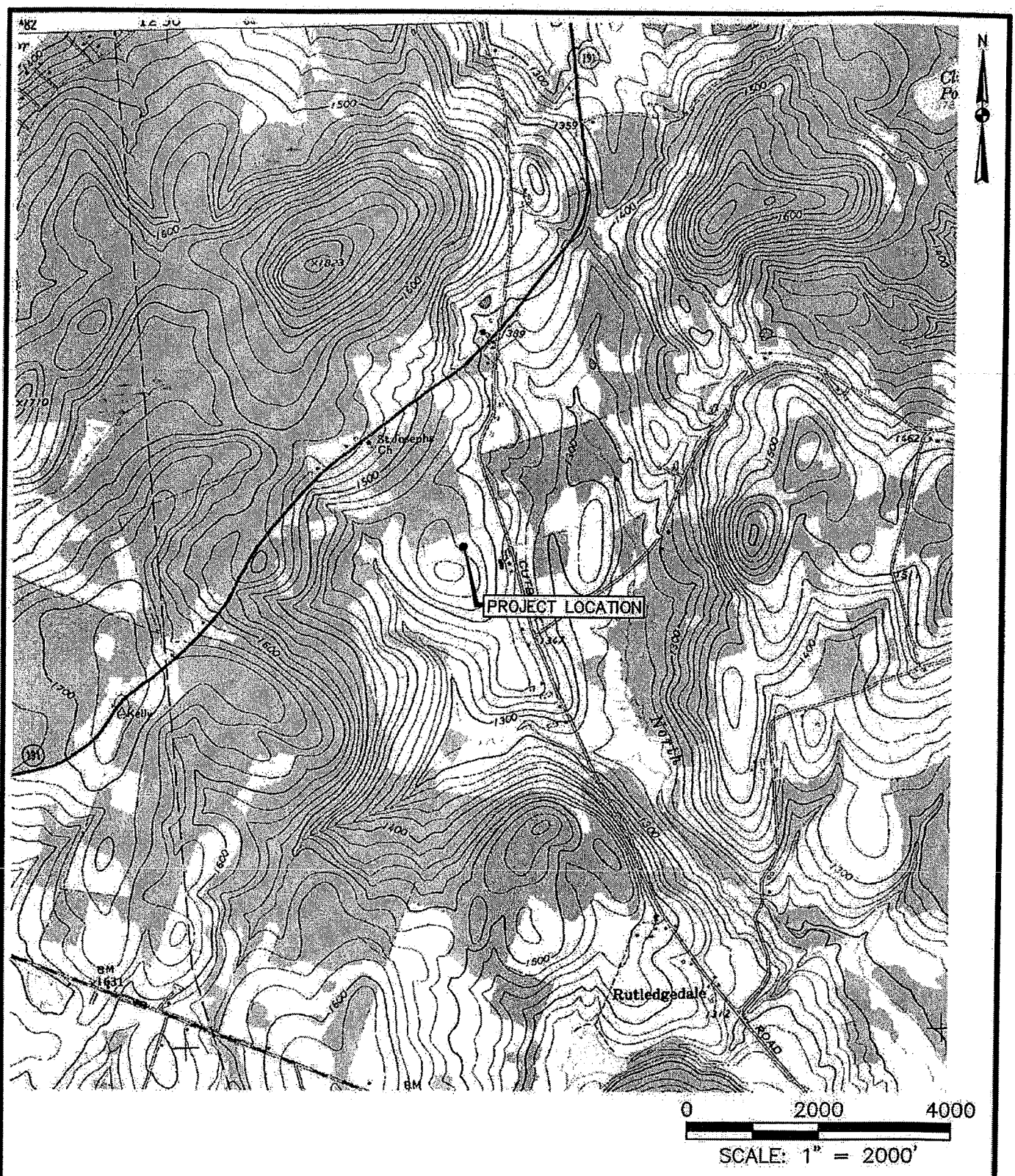
Invoice No. _____

Load No. _____

Company _____

APPENDIX B
FIGURES


N
Broome
NEW YORK
PENNSYLVANIA
Delaware
Susquehanna
Wayne
Sullivan
Lackawanna
NEW YORK
PENNSYLVANIA
TETRA TECH
Figure 1
Well Field Map
Newfield Exploration Company
Legend
Road (E)
County (E)
Wayne County (E)
Lease Area (N)
Sources:
(E) - Indicates the data was provided by ESRI.
(N) - Indicates the data was provided by Newfield Exploration Company
4 2 0 4
Miles
Drawn By: S. PAXTON 04/20/10
Checked By: A. STRASSNER 04/20/10
Approved By:
Contract Number: 112C02679
P:\GIS\NEWFIELD_EXPLORATION\MAPDOCS\MXD\PPC_PLAN_WELL_FIELD_MAP.MXD 04/20/10 SP



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TETRA TECH
WWW.TETRATECH.COM
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

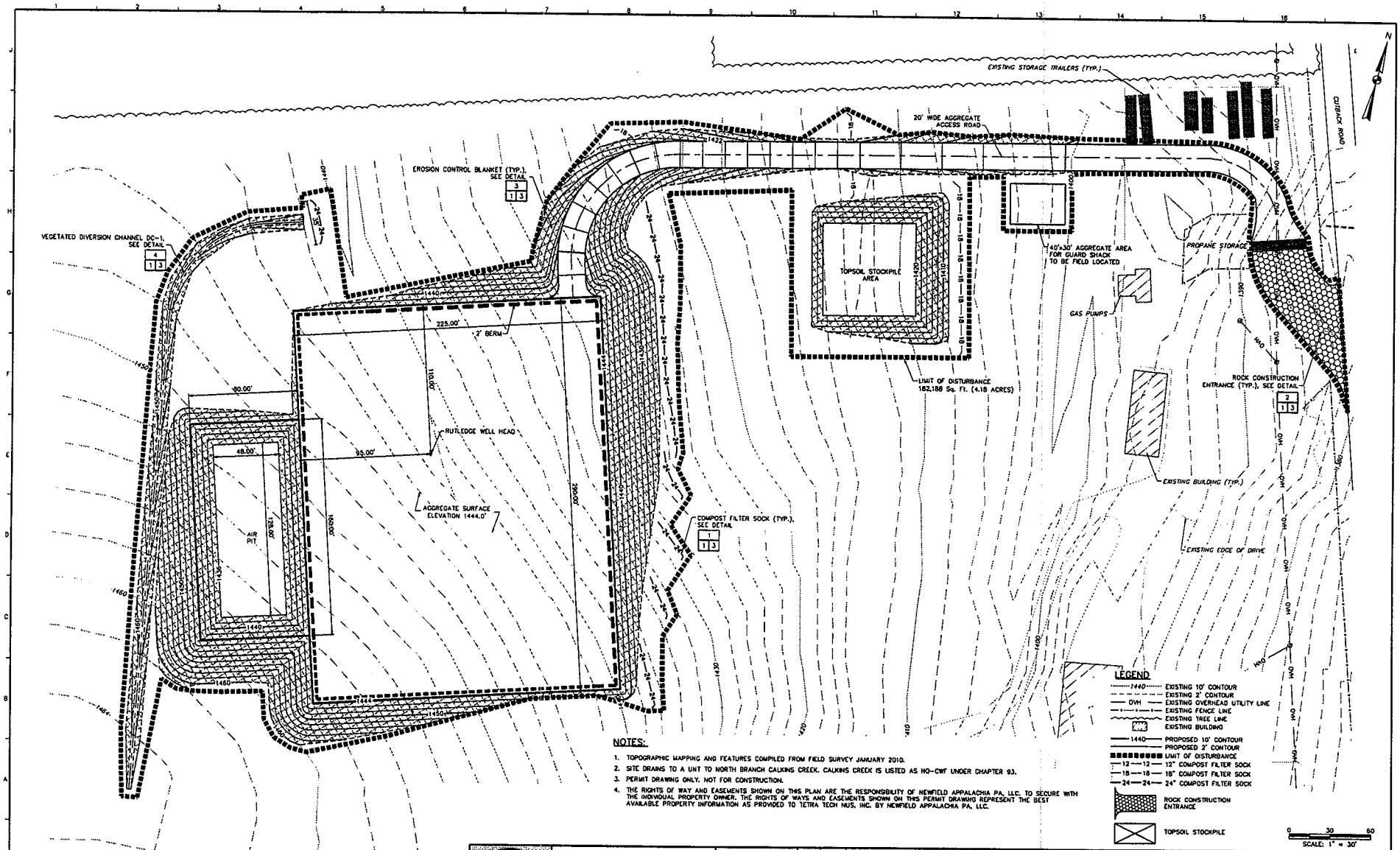
NEWFIELD APPALACHIA PA, LLC
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
LOCATION MAP

SCALE: 1" = 2000'

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

FIGURE 2



NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM FIELD SURVEY JANUARY 2010.
2. SITE DRAINS TO A UNT TO NORTH BRANCH CALKINS CREEK. CALKINS CREEK IS LISTED AS HQ-CWF UNDER CHAPTER 93.
3. PERMIT DRAWING ONLY. NOT FOR CONSTRUCTION.
4. THE RIGHTS OF WAY AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF NEWFIELD APPALACHIA PA, LLC. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS OF WAYS AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH NUS, INC. BY NEWFIELD APPALACHIA PA, LLC.

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

RUTLEDGE WELL PAD
EROSION & SEDIMENT CONTROL PLAN

SCALE: 1" = 30'

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	1 OF 7

FIGURE 3

APPENDIX C
TABLES

TABLE 1

LIST OF MATERIALS & WASTES

CONSTUCTION

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

DRILLING

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

TABLE 2

INSPECTION AND MONITORING ACTIVITIES

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

TABLE 3
AGENCY NOTIFICATION LIST

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

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

LOCAL EMERGENCY RESPONSE:

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

TABLE 4

On-Site Emergency Response Equipment

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

TABLE 5
CHAIN OF COMMAND

Primary Emergency Coordinator

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

Secondary Emergency Coordinator

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

Construction Manager
Burl Eakle
Cell: 918-448-1296

Offsite Emergency Response Contractors

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

APPENDIX D
REPORTING FORM

Spill Response Notification Form

GENERAL REPORTING INFORMATION

Prepared _____
(First) (M.I.) (Last) (Position)

Daytime phone: (xxx) xxx-xxxx Evening phone: (xxx) xxx-xxxx

Newfield Appalachia PA LLC
(Company) (Address) (City) (State) (Zip)

Calling for responsible party? Yes Were materials discharged? Yes Confidential? No

Meeting Federal obligations to report: Yes

INCIDENT DESCRIPTION

Source and/or cause:

Date of Incident:Time of Incident:

Incident Location/Address

Nearest City: XXXX, PA XXXXX (XXXXXXX County)

Distance from City: In city limits Direction from City: In city limits

Facility Oil Storage Capacity: XXXXXX gallons

Container Type:Container Capacity: (gals)

Facility Latitude: xx° xx' xx" Longitude xx° xx' xx"

MATERIAL

Name (or CHRIS Code):

Discharged Quantity (Units): Discharged to Water (Units):

RESPONSE ACTION

Actions taken to correct, control or mitigate incident:

IMPACT

No. of Injuries: No. of Deaths: Other:

Evacuation (Y/N): Damage (Y/N): Amount ($):

Medium Affected: Description: Additional Information:

AGENCY NOTIFIED

NRC 800-424-8802 Date: Time: Contact:

PADEP (570) 826-2511 Date: Time: Contact:

USCG Date: Time: Contact:

Other Date: Time: Contact:

ADDITIONAL INFORMATION:

APPENDIX E
MSDS SHEETS

MATERIAL SAFETY DATA SHEET

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

EMERGENCY OVERVIEW
CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED
Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer.
If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

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

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

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

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

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

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

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

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

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

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

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

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

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

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

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

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

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

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

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

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

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

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

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

FIRE FIGHTING INSTRUCTIONS

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

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

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

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

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

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

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

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

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

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

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

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

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

STORAGE PRECAUTIONS

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

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

WORK/HYGIENIC PRACTICES

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

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

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

ENGINEERING CONTROLS

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

EYE/FACE PROTECTION

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

SKIN PROTECTION

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

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

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

9. PHYSICAL and CHEMICAL PROPERTIES

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

ODOR
Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	320 to 690 oF (160 to 366 °C)
VAPOR PRESSURE:	0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1):	> 1.0
SPECIFIC GRAVITY (H_2O = 1):	0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Slow; varies with conditions
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

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

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

11. TOXICOLOGICAL PROPERTIES

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

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

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

MUTAGENICITY (genetic effects)
This material has been positive in a mutagenicity study.

12. ECOLOGICAL INFORMATION

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

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

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

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

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

CLEAN WATER ACT (OIL SPILLS)

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

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

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

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

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

CALIFORNIA PROPOSITON 65 LIST OF CHEMICALS

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

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

CANADIAN REGULATORY INFORMATION (WHMIS)

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

16. OTHER INFORMATION

NFPA® HAZARD RATING

HEALTH:	0
FIRE:	2
REACTIVITY:	0

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

HMIS® HAZARD RATING

HEALTH:	1 *	* Chronic
FIRE:	2	
PHYSICAL:	0	

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

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

ACRONYMS:

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

MATERIAL SAFETY DATA SHEET

Review Date: 04/23/2007

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

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

MSDS NUMBER: 614348LU - 1
PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

MANUFACTURER
SOPUS Products
P.O. Box 4427
Houston, TX. 77210-4427

TELEPHONE NUMBERS
Spill Information: (877) 242-7400
Health Information: (877) 504-9351
MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

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

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Appearance & Odor: Bright and clear liquid. Mild odor.
Health Hazards: No known immediate health hazards.
Physical Hazards: No known physical hazards.
NFPA Rating (Health, Fire, Reactivity): 0, 1, 0
Hazard Rating: Least - 0 Slight - 1 Moderate - 2 High - 3 Extreme - 4

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

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

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

Ingestion:

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

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

Signs and Symptoms:
Irritation as noted above.

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

For additional health information, refer to section 11.

SECTION 4 FIRST AID MEASURES

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

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

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

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

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

SECTION 5 FIRE FIGHTING MEASURES

Flash Point [Method]: >400 °F/>204.44 °C [Pensky-Martens Closed Cup]

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

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

Unusual Fire Hazards:
Material may ignite when preheated.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures:
May burn although not readily ignitable.

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

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

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

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

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

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

SECTION 7 HANDLING AND STORAGE

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

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

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

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical	Limit	TWA	STEL	Ceiling	Notation
Oil mist, mineral	ACGIH TLV	5 mg/m3	10 mg/m3		
Oil mist, mineral	OSHA PEL	5 mg/m3			

Exposure Controls

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

Personal Protection

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

Eye Protection:
Chemical Goggles, or Safety glasses with side shields

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

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

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

Types of respirator(s) to be considered in the selection process include:
For Mist: Air Purifying, R or P style NIOSH approved respirator.
For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Bright and clear liquid. Mild odor.
Substance Chemical Family: Petroleum Hydrocarbon

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

SECTION 10 REACTIVITY AND STABILITY

Stability:
Material is stable under normal conditions.

Conditions to Avoid:
Avoid heat and open flames.

Materials to Avoid:
Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:

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

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity

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

Carcinogenicity Classification

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

SECTION 12 ECOLOGICAL INFORMATION

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

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

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

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

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

International Air Transport Association
Not regulated under IATA rules.

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

SECTION 15 REGULATORY INFORMATION

Federal Regulatory Status

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

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

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

SARA Hazard Categories (311/312):

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

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

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

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

State Regulation

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

SECTION 16 OTHER INFORMATION

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

SECTION 17 LABEL INFORMATION

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

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

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

ATTENTION!

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

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

FIRST AID

Inhalation: If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.
Skin Contact: Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
Eye Contact: Flush with water. If irritation occurs, get medical attention.
Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO_2) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK

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

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

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

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

TRANSPORTATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

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

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flames or heat. Keep container closed and drum bungs in place.

Name and Address

SOPUS Products
P.O. Box 4427
Houston, TX 77210-4427

ADMINISTRATIVE INFORMATION	
MANUFACTURER ADDRESS:	SOPUS Products, P.O. Box 4427, Houston, TX. 77210-4427

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT : IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

TO DETERMINE THE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, YOU SHOULD CONSULT WITH YOUR LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. WE WILL NOT PROVIDE ADVICE ON SUCH MATTERS, OR BE RESPONSIBLE FOR ANY INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN. THE UNDERLYING DATA, AND THE INFORMATION PROVIDED HEREIN AS A RESULT OF THAT DATA, IS THE PROPERTY OF SOPUS PRODUCTS AND IS NOT TO BE THE SUBJECT OF SALE OR EXCHANGE WITHOUT THE EXPRESS WRITTEN CONSENT OF SOPUS PRODUCTS.

44815-10737-100R-04/16/2007

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CALCIUM CHLORIDE - POWDER**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CALCIUM CHLORIDE - POWDER
Synonyms: None
Chemical Family: Inorganic Salt
Application: Accelerator

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium chloride		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.
Storage Information	Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Dust proof goggles.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	10
Specific Gravity @ 20 C (Water=1):	0.83
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	51
Boiling Point/Range (F):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	42
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	147.02

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause skin irritation. May cause skin burns on prolonged contact.
Eye Contact	May cause severe eye irritation. May cause corneal injury.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 1000 mg/kg (Rat)
Dermal Toxicity:	LD50: > 5000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

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

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

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

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: DRILTREAT®

Revision Date: 09-Mar-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DRILTREAT®
Synonyms: None
Chemical Family: Lipid
Application: Oil-wetting Agent

Manufacturer/Supplier

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

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation.

4. FIRST AID MEASURES

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

Skin Wash with soap and water.

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	400
Flash Point/Range (C):	204
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

Special Exposure Hazards Decomposition in fire may produce toxic gases.

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

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

7. HANDLING AND STORAGE

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

Storage Information Store away from oxidizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally necessary.

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

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

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Amber
Odor:	Bean
pH:	6.4-7
Specific Gravity @ 20 C (Water=1):	1.03
Density @ 20 C (lbs./gallon):	8.58
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	32
Freezing Point/Range (C):	0
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Disperses
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

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

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: 497,500 ppm (Mysidopsis bahia) SPP @ 12 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **DURATONE® HT**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DURATONE® HT
Synonyms: None
Chemical Family: Blend
Application: Fluid Loss Additive

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Kaolin	1332-58-7	10 - 30%	2 mg/m^3	Not applicable
Nonylphenol	25154-52-3	5 - 10%	Not applicable	Not applicable
Sodium hydroxide	1310-73-2	1 - 5%	2 mg/m^3	2 mg/m^3
Quaternary ammonium compounds		10 - 30%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician — Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	608
Autoignition Temperature (C):	320
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

Special Exposure Hazards — Decomposition in fire may produce toxic gases.

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

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 2*

6. ACCIDENTAL RELEASE MEASURES

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

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

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

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray to black
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.8
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	31 uncompacted; 44 compacted
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	< -1 (OECD117)

9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight (g/mole): Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong alkalis. Strong acids. Aldehydes. Ketones. Acrylates.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A). Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).
Skin Contact	May cause moderate skin irritation. May cause an allergic skin reaction.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Ames Test: Negative

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability BOD(28 Day): 9% of COD

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 30 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: EC50: 370 mg/l (Daphnia magna)

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Aluminum Oxide//1344-28-1
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.

EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Crystalline silica

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **GELTONE® V**

Revision Date: 02-Jun-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: GELTONE® V
Synonyms: None
Chemical Family: Blend
Application: Viscosifier

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, cristobalite	14464-46-1	0 - 1%	0.025 mg/m^3	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$
Crystalline silica, tridymite	15468-32-3	0 - 1%	0.05 mg/m^3	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$
Crystalline silica, quartz	14808-60-7	2-6	0.025 mg/m^3	$\frac{10\ mg/m^3}{\%SiO2 + 2}$
Isopropanol	67-63-0	1 - 5%	200 ppm	400 ppm
Modified bentonite		60 - 100%	Not applicable	Not applicable

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

3. HAZARDS IDENTIFICATION

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician — Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media — All standard firefighting media.

Special Exposure Hazards — Not applicable.

Special Protective Equipment for Fire-Fighters — Not applicable.

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

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures — None known.

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

7. HANDLING AND STORAGE

Handling Precautions

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

Storage Information

Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

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

Respiratory Protection

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

Hand Protection

Normal work gloves.

Skin Protection

Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection

Wear safety glasses or goggles to protect against exposure.

Other Precautions

None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	Tan
Odor:	Mild
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35- 57
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Miscible in hydrocarbons
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A). Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

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

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LE SUPERMUL**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LE SUPERMUL
Synonyms: None
Chemical Family: Blend
Application: Emulsifier

Manufacturer/Supplier

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

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

4. FIRST AID MEASURES

Inhalation

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

Skin

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

Eyes

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

Ingestion

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

Notes to Physician

Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200**Min:** > 200
Flash Point/Range (C):	> 100**Min:** > 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Decomposition in fire may produce toxic gases.

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

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMIS Ratings: Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

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

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

Respiratory Protection Organic vapor respirator.
In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

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

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Amber
Odor:	Mild
pH:	2.6
Specific Gravity @ 20 C (Water=1):	0.924
Density @ 20 C (lbs./gallon):	7.7
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	20
Freezing Point/Range (C):	-6.6
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	280-300
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Lung disorders. Skin disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause reproductive system damage. Repeated overexposure may cause liver and kidney effects.

Other Information None known.

Toxicity Tests

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

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

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

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

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

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Magnesium silicate	1343-90-4	60 - 100%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	2-6	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granules
Color:	Gray to tan
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32-38
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure

Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact

None known.

Eye Contact

May cause eye irritation.

Ingestion

May be harmful if swallowed.

Aggravated Medical Conditions

Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **RHEMOD L**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Wash hands after use.
Storage Information	Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Organic vapor respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark
Odor:	Fatty acid
pH:	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	0.96
Density @ 20 C (lbs./gallon):	8
Bulk Density @ 20 C (lbs/ft3):	57.30
Boiling Point/Range (F):	> 572
Boiling Point/Range (C):	> 300
Freezing Point/Range (F):	< -4
Freezing Point/Range (C):	< 25
Vapor Pressure @ 20 C (mmHg):	< 0.001
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	0
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	1849 @ 25C
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye and skin contact.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined**Min:** > 220
Flash Point/Range (C):	Not Determined**Min:** > 104
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.
Storage Information	Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear blue
Odor:	Slight Alcohol
pH:	9.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	1.025
Density @ 20 C (lbs./gallon):	8.5
Bulk Density @ 20 C (lbs/ft3):	63.6
Boiling Point/Range (F):	> 212
Boiling Point/Range (C):	> 100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Glycol Ethers//34398-01-1 Isopropanol//67-63-0
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FWCA CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	770
Autoignition Temperature (C):	410
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

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

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	6.5
Specific Gravity @ 20 C (Water=1):	1.39
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

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

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 322 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Blend
Application: Cement Additive

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

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

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Red
Odor:	Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.28
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35.2
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

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

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media Water spray, dry chemical, or foam.

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust. Do not swallow. Avoid contact with eyes, skin, or clothing.

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

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

Skin Protection Normal work coveralls.

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

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to off white
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.37
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	25-35
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	18
Freezing Point/Range (C):	-8
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Prolonged or repeated contact may cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	No adverse health effects are expected from swallowing.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	BOD(28 Day): 3% of COD
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM48: 2000 mg/l (Arcatia tonsa)
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	EC50: 3300 mg/l (Skeletonema costatum)
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-5**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

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

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.
Storage Information	Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	29.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1000 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-601**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

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

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

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

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

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Woody
pH:	7.8
Specific Gravity @ 20 C (Water=1):	1.08
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30.5
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

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

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **KCL POTASSIUM CHLORIDE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

3. HAZARDS IDENTIFICATION

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

4. FIRST AID MEASURES

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

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

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

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

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

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

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

6. ACCIDENTAL RELEASE MEASURES

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

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

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Dust proof goggles.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Bulk Density @ 20 C (lbs/ft3):	72.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.55

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause moderate skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: 100-330 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information

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

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

Disclaimer Statement

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 05-Jan-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fly ash	68131-74-8	30 - 60%	Not applicable	Not applicable
Bentonite	1302-78-9	1 - 5%	Not applicable	Not applicable
Portland cement	65997-15-1	30 - 60%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Not Determined
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact May cause severe eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

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

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Portland cement	65997-15-1	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	<3	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	3.15
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	94
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from any contact with water.
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact May cause severe eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

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

Ecotoxicological Information

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 25**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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

Manufacturer/Supplier

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

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3

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

3. HAZARDS IDENTIFICATION

Hazard Overview

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

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

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

4. FIRST AID MEASURES

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

5. FIRE FIGHTING MEASURES

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

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	168
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

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

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

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

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

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

Canadian Regulations

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

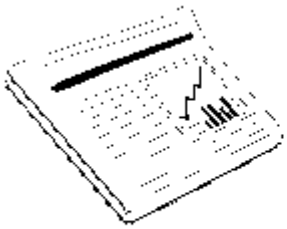
16. OTHER INFORMATION

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

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

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

Delaware River Basin Commission



News Release

For Immediate Release

May 6, 2010

DRBC WILL REVIEW NATURAL GAS WELL PAD PROJECTS AFTER ADOPTION OF NEW REGULATIONS

(WEST TRENTON, N.J.) -- The Delaware River Basin Commission (DRBC) at its May 5, 2010 public business meeting directed commission staff to draft regulations for natural gas well pad projects in shale formations in the Delaware River Basin. The commissioners will consider specific natural gas well pad applications after the new regulations are in place.

“The drafting process is already underway, so it made logical sense for the development of new regulations to move forward in advance of any individual project decisions,” DRBC Executive Director Carol R. Collier said in describing the action taken yesterday by the commissioners representing Delaware, New Jersey, New York, Pennsylvania, and the federal government. The rulemaking process will include public notice and a full opportunity for public comment before the commissioners adopt the regulations.

The DRBC has already conducted a public hearing and received over 2,000 written comments regarding a proposal previously submitted by Stone Energy Corporation for the Matoushek #1 well located in Clinton Township, Wayne County, Pa. The commissioners’ decision to rule upon this and other pending and future specific natural gas well pad project applications after the new regulations are adopted is consistent with many of the public comments submitted.

Commission review of pending or future proposed water withdrawals to be used to supply water to natural gas extraction projects, including Stone Energy’s proposed water withdrawal from the West Branch Lackawaxen River in Mount Pleasant Township, Wayne County, Pa., will proceed in accordance with existing DRBC regulations. The written comments that the DRBC received during the comment period that closed on April 12 pertained to both Stone Energy’s proposed water withdrawal project and its proposed natural gas well drilling project. The earliest that the commission could vote on the Stone Energy proposed water withdrawal project would be its next public business meeting scheduled for July 14, 2010.

The DRBC was formed by compact in 1961 through legislation signed into law by President John F. Kennedy and the governors of the four basin states with land draining to the Delaware River. The passage of this compact marked the first time in our nation's history that the federal government and a group of states joined together as equal partners in a river basin planning, development, and regulatory agency.

Additional information about the commission can be found on its web site at www.drbc.net.

***

Contact: Clarke Rupert, DRBC, 609-883-9500 ext. 260, clarke.rupert@drbc.state.nj.us

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Hydrologic Info | News Releases | Next DRBC Meeting | Other Meetings | Publications | Basin Facts | Contact Info | Your Comments Welcomed

Commission Member Links: Delaware | New Jersey | Pennsylvania | New York | United States |

DRBC Home Page

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Delaware River Basin Commission
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UNITED STATES OF AMERICA

Delaware River Basin Commission
25 State Police Drive
PO Box 7360
West Trenton, New Jersey
08628-0360
Phone: (609) 883-9500 Fax: (609) 883-9522
Web Site: http://www.drbc.net

Carol R. Collier
Executive Director

Robert Tudor
Deputy Executive Director

SUPPLEMENTAL DETERMINATION OF THE EXECUTIVE DIRECTOR CONCERNING NATURAL GAS EXTRACTION ACTIVITIES IN SHALE FORMATIONS WITHIN THE DRAINAGE AREA OF SPECIAL PROTECTION WATERS

This determination supplements the Executive Director's Determination of May 19, 2009 ("2009 Determination") concerning natural gas extraction activities in shale formations within the drainage area of Special Protection Waters (SPW) insofar as that determination addressed "wells intended solely for exploratory purposes."

In my Determination of May 2009, I exercised the authority conferred on the Executive Director by section 2.3.5 B.18 of the Commission's *Rules of Practice and Procedure* (RPP) by directing all sponsors of natural gas extraction projects in shale formations within the drainage area of Special Protection Waters to obtain Commission approval before commencing such projects, notwithstanding that the thresholds for review established by the RPP were not exceeded. This action was based on my recognition that as a result of water withdrawals, wastewater disposal and other activities, natural gas extraction projects in shale formations could individually or cumulatively affect the water quality of Special Protection Waters by altering their physical, biological, chemical or hydrological characteristics.

My 2009 Determination that sponsors of natural gas extraction projects in shale formations must obtain Commission approval expressly did not cover "wells intended solely for exploratory purposes." Today, subject to the reservations set forth below, I am withdrawing that exclusion and extending the provisions of my 2009 Determination to include exploratory wells. That is, by this Supplemental Determination, I am specially directing all natural gas well project sponsors, *including the sponsors of natural gas well projects intended solely for exploratory purposes*, that they may not commence any natural gas well project for the production from or exploration of shale formations within the drainage area of Special Protection Waters without first applying for and obtaining Commission approval. For the purpose of this Determination, any natural gas well drilled in or through shale is assumed to be targeting a shale formation and is subject to this Determination, unless the project sponsor proves otherwise. All other aspects of my 2009 Determination remain in effect.

My action today recognizes the risks to water resources, including ground and surface water that the land disturbance and drilling activities inherent in any shale gas well pose. In light of the Commission's May 5, 2010 decision to finalize natural gas regulations before considering project approvals, this Supplemental Determination removes any regulatory incentive for project sponsors to classify their wells as exploratory wells and install them without Commission review before the Commission's natural gas regulations are in place. It thus supports the Commission's goal that exploratory wells do not serve as a source of degradation of the Commission's Special Protection Waters.

Reservation for Existing State-Approved Projects. Where entities have invested in exploratory well projects in reliance on my May 2009 Determination and information from staff, there are countervailing considerations that favor allowing these projects to move ahead. I am informed that since May of 2009 the Pennsylvania Department of Environmental Protection (PADEP) has issued a limited number of natural gas well drilling permits within the Delaware River Basin targeting shale formations, while the New York State Department of Environmental Conservation has not issued any natural gas well permits targeting shales in the Basin since that date. In contrast to the thousands of wells projected to be installed in the Basin over the next several years, the risk to Basin waters posed by only the wells approved by PADEP since May 2009 are comparatively small. Not only are these wells subject to state regulation as to their construction and operation, but they continue to require Commission approval before they can be fractured or otherwise modified for natural gas production. In light of these existing safeguards and the investment-backed expectations of the sponsors of these projects, this Supplemental Determination does not prohibit any exploratory natural gas well project from proceeding if the applicant has obtained a state natural gas well permit for the project on or before the date of issuance set forth below.

A copy of this Supplemental Determination will be posted on the Commission's website, and additional copies will be mailed directly to those project sponsors and potential project sponsors that the Commission has identified.

Any person adversely affected by this action may request a hearing by submitting a request in writing to the Commission Secretary within thirty (30) days of the date set forth below, in accordance with the RPP.

Carol R. Collier

Carol R. Collier, Executive Director
Dated: June 14, 2010

PADEP-APPROVED NATURAL GAS WELL PROJECTS IN THE DELAWARE BASIN AS OF MID-OCTOBER 2010

	County Name	Municipality Name	Date Disposed	Appl Type Code	Other Id	Marcellus Shale Well	Horizontal Well	Well Type	Site Name	Total Depth	Operator	Status as of 10-12-10	State Code	Zip Code
1	Wayne	Damascus	04/29/2010	NEW	127-20012	N	N	GAS	**HL RUTLEDGE 1 1 OG WELL**	8350	**NEWFIELD APPALACHIA PA LLC**	**PAD CONSTRUCTED**	TX	77060-2424
2	Wayne	Damascus	04/30/2010	NEW	127-20016	N	N	TEST	**VE CRUM 1 1 OG WELL**	8350	**NEWFIELD APPALACHIA PA LLC**	**DRILLED**	TX	77060-2424
3	Wayne	Damascus	05/07/2010	NEW	127-20015	N	N	TEST	**EM SCHWEIGHOFER 1 1 OG WELL**	8350	**NEWFIELD APPALACHIA PA LLC**	**NO ACTION**	TX	77060-2424
4	Wayne	Damascus	05/27/2010	NEW	127-20017	N	N	GAS	**WOODLAND MGMT PARTNERS 1 1 OG WELL**	8350	**NEWFIELD APPALACHIA PA LLC**	**DRILLED**	TX	77060-2424
5	Wayne	Manchester	04/23/2010	NEW	127-20013	N	N	GAS	**DL TEEPLE 1 1 OG WELL**	8350	**NEWFIELD APPALACHIA PA LLC**	**DRILLED**	TX	770602424
6	Wayne	Manchester	05/25/2010	NEW	127-20018	Y	Y	GAS	**DL TEEPLE 1 2H OG WELL**	8140	**NEWFIELD APPALACHIA PA LLC**	**APPLICATION FILED W/ DRBC** (Horizontal Production Well)	TX	77060-2424
7	Wayne	Buckingham	07/22/2009	NEW	127-20011	N	N	GAS	**STOCKPORT ASSN 1**	8850	**PENNSWOOD OIL & GAS LLC** (Mr. Nowicki)	**NO ACTION**	PA	18920-9998
8	Wayne	Preston	07/29/2009	NEW	127-20010	N	N	GAS	**PRESTON 38 LLC OG WELL**	8753	**PENNSWOOD OIL & GAS LLC** (Mr. Nowicki)	**NO ACTION**	PA	18920-9998
9	Wayne	Clinton	03/14/2008	NEW	127-20006	Y	N	GAS	**MATOUSHEK 1 OG WELL**	8351	**STONE ENERGY CORP**	**DRILLED**	LA	70506
10	Wayne	Clinton	04/28/2008	NEW	127-20007	Y	N	GAS	**GEUTHER 1 OG WELL**	8150	**STONE ENERGY CORP**	**NO ACTION**	LA	70506
11	Bucks	Nockamixon	04/13/2010	REN	017-20004	N	N	GAS	**CABOT 2 OG WELL**	9500	**ARBOR OPERATING LLC**	**NO ACTION** (Counsel Withdrawn in EHB and DRBC Proceedings)	MI	49686
12	Wayne	Oregon	02/26/2009	NEW	127-20008	N	N	GAS	**ROBSON 627528 1 OG WELL**	8898	**CHESAPEAKE APPALACHIA LLC**	**DRILLED**	WV	25302
13	Wayne	Preston	03/05/2009	NEW	127-20009	Y	N	GAS	**B & E WELLS 1 OG WELL**	NULL	**SCHRADER KEVIN E**	**NO ACTION**	PA	18437
14	Wayne	Scott	7/13/2010	NEW	127-20020	Y	N	GAS	**DAVIDSON 1V WELL**	6240	**HESS CORP**	**SITE PREP UNDER WAY**	TX	77002
15	Wayne	Scott	7/20/2010	NEW	127-20022	Y	N	GAS	**HAMMOND 1V WELL**	6790	**HESS CORP**	**SITE PREP UNDER WAY**	TX	77002

Source: Except for data contained in the column headed "Status as of 10-12-10" (hereinafter, "Status Data") all data are from the spreadsheet entitled "Permits Issued by County with Location Information (Excel format containing formatting macros)," a link to which is posted on PADEP's web page at http://www.dep.state.pa.us/dep/deputate/minres/oilgas/RIG10.htm. Status Data were furnished by DRBC Project Review Section staff.

Note: Some columns are hidden to fit this spreadsheet on a single 11" x 17" page. Unhide columns by selecting Format Menu, Visibility, Hide & Unhide.

Please see the accompanying page of notes relating to this spreadsheet.

No	Authorization #	Well Name	Applicant	Auth. type	App. Type	Date Received	Status/date	Work Status	County	Watershed	Lat	Lon
1	710932	Matoushek 1V	STONE ENERGY CORP	Drill & Operate Well Permit	New	1/31/2008	Issued 03/14/2008	Drilled TAed	Wayne	DRBC	41.6851	-75.365
2	715410	Geuther 1V	STONE ENERGY CORP	Drill & Operate Well Permit	New	3/6/2008	Issued 04/28/2008	Expired	Wayne	DRBC	41.6844	-75.4356
3	720872	B& E Wells 1V	SCHRADER KEVIN E	Drill & Operate Well Permit	New	4/14/2008	Issued 03/05/2009	Expired	Wayne		Not available	
4	760352	Robson 1V	CHESAPEAKE APPALACHIA LLC	Drill & Operate Well Permit	New	1/13/2009	Issued 02/26/2009	Drilled PAed	Wayne	DRBC	41.6276	-75.2028
5	792478	Preston 38 LLC 1V	PENNSWOOD OIL & GAS LLC	Drill & Operate Well Permit	New	5/15/2009	Issued 07/29/2009	Active (Nowicki)	Wayne	DRBC	41.8031	-75.3902
6	796670	Stockport Assn 1V	PENNSWOOD OIL & GAS LLC	Drill & Operate Well Permit	New	6/15/2009	Issued 07/22/2009	Active (Nowicki)	Wayne	DRBC	41.8905	-75.2983
7	825419	HL Runtledge 1V	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	2/24/2010	Issued 04/29/2010	Active	Wayne	DRBC	41.7287	-75.1919
8	826657	Dl Teeple 1V	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	3/8/2010	Issued 04/23/2010	Drilling	Wayne	DRBC	41.8275	-75.1978
9	827012	B&E Wells 1V	SCHRADER KEVIN E	Drill & Operate Well Permit	New	3/10/2010	Issued 06/10/2010	Active (Schrader)	Wayne	DRBC	41.8458	-75.3376
10	827239	V E Crum 1V	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	3/12/2010	Issued 04/30/2010	Active	Wayne	DRBC	41.6769	-75.0821
11	827248	EM Schweighofer 1V	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	3/12/2010	Issued 05/07/2010	Active	Wayne	DRBC	41.7541	-75.1821
12	830957	Woodlands Management Ptrs 1V	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	4/12/2010	Issued 05/27/2010	Building Location	Wayne	DRBC	41.7656	-75.1086
13	830993	DL Teeple 1 2H	NEWFIELD APPALACHIA PA LLC	Drill & Operate Well Permit	New	4/13/2010	Issued 05/25/2010	Active	Wayne	DRBC	41.8228	-75.1935
14	827896	Cabot 2V	Arbor Operating LLC	Drill and Operate	New	3/11/2010	Issued 4/13/2010	Active	Bucks	DRBC		
15	836496	Davidson 1V	HESS CORP	Drill & Operate Well Permit	New	5/26/2010	Pending		Wayne	DRBC		
16	838228	Hammond 1V	HESS CORP	Drill & Operate Well Permit	New	6/4/2010	Pending		Wayne	DRBC		
17	832454	Davidson 1V	HESS CORP	Expedited ESCGP-1	New	4/26/2010	Issued 05/13/2010	Active	Wayne	DRBC		
18	833665	Hammond 1V	HESS CORP	Expedited ESCGP-1	New	5/7/2010	Issued 05/20/2010	Active	Wayne	DRBC		
19	837378	Funke 1V	HESS CORP	Expedited ESCGP-1	New	6/7/2010	Issued 06/28/2010	Active	Wayne	DRBC		
20	839543	Baker 1V	HESS CORP	Expedited ESCGP-1	New	6/28/2010	Pending		Wayne	DRBC		

Didn't pass Hess due diligence
Newfield
Hess PADEP Erosion and Sediment Control General Permits in DRBC (3 approved, 1 pending)
Hess PADEP Drilling Permit Applications (2 pending)

NOTE: The search goes back to Jan 2006

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Delaware River Basin Commission
25 State Police Drive
PO Box 7360
West Trenton, New Jersey
08628-0360
Phone: (609) 883-9500 Fax: (609) 883-9522
Web Site: http://www.drbc.net

Carol R. Collier
Executive Director

Robert Tudor
Deputy Executive Director

AMENDMENT TO SUPPLEMENTAL DETERMINATION OF THE EXECUTIVE DIRECTOR CONCERNING NATURAL GAS EXTRACTION ACTIVITIES IN SHALE FORMATIONS WITHIN THE DRAINAGE AREA OF SPECIAL PROTECTION WATERS

On June 14, 2010 I extended to all natural gas exploratory wells, with the exception of those for which the Pennsylvania Department of Environmental Protection (PADEP) had already granted well drilling permits, my determination that the sponsors of natural gas extraction projects in shale formations within the drainage area of Special Protection Waters must obtain the Commission's approval before commencing such projects.

Following this decision, I received a request from the Hess Corporation that it be allowed to proceed with the initial phase of an exploratory drilling program planned for its lease holdings in Wayne County, Pennsylvania. Specifically, Hess requested permission to construct two vertical exploratory wells for which it had obtained Pennsylvania Erosion and Sediment Control General Permits (ESCGP-1's) prior to June 14th and for which as of that date well drilling permit applications had been filed with PADEP and were under active review. A state drilling permit for the Davidson 1V well has since been issued – PADEP Permit No. 127-20020 dated July 13, 2010 – and a PADEP permit for the Hammond 1V well is expected to be approved in July.

Hess cited as a basis for its request that by mid-June the Davidson 1V and Hammond 1V wells were in the final stages of the permitting process and represented a level of investment equivalent to that of the natural gas exploratory wells that were "grandfathered" by my decision of June 14th. Hess also urged that the scientific information to be derived from the two wells was critical to the company and to many hundreds of property owners with whom it has signed leases. Hess and its investment partner Newfield Appalachia LLC ("Newfield") have combined lease holdings of more than 100,000 acres in the Delaware Basin. Although Newfield is proceeding with an exploratory program that includes five wells in east, southeast Wayne County, no other exploratory wells have been approved in the north, northwest portion of the county, where Hess's leases are concentrated. The timing of the exploratory program is important to both entities and their lessors. Hess representatives have advised me that if the company is able to proceed with the Davidson 1V and Hammond 1V wells this summer, the two wells are expected to meet its program needs through the end of the year. Further, Hess has assured me that it supports the Commission's initiative to establish robust and responsible regulations governing natural gas development in the Delaware Basin in that timeframe.

I am convinced that the scientific information that may be derived from the two proposed exploratory wells is important in the near term, while the risk from allowing two additional exploratory wells to proceed is subject to the same balancing that I discussed in my Supplemental Determination of June 14th. Only two exploratory wells are at issue; both are

subject to PADEP well drilling permits; and in light of the erosion and sediment control permits issued before June 14th, both are included in Hess's investment-backed expectations. Hess's ESCGP-1 applications, which Hess furnished to the DRBC, provide specific information regarding siting of the two proposed wells and set forth in detail the erosion and sediment control measures to be implemented during and after their construction to protect water resources. These measures go beyond the requirements applicable to the other exploratory well projects "grandfathered" by my June 14th Determination, each of which fell below the five-acre threshold at which the requirement for an ESCGP-1 is triggered. In light of the other factors discussed above, Hess's additional sediment and erosion control demonstrations tip the balance in favor of allowing the two exploratory wells to proceed.

Accordingly, I find that allowing the Davidson 1V and Hammond 1V natural gas exploratory wells to be constructed at this time would serve multiple interests and in particular could help indicate the extent of natural gas development activity that is likely to occur in the Basin. By this Amended Supplemental Determination, I am advising the Hess Corporation that it may proceed with construction of the Davidson 1V and Hammond 1V natural gas exploratory wells. This approval is limited to the two well projects as described in Hess's letter to me of July 13, 2010 and supporting documents, including the ESCGP-1 applications and corresponding permits issued by Pennsylvania in May (collectively "letter of July 13th"). Any proposed deviation from the projects as described in Hess's letter of July 13th will invalidate this Amended Determination unless and until Hess demonstrates to my satisfaction that the proposed change does not increase the risk of harm to the basin's water resources. Any proposal to reconfigure either of the two exploratory wells for production must undergo review and approval by the Commission in accordance with my Determinations of May 19, 2009 and June 14, 2010.

Except as modified herein as to the two Hess exploratory wells, my Supplemental Determination of June 14, 2010 remains in full effect.

Any person adversely affected by this action may request a hearing by submitting a request in writing to the Commission Secretary within thirty (30) days of the date set forth below, in accordance with the Commission's *Rules of Practice and Procedure*.

Carol R. Collier

Carol R. Collier, Executive Director
Dated: July 23, 2010

FAX TRANSMISSION

COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL HEARING BOARD
2nd Floor, Rachel Carson State Office Bldg.
Harrisburg, PA 17105-8457
717-787-3483
Fax: 717-783-4738

To: Elizabeth Kanies Brown **Date:** 10-19-10

Fax #: 215-369-1181 **Pages:** 3, including this cover sheet.

From: Kathy

Subject: ~~210~~ 2010-066-K

COMMENTS:

IF THERE ARE ANY PROBLEMS WITH THIS TRANSMISSION PLEASE CALL _____ AT THE ABOVE TELEPHONE NUMBER.

arbor
OPERATING LLC

Department of Environmental Protection
Oil and Gas Management Program
Southwest Regional Office
400 Waterfront Dr.
Pittsburgh PA 15222

VIA CERTIFIED MAIL

Attention Mr. Alan Eichler, Regional Manager

October 14, 2010

RE: Arbor Operating Cabot #2
Permit # 37-017-2004-00

Dear Mr. Eichler,

Please allow this letter to confirm Arbor's intent to immediately withdraw the above mentioned Well Permit from the records of Pennsylvania Department of Environmental Protection.

We would also request a full release and return of our bonding mechanism.

Thank you for your immediate attention to this matter.

If you should have any questions please do not hesitate to contact our office.

ARBOR OPERATING L.L.C.

Dylan Fogelsong

Dylan Fogelsong

cc: Ms. Gail A. Myers Esquire

304 South Union Street, Traverse City, Michigan 49684
Tel 231 941 2237 Fax 231 941 2296

for mike
10-19-10

arbor
operating LLC

(10-066-K 3)

Honorable Judge Michael Krancer,

VIA FAX TO 717.783.4738

Please accept a copy of Arbor Operating's Letter to the Department of Environmental Protection, dated October 14th, 2010, as confirmation of Arbor Operating's desire to withdraw Permit # 37-017-2004-00 for the Cabot #2 well.

May we assume that this withdrawal will eliminate the need to appear on October 22nd? Please provide confirmation to Dylan Fogelsong at the number (s) below.

Thank you for your consideration.

Sincerely,

ARBOR OPERATING L.L.C.

Dylan Fogelsong

Enc.

104 South Union St.
Traverse City MI 49684

T 231.941.2237 F 231.941.2296

5500-FM-OG0001A Rev. 11/2007

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

WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 827239
Watershed Name: N. Bra Calkins Creek	Quality: HQ

Permittee	OGO.#	Permit Number	Date Issued
NEWFIELD APPALACHIA PA LLC	OGO-67425	37-127-20016-	04/30/2010

Address	Farm Name & Well Number	Well Serial #
363 N SAM HOUSTON PKWY E STE 2020	VE CRUM 1 1	
	Municipality: Damascus / County: Wayne	
HOUSTON, TX 77060-2424	7½ ' Quadrangle Name: Damascus	Map Section #: 5

Phone	Project #	Latitude	Longitude
(281) 847-6031		41-40-37.8900	-75-4-56.7400

Surf Elev at Site	Anticipated Total Depth	Well Type	Offset distances referenced to NE corner of map section.
904 feet	8350 feet	TE	South 11347 feet West 11136 feet

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

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

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

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

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

Special Permit Conditions:

This permit expires **04/30/2011** unless drilling is commenced on or before that date and prosecuted with due diligence.

S. Craig [illegible]
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-FM-OG0004 Rev. 1/2010

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

DEP USE ONLY	
Site ID	Primary Fac ID: 728804
Client Id: 277879	Subfacility Id

Well Record and Completion Report

ll Operator	DEP ID#	Well API # (Permit / Reg)	Project Number	Acres
NEWFIELD APPALACHIA PA LLC	277879	37-127-20016-		

Address	Well Farm Name & Well #	Serial #
363 N SAM HOUSTON PKWY E STE 2020,	VE CRUM 1 1	

City	State	Zip Code	County	Municipality
HOUSTON	TX	77060-2424	Wayne	Damascus

Phone	Fax	USGS 7.5 min. quadrangle map
(281) 847-6031		Damascus

Check all that apply: ☐ Original Well Record ☐ Original Completion Report ☐ Amended Well Record ☐ Amended Completion Report

WELL RECORD

Also complete the Log of Formations on back (page 2)

Well Type ☐ Gas ☐ Oil ☐ Combination Oil & Gas ☐ Injection ☐ Storage ☐ Disposal

Drilling Method ☐ Rotary – Air ☐ Rotary – Mud ☐ Cable Tool

Date Drilling Started	Date Drilling Completed	Surface Elevation	Total Depth – Driller	Total Depth - Logger
		ft.	ft.	ft.

Casing and Tubing

Cement returned on surface casing? ☐ Yes ☐ No

Cement returned on coal protective casing? ☐ Yes ☐ No ☐ N/A

Hole Size	Pipe Size	Wt.	Thread / Weld	Amount in Well (ft)	*Material Behind Pipe* Type and Amount	*Packer / Hardware / Centralizers* Type	Size	Depth	Date Run

COMPLETION REPORT

Perforation Record

Date	Interval Perforated From	To

Stimulation Record

Date	Interval Treated	*Fluid* Type	Amount	*Propping Agent* Type	Amount	Average Injection

Natural Open Flow	Natural Rock Pressure	Hours	Days
After Treatment Open Flow	After Treatment Rock Pressure	Hours	Days

Well Service Companies -- Provide the name, address, and phone number of all well service companies involved.

Name	Name	Name
Address	Address	Address
City - State – Zip	City - State – Zip	City - State – Zip
Phone	Phone	Phone

5500-FM-OG0004 Rev. 1/2010

LOG OF FORMATIONS

Well API#: 37-127-20016--

(If you will need more space than this page, please photocopy the blank form before filling it in.)

Formation Name or Type	Top (feet)	Bottom (feet)	Gas at (feet)	Oil at (feet)	Water at (fresh / brine; ft.)	Source of Data

I do hereby certify to the best of my knowledge, information and belief that the well identified on this Well Record and Completion Report has been properly cased and cemented in accordance with the requirements of 25 Pa. Code Chapter 78 and any conditions contained in the permit for this well. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator's Signature	**DEP USE ONLY**
	Reviewed by: Date:
Title: Date:	Comments:

5500-FM-OG0075 Rev. 8/2001

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

Well Site Restoration Report

DEP USE ONLY	
Site ID	Primary Fac ID: 728804
Client Id: 277879	Subfacility Id

A. Operator and Well Information

Please read instructions on back before completing this form.

Well Operator: NEWFIELD APPALACHIA PA LLC	DEP ID#: 277879	Well API # (Permit / Reg): 37-127-20016-	
Address: 363 N SAM HOUSTON PKWY E STE 2020,		Well Farm Name & Well #: VE CRUM 1 1	Serial #:
City: HOUSTON	State: TX / Zip Code: 77060-2424	County: Wayne	Municipality: Damascus
Phone: (281) 847-6031	Fax:		

B. Land Application of Tophole Water

Date applied	pH
Volume (bbls)	Spec. cond. (µmhos/cm)

C. Off-site Waste Disposal

Type: ☐ Driling Fluid (803) **Amount:** bbls

☐ Fracing Fluid (804) bbls

☐ Other, specify: **Qty:** bbls or tons

Method of disposal or reuse

☐ Disposal Well (04) ☐ Sewage Treatment Plant (10)

☐ Landfill (05) ☐ Brine Treatment Plant (12)

☐ Other (08)

Facility Information

Name | Permit #

Hauler Information

Name

Address

City | State | Zip Code

D. On-site Disposal – Drill Cuttings or Waste

Location of center of disposal area in relation to the well:

Course: degrees | Distance: feet

Describe the **material disposed**, including additives.

Specify disposal method

☐ Unlined pit, complete Section E. ☐ Dusting

☐ Lined pit, complete Section E. ☐ Solidification

☐ Land application, complete Section F. ☐ Other

E. Pit Disposal

Describe pit closure procedures.

Subbase, material: Thickness: inches

Pit liner, material: Thickness: mils

Pit dimensions (feet) Length: Width: Depth:

F. Land Application

Area: Length: feet Width: feet

Waste-to-soil ratio (by volume):

Chemical analysis of waste

Cadmium (Cd)	ppm	Nickel (Ni)	ppm
Copper (Cu)	ppm	Zinc (Zn)	ppm
Chromium (Cr)	ppm	Oil and Grease	%
Lead (Pb)	ppm	Spec. Cond.	µmhos/cm
Mercury (Hg)	ppm		

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

Instructions for Well Site Restoration Report

Form 5500-FM-OG0075

Use this form to file the Well Site Restoration Report as required under 25 Pa. Code § 78.65(3). This report is to be filed with the department within 60 days after the restoration of the well site.

Section A. Operator and Well Information

Enter the name, address and telephone number of the well operator/permittee.

Provide the requested well information.

Section B. Land Application Of Tophole Water

Land application of tophole water must be performed in accordance with 25 Pa. Code § 78.60.

Provide the date(s) when tophole water was applied to the land, the estimated volume discharged, and the pH and specific conductance readings of the tophole water.

Section C. Off-site Waste Disposal

If disposing of residual waste off-site, complete this section.

Check the box next to each type of waste taken off-site for disposal. More than one box may be checked. Identify the number of barrels of drilling or fracing fluid removed. If checking "other", identify the waste and show the amount in either barrels or tons. Circle the appropriate unit of measurement.

Check the box next to the type of facility or site receiving the waste. Provide the name and permit number of the facility.

Provide the name and address of the person or company hauling the waste.

Section D. On-site Disposal – Drill Cuttings or Waste

If disposing of drill cuttings and/or residual waste on-site in accordance with 25 Pa. Code § 78.61 (Disposal of drill cuttings), § 78.62 (Disposal of residual waste—pits), or § 78.63 (Disposal of residual waste—land application), complete this section.

Locate the approximate center of the disposal area by giving the course in degrees and the distance in feet from the wellhead.

Describe the types of materials that were disposed on-site. Include drill cuttings above the surface casing seat, drill cuttings below the surface casing seat, cement returns, drilling muds, frac sands, and any other material that is being disposed on-site. Indicate any additives that were in the materials being disposed.

Additives are usually present to modify the performance of cement, drilling muds or frac sands. An example might be salt or oil in drilling muds.

Check the box next to the on-site disposal methods used. If "other" is checked, briefly describe the method of disposal.

Section E. Pit Disposal

If disposing of drill cuttings under 25 Pa. Code § 78.61 (Disposal of drill cuttings) complete the pit dimensions part of this section. If disposing of drill cuttings and/or residual waste under 25 Pa. Code § 78.62 (Disposal of residual waste—pits), complete all of this section.

Describe the procedures used to close the pit. The procedures should conform to requirements in 25 Pa. Code § 78.62.

Describe the type of material and thickness used for the subbase and pit liner. The manufacturer should be identified when describing the type of material used for the pit liner.

Provide the dimensions of the pit, giving the appropriate length, width, and depth in feet.

Section F. Land Application

If disposing of drill cuttings and/or residual waste including contaminated drill cuttings under 25 Pa. Code § 78.63, complete this section.

Provide the approximate length and width of the land application area in feet. Indicate the ratio of waste to soil by volume. As an example, if a 3-inch layer of waste was mixed into a 6-inch layer of soil the ratio would be 1/2. In no case may the ratio exceed 1/1.

Complete the chemical analysis information if it is requested by the department. The analysis is to be performed on the waste soil mixture after land application has occurred. See the guidelines for land application in the "Oil and Gas Operators Manual" for taking samples and for analysis methods.

If more room is needed to complete any section, provide the information on 8 ½" by 11" sheets of paper and attach to this form. Indicate the sections the information applies to.

CRUM WELL PAD
NEWFIELD APPALACHIA PA LLC.

DAMASCUS TOWNSHIP, WAYNE COUNTY, PENNSYLVANIA

EROSION & SEDIMENT CONTROL PLAN

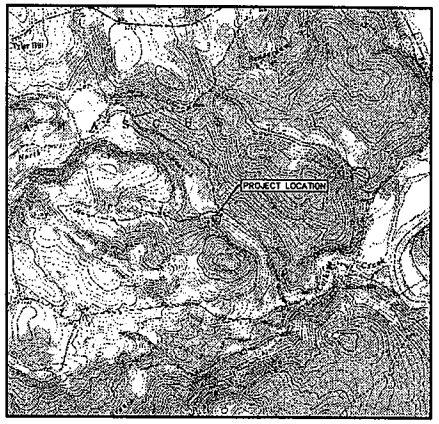
JUNE 2010

DRAWING INDEX	
No.	DRAWING TITLE
C-1	EROSION & SEDIMENT CONTROL PLAN
C-2	EROSION & SEDIMENT CONTROL NOTES
C-3	EROSION & SEDIMENT CONTROL DETAILS
C-4	STAKEOUT & SITE GEOMETRY PLAN
C-5	SITE SECTIONS
C-6	CONSTRUCTION DETAILS & BID QUANTITIES
C-7	CONSTRUCTION SPECIFICATIONS

TETRA TECH

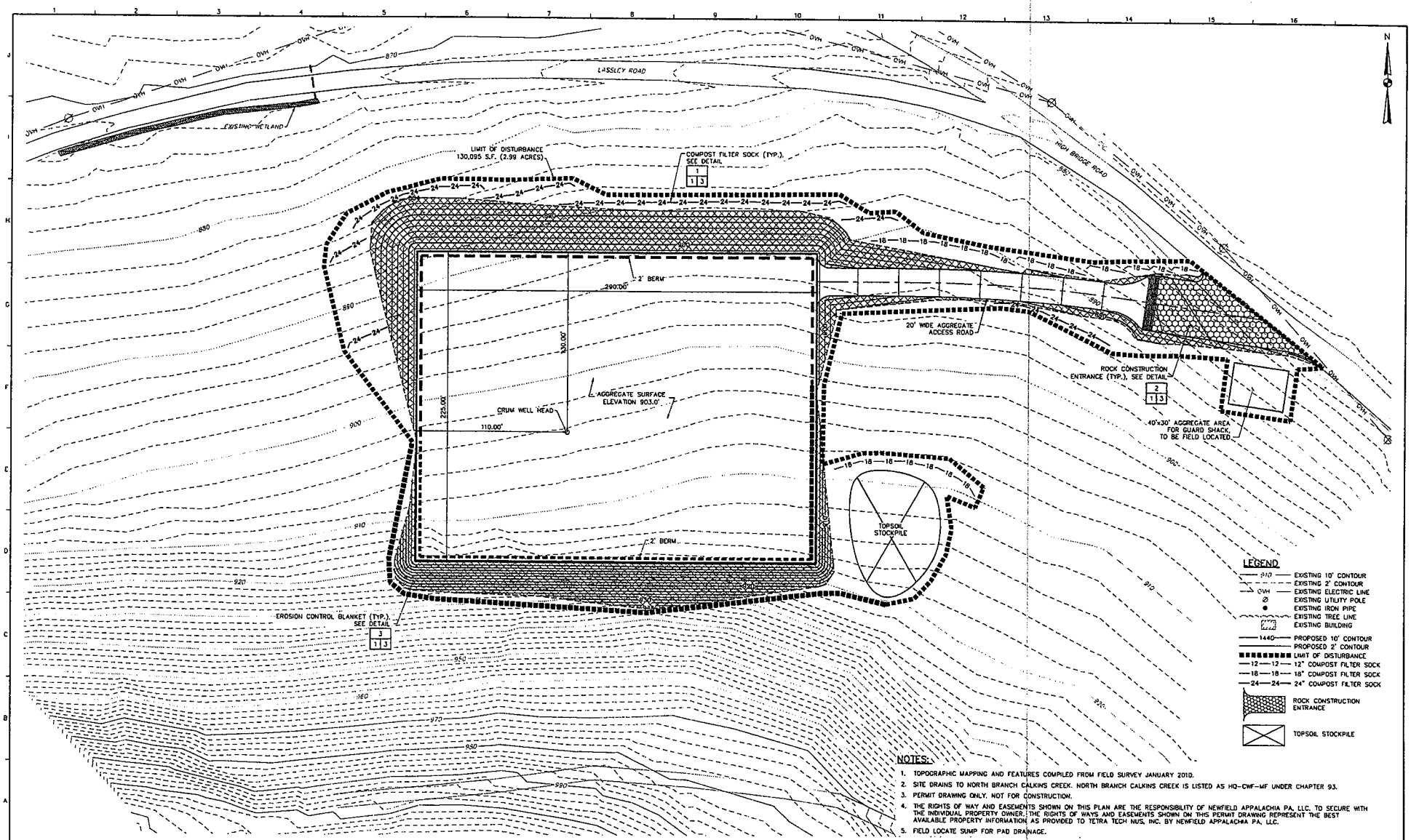
complex world | CLEAR SOLUTIONS™

661 ANDERSEN DRIVE – FOSTER PLAZA VII, PITTSBURGH, PA 15220
TEL: (412) 921-7090 | FAX: (412) 921-4040



LOCATION MAP
DAMASCUS, PA. – USGS 7.5' QUADRANGLE
CRUM WELL PAD
WAYNE COUNTY, PENNSYLVANIA
SCALE: 1" = 2000'

0 2000 4000
SCALE: 1" = 2000'



NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM FIELD SURVEY JANUARY 2010.
2. SITE DRAINS TO NORTH BRANCH CALKINS CREEK. NORTH BRANCH CALKINS CREEK IS LISTED AS HQ-CWF-MF UNDER CHAPTER 93.
3. PERMIT DRAWING ONLY. NOT FOR CONSTRUCTION.
4. THE RIGHTS OF WAY AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF NEWFIELD APPALACHIA PA, LLC. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS OF WAYS AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH NUS, INC. BY NEWFIELD APPALACHIA PA, LLC.
5. FIELD LOCATE SUMP FOR PAD DRAINAGE.

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
EROSION & SEDIMENT CONTROL PLAN

SCALE: 1" = 30'

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	1 OF 7

C-1

STANDARD EROSION AND SEDIMENT CONTROL PLAN NOTES

1. STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.
2. THE OPERATOR SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY IMPLEMENTED.
3. UNTIL THE SITE ACHIEVES FINAL STABILIZATION, THE OPERATOR SHALL ASSURE THAT THE BEST MANAGEMENT PRACTICES ARE IMPLEMENTED, INSPECTED, OPERATED, AND MAINTAINED. THE OPERATOR SHALL MAINTAIN AND MAKE AVAILABLE TO DEPARTMENT OF ENVIRONMENTAL PROTECTION, WRITTEN INSPECTION LOGS. ALL MAINTENANCE WORK, INCLUDING CLEANING, REPAIR, REPLACEMENT, REGRADING, AND RESTABILIZATION SHALL BE PERFORMED IMMEDIATELY UPON DISCOVERY OF DEFICIENCY.
4. ALL PUMPING OF SEDIMENT LADEN WATER SHALL BE THROUGH A SEDIMENT CONTROL BMP, SUCH AS A PUMPED WATER FILTER BAG DISCHARGING OVER NON-DISTURBED AREAS.
5. THE CONTRACTOR SHALL REVIEW THE PROVISIONS OF THE APPENDIX 64, EROSION CONTROL RULES AND REGULATIONS, TITLE 25, PART 1, DEPARTMENT OF ENVIRONMENTAL PROTECTION, SUBPART C, PROTECTION OF NATURAL RESOURCES, ARTICLE III, WATER RESOURCES, CHAPTER 102, EROSION CONTROL.
6. A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN MUST BE ON THE PROJECT SITE AT ALL TIMES.
7. EROSION AND SEDIMENT BMPS MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS WITHIN THE TRIBUTARY AREAS OF THOSE BMPS.
8. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS CONTROLS SHALL BE REMOVED. AREAS DISTURBED DURING REMOVAL OF THE BMPS MUST BE STABILIZED IMMEDIATELY.
9. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.
10. AT LEAST 3 DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES SHALL NOTIFY THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776 FOR BURIED UTILITIES LOCATIONS.
11. IN A TIMELY MANNER AFTER EARTH DISTURBANCE ACTIVITIES CEASE, THE OPERATOR SHALL STABILIZE ANY AREAS DISTURBED BY THE ACTIVITIES. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE SPECIFIED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY VEGETATIVE STABILIZATION SPECIFICATIONS. DISTURBED AREAS WHICH ARE AT FINISHED GRADE OR WHICH WILL NOT BE REDISTURBED WITHIN 1 YEAR MUST BE STABILIZED IN ACCORDANCE WITH THE PERMANENT VEGETATIVE STABILIZATION SPECIFICATIONS.
12. AT STREAM CROSSINGS, 50' BUFFER AREAS SHOULD BE MAINTAINED. ON BUFFERS, CLEARING, SOD DISTURBANCES, EXCAVATION, AND EQUIPMENT TRAFFIC SHOULD BE MINIMIZED. ACTIVITIES SHOULD AS STACKING LOGS, BURNING CLEARED BRUSH, DISCHARGING RAINWATER FROM TRENCHES, WELDING PIPE SECTIONS, REFUELING AND MAINTAINING EQUIPMENT SHOULD BE ACCOMPLISHED OUTSIDE OF BUFFERS.
13. MULCH OR EROSION CONTROL BLANKETS MUST BE INSTALLED ON ALL SLOPES 3:1 AND STEEPER.
14. SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED, OR PLACED IN TOPSOIL STOCKPILES.
15. THE OPERATOR SHALL REMOVE FROM THE SITE, RECYCLE, OR DISPOSE OF ALL BUILDING MATERIALS AND WASTES IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ. THE CONTRACTOR SHALL NOT ILLEGALLY BURY, DUMP, OR DISCHARGE ANY BUILDING MATERIAL OR WASTES AT THE SITE.

TEMPORARY EROSION AND SEDIMENT CONTROLS
INSPECTION AND MAINTENANCE SCHEDULE

BMP	INSPECTION FREQUENCY	MAINTENANCE TO BE PERFORMED
COMPOST FILTER SOCK	WEEKLY AND AFTER RAINFALL EVENTS	MAINTENANCE SHALL BE PERFORMED AS NEEDED . SEDIMENT SHALL BE REMOVED ONCE IT HAS ACCUMULATED TO ONE HALF THE ORIGINAL HEIGHT OF THE BARRIER. COMPOST FILTER SOCK SHALL BE REPLACED WHENEVER IT HAS DETERIORATED TO SUCH AN EXTENT THAT THE EFFECTIVENESS OF COMPOST FILTER SOCK IS REDUCED. COMPOST FILTER SOCKS SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED. ALL SEDIMENT ACCUMULATION AT THE COMPOST FILTER SOCK SHALL BE REMOVED AND PROPERLY DISPOSED OF BEFORE THE COMPOST FILTER SOCK IS REMOVED.
ROCK CONSTRUCTION ENTRANCE	DAILY	CONTRACTOR SHALL MAINTAIN/REPLACE MATERIAL AS NEEDED THROUGHOUT CONSTRUCTION TO MAINTAIN MINIMUM THICKNESS DURING USE OF ACCESS ROAD. A STOCKPILE OF ROCK WILL BE MAINTAINED ON SITE FOR THIS PURPOSE
MULCH STABILIZATION PEG AND TWINE	WEEKLY AND AFTER RAINFALL EVENTS	REPLACE MULCH, PEGS AND TWINE AS REQUIRED. RESTORE SEEDING IN AFFECTED AREA IF NECESSARY.

REVEGETATION

A. TEMPORARY GRASS COVER SHALL BE ESTABLISHED IN THE FOLLOWING AREAS:

1. WHERE SOIL STOCKPILES ARE TO BE EXPOSED FOR A PERIOD GREATER THAN THIRTY (30) DAYS, THE STOCKPILE SHALL BE SEEDED.
2. WHERE VEGETATIVE FILTERS MUST BE ESTABLISHED BELOW FILTER BAGS, A MINIMUM DISTANCE OF 10 FT SHALL BE SEEDED DOWNSLOPE OF THE TRAP OUTLET. TEMPORARY COVER - SEED MIXTURE FOR TEMPORARY COVER SHALL CONSIST OF 100% ANNUAL RYEGRASS. SEED SHALL BE APPLIED AT THE RATE OF 40 LB/ACRE OR AS RECOMMENDED BY A LOCAL RECOGNIZED SEED SUPPLIER APPROVED BY THE OWNER'S REPRESENTATIVE. PRIOR TO SEEDING, APPLY 1 TON OF AGRICULTURAL GRADE LIMESTONE PER ACRE PLUS FERTILIZER AT THE RATE OF 15-30-30 LB. PER ACRE AND WORK INTO SOIL.

B. PERMANENT COVER:

RECOMMENDED PERMANENT SEED MIXTURES
COOL AND WARM SEASON GRASS

MIXTURE NUMBER	SEASON	SEASON [SEEDING RATE LB/AC.]
1	COOL	TALL FESCUE*[79], OR FINE FESCUE[46], PLUS REDTOP[4], OR PERENNIAL RYEGRASS[19], PLUS BIRDSFOOT TREFOIL[8]
2	COOL	BIRDSFOOT TREFOIL[8], PLUS TALL FESCUE*[40]
3	COOL	ORCHARDGRASS[26], OR SMOOTH BROMEGRASS[33], PLUS BIRDSFOOT TREFOIL[8]
4	WARM	FLATPEA[27], PLUS TALL FESCUE*[26], OR PERENNIAL RYEGRASS[25]
5	WARM	DEERTOUNGE[21], PLUS BIRDSFOOT TREFOIL[8]
6	WARM	SWITCHGRASS[15], OR BIG BLUESTEM[15], PLUS BIRDSFOOT TREFOIL[8]

RECOMMENDED PERMANENT SEED MIXTURES
FOR STABILIZING DISTURBED AREAS

SITE CONDITION	SEED MIXTURE
CUT SLOPES & FILLS (NOT MOWED)	
WELL-DRAINED	2, 4 OR 6
VARIABLE DRAINAGE	2
CUT SLOPES & FILLS (MOWED)	1
CUT SLOPES & FILLS (GRAZED/HAY)	1, 2 OR 3
GULLIES & ERODABLE AREAS	2 OR 6
EROSION CONTROL BMP'S	
CHANNELS, DRAINAGE DITCHES, TRAP EMBANKMENTS, ETC	1 OR 2
FOR HAY OR SILAGE	2 OR 3
RIGHT-OF-WAY	
WELL-DRAINED	4 OR 6
VARIABLE DRAINAGE	2
WELL-DRAINED AREAS FOR GRAZING/HAY	2 OR 3
STRIP MINED AREAS	
SPOILS, WASTE AREAS, FLY ASH, SLAG, ETC. (LIME TO SOIL TEST)	2, 4 OR 5
FOR GRAZING/HAY	2, 3 OR 6

CONSTRUCTION SEQUENCE

REFER TO THE E&SC PLAN DRAWINGS FOR THE LOCATION OF THE PROPOSED WORK AND THE ASSOCIATED BMPS. A GENERALIZED CONSTRUCTION SEQUENCE IS PROVIDED BELOW. THE CONSTRUCTION SEQUENCE IS INTENDED TO PROVIDE A GENERAL COURSE OF ACTION IN ORDER TO CONFORM TO THE APPLICABLE REGULATORY AGENCY REQUIREMENTS FOR TEMPORARY AND PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL. ALL NECESSARY PARTS FOR PROPER AND COMPLETE EXECUTION OF WORK PERTAINING TO THIS PLAN, WHETHER SPECIFICALLY MENTIONED OR NOT, ARE TO BE PERFORMED BY THE CONTRACTOR. IT IS NOT INTENDED THAT THE DRAWINGS AND THIS REPORT SHOW EVERY DETAILED PIECE OF MATERIAL OR EQUIPMENT. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS LISTED IN THIS SECTION. THE CONTRACTOR MAY BE REQUIRED TO ALTER CONTROLS BASED ON EFFECTIVENESS OF CONTROLS OR DIFFERING CONDITIONS ENCOUNTERED IN THE FIELD.

1. LOCATE STAGING AREAS AND ACCESS POINTS INCLUDING CONSTRUCTION ENTRANCES. INSTALL SEDIMENT BARRIERS DOWN SLOPE OF THESE AREAS.
2. INSTALL ROCK CONSTRUCTION ENTRANCE. REFER TO THE ROCK CONSTRUCTION ENTRANCE DETAIL ON DRAWINGS FOR DIMENSIONS.
3. INSTALL SEDIMENT BARRIERS ALONG THE PERIMETERS OF THE SITE AS SHOWN ON THE CONSTRUCTION DRAWINGS.
4. INSTALL EROSION CONTROL SEDIMENT BASINS, EROSION CONTROL BLANKET, TEMPORARY SLOPE PIPES, CHANNELS AND ROCK APRONS AS SHOWN ON THE EROSION CONTROL PLAN DRAWINGS.
5. CLEAR AND GRUB THE SITE.
6. STRIP AND STOCKPILE TOPSOIL. CONSTRUCT STOCKPILES AS SHOWN IN THE DETAILS ON THE CONSTRUCTION DRAWINGS.
7. MINIMIZE TOTAL AREA OF DISTURBANCE. MAINTAIN ALL TEMPORARY SOIL STOCKPILES WITHIN EXISTING SOIL EROSION AND SEDIMENT CONTROLS.
8. GRADE SURFACE TO FINISHED GRADE ELEVATIONS AS SOON AS PRACTICABLE.
9. INSTALL EROSION CONTROL BLANKET ON ALL SLOPES GREATER THAN 3:1 AS SHOWN ON THE CONSTRUCTION DRAWINGS.
10. IMMEDIATELY SEED AND MULCH DISTURBED AREAS OR PREPARE FOR AGGREGATE STABILIZATION.
11. MAINTAIN ALL EROSION AND SEDIMENTATION CONTROL DEVICES UNTIL SITE WORK IS COMPLETE AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER AND AGGREGATE STABILIZATION IS ESTABLISHED.
12. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATIVE COVER AND AGGREGATE STABILIZATION OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS. REMOVE ALL SOIL AND EROSION SEDIMENT CONTROL MEASURES UPON ESTABLISHMENT OF A UNIFORM 70% VEGETATIVE COVER AND AGGREGATE STABILIZATION OVER THE DISTURBED AREA. RE-GRADE AND REVEGETATE AREAS DISTURBED DURING THE REMOVAL OF THE SOIL EROSION AND SEDIMENT CONTROLS.

SITE RESTORATION

AREAS AT FINAL GRADE ARE TO BE SEEDED, MULCHED AND STABILIZED IMMEDIATELY AS SPECIFIED ABOVE. WITHIN NINE MONTHS AFTER COMPLETION OF DRILLING THE WELL, THE OIL AND GAS WELL OWNER OR OPERATOR MUST RESTORE THE LAND SURFACE WITHIN THE AREA DISTURBED IN SITING, DRILLING, COMPLETING AND PRODUCING THE WELL. THIS INCLUDES:

a. REMOVING OR FILLING THE PIT USED TO CONTAIN PRODUCED FLUIDS OR INDUSTRIAL WASTES AND DRILL CUTTINGS. PROCEDURES FOR PROPER WASTE HANDLING AND DISPOSAL SHALL BE IN ACCORDANCE WITH DEP ACCEPTED PRACTICES AND STANDARDS.

b. REMOVING ALL DRILLING SUPPLIES NOT NEEDED FOR PRODUCTION. DRILLING SUPPLIES AND EQUIPMENT NOT NEEDED FOR PRODUCTION MAY BE STORED AT THE WELL SITE IF THE EXPRESS WRITTEN CONSENT OF THE SURFACE LANDOWNER IS OBTAINED.

c. IMPLEMENT TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES TO MINIMIZE THE POTENTIAL FOR ACCELERATED EROSION AND SEDIMENTATION DUE TO EARTH DISTURBANCES NECESSARY FOR SITE RESTORATION. THESE AREAS ARE TO BE SEEDED AND MULCHED UPON COMPLETION.

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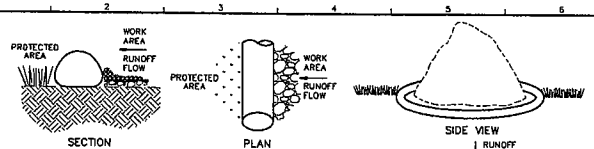
MARK	DATE	DESCRIPTION	BY

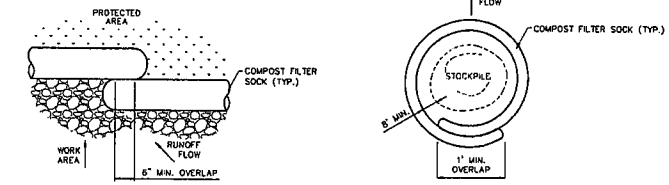
NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

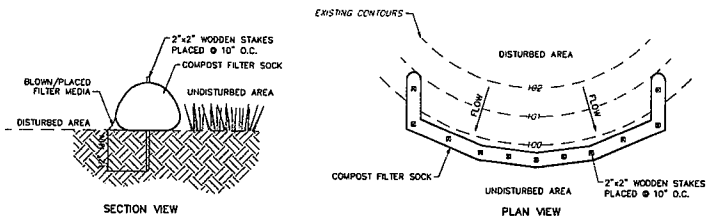
CRUM WELL PAD
EROSION & SEDIMENT CONTROL NOTES
SCALE: NOT TO SCALE

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	2 OF 7

C-2







COMPOST STANDARDS	
ORGANIC MATTER CONTENT	80%-100% (DRY WEIGHT BASIS)
ORGANIC	FIBROUS & ELONGATED
pH	5.5-8.0
MOISTURE CONTENT	35%-55%
PARTICLE SIZE	98% PASS THROUGH 1" SCREEN
SOLUBLE SALT CONCENTRATION	5.0 dS MAXIMUM

MAXIMUM SLOPE LENGTHS FOR COMPOST FILTER SOCK			
% SLOPE	12" DIAMETER	18" DIAMETER	24" DIAMETER
2 (OR LESS)	150	500	1000
5	100	250	550
10	50	150	325
15	35	100	215
20	25	70	175
25	20	55	135
30	15	45	100
35	15	40	85
40	15	35	75
45	10	30	60
50	10	25	50

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY 18" DIAMETER SOCK SHALL NOT EXCEED THAT SHOWN ON ABOVE TABLE FOR REINFORCED SILT FENCE. MAXIMUM SLOPE LENGTH FOR A 24" DIAMETER SOCK SHALL NOT EXCEED THAT FOR SUPER SILT FENCE.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.

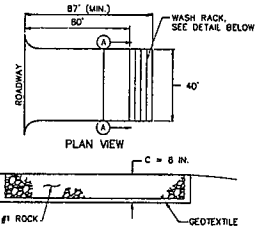
ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

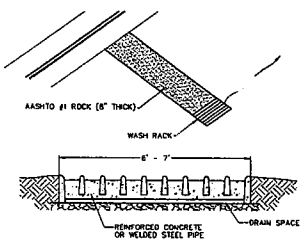
UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

COMPOST FILTER SOCK
NOT TO SCALE
1 | 1 | 3



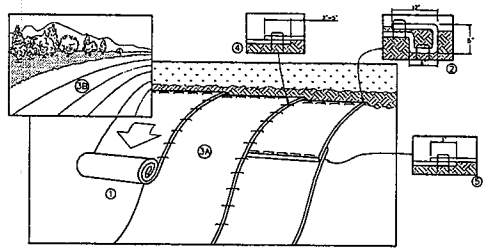
MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

ROCK CONSTRUCTION ENTRANCE
NOT TO SCALE
2 | 1 | 3



MAINTENANCE:
ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FUTHER USE OF THE RACK. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE.

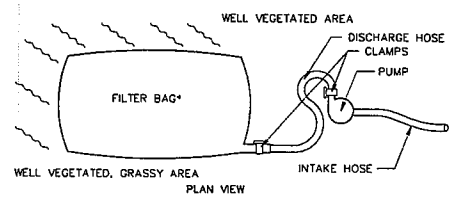
WASH RACK DETAIL
NOT TO SCALE

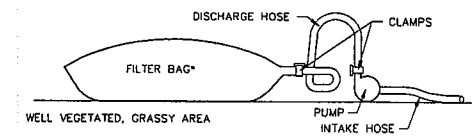


NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
   NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF RECP's EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE RECP's.
3. ROLL THE RECP's (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL RECP's MUST BE STAPLED WITH APPROXIMATELY 2" - 5" (5 CM - 12.5 CM) OVERLAP DEPENDING ON RECP's TYPE.
5. CONSECUTIVE RECP's SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE RECP's WIDTH.
   NOTE:
   *IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE RECP's.

EROSION CONTROL BLANKET - SLOPE INSTALLATION
NOT TO SCALE
3 | 1 | 3





NOTES:

1. FILTER SHALL BE MADE OF NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE-STITCHED "J" SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
2. SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FULL.
3. BAGS SHALL BE LOCATED IN WELL VEGETATED (GRASSY) AREAS, AND DISCHARGE INTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED.
5. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.

PUMPED WATER FILTER BAG
NOT TO SCALE

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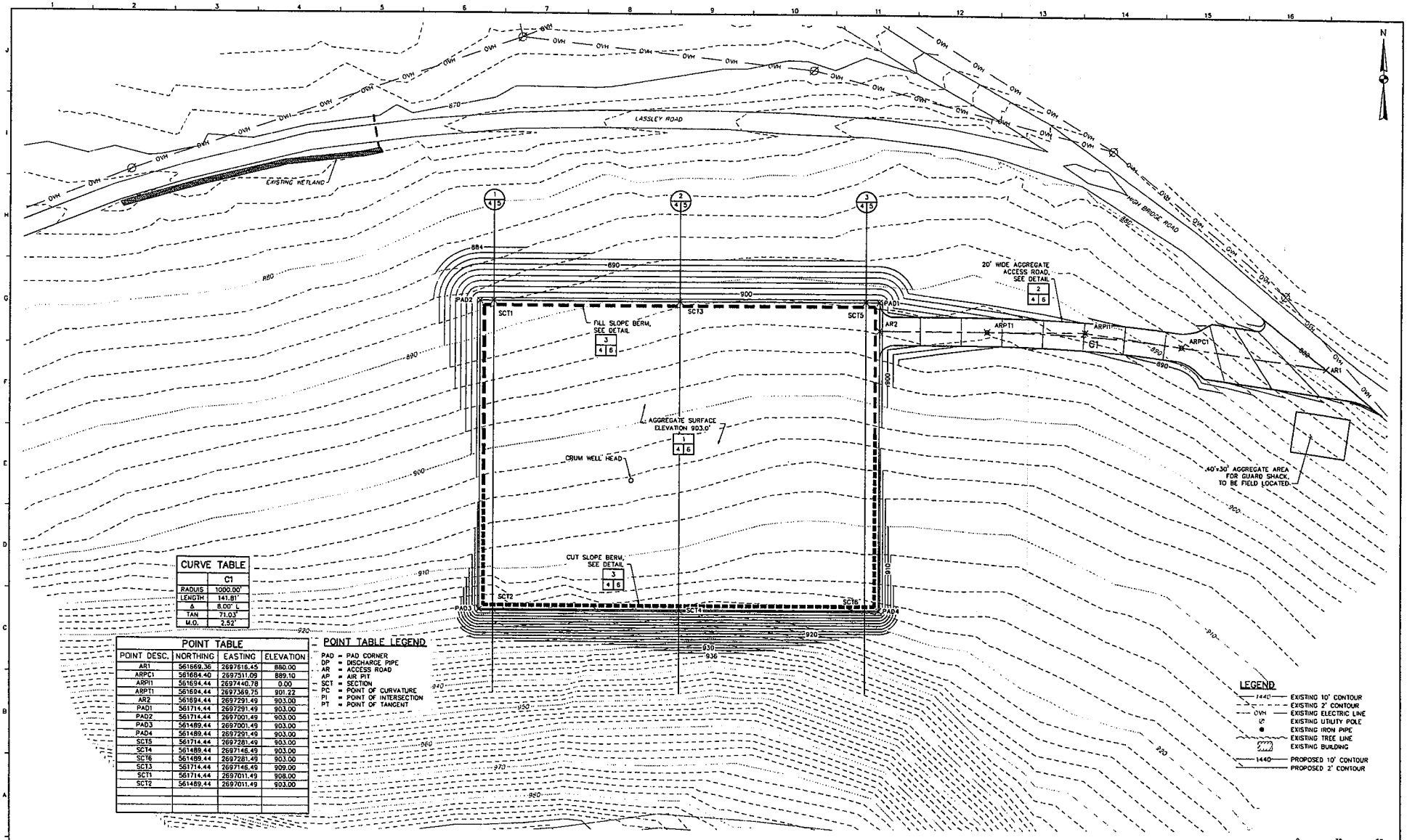
MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
EROSION & SEDIMENT CONTROL DETAILS
SCALE: AS NOTED

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	3 OF 7

C-3



CURVE TABLE	
	C1
RADIUS	1000.00'
LENGTH	141.81'
Δ	8.00°
TAN	71.03'
M.O.	2.52'

POINT TABLE			
POINT DESC.	NORTHING	EASTING	ELEVATION
AR1	561669.36	2697616.45	880.00
ARPC1	561684.40	2697511.09	889.10
ARPI1	561694.44	2697440.78	0.00
ARPT1	561694.44	2697369.75	901.22
AR2	561694.44	2697291.49	903.00
PAD1	561714.44	2697291.49	903.00
PAD2	561714.44	2697001.49	903.00
PAD3	561489.44	2697001.49	903.00
PAD4	561489.44	2697291.49	903.00
SCT5	561714.44	2697281.49	903.00
SCT4	561489.44	2697146.49	903.00
SCT6	561489.44	2697281.49	903.00
SCT3	561714.44	2697146.49	909.00
SCT1	561714.44	2697011.49	908.00
SCT2	561489.44	2697011.49	903.00

POINT TABLE LEGEND

- PAD = PAD CORNER
- DP = DISCHARGE PIPE
- AR = ACCESS ROAD
- AP = AIR PIT
- SCT = SECTION
- PC = POINT OF CURVATURE
- PI = POINT OF INTERSECTION
- PT = POINT OF TANGENT

LEGEND

- 1440 — EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- OVH — EXISTING ELECTRIC LINE
- EXISTING UTILITY POLE
- EXISTING IRON PIPE
- EXISTING TREE LINE
- EXISTING BUILDING
- 1440 — PROPOSED 10' CONTOUR
- PROPOSED 2' CONTOUR

SCALE: 1" = 30'

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MARK	DATE	DESCRIPTION	BY

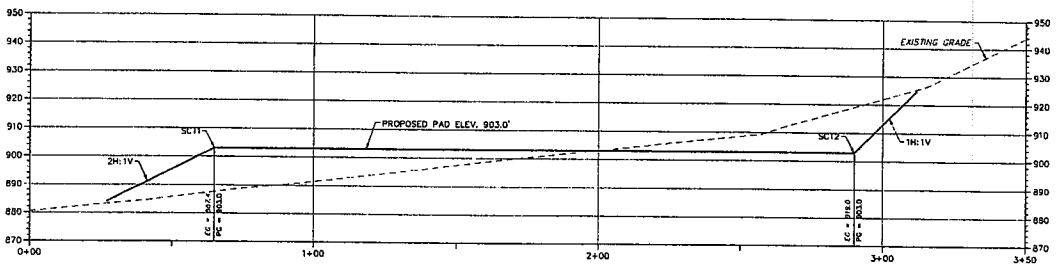
NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
STAKEOUT & SITE GEOMETRY PLAN

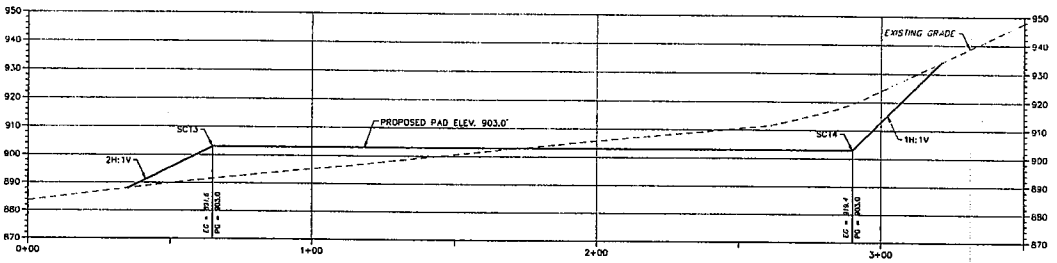
SCALE: 1" = 30'

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	4 OF 7

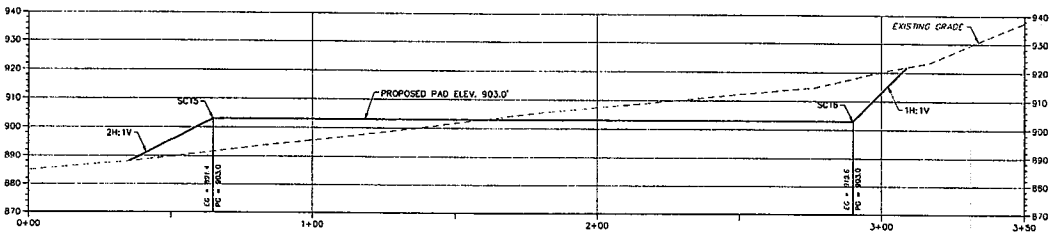
C-4



SECTION (1 / 4|5)
SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'



SECTION (2 / 4|5)
SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'



SECTION (3 / 4|5)
SCALE: HORIZ: 1" = 20'
VERT: 1" = 20'

0 20 40
SCALE: 1" = 20'

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MARK	DATE	DESCRIPTION	BY

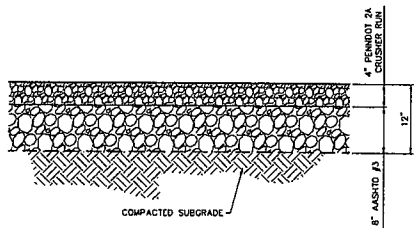
NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
SITE SECTIONS

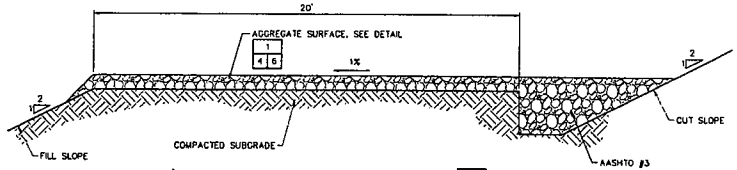
SCALE: 1" = 20'

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	5 OF 7

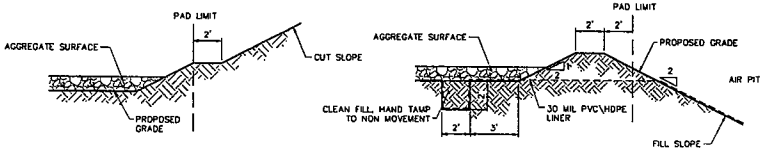
C-5



AGGREGATE SURFACE FOR WELL PAD & ACCESS ROAD [1 / 4 6]
NOT TO SCALE



20' WIDE AGGREGATE ACCESS ROAD DETAIL [2 / 4 6]
NOT TO SCALE



CUT SLOPE INSTALLATION

FILL SLOPE INSTALLATION

BERM DETAIL [3 / 4 6]
NOT TO SCALE

PROJECT BID QUANTITIES

ITEM	DESCRIPTION	UNITS	QUANTITY
1	MOBILIZATION/DE-MOBILIZATION	LUMP SUM	1
2	CLEARING & GRUBBING	ACRE	2.99
3	STRIP & STOCKPILE TOPSOIL	CUBIC YARD	2,450
4	COMPOST FILTER SOCK - 12" DIAMETER	LINEAR FOOT	0
5	COMPOST FILTER SOCK - 18" DIAMETER	LINEAR FOOT	360
6	COMPOST FILTER SOCK - 24" DIAMETER	LINEAR FOOT	580
7	AGGREGATE FOR WELL PAD, ACCESS ROAD & 30'x40' GUARD SHACK AREA	CUBIC YARD	2,800
8	ROCK CONSTRUCTION ENTRANCE	EACH	1
9	EARTHWORK (INCLUDES ACCESS ROAD, WELL PAD & DIVERSION DITCHES)	CUBIC YARD	10,700
10	ROCK CUT	CUBIC YARD	N/A
11	TEMPORARY SEED, SUPPLEMENTS & MULCH	ACRE	061
12	RIPRAP	CUBIC YARD	N/A
13	EROSION CONTROL BLANKET	SQUARE YARD	3,000
14	TIRE WASH RACK	EACH	1
15	SITE RESTORATION - AGGREGATE REMOVAL, SPREADING TOPSOIL, PERMANENT SEEDING	LUMP SUM	N/A
16	TEMPORARY CHAIN LINK FENCE DURING CONSTRUCTION	LINEAR FOOT	N/A
17	CULVERT PIPE FOR ACCESS ROAD CROSSING	LINEAR FOOT	N/A
18	MAINTENANCE AND REPAIR OF EROSION CONTROL DEVICES	LUMP SUM	1

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MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
CONSTRUCTION DETAILS & BID QUANTITIES

SCALE: AS NOTED

DATE:	6/15/10
PROJECT NO.:	112C02759
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	6 OF 7

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GENERAL

CONSTRUCTION ACTIVITIES WILL BE PERFORMED IN ACCORDANCE WITH PENN DOT PUBLICATION 408 SPECIFICATIONS – LATEST EDITION. THE FOLLOWING CONSTRUCTION OPERATIONS ARE INCLUDED IN THE BID PACKAGE FOR THE SITE AND ARE SUMMARIZED BELOW: SHOULD A CONFLICT BE DISCOVERED, CONTACT THE OWNER FOR A FINAL DECISION. THE OWNER IS DEFINED AS NEWFIELD APPALACHIA PA LLC.

THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND OR MANUFACTURERS MATERIAL CATALOG CUTS TO THE OWNER FOR REVIEW.

THE CONTRACT TERMS AND CONDITIONS SHALL BE IN ACCORDANCE WITH THE GENERAL AND SPECIAL PROVISIONS AND THE AGREEMENT AS PROVIDED BY THE OWNER.

TECHNICAL SPECIFICATIONS

1.0 CLEARING AND GRUBBING –

1.1 DESCRIPTION

REMOVAL OF TOPSOIL TO THE LIMITS OF GRADING AND STOCKPILE ON SITE AT A LOCATION DESIGNATED BY THE OWNER.

REMOVAL OF ORGANIC MATERIAL TO THE LIMITS OF GRADING AND DISPOSE OF OFF SITE

REMOVAL OF TRASH OR DEBRIS WITHIN THE GRADING LIMITS

1.2 CONSTRUCTION

INSTALL EROSION AND SEDIMENT CONTROL FEATURES PRIOR TO THE START OF CLEARING AND GRUBBING OPERATIONS

CUT TREES AND SHRUBS AND DISPOSE OF OFFSITE UNLESS DIRECTED BY THE OWNER

BURNING IS NOT PERMITTED

REMOVE STUMPS WITHIN THE GRADING AREA TO A DEPTH AT LEAST 2 FEET BELOW THE SUBGRADE ELEVATION AND OR SLOPE ELEVATIONS

DO NOT DAMAGE TREES OR AREAS BEYOND THE LIMIT OF GRADING. DAMAGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2.0 EROSION AND SEDIMENT CONTROLS

2.1 DESCRIPTION

PROVIDE, FURNISH, INSTALL AND MAINTAIN THE EROSION AND SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND OR THE APPROVED EROSION AND SEDIMENT CONTROL PLAN

2.2 MATERIAL

COMPOST FILTER SOCKS SHALL BE COMMERCIALLY MADE USING 5 MIL CONTINUOUS HDPE FILAMENT WOVEN INTO A TUBULAR MESH NETTING WITH 3/8 INCH WOVEN OPENINGS. COMPOST FILTER SOCK DIAMETERS ARE 12 INCH, 18 INCH AND 24 INCHES.

COMPOST – SEE SHEET C-3

WOODEN STAKES – 2 INCH BY 2 INCH BY 42 INCH

ROCK CONSTRUCTION ENTRANCE

AASHTO #1 LIMESTONE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION703 – AGGREGATE

GEOTEXTILE – CLASS 4 SEPARATION IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 735

TRUCK WASH RACK

CONCRETE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 704 CEMENT CONCRETE – CLASS C.

WELDED STEEL PIPE – MINIMUM 4 INCH DIAMETER

EROSION BLANKET

100% BIODEGRADABLE EROSION CONTROL BLANKET, MACHINE-PRODUCED MAT OF 100% COCONUT FIBER WITH A FUNCTIONAL LONGEVITY OF UP TO 24 MONTHS.

THE BLANKET SHALL BE OF CONSISTENT THICKNESS WITH THE COCONUT EVENLY DISTRIBUTED OVER THE ENTIRE AREA OF THE MAT. THE BLANKET SHALL BE COVERED ON THE TOP AND BOTTOM SIDES WITH 100% BIODEGRADABLE WOVEN, NATURAL, ORGANIC FIBER NETTING. THE TOP NETTING SHALL CONSIST OF MACHINE DIRECTIONAL STRANDS FORMED FROM TWO INTERTWINED YARNS WITH CROSS DIRECTIONAL STRANDS INTERWOVEN THROUGH THE TWISTED MACHINE STRANDS TO FORM AN APPROXIMATE 0.50 X 1.00 (1.27 X 2.54 CM) MESH. THE BLANKET SHALL BE SEWN TOGETHER ON 1.50 INCH (3.81 CM) CENTERS WITH DEGRADABLE THREAD.

MATERIAL SHALL MEET REQUIREMENTS ESTABLISHED BY THE EROSION CONTROL TECHNOLOGY COUNCIL (ECTC).

MATERIAL CONTENT

MATRIX – 100 PERCENT COCONUT FIBER 0.5 LBS/YD2

NETTINGS – 100 PERCENT BIODEGRADABLE ORGANIC JUTE FIBER 9.3 LB/1000 FT2

THREAD – BIODEGRADABLE

TEMPORARY SEED AND MULCH

SEE SHEET C-2

PENNDOT PUBLICATION 408 SECTION 805 – MULCHING – HAY, STRAW OR WOOD FIBER

RIP RAP

IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 850 – ROCK LINING: R-4

2.3 CONSTRUCTION

INSTALL THE ROCK CONSTRUCTION ENTRANCE AND TIRE WASH FACILITY PRIOR TO THE START OF EARTHWORK OPERATIONS. MAINTAIN THE ROCK THICKNESS BY ADDING ROCK FROM AN ADJACENT STOCKPILE.

REMOVE SEDIMENT DEPOSITS ON A DAILY BASIS FROM THE ROCK ENTRANCE AND PUBLIC STREETS AND RETURN THE SEDIMENT TO THE CONSTRUCTION SITE.

INSTALL FILTER SOCKS AT THE LOCATIONS SHOWN ON THE CONTRACT DRAWINGS IN ACCORDANCE WITH THE DIAMETER SPECIFIED.

INSTALL 2 INCH BY 2 INCH WOODEN STAKE AT TEN FEET ON CENTER THROUGH THE FILTER SOCK.

INSTALL EROSION BLANKET UPON COMPLETION OF EARTH DISTURBANCE AND EMBANKMENT CONSTRUCTION. APPLY TEMPORARY SEED AND MULCH.

MAINTENANCE AND REPAIR:

INSPECT AND REPAIR DAMAGED OR DISLODGED EROSION AND SEDIMENT CONTROL DEVICES. INSPECT THE CONTROL DEVICES AFTER EACH RAIN EVENT AND OR AT A MINIMUM OF WEEKLY. IMMEDIATELY REPAIR, RE-STAKE, EXTEND OR REPLACE DAMAGED CONTROL DEVICES.

REMOVE SEDIMENT BUILD UP OR DEBRIS WHEN THE BUILD UP REACHES ONE HALF THE HEIGHT OF THE CONTROL DEVICE. DISPOSE OF THE SOIL MATERIAL ON SITE. DISPOSE OF TRASH AND DEBRIS OFF SITE.

INSTALL ROCK LINING AT THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

3.0 DEMOLITION

3.1 DESCRIPTION

REMOVAL OF BUILDINGS, WALLS, STRUCTURES AS INDICATED ON THE CONTRACT DRAWINGS.

3.2 CONSTRUCTION

REMOVE AND DISPOSE OF OFF SITE BUILDINGS, WALLS, STRUCTURES AS INDICATED.

ONSITE DISPOSAL IS NOT PERMITTED.

4.0 EARTHWORK – EXCAVATION AND EMBANKMENT

4.1 DESCRIPTION

EXCAVATE SOIL AND ROCK TO THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

CONSTRUCT EMBANKMENTS TO THE LINES AND GRADES INDICATED ON THE CONTRACT DRAWINGS.

4.2 CONSTRUCTION

EXCAVATE SOIL AND ROCK BY MECHANICAL MEANS.

BLASTING IS NOT PERMITTED.

PREPARED THE EMBANKMENT FOUNDATION AREA IN ACCORDANCE WITH SECTION 1.0 CLEARING AND GRUBBING.

PLACE SOIL MATERIAL IN NOT MORE THAN EIGHT INCH LOOSE LIFTS FOR THE FULL WIDTH AND COMPACT TO NOT LESS THAN 95% OF ASTM D698 STANDARD PROCTOR. THE CONTRACTOR SHALL SAMPLE, TEST AND SUBMIT THE RESULTS TO THE OWNER PRIOR TO THE START OF EMBANKMENT OPERATIONS. MAINTAIN SOIL OPTIMUM MOISTURE WITHIN PLUS OR MINUS TWO PERCENTAGE POINTS.

DO NOT PLACE SOIL MATERIAL THAT IS FROZEN, WET OR CONTAINING OBJECTIONABLE MATERIAL.

PLACE ROCK MATERIAL IN UNIFORM LAYERS. MAXIMUM ROCK SIZE PERMITTED IN THE EMBANKMENT IS EIGHT INCHES IN ANY DIMENSION.

PREPARE THE PAD SUBGRADE AND ACCESS ROAD SUBGRADE BY COMPACTING THE TOP TWO FEET OF THE EMBANKMENT OR CUT SURFACE TO 100% OF ASTM D698 STANDARD PROCTOR.

SHOULD NON RIPABLE ROCK BE ENCOUNTERED, IMMEDIATELY CONTACT THE OWNER FOR DIRECTION ON EXCAVATION.

6.0 CULVERT PIPE

6.1.1 DESCRIPTION

FURNISH, PROVIDE AND INSTALL DUCTILE IRON OR WELDED STEEL CULVERT PIPE AT ROAD CROSSINGS AT THE DIAMETER, LINE AND GRADE INDICATED ON THE CONTRACT DRAWINGS.

6.1.2 MATERIAL

WELDED STEEL CULVERT PIPE IN ACCORDANCE WITH A53, TYPE S.

DUCTILE IRON PIPE IN ACCORDANCE WITH ASTM A716

6.1.3 CONSTRUCTION

INSTALL AND MAINTAIN CULVERT PIPE DURING CONSTRUCTION. KEEP THE PIPE CLEAR OF DEBRIS AND SEDIMENT BUILDUP.

7.0 WELL PAD AND ACCESS ROAD

7.1 DESCRIPTION

PROVIDE, FURNISH AND INSTALL AGGREGATE FOR THE WELL PAD SURFACE AND THE ACCESS ROAD SURFACE.

7.2 MATERIAL

AGGREGATE IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 703 AGGREGATE

SIX INCHES OF AASHTO # 3

SIX INCHES OF PENNDOT # 57

PERFORATED CORRUGATED POLYETHYLENE CULVERT UNDERDRAIN PIPE

FOUR INCH DIAMETER IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 601 – PIPE CULVERTS

7.3 CONSTRUCTION

COMPACT AND SHAPE SUBGRADE TO THE LINES AND GRADES ON THE CONTRACT DRAWINGS.

COMPACT THE SUBGRADE TO 100% OF ASTM D698 STANDARD PROCTOR. REMOVE AND REPLACE ANY SUBGRADE THAT IS SOFT OR DISPLAYS VISUAL MOVEMENT WITH CLEAN FILL.

INSTALL THE AGGREGATE IN TWO LIFTS. COMPACT LIFTS TO NON-MOVEMENT.

INSTALL THE CORRUGATED CULVERT PIPE TO THE LINE AND GRADE SHOWN ON THE CONTRACT DRAWINGS.

8.0 SITE RESTORATION

8.1 DESCRIPTION

UPON COMPLETION OF THE WELL DRILLING AND AT THE NOTIFICATION BY THE OWNER, RETURN TO THE SITE AND REMOVE AND DISPOSE OF LOOSE AGGREGATE. COVER THE SITE WITH TOPSOIL FROM THE CURRENT STOCKPILE AND APPLY PERMANENT SEED, SUPPLEMENTS AND MULCH.

8.2 MATERIAL

TOPSOIL FROM THE EXISTING STOCKPILE

PERMANENT SEED AND SOIL SUPPLEMENTS SEE SHEET C-2

MULCH IN ACCORDANCE WITH PENNDOT PUBLICATION 408 SECTION 805 – MULCHING – HAY, STRAW OR WOOD FIBER

8.3 CONSTRUCTION

REMOVE AND DISPOSE OF OFF SITE LOOSE AGGREGATE FROM THE WELL PAD.

SPREAD TOPSOIL EVENLY ACROSS THE WELL PAD AND APPLY PERMANENT SEED, SOIL SUPPLEMENTS AND MULCH

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MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
CONSTRUCTION SPECIFICATIONS

SCALE: AS NOTED

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	7 OF 7

C-7

DAMASCUS TOWNSHIP

WAYNE COUNTY, PENNSYLVANIA

NOTICE OF ACTIVE PERMIT

DRIVEWAY PERMIT

PERMIT NUMBER 3402

ISSUED TO **VERNON D. & ELEANOR B. CRUM**

ISSUED: **05/10/10**

FOR: **ACCESS DRIVEWAY**

PIPE: **YES** DIAM: **18 INCHES**

PIPE OFFSET FROM ROAD CENTERLINE (FT): **20+-**

LOCATION: **NO #** **HIGH BRIDGE ROAD**

CONSTRUCTION MUST BEGIN WITHIN 12 MONTHS OF DATE OF ISSUE.

THIS NOTICE MUST BE POSTED AT THE PROJECT LOCATION WHERE IT IS VISIBLE TO THE PUBLIC.

ZONING OFFICER

DAMASCUS TOWNSHIP ROAD OCCUPANCY PERMIT

DAMASCUS TOWNSHIP, WAYNE COUNTY, PENNSYLVANIA

ISSUED IN ACCORDANCE WITH ATTACHED DOCUMENTS

DATE ISSUED:	**May 10, 2010**				
ISSUED TO:	**VERNON D. & ELEANOR B. CRUM**				
ADDRESS:	**94 LASSLEY ROAD, MILANVILLE, PA 18443**				
LOCATION:	**NO #**	**HIGH BRIDGE ROAD**			**T-636**
PERMIT NO.:	**3402**				
WORK START DATE		**05/10/10**			
WORK MUST BE COMPLETED BEFORE		**05/10/11**			
PERMIT ISSUED FOR USE TYPE:		**ACCESS DRIVEWAY**			
NEAREST INTERSECTING ROAD:		**LASSLEY ROAD**			
DIST. TO NEAREST ROAD:		**250+-**	**FEET**		
DIST. TO NEAREST INTERSECTING DRIVEWAY SAME SIDE				**N/A**	**FEET**
DIST. TO NEAREST INTERSECTING DRIVEWAY OPP SIDE				**50+-**	**FEET**
TOWNSHIP ROAD R.O.W. WIDTH		**33**	**FEET**		
IMPROVED ROADWAY WIDTH		**18**	**FEET**		
APPROX. SIGHT DISTANCE LEFT		**250**	**FEET**		
APPROX. SIGHT DISTANCE RIGHT		**300**	**FEET**		
POSTED SPEED LIMIT:		**N/A**	**MPH**		
PURPOSE OF WORK:		**COMMERCIAL**			
INSTALL CULV. PIPE		**YES**			
MIN. PIPE DIAM		**18**	**INCH**		
MIN. PIPE LENGTH		**60+-**	**FEET**		
OFFSET FROM ROAD CENTER		**20+-**	**FEET MIN.**		
UTILITY OVERHEAD OR UNDERGROUND		**N/A**			
UTILITY PARALLEL OR CROSSING		**N/A**			
UTILITY OFFSET FROM RD CENTER		**N/A**	**FEET**		

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Out-of-state callers dial 8-1-1

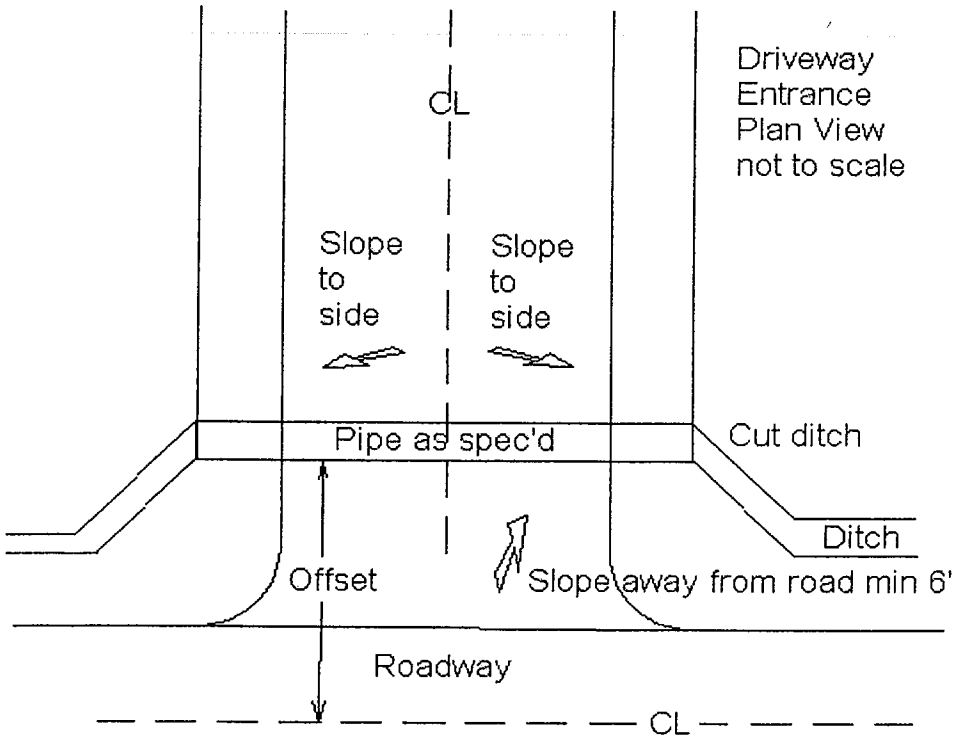
Be prepared to provide exact dig location.

1. **Under and subject to all conditions, restrictions and regulations prescribed by the Township and on the general provisions and specifications, a true copy whereof is attached and made a part hereof, with the same force and effect as if written or printed herein and subject to the special conditions, restrictions and regulations hereinafter set forth.**
2. **Property owner is responsible for clearing of brush, trees and other obstructions to enable and maintain adequate sight distance at all times.**
3. **Property owner is responsible for maintaining any drainage facilities installed to prevent water runoff from eroding or flooding the public roadway, or otherwise creating a nuisance or hazard.**
4. **No parking of any vehicles in a public roadway is allowed.**
5. **Notify Township 48 hours in advance of start of construction for inspection.**
6. **No grading or altering of stormwater drainage allowed without consulting Township.**

APPROVED BY: _____ DATE: 5/26/10

IMPORTANT: 1) The terms and conditions of this permit require the permittee to complete this work by the date specified in the permit. Where permittee fails to complete the work by the time specified the permit will become void. 2) If the permittee applies for a time extension before the epiration date of this permit a 30 day extension will be granted in the form of a supplemental permit. 3) If the work is started and not completed by specified date permittee must notify the Township prior to the expiration date of the permit. 4) The fees are applied to inspections of the site and associated filing of documents by the Township and are not refundable.

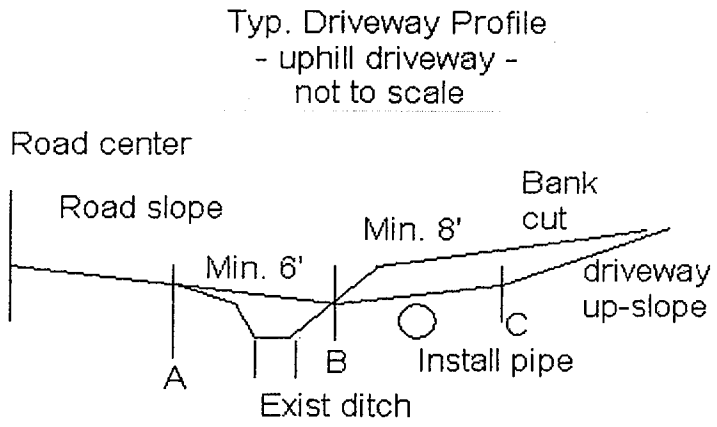
FIGURE 1 - DRIVEWAY ENTRANCE PLAN VIEW



Notes:

1. Driveway must be crowned min 4% from centerline to provide positive drainage.
2. Pipe must be set back (offset) minimum as specified in permit. Further setback to provide adequate cover over the pipe is allowable. 20+- feet from center
3. Minimum recommended pipe cover 12 inches of material.
4. Pipe size must be minimum diameter as specified in permit. 18 inches min.
5. Roadside ditch must be cut to provide flow of stormwater to and from installed pipe.
6. Grade must be downhill from roadway as specified in figure 3 or 4.
7. Runoff from driveway must not reach roadway.
8. No grading or altering of stormwater drainage allowed without consulting Township.

FIGURE 3 - DRIVEWAY PROFILE (TYP) - UPHILL ACCESS



Notes:

1. Driveway must be crowned min 4% from centerline to provide positive drainage.
2. Cut upslope to provide drainage ditch.
3. Driveway ditch must discharge to driveway pipe.
4. Fill downslope side as needed.
5. Runoff must run to sides of driveway surface
6. Runoff must not be allowed to run into township roadway.
7. No grading or altering of stormwater drainage allowed without consulting Township.
8. Minimum recommended pipe cover 12 inches of material.

Driveway Address for the Crum 1-1 Well Site

Address was assigned by GIS and is on file with county Emergency Management office and 911 dispatch.

Crum 1-1
151 High Bridge Rd
Milinville PA 18423

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

Prepared for:

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

Prepared by:

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

May 2010

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 DESCRIPTION OF FACILITY

1.1 DESCRIPTION OF THE INDUSTRIAL OR COMMERCIAL ACTIVITY

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

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

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

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

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

1.2 DESCRIPTION OF EXISTING EMERGENCY RESPONSE PLANS

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

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

1.3 MATERIAL AND WASTE INVENTORY

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

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

1.4 POLLUTION INCIDENT HISTORY

Newfield has not had any reportable incidents for this facility.

1.5 IMPLEMENTATION SCHEDULE FOR PLAN ELEMENTS NOT CURRENTLY IN PLACE

All plan elements are in place.

1.6 PURPOSE AND IMPLEMENTATION OF PPC PLAN

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

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

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

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

1.7 PLAN REVISIONS

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

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

2.0 IMPLEMENTATION OF PPC PLAN

2.1 ORGANIZATIONAL STRUCTURE OF FACILITY FOR IMPLEMENTATION

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

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

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

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

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

2.2 LIST OF EMERGENCY COORDINATORS

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

Primary Emergency Coordinator

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

Secondary Emergency Coordinator

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

2.3 DUTIES AND RESPONSIBILITIES OF THE EMERGENCY COORDINATOR

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

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

4. Assess the health or environmental hazards and how this problem or condition will affect employees or its affect on the surrounding community.

5. Take all reasonable measures to stabilize the situation. The Emergency Coordinator will take all reasonable measures to ensure that the fire, explosion, emission, or discharge does not reoccur or spread to other materials at the site. These measures can include, when appropriate, stopping operations, collecting and containing released materials or wastes, and removing or isolating containers.

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

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

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

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

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

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

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

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

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

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

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

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

The report should include the following information:

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

2.4 CHAIN OF COMMAND

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

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

2.5 DISTRIBUTION OF THIS PPC PLAN

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

- Drilling Manager (Primary Emergency Coordinator)
- Production Manager (Secondary Emergency Coordinator)

The PPC Plan will be reviewed and amended, if necessary, based on the criteria described earlier in Section 1.7.

3.0 SPILL AND LEAK PREVENTION AND RESPONSE

The site will be maintained and operated to minimize the possibility of a fire, explosion or discharge of oils, hazardous materials or their constituents to air, soil, surface water or groundwater which could threaten human health or the environment, in accordance with the requirements of 25 PA Code Section 265.31.

3.1 PRE-RELEASE PLANNING

The following sections discuss specific locations where the potential exists for accidental spills of oils and/or chemicals. The controls that are in place to minimize the potential for an uncontrolled release to the environment are also discussed. In the event that an uncontrolled spill of hazardous substances occurs, the procedures described in Section 4.0 will be followed.

To enhance spill prevention at the facility, great care will be exercised in handling oil and other materials covered in this PPC Plan. Any unusual conditions observed by any employees or contractors will be reported to one of the Emergency Response Coordinators. Management personnel whose responsibilities include involvement with the materials discussed in this document will also be familiar with this plan and the procedures recommended for spill prevention.

Spill Prevention Measures: Procedures that are to be followed to prevent and/or minimize oil spills at the Newfield facility include:

- ASTs and/or containers will be stored in secondary containment with sufficient volume;
- ASTs and regulated material containers will be visually inspected weekly for leaks;
- Special care will be taken when transferring regulated materials to prevent product loss;
- Regulated materials will be stored in a manner that minimizes the potential for contact with stormwater;
- Absorbent and spill control materials shall be maintained on-site for emergency use;

- Emergency response personnel will be familiar with procedures to follow in the case of a spill; and

- In cases where there may be leaking equipment or operations where oil or oil-related compounds are leaked, spilled, or otherwise released, containment booms or absorbent materials shall be used and equipment shall be repaired.

In the event that an uncontrolled spill of oil or a hazardous material occurs, the procedures described in Section 4.0 will be followed. Responses should be coordinated with federal, state and local agencies as appropriate.

3.2 MATERIAL COMPATIBILITY

The majority of materials received on-site in totes, drums, pails or other small containers are stored in the containers supplied by the manufacturer.

Construction materials used for the ASTs have been selected and designed to be compatible with the materials that are being stored and are typical for the natural gas industry.

3.3 INSPECTIONS AND MONITORING PROGRAM

Operating equipment will be inspected daily, and a copy of the inspection and maintenance form is included in Appendix A. Employees are responsible for detecting and reporting potential problems on the inspection and maintenance form.

Storage tank inspections will be conducted weekly and include evaluation of the following: pumps, valves, and fittings for leaks; the tank condition for evidence of corrosion; secondary containment; evidence of spilled materials; and effectiveness of housekeeping practices.

Completed inspection forms and inspection reports will be maintained in the Primary Emergency Coordinator's office. Noncompliance issues identified during the comprehensive site evaluation will be addressed in a timely manner. If additional control measures are required, implementation of the measures will generally occur within 90 days of the site evaluation. Compliance issues that require revisions to the PPC Plan (description of additional pollutant sources, measures, or controls) will be incorporated into the plan within approximately 15 days of the site evaluation.

Stormwater Management System: Stormwater inspections will include an evaluation of best management practices (BMPs), where appropriate. In accordance with the erosion and sedimentation control plan prepared for the site, erosion and sedimentation control (ESC) measures will be implemented where there is the potential for sediment or soil particles to impact stormwater quality. Repairs will be made, as necessary, following the site inspection.

Storage Tanks and Drum Storage Areas: Tanks and drum storage areas will be accessed daily. Spills or leaks that may occur will be contained by secondary containment and noted as part of routine facility operations. To enhance the daily observations, periodic inspections will be performed for the tank and drum storage areas as described in Table 2. The inspections will include observation of spill and/or leaks and observations of the condition of associated secondary containment structures. Records for the inspections will be maintained in the Primary Emergency Coordinator's office.

3.4 PREVENTIVE MAINTENANCE

Newfield will ensure that preventative maintenance of operating machinery on each construction site is performed regularly.

3.5 HOUSEKEEPING PROGRAM

The Newfield Construction Manager will be responsible for general construction site housekeeping. Specific steps taken under this program will include:

- Debris and/or sediment removal, as necessary.
- Regular refuse pickup and disposal.
- Proper filling and emptying of storage containers, tanks, and equipment to minimize spill potential.
- Periodic review of good housekeeping procedures in the employee-training program.

Once completed, the Production Manager will have overall responsibility for housekeeping at the facility. Newfield currently does not anticipate that bulk quantities of hazardous waste materials will be stored at the facility.

3.6 SECURITY

The facility is not fully fenced but is located in a remote location with limited access except via the site access road. The facility is normally manned during drilling and well development.

Flow and drain valves are locked and in the off position when in non-operational or non-standby status. The starter controls for each oil pump are locked in the off position when in non-operating or non-standby status. Master flow/drain valves are all located on the Facility and monitored by staff.

Any loading/unloading connections of facility piping is capped or blind flanged when not in service or is in standby service for an extended amount of time.

The facility has lighting sufficient for detection of spills during nighttime operations. Consideration has been given to: (a) discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel, and (b) prevention of spills occurring through acts of vandalism.

3.7 EXTERNAL FACTOR PLANNING

External factors are not anticipated to increase the risk of a spill or release that would impact human safety or the environment. Power outages, adverse weather conditions, or employee strikes could result in discontinuation of earth moving, drilling or well preparation activities. The Emergency Coordinator will monitor operations and initiate their orderly shutdown when necessary.

Access road conditions may be impacted by adverse weather conditions, possibly increasing the risk of a release of materials being delivered or removed. Truck drivers should report poor road conditions to the Construction or Drilling Manager. If conditions deteriorate to where they may impact safe movement of materials, the construction or Drilling Manager will review the conditions and initiate repairs or road closure as deemed necessary.

3.8 EMPLOYEE TRAINING PROGRAM

Newfield's employee training program enables employees to understand the processes and materials with which they are working, the safety and health hazards, the practices for preventing spills, and the procedures for responding properly and rapidly to spills. It also familiarizes personnel with emergency procedures.

All Newfield employees receive job specific training. Emergency Coordinators, Well Tenders, and other oil or hazardous material handling employees receive annual training on the facility's PPC and SPCC plans.

Job specific training includes preventive maintenance, inspection and monitoring activities, shut down procedures and housekeeping practices. PPC training will include spill/release recognition, initial response, initial notifications and follow-up. The training program is designed to ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communications and alarms systems; response to fires and explosions; site evacuation procedures; and shutdown of operations.

Annual right-to-know training for all facility employees is conducted relevant to the materials present at the facility. Employees will be given detailed instructions regarding the materials and wastes with which they are working; including safety and health hazards, handling methods, proper disposal procedures, and emergency procedures. The location of MSDS's for on-site materials will be identified to all employees.

Training records will be maintained at the facility and in the employee's personnel file.

4.0 COUNTERMEASURES

4.1 COUNTERMEASURES TO BE UNDERTAKEN BY FACILITY

The following sections present general spill response practices to be implemented at the Newfield facility, as appropriate.

4.1.1 Spill Clean-Up Procedures - General

Incidental spills should be contained and cleaned up when discovered per the employees job related training. Clean up material should be placed into a marked container and the Construction or Drilling Manager notified appropriately.

For large spills or spills of oils or hazardous materials which may reach surface water or impact the environment, the employee who first discovers the spill should contact the Emergency Coordinator. He should then work to contain and clean-up the spill.

Spill clean-up involves three steps: containment, removal, and disposal. In the event of a spill, it is very important that the material be contained to the maximum extent possible in order to minimize the effect of the spill and the cost of clean-up. **NOTE: ANY SHEEN ON A WATERBODY (STREAM, RIVER, OR WETLAND) IS A REPORTABLE RELEASE.** Once the spill is contained, the spilled material and contaminated material must be collected and physically removed from the area

4.1.2 Spill Clean-Up Procedures - Specific

The employee should do the following:

- Contain the spill to the smallest area possible using absorbent materials, earthen dikes or other diversion or containment structures. Stormwater collection structures will be either blocked or pumped.
- Block off the area to prevent traffic or employees from entering the area.
- For oils and other organic materials, apply a non-reactive sorbent material, such as Oil-Dri or Kitty Litter, to the spill.
- In the case of a spill of acids hazardous waste, check the MSDS and then neutralize with lime or soda ash if appropriate.
- If a leaking tank is involved, stop liquid flows as appropriate and dike the tank area with earth or absorbent material.

- If a leaking pail, drum or other small container is involved, place it in an over-pack container.
- Clean up spilled material and place it in a marked container.
- Work with the emergency coordinator to properly store the material and arrange for proper disposal

4.1.3 Fire or Explosion

In the case of a fire or explosion, the local fire department should be notified by calling 911. Employees may attempt to extinguish fires using handheld fire extinguishers based upon their job training.

The Emergency Coordinator will determine if evacuation per section 4.4 is required.

4.2 COUNTERMEASURES TO BE UNDERTAKEN BY CONTRACTORS

The following list shows area emergency response contractors to contact should the facility require outside help.

Company: Minuteman Spill Response, Inc.
Address: P.O. Box 10
Mifflinville, PA 18631
Telephone Number: 570-759-3658
Response Time: Approximately 2 to 3 hrs
Equipment and Services: Hazardous Materials Emergency Response

4.3 INTERNAL AND EXTERNAL COMMUNICATIONS AND ALARM SYSTEM

This section describes the internal communications or alarm used to provide immediate emergency instruction (voice or signal) to installation personnel, and the external communications or alarm system used to summon emergency assistance from local police or fire departments.

Newfield facilities in Wayne County are remote and generally do not have land-line telephone systems or alarm systems. The primary means of communication is via voice or mobile telephones. Mobile phones are provided to the Drilling and Production Managers (Primary and Secondary Emergency Coordinators).

Fire, police, and emergency service can be summoned by calling the 911 or per the numbers listed in Table 3.

4.4 EVACUATION PLAN

In the unlikely event that the site must be evacuated, the Emergency Coordinator will alert personnel to re-group at the pre-designated location for attendance taking. The Emergency Coordinator is responsible to verify that all site workers are accounted for during an evacuation. Periodic drills will be conducted, if deemed necessary, to evaluate the effectiveness of this evacuation plan.

If an emergency situation requires evacuation of personnel, the Emergency Coordinator will implement the following evacuation procedures:

1. The Emergency Coordinator will provide evacuation instructions to facility personnel via the construction site communications network, as appropriate.

2. Personnel evacuation will typically proceed as follows:

   a. If downwind of incident: Evacuate via the most accessible route perpendicular to the prevailing wind direction.
   b. If upwind of incident: Evacuate in an upwind direction.

3. Personnel will reassemble at the public road at the facility entrance as shown on Figure 3 or an alternate assembly point identified by the Emergency Coordinator, that is upwind of the incident location, and remain at this location until the Emergency Coordinator has accounted for all personnel.

4. The names of employees and the destination of employees transported to hospitals, etc. for treatment will be recorded by the Emergency Coordinator, first aid personnel or fire officials.

Once on public roadways, evacuation routes are left up to the individual.

4.5 EMERGENCY EQUIPMENT AVAILABLE FOR RESPONSE

This section provides a list of available emergency equipment, and procedures for maintenance and decontamination of emergency equipment. Newfield's emergency equipment at the facility will allow personnel to respond safely and quickly to emergency situations. Equipment will be inspected and maintained by Construction Manager to assure recommended quantities are available and its proper operation in time of emergency. After an emergency, equipment will be decontaminated, cleaned, and re-fit for its intended use before normal operations resume.

The Newfield facility will be equipped with the following emergency response equipment:

(1) Mobile telephones are provided to the Drilling and Production Mangers and are immediately available at the scene of operations for summoning emergency assistance from local police departments, fire departments or State or local emergency response teams.

(2) Portable fire extinguishers, fire control equipment, spill control equipment and decontamination equipment. This equipment is detailed in Table 4 of Appendix C.

5.0 EMERGENCY SPILL CONTROL NETWORK

5.1 ARRANGEMENTS WITH LOCAL EMERGENCY RESPONSE AGENCIES AND HOSPITALS

This section provides a list of local emergency response agencies and hospitals, and associated phone numbers. Arrangements can be made, as appropriate, to inform local emergency response agencies and hospitals concerning the type of materials handled at the Newfield facility and the potential need for services.

If appropriate, arrangements can be made to designate who will be the primary emergency response agency and who will provide support services during emergencies. Efforts can be made to familiarize police, fire departments, emergency response teams, and the Wayne County Emergency Management Agency (EMA) Coordinator with the layout of the site, the properties and dangers associated with any hazardous materials handled, places where personnel would normally be working, entrances to roads inside the site, and potential evacuation routes.

If considered appropriate by Newfield's Emergency Coordinator, agreements with hospitals and emergency response agencies can be made and included in the periodic updating or amending of the PPC Plan. The agreements and/or arrangements include efforts to familiarize area agencies and emergency responders with facility operations and potential emergency operations. The following agencies can be contacted and provided with a copy of this PPC Plan, at the discretion of the Newfield Emergency Coordinator.

- Local fire companies;
- Local county emergency response personnel;
- Local ambulance personnel; and
- Local hospital.

Table 3 lists local emergency response agencies to be contacted in the event of an emergency or reportable spill. In the unlikely event that a widespread emergency exists, the Wayne County EMA would be contacted first, and the Coordinator in turn could contact appropriate emergency response agencies through their communications network.

The Wayne County Emergency Management Agency can be contacted at (570) 253-1622. Routing of injured persons will be performed by emergency medical services personnel based on the number and type of injuries requiring treatment. The emergency medical services coordinator may be provided with a copy of this PPC Plan to assist in planning. The nearest hospitals are Catskill Regional Medical Hospital in Callicoon, New York, and Wayne County Memorial Hospital in Honesdale, Pennsylvania. The nearest fire departments are Callicoon Fire District in Callicoon, New York, Protection Engine Co No. 3 in Honesdale, Pennsylvania, and Narrowsburg Fire Department, in Narrowsburg, New York. The nearest police departments are the Honesdale Police Department, located in Honesdale, Pennsylvania, and Waymart Police Department in Honesdale Pennsylvania. All emergency response departments shall be reached through the 911 system.

5.2 NOTIFICATION LISTS

If the Emergency Coordinator determines that the facility has had an emission, discharge, fire, or explosion that could threaten human health or the environment, he will contact and report as necessary his findings to the appropriate agencies listed in Table 3. When calling any of the agencies listed in Table 3, the following information should be available for reporting to the identified agencies:

- Company name and location;
- Name of person reporting the spill, title, and telephone number;
- The type of material released;
- Estimated or exact (if known) quantity of material released (i.e., gallons, pounds, etc.);
- A brief description of the incident, including type of incident, nature of hazardous material involvement, and possible hazards to human health and the environment outside the facility;
- Probable source and location of the spill source;
- Date and time of the spill;
- Location of entry point into surface water and amount reaching the waterway (if applicable);
- The name of the receiving water and the downstream water bodies of which it is a tributary;
- Confirmation that release has been stopped or, if not, when will it be stopped;
- Mitigation/containment actions initiated;
- Direction of material movement;

- Potential population affected by the release;
- Name of person to contact on behalf of the company who will be at the scene and will be directing response measures;
- Telephone number where the on-scene coordinator can be reached; and
- The extent of injuries, if any.

A reporting form is attached in Appendix D for use by the Emergency Coordinator.

A written report including the above listed information, and other information that may be required by the applicable regulations (see 25 PA Code Section 265.56) regarding the spilled material, will need to be transmitted within 15 days to the following agencies:

U.S. Environmental Protection Agency
Region III
Spill Response Section
1650 Arch Street
Philadelphia, PA 19103

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management
2 Public Square
Wilkes-Barre, Pennsylvania 18711

6.0 WASTE DISPOSAL PRACTICES

Produced water will be removed periodically from the tanks at each well site and transported by a licensed residual waste hauler to a permitted disposal facility. Other wastes generated onsite will include used hydraulic oil that will be reclaimed from operating equipment and transported offsite for recycling. All wastes will be disposed in accordance with applicable local, state, and federal regulations.

7.0 STORMWATER MANAGEMENT PRACTICES

Newfield implements several Best Management Practices (BMPs) at each well site to reduce the potential for stormwater runoff of suspended solids and other contaminants. These BMPs include routine visual inspections, preventive maintenance, good housekeeping, and management of stormwater run-on and runoff. Routine inspection and monitoring, preventive maintenance, and good housekeeping programs are discussed in Sections 3.3, 3.4, and 3.5 of this PPC Plan. These programs prevent accidental releases of contaminants and reduce contaminant migrations via stormwater discharges. Stormwater management activities are discussed in Section 3.1 of this PPC Plan. The certification statement regarding the evaluation of discharges and confirmation that they will be comprised solely of stormwater is presented at the beginning of this Plan. Potential "significant sources of non-stormwater at the site" may include condensate, brine, hydraulic oil drums and tanks, gasoline and diesel fuel. Storage areas for these significant sources will be inspected on a daily basis.

8.0 SEDIMENT AND EROSION PREVENTION

Erosion and sedimentation controls are managed in accordance with PADEP requirements. Copies of the site E&S Plan are available at the Newfield office in Honesdale, PA and at each well site.

APPENDIX A

INSPECTION FORMS

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Facility:	Inspector Name:
Date of Inspection:	

Instructions: Indicate yes or no. If no, record observations describing the specific equipment and discrepancy.

Aboveground Storage Tanks		
• Equipment appears adequately supported	Yes ☐	No ☐
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes ☐	No ☐
• Coating condition appears satisfactory	Yes ☐	No ☐
• Corrosion appears acceptable	Yes ☐	No ☐
• Level gauages/alarms are operative	Yes ☐	No ☐
• Containers are labeled	Yes ☐	No ☐
Observations:		

Processing Equipment		
• Equipment appears adequately supported	Yes ☐	No ☐
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes ☐	No ☐
• Coating condition appears satisfactory	Yes ☐	No ☐
• Corrosion appears acceptable	Yes ☐	No ☐
Observations:		

Other Facility Equipment is Checked for: ❖ No evidence of active or past leaks ❖ Condition of equipment appears to be satisfactory (i.e., not damaged, deteriorated, or worn), and ❖ Corrosion appears to be acceptable.		
• Wellheads	Yes ☐	No ☐
• Gathering systems	Yes ☐	No ☐
• Well test stations	Yes ☐	No ☐
• Traps/Sumps	Yes ☐	No ☐
• Drainage systems and nearby ditches	Yes ☐	No ☐
• Applicable flowlines including right-of-way areas	Yes ☐	No ☐
• Containment systems	Yes ☐	No ☐
• Facility piping	Yes ☐	No ☐
Observations:		

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Secondary Containment		
• Passive containment (berm) has adequate capacity and integrity as intended	Yes ☐	No ☐
• Active containment measures are adequate	Yes ☐	No ☐
• No evidence of active or past leaks (i.e., staining, sheen)	Yes ☐	No ☐
• Any valves are closed and plugged	Yes ☐	No ☐
• Active containment is free from a significant quantity of rain/snow	Yes ☐	No ☐
	Yes ☐	No ☐
Observations:		

Security		
• Lighting is adequate to observe leaks, spills, and vandalism	Yes ☐	No ☐
• Pumps, valves, nozzles are locked	Yes ☐	No ☐
Observations:		

Spill Response		
• Spill response kits are stocked and located in readily accessible areas	Yes ☐	No ☐
Observations:		

Signature:	Date:

E&S INSPECTION FORM

The E&S plan contains a maintenance program which provides for inspection of BMPs (Best Management Practices such as filter sock, vegetation, construction entrances, etc.) on a weekly basis and after each measurable rainfall event, including the repair of BMPs to ensure effective and efficient operation. The maintenance program for both the temporary and permanent erosion and sediment control BMPs, including disposal of materials removed from the BMPs or project area, has been included in the narrative. The type of maintenance, such as cleanout, repair, replacement, regrading, re-stabilizing, etc. for each of the BMPs is included in the plan. **NOTE: This inspection report must be kept up to date and onsite.**

INSPECTION DATE	INITIALS	RAINFALL OR WEEKLY?	LOCATION OF E&S CONTROL(S)	CONDITION NOTED	CORRECTIVE MEASURES TAKEN

Facility: _____ **Inspector:** _____ **Signed:** _____ **Date:** _____

Print *Signature*

Tank Truck Loading and Unloading Checklist

Date: _____ Material being loaded/unloaded: _____

Driver/Loader present during loading or unloading of material _____
(signature)

_____ Current volume in storage tank was checked prior to loading.

_____ Fill hose inspected for condition prior to loading.

_____ Wheel chocks in place prior to loading.

_____ Tanker valve(s) were inspected for leakage prior to filling and departure.

_____ The loading of the tanker was monitored.

_____ Hoses were replaced and capped after loading.

_____ No material was spilled onto the containment pad or ground.

- These forms must be completed for every tank truck shipment and must be filed in the facility PPC Plan.
- All spills should be immediately reported to at least one of the following Newfield personnel:

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Burl Eakle
Cell: 918-448-1296

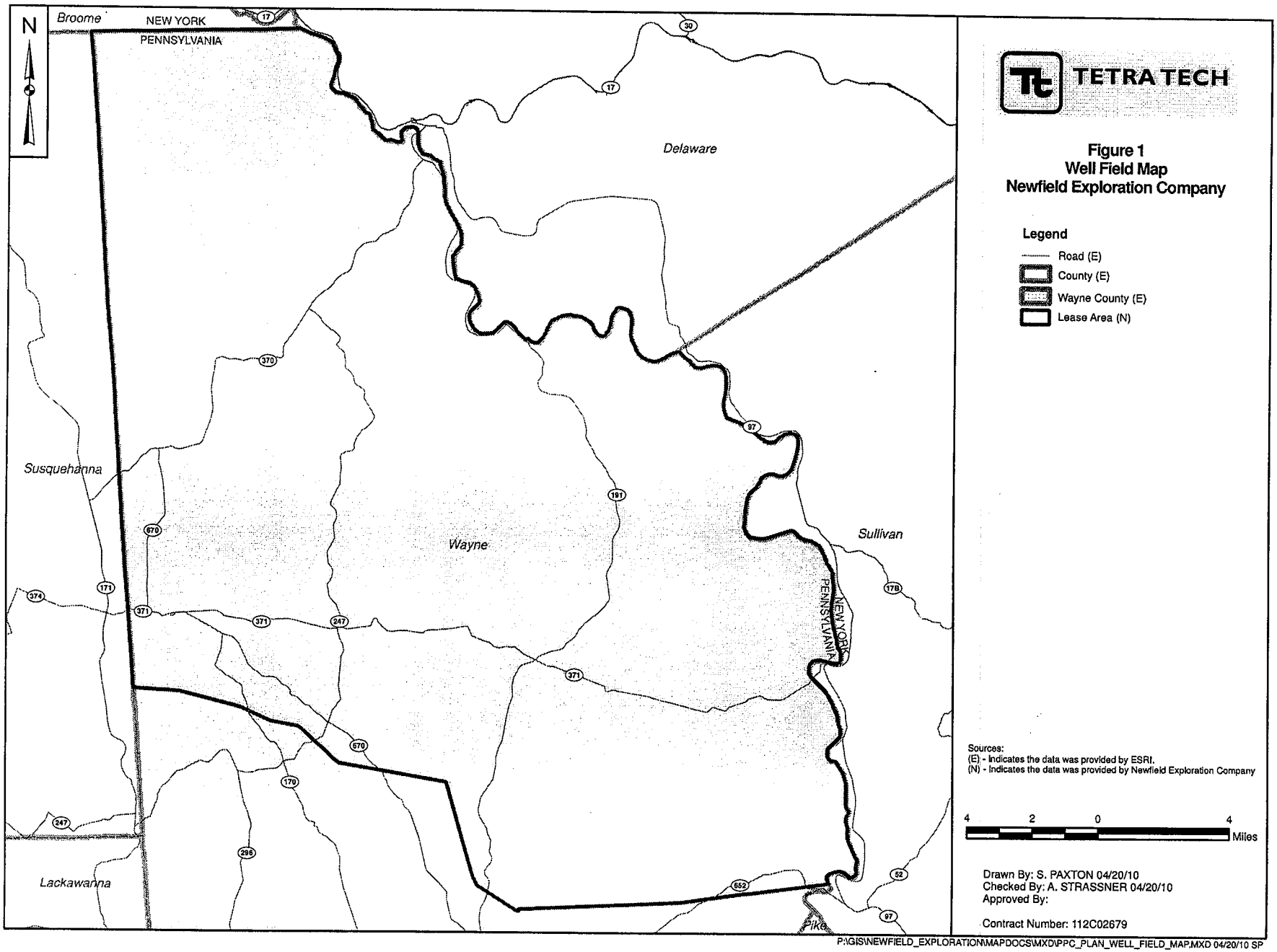
Delivery Information

Invoice No. _____

Load No. _____

Company _____

APPENDIX B
FIGURES



TETRA TECH

Figure 1
Well Field Map
Newfield Exploration Company

Legend

- Road (E)
- County (E)
- Wayne County (E)
- Lease Area (N)

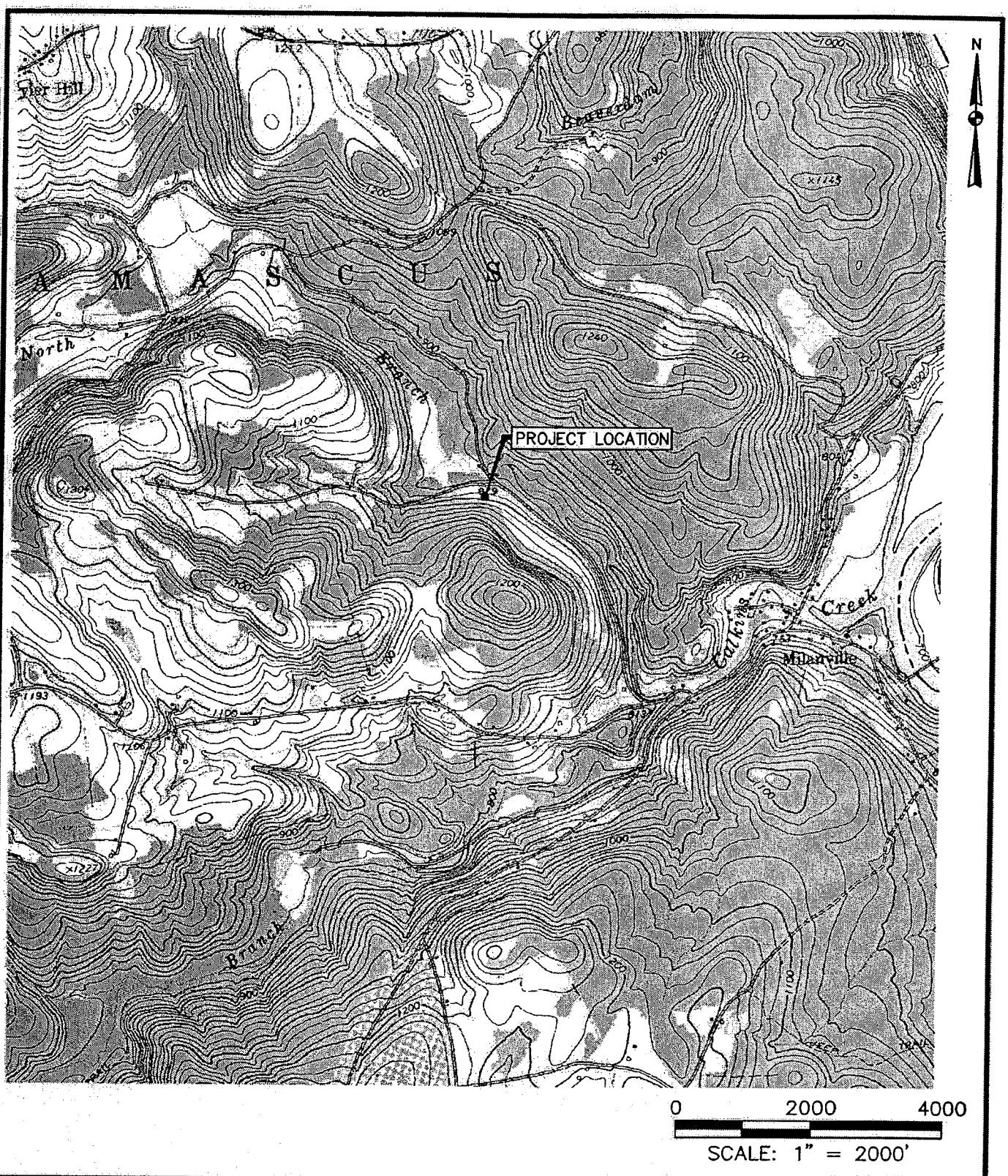
Sources:
(E) - Indicates the data was provided by ESRI.
(N) - Indicates the data was provided by Newfield Exploration Company

4 2 0 4 Miles

Drawn By: S. PAXTON 04/20/10
Checked By: A. STRASSNER 04/20/10
Approved By:

Contract Number: 112C02679

P:\GIS\NEWFIELD_EXPLORATION\MAPDOCS\MXD\PPC_PLAN_WELL_FIELD_MAP.MXD 04/20/10 SP



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TETRA TECH

WWW.TETRATECH.COM

661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

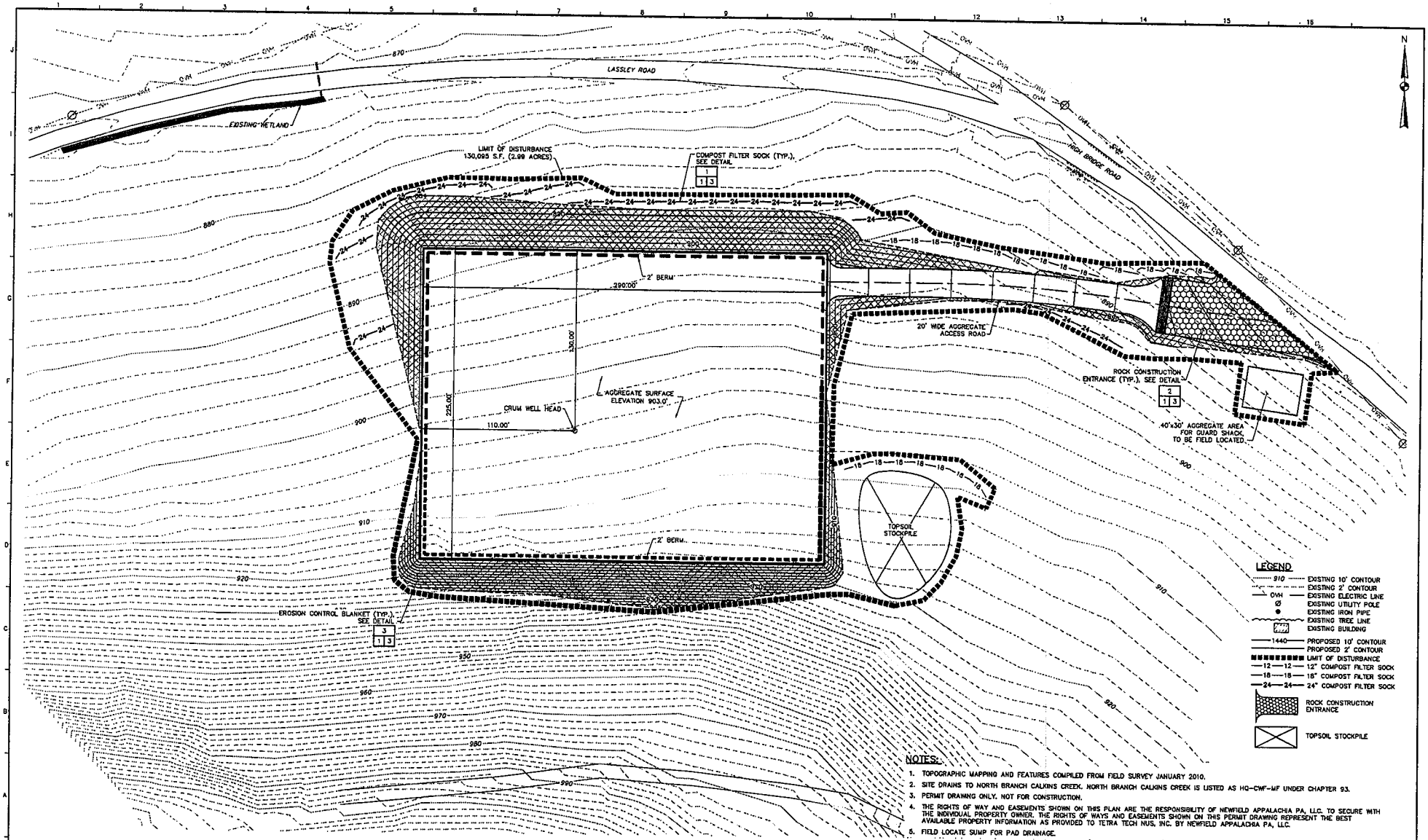
NEWFIELD EXPLORATION COMPANY
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
LOCATION MAP

SCALE: 1" = 2000'

DATE:	3/3/10
PROJECT NO.:	112C02568
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	RAL
SHEET:	1 OF 2

FIGURE 2



NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM FIELD SURVEY JANUARY 2010.
2. SITE DRAINS TO NORTH BRANCH CALKINS CREEK. NORTH BRANCH CALKINS CREEK IS LISTED AS HQ-CWF-MF UNDER CHAPTER 93.
3. PERMIT DRAWING ONLY. NOT FOR CONSTRUCTION.
4. THE RIGHTS OF WAY AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF NEWFIELD APPALACHIA PA, LLC. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS OF WAYS AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH NUS, INC. BY NEWFIELD APPALACHIA PA, LLC.
5. FIELD LOCATE SUMP FOR PAD DRAINAGE.

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE - FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

CRUM WELL PAD
EROSION & SEDIMENT CONTROL PLAN

SCALE: 1" = 30'

DATE:	6/15/10
PROJECT NO.:	112C02769
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	ARB
SHEET:	1 OF 7

FIGURE 3

APPENDIX C
TABLES

TABLE 1

LIST OF MATERIALS & WASTES

CONSTUCTION

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	250 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	180 gallons	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

DRILLING

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	2000 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	320 gallons	Well Pad	Sorbent pads; shovels/Gang box
DURATONE HT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
GELTONE V	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Lime	7,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Base Fluid	300 bbl	Well Pad	Sorbent pads; shovels/Gang box
Rig Wash	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Calcium Chloride (CaCl-)	4,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
RHEMOD L	1,770 lbs	Well Pad	Sorbent pads; shovels/Gang box
LE SUPERMUL	8,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
BARACARB 25, 50 (2 pallets each)	12,600 lbs	Well Pad	Sorbent pads; shovels/Gang box
WALNUT	2,400 lbs	Well Pad	Sorbent pads; shovels/Gang box
DRILTREAT	1,900 lbs	Well Pad	Sorbent pads; shovels/Gang box
Liquid Mud	1,500 bbl	Well Pad	Sorbent pads; shovels/Gang box
BAROID REGULAR / **BAROID BULK (barite)	125,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Drill Cuttings	100,000 lbs	Air Pit	Sorbent pads; shovels/Gang box
Cement	130,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

TABLE 2

INSPECTION AND MONITORING ACTIVITIES

Activity	Frequency
Erosion and Sedimentation Control Measures	Weekly or after a significant rain event
Aboveground Storage Tanks	Daily
Drum Storage Areas	Daily
Best Management Practices (BMPs)	Per BMP requirements
Dust Control Measures	Daily
Preparedness, Prevention, and Contingency (PPC) Plan Compliance Evaluation Inspections and Update of PPC Plan, as Appropriate	Annually

TABLE 3
AGENCY NOTIFICATION LIST

The following agencies are to be contacted, as appropriate, in the event of an emergency, accident, or chemical release.

Agency	Telephone No.
PADEP Northeast Regional Office	570-826-2511
PADEP Southcentral Office (Harrisburg)	877-333-1904
Pennsylvania Emergency Management Agency	717-651-2001
Police Department	9-1-1
Volunteer Fire Department	9-1-1
U.S. Environmental Protection Agency	215-814-5700
U.S. Coast Guard National Response Center	800-424-8802
U.S. Coast Guard (local)	570-421-1191
Pennsylvania Fish and Boat Commission	814-445-8974
Chemical Transportation Emergency Center:	
* Chemical Exposure Information	800-424-9300

LOCAL EMERGENCY RESPONSE:

Fire Department – Callicoon Fire District in Callicoon, New York, Protection Engine Co No. 3 in Honesdale, Pennsylvania Narrowsburg Fire Department, in Narrowsburg, New York.	9-1-1
Police Department – Honesdale Police Department, Honesdale, Pennsylvania Waymart Police Department, Honesdale Pennsylvania	9-1-1
Hospitals-Wayne County Memorial Hospital, Honesdale, Pennsylvania	570-251-6672
Catskill Regional Medical Hospital in Callicoon, New York	845-887-5530
Local Emergency Management Wayne County EMA	570-253-1622

TABLE 4

On-Site Emergency Response Equipment

On-Site Emergency Response Equipment
Fire Extinguishers
Tyvek Suits
Nitrile Gloves
Hearing Protection
Particulate Adsorbent
Absorbent Pads
Shovels
Earth Moving Equipment
Decontamination Equipment

TABLE 5
CHAIN OF COMMAND

Primary Emergency Coordinator

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Secondary Emergency Coordinator

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Construction Manager
Burl Eakle
Cell: 918-448-1296

Offsite Emergency Response Contractors

Company: Minuteman Spill Response, Inc.
Telephone Number: 800-905-7788

APPENDIX D
REPORTING FORM

Spill Response Notification Form

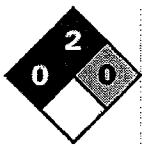
GENERAL REPORTING INFORMATION
Prepared _____ (First) (M.I.) (Last) (Position)
Daytime phone: (xxx) xxx-xxxx Evening phone: (xxx) xxx-xxxx
Newfield Appalachia PA LLC (Company) (Address) (City) (State) (Zip)
Calling for responsible party? Yes Were materials discharged? Yes Confidential? No
Meeting Federal obligations to report: Yes
INCIDENT DESCRIPTION
Source and/or cause:
Date of Incident:Time of Incident:
Incident Location/Address
Nearest City: XXXX, PA XXXXX (XXXXXXX County)
Distance from City: In city limits Direction from City: In city limits
Facility Oil Storage Capacity: XXXXXX gallons
Container Type:Container Capacity: (gals)
Facility Latitude: xx° xx' xx" Longitude xx° xx' xx"
MATERIAL
Name (or CHRIS Code):
Discharged Quantity (Units): Discharged to Water (Units):
RESPONSE ACTION
Actions taken to correct, control or mitigate incident:
IMPACT
No. of Injuries: No. of Deaths: Other:
Evacuation (Y/N): Damage (Y/N): Amount ($):
Medium Affected: Description: Additional Information:
AGENCY NOTIFIED
NRC 800-424-8802 Date: Time: Contact:
PADEP (570) 826-2511 Date: Time: Contact:
USCG Date: Time: Contact:
Other Date: Time: Contact:
ADDITIONAL INFORMATION:

APPENDIX E
MSDS SHEETS

MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types) **MSDS No. 9909**

EMERGENCY OVERVIEW
CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED
Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer.
If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).



NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800) 424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Diesel Fuel (68476-34-6)	100
Naphthalene (91-20-3)	Typically < 0.01

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

SKIN
May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	> 125 °F (> 52 °C) minimum PMCC
AUTOIGNITION POINT:	494 °F (257 °C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%):	0.6
UPPER EXPLOSIVE LIMIT (%):	7.5

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static

Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ["Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Components (CAS No.)	Source	Exposure Limits TWA/STEL	Note
Diesel Fuel: (68476-34-6)	OSHA ACGIH	5 mg/m, as mineral oil mist 100 mg/m^3 (as totally hydrocarbon vapor) TWA	A3, skin
Naphthalene (91-20-3)	OSHA ACGIH	10 ppm TWA 10 ppm TWA / 15 ppm STEL	A4, Skin

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE

Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR

Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	320 to 690 oF (160 to 366 °C)
VAPOR PRESSURE:	0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1):	> 1.0
SPECIFIC GRAVITY (H_2O = 1):	0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Slow; varies with conditions
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY

Acute dermal LD50 (rabbits): > 5 ml/kg
Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits)
Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)

This material has been positive in a mutagenicity study.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	Diesel Fuel	Placard (International Only):
HAZARD CLASS and PACKING GROUP:	3, PG III	
DOT IDENTIFICATION NUMBER:	NA 1993 (Domestic) UN 1202 (International)	
DOT SHIPPING LABEL:	None	

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the *de minimis* levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITON 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Diesel Engine Exhaust (no CAS Number listed)	10/01/1990

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING

HEALTH:	0
FIRE:	2
REACTIVITY:	0

Refer to NFPA 704 "Identification of the Fire Hazards of Materials" for further information

HMIS® HAZARD RATING

HEALTH:	1 *	* Chronic
FIRE:	2	
PHYSICAL:	0	

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212) 642-4900
API	American Petroleum Institute (202) 682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

MATERIAL SAFETY DATA SHEET

Review Date: 04/23/2007

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

MSDS NUMBER: 614348LU - 1
PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

MANUFACTURER
SOPUS Products
P.O. Box 4427
Houston, TX. 77210-4427

TELEPHONE NUMBERS
Spill Information: (877) 242-7400
Health Information: (877) 504-9351
MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

INGREDIENTS	CAS#	CONCENTRATION
Heavy Duty Motor Oil		
Highly refined petroleum oils	Mixture	90 - 99 %volume
Zinc Dialkyldithiophosphate	68649-42-3	1 - 5 %volume
Proprietary additives	Mixture	1 - 5 %volume

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Appearance & Odor: Bright and clear liquid. Mild odor.
Health Hazards: No known immediate health hazards.
Physical Hazards: No known physical hazards.
NFPA Rating (Health, Fire, Reactivity): 0, 1, 0
Hazard Rating: Least - 0 Slight - 1 Moderate - 2 High - 3 Extreme - 4

Inhalation:
Inhalation of vapors (generated at high temperatures only) or oil mist may cause mild irritation of the nose, throat, and respiratory tract.

Eye Irritation:
Lubricating oils are generally considered no more than minimally irritating to the eyes.

Skin Contact:
May cause slight irritation of the skin. If irritation occurs, a temporary burning sensation and minor redness and/or swelling may result.

Ingestion:

Lubricating oils are generally no more than slightly toxic if swallowed.

Other Health Effects:
The International Agency for Research on Cancer (IARC) has determined there is sufficient evidence for the carcinogenicity in experimental animals of used gasoline motor oils. Handling procedures and safety precautions in the MSDS should be followed to minimize exposure to the used product.

Signs and Symptoms:
Irritation as noted above.

Aggravated Medical Conditions:
Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

For additional health information, refer to section 11.

SECTION 4 FIRST AID MEASURES

Inhalation:
Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.

Skin:
Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye:
Flush with water. If irritation occurs, get medical attention.

Ingestion:
Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

Note to Physician:
In general, emesis induction is unnecessary in high viscosity, low volatility products such as oils and greases.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point [Method]: >400 °F/>204.44 °C [Pensky-Martens Closed Cup]

Extinguishing Media:
Material will float and can be re-ignited on surface of water. Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames. Do not use a direct stream of water.

Fire Fighting Instructions:
Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure, NIOSH approved, self-contained breathing apparatus. This material is non-flammable.

Unusual Fire Hazards:
Material may ignite when preheated.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures:
May burn although not readily ignitable.

Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

Spill Management:
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

Place in container for proper disposal. Remove contaminated soil to remove contaminated trace residues. Dispose of in same manner as material.

Reporting:
CERCLA: Product is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion. Releases to air, land, or water are not reportable under CERCLA (Superfund).

CWA: This product is an oil as defined under Section 311 of EPA's Clean Water Act (CWA). Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 1-800-424-8802.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures:
Wash with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet. Launder contaminated clothing before reuse. Properly dispose of contaminated leather articles such as shoes or belts that cannot be decontaminated. Avoid heat, open flames, including pilot lights, and strong oxidizing agents. Use explosion-proof ventilation to prevent vapor accumulation. Ground all handling equipment to prevent sparking.

Storage:
Do not store in open or unlabeled containers. Store in a cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.

Container Warnings:
Keep containers closed when not in use. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical	Limit	TWA	STEL	Ceiling	Notation
Oil mist, mineral	ACGIH TLV	5 mg/m3	10 mg/m3		
Oil mist, mineral	OSHA PEL	5 mg/m3			

Exposure Controls

Provide adequate ventilation to control airborne concentrations below the exposure guidelines/limits.

Personal Protection

Personal protective equipment (PPE) selections vary based on potential exposure conditions such as handling practices, concentration and ventilation. Information on the selection of eye, skin and respiratory protection for use with this material is provided below.

Eye Protection:
Chemical Goggles, or Safety glasses with side shields

Skin Protection:
Use protective clothing which is chemically resistant to this material. Selection of protective clothing depends on potential exposure conditions and may include gloves, boots, suits and other items. The selection(s) should take into account such factors as job task, type of exposure and durability requirements.

Published literature, test data and/or glove and clothing manufacturers indicate the best protection is provided by:
Neoprene, or Nitrile Rubber

Respiratory Protection:
If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, an approved respirator must be worn. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Types of respirator(s) to be considered in the selection process include:
For Mist: Air Purifying, R or P style NIOSH approved respirator.
For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Bright and clear liquid. Mild odor.
Substance Chemical Family: Petroleum Hydrocarbon

Flash Point	> 400 °F [Pensky-Martens Closed Cup]	**Pour Point**	-20 °F
Solubility (in Water)	Insoluble	**Specific Gravity**	0.88 - 0.89
Stability	Stable	**Viscosity**	103 cSt @ 40 °C

SECTION 10 REACTIVITY AND STABILITY

Stability:
Material is stable under normal conditions.

Conditions to Avoid:
Avoid heat and open flames.

Materials to Avoid:
Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:

Thermal decomposition products are highly dependent on combustion conditions. A complex mixture of airborne solids, liquids and gases will evolve when this material undergoes pyrolysis or combustion. Aldehydes, Carbon Monoxide, Carbon Dioxide, Hydrogen Sulfide, Ketones, Nitrogen Oxidesand other unidentified organic compounds may be formed upon combustion.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity

TEST	Result	OSHA Classification	Material Tested
Dermal LD50	>5.0 g/kg(Rabbit)	Non-Toxic	Based on components(s)
Oral LD50	>5.0 g/kg(Rat)	Non-Toxic	Based on components(s)

Carcinogenicity Classification

Chemical Name	NTP	IARC	ACGIH	OSHA
Heavy Duty Motor Oil	No	Not Reviewed by IARC	Not Reviewed	No

SECTION 12 ECOLOGICAL INFORMATION

Environmental Impact Summary:
There is no ecological data available for this product. However, this product is an oil. It is persistent and does not readily biodegrade. However, it does not bioaccumulate.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

Under RCRA, it is the responsibility of the user of the material to determine, at the time of the disposal, whether the material meets RCRA criteria for hazardous waste. This is because material uses, transformations, mixtures, processes, etc. may affect the classification. Refer to the latest EPA, state and local regulations regarding proper disposal.

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

International Air Transport Association
Not regulated under IATA rules.

International Maritime Organization Classification
Not regulated under International Maritime Organization rules.

SECTION 15 REGULATORY INFORMATION

Federal Regulatory Status

OSHA Classification:
Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Ozone Depleting Substances (40 CFR 82 Clean Air Act):
This material does not contain nor was it directly manufactured with any Class I or Class II ozone depleting substances.

Superfund Amendment & Reauthorization Act (SARA) Title III:
There are no components in this product on the SARA 302 list.

SARA Hazard Categories (311/312):

Immediate Health	Delayed Health	Fire	Pressure	Reactivity
NO	NO	NO	NO	NO

SARA Toxic Release Inventory (TRI) (313):
Zinc compounds

Toxic Substances Control Act (TSCA) Status:
All component(s) of this material is(are) listed on the EPA/TSCA Inventory of Chemical Substances.

Other Chemical Inventories:
Component(s) of this material is (are) listed on the Australian AICS, Canadian DSL, Chinese Inventory, European EINECS, Korean Inventory, Philippines PICCS,

State Regulation

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

SECTION 16 OTHER INFORMATION

Revision#: 1
Review Date: 04/23/2007
Revision Date: 12/19/2006
Revisions since last change (discussion): This Material Safety Data Sheet (MSDS) has been reviewed to fully comply with the guidance contained in the ANSI MSDS standard (ANSI Z400.1-2003). We encourage you to take the opportunity to read the MSDS and review the information contained therein.

SECTION 17 LABEL INFORMATION

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

ATTENTION!

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE OIL ACNE OR DERMATITIS. USED GASOLINE ENGINE OIL HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS.

Precautionary Measures:
Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid breathing of vapors, fumes, or mist. Use only with adequate ventilation. Wash thoroughly after handling.

FIRST AID

Inhalation: If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.
Skin Contact: Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
Eye Contact: Flush with water. If irritation occurs, get medical attention.
Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO_2) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK

Dike and contain spill.
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

CONTAINS: Highly refined petroleum oils, Mixture; Zinc Dialkyldithiophosphate, 68649-42-3; Proprietary additives, Mixture

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

TRANSPORTATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flames or heat. Keep container closed and drum bungs in place.

Name and Address

SOPUS Products
P.O. Box 4427
Houston, TX 77210-4427

ADMINISTRATIVE INFORMATION	
MANUFACTURER ADDRESS:	SOPUS Products, P.O. Box 4427, Houston, TX. 77210-4427.

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT : IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

TO DETERMINE THE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, YOU SHOULD CONSULT WITH YOUR LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. WE WILL NOT PROVIDE ADVICE ON SUCH MATTERS, OR BE RESPONSIBLE FOR ANY INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN. THE UNDERLYING DATA, AND THE INFORMATION PROVIDED HEREIN AS A RESULT OF THAT DATA, IS THE PROPERTY OF SOPUS PRODUCTS AND IS NOT TO BE THE SUBJECT OF SALE OR EXCHANGE WITHOUT THE EXPRESS WRITTEN CONSENT OF SOPUS PRODUCTS.

44815-10737-100R-04/16/2007

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CALCIUM CHLORIDE - POWDER**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CALCIUM CHLORIDE - POWDER
Synonyms: None
Chemical Family: Inorganic Salt
Application: Accelerator

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium chloride		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.
Storage Information	Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Dust proof goggles.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	10
Specific Gravity @ 20 C (Water=1):	0.83
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	51
Boiling Point/Range (F):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	42
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	147.02

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause skin irritation. May cause skin burns on prolonged contact.
Eye Contact	May cause severe eye irritation. May cause corneal injury.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 1000 mg/kg (Rat)
Dermal Toxicity:	LD50: > 5000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **DRILTREAT®**

Revision Date: 09-Mar-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DRILTREAT®
Synonyms: None
Chemical Family: Lipid
Application: Oil-wetting Agent

Manufacturer/Supplier
Baroid Drilling Fluids
a Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation.

4. FIRST AID MEASURES

Inhalation Under normal conditions, first aid procedures are not required.

Skin Wash with soap and water.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	400
Flash Point/Range (C):	204
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire-fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing.

Storage Information Store away from oxidizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally necessary.

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Amber
Odor:	Bean
pH:	6.4-7
Specific Gravity @ 20 C (Water=1):	1.03
Density @ 20 C (lbs./gallon):	8.58
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	32
Freezing Point/Range (C):	0
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Disperses
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	None known.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Biodegradable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: 497,500 ppm (Mysidopsis bahia) SPP @ 12 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **DURATONE® HT**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DURATONE® HT
Synonyms: None
Chemical Family: Blend
Application: Fluid Loss Additive

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Kaolin	1332-58-7	10 - 30%	2 mg/m^3	Not applicable
Nonylphenol	25154-52-3	5 - 10%	Not applicable	Not applicable
Sodium hydroxide	1310-73-2	1 - 5%	2 mg/m^3	2 mg/m^3
Quaternary ammonium compounds		10 - 30%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation — If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin — Wash with soap and water. Get medical attention if irritation persists.

Eyes — In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion — Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician — Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	608
Autoignition Temperature (C):	320
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media — Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards — Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters — Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 2*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures — Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures — Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray to black
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.8
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	31 uncompacted; 44 compacted
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	< -1 (OECD117)

9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight (g/mole): Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong alkalis. Strong acids. Aldehydes. Ketones. Acrylates.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A). Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).
Skin Contact	May cause moderate skin irritation. May cause an allergic skin reaction.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Ames Test: Negative

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability BOD(28 Day): 9% of COD

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 30 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: EC50: 370 mg/l (Daphnia magna)

Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Aluminum Oxide//1344-28-1
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.

EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **GELTONE® V**

Revision Date: 02-Jun-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: GELTONE® V
Synonyms: None
Chemical Family: Blend
Application: Viscosifier

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, cristobalite	14464-46-1	0 - 1%	0.025 mg/m^3	1/2 x $\frac{10 \text{ mg/m}^3}{\%SiO2 + 2}$
Crystalline silica, tridymite	15468-32-3	0 - 1%	0.05 mg/m^3	1/2 x $\frac{10 \text{ mg/m}^3}{\%SiO2 + 2}$
Crystalline silica, quartz	14808-60-7	2-6	0.025 mg/m^3	$\frac{10 \text{ mg/m}^3}{\%SiO2 + 2}$
Isopropanol	67-63-0	1 - 5%	200 ppm	400 ppm
Modified bentonite		60 - 100%	Not applicable	Not applicable

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

Storage Information

Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection

Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection

Normal work gloves.

Skin Protection

Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.

Eye Protection

Wear safety glasses or goggles to protect against exposure.

Other Precautions

None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	Tan
Odor:	Mild
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35- 57
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Miscible in hydrocarbons
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A). Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LE SUPERMUL**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LE SUPERMUL
Synonyms: None
Chemical Family: Blend
Application: Emulsifier

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Diethylene glycol monobutyl ether	112-34-5	1 - 5%	Not applicable	Not applicable
Ethylene glycol monobutyl ether	111-76-2	1 - 5%	20 ppm	50 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview

May cause eye and skin irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation

If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes

In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion

Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician

Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200**Min:** > 200
Flash Point/Range (C):	> 100**Min:** > 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Use water spray to cool fire exposed surfaces. Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 2, Flammability 1, Reactivity 0
HMIS Ratings:	Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.
Storage Information	Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor respirator. In high concentrations, supplied air respirator or a self-contained breathing apparatus.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Amber
Odor:	Mild
pH:	2.6
Specific Gravity @ 20 C (Water=1):	0.924
Density @ 20 C (lbs./gallon):	7.7
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	20
Freezing Point/Range (C):	-6.6
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	280-300
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Lung disorders. Skin disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause reproductive system damage. Repeated overexposure may cause liver and kidney effects.

Other Information None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® OIL ABSORBENT**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® OIL ABSORBENT
Synonyms: None
Chemical Family: Mineral
Application: Suspending Agent

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Magnesium silicate	1343-90-4	60 - 100%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	2-6	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granules
Color:	Gray to tan
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32-38
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact None known.

Eye Contact May cause eye irritation.

Ingestion May be harmful if swallowed.

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **RHEMOD L**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: RHEMOD L
Synonyms: None
Chemical Family: Tall oil fatty acid
Application: Viscosifier

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fatty acids, C18-unsatd., trimers	68937-90-6	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	518
Flash Point/Range (C):	270
Flash Point Method:	COC
Autoignition Temperature (F):	> 425
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 1, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Wash hands after use.
Storage Information	Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Organic vapor respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark
Odor:	Fatty acid
pH:	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	0.96
Density @ 20 C (lbs./gallon):	8
Bulk Density @ 20 C (lbs/ft3):	57.30
Boiling Point/Range (F):	> 572
Boiling Point/Range (C):	> 300
Freezing Point/Range (F):	< -4
Freezing Point/Range (C):	< 25
Vapor Pressure @ 20 C (mmHg):	< 0.001
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	0
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	1849 @ 25C
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye and skin contact.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® RIG WASH**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® RIG WASH
Synonyms: None
Chemical Family: Blend
Application: Surfactant

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Isopropanol	67-63-0	1 - 5%	200 ppm	400 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion If swallowed dilute with 1-2 glasses of milk or water and then induce vomiting.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined**Min:** > 220
Flash Point/Range (C):	Not Determined**Min:** > 104
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.

Storage Information Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear blue
Odor:	Slight Alcohol
pH:	9.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	1.025
Density @ 20 C (lbs./gallon):	8.5
Bulk Density @ 20 C (lbs/ft3):	63.6
Boiling Point/Range (F):	> 212
Boiling Point/Range (C):	> 100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Glycol Ethers//34398-01-1 Isopropanol//67-63-0
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FWCA CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FWCA CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polysaccharide
Application: Free Water Control Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	770
Autoignition Temperature (C):	410
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	6.5
Specific Gravity @ 20 C (Water=1):	1.39
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Aldehydes. Carboxylic acids. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 322 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 322 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Blend
Application: Cement Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium formate	141-53-7	1 - 5%	Not applicable	Not applicable
Cellulose derivative		10 - 30%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Red
Odor:	Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.28
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35.2
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 344 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 344 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polymer
Application: Fluid Loss Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified acrylamide copolymer		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water spray, dry chemical, or foam.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust. Do not swallow. Avoid contact with eyes, skin, or clothing.

Storage Information Store in a cool, dry location. Store away from oxidizers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Nitrile gloves. Polyvinylchloride gloves. Neoprene gloves. Rubber gloves. Butyl rubber gloves. Cloth gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to off white
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.37
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	25-35
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	18
Freezing Point/Range (C):	-8
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide. Oxides of sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Prolonged or repeated contact may cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	No adverse health effects are expected from swallowing.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	BOD(28 Day): 3% of COD
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM48: 2000 mg/l (Arcatia tonsa)
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	EC50: 3300 mg/l (Skeletonema costatum)
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-5**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-5
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modifed lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.
Storage Information	Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Black
Odor:	Molasses
pH:	9.5-10.3
Specific Gravity @ 20 C (Water=1):	1.32

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	29.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1000 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-601**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-601
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modifed lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.2
Flammability Limits in Air - Upper (%):	Not Determined
Flammability Limits in Air - Upper (oz./ft3):	3.5

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 1, Reactivity 0
HMIS Ratings:	Health 1, Flammability 1, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.
Storage Information	Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Woody
pH:	7.8
Specific Gravity @ 20 C (Water=1):	1.08
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30.5
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **KCL POTASSIUM CHLORIDE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: KCL POTASSIUM CHLORIDE
Synonyms: None
Chemical Family: Inorganic Salt
Application: Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Potassium chloride	7447-40-7	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid breathing vapors.

Storage Information Store in a cool, dry location. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Dust proof goggles.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White to gray
Odor:	Odorless
pH:	9.2
Specific Gravity @ 20 C (Water=1):	1.99
Density @ 20 C (lbs./gallon):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Bulk Density @ 20 C (lbs/ft3):	72.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.55

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause moderate skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: 100-330 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **POZ STANDARD CEMENT 50/50**

Revision Date: 05-Jan-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: POZ STANDARD CEMENT 50/50
Synonyms: None
Chemical Family: Cement
Application: Cement

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fly ash	68131-74-8	30 - 60%	Not applicable	Not applicable
Bentonite	1302-78-9	1 - 5%	Not applicable	Not applicable
Portland cement	65997-15-1	30 - 60%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Not Determined
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact May cause severe eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	E Corrosive Material D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CEMENT - CLASS H - PREMIUM**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CEMENT - CLASS H - PREMIUM
Synonyms: None
Chemical Family: Cement
Application: Cement

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Portland cement	65997-15-1	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	<3	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	3.15
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	94
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from any contact with water.
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure

Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact

Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact

May cause severe eye irritation.

Ingestion

None known

Aggravated Medical Conditions

Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	E Corrosive Material D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 25**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 25
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier

Baroid Drilling Fluids
a Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	168
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 50**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 50
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	72-112
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID®**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID®
Synonyms: None
Chemical Family: Mineral
Application: Weight Additive

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Barium sulfate	7727-43-7	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Pink to tan to gray
Odor:	Odorless
pH:	8-9-
Specific Gravity @ 20 C (Water=1):	4.2
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	100- 155
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	233.4

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact None known.

Eye Contact May cause mild eye irritation.

Ingestion May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: 7500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 132.6 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels:	None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LIME**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LIME
Synonyms: None
Chemical Family: Inorganic
Application: pH Control

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium hydroxide	1305-62-0	60 - 100%	5 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye and skin burns. May cause respiratory irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin
Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not Determined

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from acids. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	12.2
Specific Gravity @ 20 C (Water=1):	2.24
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	75
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.2
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Causes severe skin irritation. May cause skin burns on prolonged contact.
Eye Contact	Causes severe eye irritation May cause eye burns.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 7340 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 100-500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: 478,520 ppm (Mysidopsis bahia) SPP @ 8 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Empty container completely. Transport with all closures in place. Return for reuse or dispose in a sanitary landfill according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WALNUT HULLS**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WALNUT HULLS
Synonyms: None
Chemical Family: Nut Hulls
Application: Loss Circulation Material

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Walnut hulls	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation.

4. FIRST AID MEASURES

Inhalation Under normal conditions, first aid procedures are not required.

Skin Under normal conditions, first aid procedures are not required.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.07
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Safety glasses.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.1
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 10 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

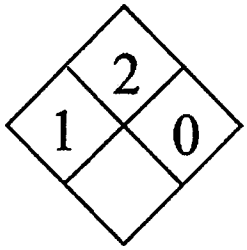
For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

INTEGRITY
INDUSTRIES INC.



****

MATERIAL SAFETY DATA SHEET

****

SECTION I - MANUFACTURER

Integrity Industries, Inc.
2710 E. Corral St.
Kingsville, Texas 78363
Emergency Phone: (361) 595-5561

Revised Date: 06/05/2008
Supercedes: new

THIS DOCUMENT IS PREPARED PURSUANT TO THE OSHA HAZARDOUS COMMUNICATION STANDARD (29 CFR 1910.1200). ALSO, OTHER SUBSTANCE NOT DEEMED "HAZARDOUS" PER THIS MSDS MAY BE LISTED.

SECTION II - MATERIAL IDENTIFICATION

Trade Name: **SYNVERT Base Oil**
Synonyms/Other Designations: Synthetic Drilling Fluid / Polymer Suspension Base
Placard: Not Applicable
Hazard(s): non-hazardous

Component	CAS Number	Weight
Paraffin/Olefin blend	Mixture	100%

SECTION III - PHYSICAL & CHEMICAL DATA

Boiling Point: IBP > 300 °F
Specific Gravity (H2O=1): 0.766
Vapor Density (Air=1): n/a
Appearance: Clear, oily liquid

Pour Point: ND
Vapor Pressure (mm Hg @ 68 °F): 0.135
Solubility in H2O: Insoluble
Viscosity (cSt @104 °F): 1.4

SECTION IV - REACTIVITY

Stability: Stable
Incompatibility: Heat, sparks, open flame. May react with strong acids/strong oxidizing agents, chlorates, nitrates, peroxides.
Hazardous Decomposition Products: Oxides of carbon. Hazardous Polymerizations: will not occur

SECTION V - FIRE & EXPLOSION DATA

Flash Point (ASTM D-93): > 200 °F
Autoignition: n/a
Extinguishing Media: Water spray, Dry Chemical, Foam, CO2
Special Fire Fighting Procedures: Respirators/eye protection and full firefighting protective gear.
Unusual Fire Hazards: Remove containers from source of heat.

SECTION VI - EMERGENCY & FIRST AID DATA

Inhalation: Move to well ventilated area; if breathing difficulties persist after 15 minutes seek medical assistance.
Eye Contact: Wash eye thoroughly for 15 minutes; if irritation persists seek medical assistance.
Skin Contact: Wash affected area with soap & water for 15 minutes; if irritation persists seek medical assistance.
Ingestion: Do not induce vomiting and seek medical advice.

SECTION VII - HEALTH HAZARDS DATA

Acute: May irritate eyes, skin, respiratory, & gastrointestinal tract. Chronic: Repeated/prolonged skin contact may irritate/redden skin, progressing to dermatitis.

SECTION VIII - SPILL & DISPOSAL DATA

Accidental Spill Procedures: Absorb in inert material and dispose of according to local, state & federal regulations. Spill into water should be contained to avoid runoff into waterways.
Handling & Storage: Keep container closed and store in cool dry place. Emptied container still contains material which may ignite with explosive violence if exposed to open flame.

SECTION IX - SPECIAL PROTECTION DATA

Respiratory Protection: Respirator in confined areas.
Ventilation: Desired Exhaust: Mechanical
Protective Gloves: Solvent/chemical resistant gloves
Eye Protection: Safety glasses, goggles.
Other Protection: As required to avoid skin contact.

SECTION X - TRANSPORT INFORMATION

The following may not apply to all shipping situations. Consult 49 CFR for more mode-specific or quantity-specific data.
DOT Proper Shipping Name: Not regulated
DOT Hazard Class or Division: Not regulated
DOT Identification Number: N/A
DOT Packaging Group: III
Type Label(s) Required. none
Placard: Not applicable
*For Limited Quantity requirements see DOT regulation 49 CFR.

SECTION XI - DISCLAIMERS

* SOME INFORMATION PROVIDED HEREIN WAS DRAWN FROM SOURCES OTHER THAN INTEGRITY INDUSTRIES.
THE INFORMATION PROVIDED HEREIN IS BELIEVED BY INTEGRITY INDUSTRIES, INC. TO BE CORRECT & RELIABLE; NO EXPRESSED OR IMPLIED WARRANTY IS PROVIDED HOWEVER.
* INTEGRITY INDUSTRIES, INC. ASSUMES NO RESPONSIBILITY AND DENIES ALL LIABILITY FOR ANY LOSS, DAMAGE, OR EXPENSE CONNECTED WITH CUSTOMERS' METHOD OF HANDLING, STORAGE, USE, AND DISPOSAL OF THIS PRODUCT.
* THE MSDS INFORMATION PROVIDED HEREIN IS APPLICABLE ONLY TO THIS PRODUCT.

5500-FM-OG0001A Rev. 11/2007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 827239
Watershed Name: N. Bra Calkins Creek	Quality: HQ

Permittee	OGO.#	Permit Number	Date Issued
NEWFIELD APPALACHIA PA LLC	OGO-67425	37-127-20016-	04/30/2010
Address: 363 N SAM HOUSTON PKWY E STE 2020		Farm Name & Well Number: VE CRUM 1 1	Well Serial #
		Municipality: Damascus	County: Wayne
HOUSTON, TX 77060-2424		7½ ' Quadrangle Name: Damascus	Map Section #: 5
Phone: (281) 847-6031	Project #	Latitude: 41-40-37.8900	Longitude: -75-4-56.7400
Surf Elev at Site: 904 feet	Anticipated Total Depth: 8350 feet	Well Type: TE	Offset distances referenced to NE corner of map section. South 11347 feet West 11136 feet

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires **04/30/2011** unless drilling is commenced on or before that date and prosecuted with due diligence.

S. Craig Lobb
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-FM-OG0004 Rev. 1/2010

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Site ID	Primary Fac ID: 728804
Client Id: 277879	Subfacility Id

Well Record and Completion Report

ll Operator	DEP ID#	Well API # (Permit / Reg)	Project Number	Acres
NEWFIELD APPALACHIA PA LLC	277879	37-127-20016-		

Address	Well Farm Name & Well #	Serial #
363 N SAM HOUSTON PKWY E STE 2020,	VE CRUM 1 1	

City	State	Zip Code	County	Municipality
HOUSTON	TX	77060-2424	Wayne	Damascus

Phone	Fax	USGS 7.5 min. quadrangle map
(281) 847-6031		Damascus

Check all that apply: ☐ Original Well Record ☐ Original Completion Report ☐ Amended Well Record ☐ Amended Completion Report

WELL RECORD

Also complete the Log of Formations on back (page 2)

Well Type ☐ Gas ☐ Oil ☐ Combination Oil & Gas ☐ Injection ☐ Storage ☐ Disposal

Drilling Method ☐ Rotary – Air ☐ Rotary – Mud ☐ Cable Tool

Date Drilling Started	Date Drilling Completed	Surface Elevation	Total Depth – Driller	Total Depth - Logger
		ft.	ft.	ft.

Casing and Tubing

Cement returned on surface casing? ☐ Yes ☐ No

Cement returned on coal protective casing? ☐ Yes ☐ No ☐ N/A

Hole Size	Pipe Size	Wt.	Thread / Weld	Amount in Well (ft)	*Material Behind Pipe* Type and Amount	*Packer / Hardware / Centralizers* Type	Size	Depth	Date Run

COMPLETION REPORT

Perforation Record

Date	Interval Perforated From	To

Stimulation Record

Date	Interval Treated	*Fluid* Type	Amount	*Propping Agent* Type	Amount	Average Injection

Natural Open Flow	Natural Rock Pressure	Hours	Days
After Treatment Open Flow	After Treatment Rock Pressure	Hours	Days

Well Service Companies -- Provide the name, address, and phone number of all well service companies involved.

Name	Name	Name
Address	Address	Address
City - State – Zip	City - State – Zip	City - State – Zip
Phone	Phone	Phone

5500-FM-OG0004 Rev. 1/2010

LOG OF FORMATIONS

Well API#: 37-127-20016--

(If you will need more space than this page, please photocopy the blank form before filling it in.)

Formation Name or Type	Top (feet)	Bottom (feet)	Gas at (feet)	Oil at (feet)	Water at (fresh / brine; ft.)	Source of Data

I do hereby certify to the best of my knowledge, information and belief that the well identified on this Well Record and Completion Report has been properly cased and cemented in accordance with the requirements of 25 Pa. Code Chapter 78 and any conditions contained in the permit for this well. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

5500-FM-OG0075 Rev. 8/2001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

Well Site Restoration Report

DEP USE ONLY	
Site ID	Primary Fac ID: 728804
Client Id: 277879	Subfacility Id

A. Operator and Well Information

Please read instructions on back before completing this form.

Well Operator: NEWFIELD APPALACHIA PA LLC	DEP ID#: 277879	Well API # (Permit / Reg): 37-127-20016-	
Address: 363 N SAM HOUSTON PKWY E STE 2020,		Well Farm Name & Well #: VE CRUM 1 1	Serial #:
City: HOUSTON	State: TX / Zip Code: 77060-2424	County: Wayne	Municipality: Damascus
Phone: (281) 847-6031	Fax:		

B. Land Application of Tophole Water

Date applied	pH
Volume (bbls)	Spec. cond. (µmhos/cm)

C. Off-site Waste Disposal

Type: ☐ Drilling Fluid (803) **Amount:** bbls

☐ Fracing Fluid (804) bbls

☐ Other, specify: **Qty:** bbls or tons

Method of disposal or reuse

☐ Disposal Well (04) ☐ Sewage Treatment Plant (10)

☐ Landfill (05) ☐ Brine Treatment Plant (12)

☐ Other (08)

Facility Information

Name: Permit #:

Hauler Information

Name:

Address:

City: State: Zip Code:

D. On-site Disposal – Drill Cuttings or Waste

Location of center of disposal area in relation to the well:

Course: degrees Distance: feet

Describe the **material disposed**, including additives.

Specify disposal method

☐ Unlined pit, complete Section E. ☐ Dusting

☐ Lined pit, complete Section E. ☐ Solidification

☐ Land application, complete Section F. ☐ Other

E. Pit Disposal

Describe pit closure procedures.

Subbase, material: Thickness: inches

Pit liner, material: Thickness: mils

Pit dimensions (feet) Length: Width: Depth:

F. Land Application

Area: Length: feet Width: feet

Waste-to-soil ratio (by volume):

Chemical analysis of waste

Cadmium (Cd)	ppm	Nickel (Ni)	ppm
Copper (Cu)	ppm	Zinc (Zn)	ppm
Chromium (Cr)	ppm	Oil and Grease	%
Lead (Pb)	ppm	Spec. Cond.	µmhos/cm
Mercury (Hg)	ppm		

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

Instructions for Well Site Restoration Report

Form 5500-FM-OG0075

Use this form to file the Well Site Restoration Report as required under 25 Pa. Code § 78.65(3). This report is to be filed with the department within 60 days after the restoration of the well site.

Section A. Operator and Well Information

Enter the name, address and telephone number of the well operator/permittee.

Provide the requested well information.

Section B. Land Application Of Tophole Water

Land application of tophole water must be performed in accordance with 25 Pa. Code § 78.60.

Provide the date(s) when tophole water was applied to the land, the estimated volume discharged, and the pH and specific conductance readings of the tophole water.

Section C. Off-site Waste Disposal

If disposing of residual waste off-site, complete this section.

Check the box next to each type of waste taken off-site for disposal. More than one box may be checked. Identify the number of barrels of drilling or fracing fluid removed. If checking "other", identify the waste and show the amount in either barrels or tons. Circle the appropriate unit of measurement.

Check the box next to the type of facility or site receiving the waste. Provide the name and permit number of the facility.

Provide the name and address of the person or company hauling the waste.

Section D. On-site Disposal – Drill Cuttings or Waste

If disposing of drill cuttings and/or residual waste on-site in accordance with 25 Pa. Code § 78.61 (Disposal of drill cuttings), § 78.62 (Disposal of residual waste—pits), or § 78.63 (Disposal of residual waste—land application), complete this section.

Locate the approximate center of the disposal area by giving the course in degrees and the distance in feet from the wellhead.

Describe the types of materials that were disposed on-site. Include drill cuttings above the surface casing seat, drill cuttings below the surface casing seat, cement returns, drilling muds, frac sands, and any other material that is being disposed on-site. Indicate any additives that were in the materials being disposed.

Additives are usually present to modify the performance of cement, drilling muds or frac sands. An example might be salt or oil in drilling muds.

Check the box next to the on-site disposal methods used. If "other" is checked, briefly describe the method of disposal.

Section E. Pit Disposal

If disposing of drill cuttings under 25 Pa. Code § 78.61 (Disposal of drill cuttings) complete the pit dimensions part of this section. If disposing of drill cuttings and/or residual waste under 25 Pa. Code § 78.62 (Disposal of residual waste—pits), complete all of this section.

Describe the procedures used to close the pit. The procedures should conform to requirements in 25 Pa. Code § 78.62.

Describe the type of material and thickness used for the subbase and pit liner. The manufacturer should be identified when describing the type of material used for the pit liner.

Provide the dimensions of the pit, giving the appropriate length, width, and depth in feet.

Section F. Land Application

If disposing of drill cuttings and/or residual waste including contaminated drill cuttings under 25 Pa. Code § 78.63, complete this section.

Provide the approximate length and width of the land application area in feet. Indicate the ratio of waste to soil by volume. As an example, if a 3-inch layer of waste was mixed into a 6-inch layer of soil the ratio would be 1/2. In no case may the ratio exceed 1/1.

Complete the chemical analysis information if it is requested by the department. The analysis is to be performed on the waste soil mixture after land application has occurred. See the guidelines for land application in the "Oil and Gas Operators Manual" for taking samples and for analysis methods.

If more room is needed to complete any section, provide the information on 8 ½" by 11" sheets of paper and attach to this form. Indicate the sections the information applies to.

5500-FM-OG0042 Rev. 8/2006

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY
DEP Client ID #
Bond Agreement #

BOND EXHIBIT A

For any wells to be covered under a Surety or Collateral Bond.

The listed well(s) are (check one):

☒ Well(s) to be drilled.

☐ Existing permitted well(s) to be bonded.

Signature

Newfield Appalachia PA, LLC
Operator Name

Donald F. Sleeth
Drilling Manager
Type or Print Name and Title

363 N. Sam Houston PkwyE.
Suite 2020
281-674-2501
Address and Telephone Number

Bond Type

☐ Collateral
Financial Institution and (Primary) Instrument ID#

☒ Surety U.S Specialty Insurance Company B005324
Company and Bond Number

Farm Name and Well Number	Permit Number (for existing wells)	FOR DEP USE ONLY
V. E. Crum 1-1		
E. M. Schweighofer 1-1		

Recycled Paper

363 N Sam Houston Pkwy E, Suite 100
Houston, Texas 77060-2421
1-866-896-4232

Newfield Appalachia LLC

REORDER 9019 - U.S. PATENT NO. 5538290, 5575508, 5641183, 5536306, 5636154, 5769458

No. 1064288

DATE 03/09/10 VENDOR NAME COMMONWEALTH OF PENNSYLVANIA VENDOR NO. 110562

INVOICE NO.	DATE	DESCRIPTION	DISCOUNT	NET AMOUNT
COMM030810A	03/08/2010	CK REQ - PERMIT APPLICATION - CRUM 1-1	0.00	1,500.00
			0.00	1,500.00

PLEASE DETACH AND RETAIN THIS STATEMENT AS YOUR RECORD OF PAYMENT. THANK YOU

THIS CHECK IS VOID WITHOUT A COLORED BORDER AND BACKGROUND PLUS A KNIGHT & FINGERPRINT WATERMARK ON THE BACK

Newfield Appalachia LLC
363 N Sam Houston Pkwy E, Suite 100
Houston, Texas 77060-2421

Wells Fargo Bank, N. A.
115 Hospital Drive
Van Wert OH 45891

No. 1064288

56-382
412

CHECK DATE	CHECK NUMBER	CHECK AMOUNT
03/09/10	1064288	$1,500.00

PAY One Thousand Five Hundred Dollars and 00/100 Cents

VOID 90 DAYS AFTER DATE OF ISSUE

TO THE ORDER OF
COMMONWEALTH OF PENNSYLVANIA
230 CHESTNUT ST
MEADVILLE, PA 16335

Second signature required over $50,000

Positive Pay Protected

⑈1064288⑈ ⑆041203824⑆9600088726⑈

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Dear Operator:

Enclosed please find well permit(s) issued for drilling or altering a well. Developing this resource in a safe and environmentally protective manner is of utmost importance. As you may be aware, there have been several recent incidences where water supplies have been affected by natural gas migration. In order to prevent future impacts to the Commonwealth's water resources and provide a mechanism for ensuring public safety, the Department is providing the following information as a reminder of the cementing requirements for oil and gas wells.

Cementing

Properly cementing the casing of a well is critical to protecting water resources, preventing gas migration, and ensuring well integrity. If the casing is improperly cemented or if insufficient cement is used, such as when cement is not returned to the surface, the operator should notify the Department pursuant to 25 Pa. Code § 78.86.

In addition, when cementing surface casing, 25 Pa. Code § 78.85 states that the cement must be allowed to set for at least 8 hours *and* until the cement attains a compressive strength of at least 350 psi. While the cement is setting, the casing must not be disturbed. This includes any activity that may cause movement or pressure changes to the casing or the cement sheath surrounding the casing. After the cement is set, care must be taken when drilling through the plug to prevent damaging the seal at the casing seat. Disturbing the casing while cement is setting or damaging the seal at the casing seat may provide a mechanism for gas and other fluids to escape from the well and contaminate groundwater and water supplies. If this occurs, the operator must notify the Department.

In addition, the Department also reminds you of the following reporting requirements for oil and gas wells.

Reporting

1. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(a) of Chapter 78 of the Oil and Gas Regulations, a **Well Record** must be submitted to the Department within thirty (30) days of cessation of drilling or altering a well.

2. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(b) of Chapter 78 of the Oil and Gas Regulations, a **Completion Report** must be submitted to the Department within thirty (30) days of completion of the well. A copy of the Well Record and Completion Report is enclosed with this letter. This is a newly revised form which requires the operator to certify that the well has been cased and cemented according to the requirements of 25 Pa. Code Chapter 78. Well Record and Completion Report forms that do not contain this certification will not be accepted by the Department. Additional copies of this form can be obtained from the Department's eLibrary at http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9841

3. Pursuant to Section 212(a) of the Oil and Gas Act, a report specifying the well status and production on the most well-specific basis available is to be provided to the Department. Section 78.121 of Chapter 78 details the reporting time frames required for various well types, waste reporting, and the acceptable format for the **Well and Waste Production Report** submissions.

4. Also note that pursuant to Section 212(b) of the Oil and Gas Act, the Department has the authority to request and does hereby request you submit a digital copy on CD of **ALL Well Logs** (temperature, electrical, radioactive, gamma ray, neutron, induction, resistivity, multi-arm caliper, acoustic, optical, etc.) that have been run on this well.

The above records and logs are to be submitted to the Department of Environmental Protections, Oil and Gas Management, 230 Chestnut St., Meadville, Pa 16335-3481 to the attention of the Regional Oil and Gas Manager.

Thank you for your cooperation in this matter.

Sincerely,

S. Craig Lobins
Regional Manager
Oil and Gas Management

Please note that the most recent revision of the Application for Drilling or Altering a Well must be submitted with all drilling applications. Please check the website below for the most recent revisions for all forms.
http://www.dep.state.pa.us/dep/deputate/minres/oilgas/o_gforms.htm

The Erosion,Sediment& Storm water Control Module is no longer being accepted for ESCGP-1 applications. Please submit the complete ESCGP-1 application for any projects. The most recent revisions must be submitted along with the application fee of $500.00

COPY

5500-FM-OG0001A Rev. 11/2007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Permittee's eFACTS ID	Auth ID
277879	830957
Watershed Name	Quality HQ
Hollister Creek	

WELL PERMIT

Permittee	OGO.#	Permit Number	Date Issued
NEWFIELD APPALACHIA PA LLC	OGO-67425	37-127-20017-00	05/27/2010
Address		Farm Name & Well Number	Well Serial #
363 N SAN HOUSTON PKWY E		WOODLAND MGMT PARTNERS 1 1	
SUITE 2020		Municipality: Damascus	County: Wayne
HOUSTON, TX 77060-2424		7½' Quadrangle Name: Callicoon	Map Section #: 7
Phone: (281) 847-6031	Project #:	Latitude: 41-45-57.2000	Longitude: -75-6-33.8000
Surf Elev at Site: 1193 feet	Anticipated Total Depth: 8350 feet	Well Type: GS	Offset distances referenced to NE corner of map section. South 9393 feet West 7108 feet

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires 05/27/2011 unless drilling is commenced on or before that date and prosecuted with due diligence.

S. Craig Lobb
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-PM-OG0001 Rev. 10/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

DEP USE ONLY	
AUTH #	CNC
Check # 1064287	Amount $ 1500

1250
200
50
$1500

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

DEP USE ONLY

Notes	OGO # 67425	Objection Date - Do not issue before: 5/3/10	Well Permit # 127-20017
	Bond # 12382		Special Cond. A B C D E F
	C: 4/13/10 n&m > 5/3/10 JC	Date Approved: 5/11/10 Ball	Watershed Name: Hollister Creek
	INV: 5-27-10		Designation: HQ EV

Please read instructions before you begin filling in this form.

Applicant (Operator) Name	DEP Client ID#	Phone	FAX	Check if new address. ☐
Newfield Appalachia PA LLC	277879	281-847-6031	281-847-6160	
Mailing Address (Street or PO Box)	**City**	**State**	**Zip +4**	**Country (if not USA)**
363 N. Sam Houston Pkwy E. Suite 2020	Houston	TX	77060-2424	

(Well) Farm Name	Well #	Serial #
Woodland Management Partners	1-1	

County	Municipality	Project # (from DEP)
WAYNE	DAMASCUS	

If you are applying for a permit to redrill, drill deeper, or alter a well that was previously permitted or registered, *or for a well site that was previously permitted but not drilled*, check this box ☐ and enter the permit or registration number here:

If applying for a permit to rework an existing well not registered or permitted, check this box ☐ and enter date drilled, if known: _____ (see instructions)

PNDI Attached: ☒ Any "hit" must include accepted mitigation plan from applicable agency.

PERMIT TYPE Check applicable.
Application is to:
- ☒ Drill a new well
- ☐ Deepen a well
- ☐ Redrill a well
- ☐ Alter a well
- ☐ E&S Control Module
- ☐ Other (specify)

TYPE OF WELL Check one.
- ☐ Gas
- ☐ Oil
- ☐ Comb. (gas & oil)
- ☐ Injection, recovery
- ☐ Injection, disposal
- ☐ Coalbed Methane
- ☐ Gas Storage
- ☒ Other (specify)

vertical test well

APPLICATION FEE Check applicable.
- ☐ Marcellus Well: Non-Vertical
- ☐ Marcellus Well: Vertical
- ☐ Non-Marcellus Well: Non-Vertical
- ☒ Non-Marcellus Well: Vertical
- ☐ $200 (Home Use Well)
- ☐ $500 E&S Fee
- ☐ $ 0 (Rehab orphan)
- ☒ Vertical: Length 8350 ft.
- ☐ Marcellus: Length _____ ft.
- ☐ Non-Vertical: Length _____ ft.

Total Application Fee $ 1500

COORDINATION WITH REGULATIONS AND OTHER PERMITS	Yes	No
1. Will the well be subject to the Oil and Gas Conservation Law? If "No," go to 2).	☒	☐
a. If "Yes" to #1, is the well at least 330 feet from outside lease or unit boundary?	☒	☐
b. Does the location fall within an area covered by a spacing order?	☐	☒
2. Will the well penetrate a workable coal seam? If "No," include justification and supporting documentation.	☐	☒
3. If the well will penetrate a workable coal seam, and the well is a "non-conservation" gas well, does the location comply with the distance requirements of Section 7 of the Coal and Gas Resource Coordination Act? (At least 1,000 feet from all existing wells).	☐	☐
a. If "No," is the required exception request attached? (Check here if re-working an existing well: ☐ N/A)	☐	☐
4. Will the well be drilled at a location where the coal has been removed?	☐	☒
5. Will the well be drilled through an active (operating or projected) coalmine, or within 1,000 feet of the boundary?	☐	☒
a. If "Yes," print the names of: Mine: _____ Operator: _____		
6. Will the well penetrate or be within 2,000 feet of an active gas storage reservoir boundary?	☐	☒
a. If Yes, print the names of: Storage Field: _____ Operator: _____		
7. Is the proposed well location within the permitted area of a landfill?	☐	☒
8. Will the well site be within 100 feet (measured horizontally) of a stream, spring or body of water identified on the most current 7½' topographic map?	☐	☒
a. If "Yes," is a request for a waiver (form 5500-FM-OG0057), and E&S control plan attached?	☐	☐
9. Will the well site be within 100 feet of a wetland or in a wetland?	☐	☒
a. Is the well site within 100 feet of a wetland greater than one acre in size?	☐	☐
If yes, is a waiver request (form 5500-FM-OG0057) and E&S control plan attached?	☐	☐
10. Will the well be drilled within 200 feet (horizontally) from any existing building or an existing water supply?	☐	☒
a. If "Yes," is written consent from the owner attached?	☐	☐
b. If written consent is not attached, is a variance request (form 5500-FM-OG0058) attached?	☐	☐

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NORTHWEST REGIONAL OFFICE

	Yes	No
11. Will the well be located where it may impact a public resource as outlined in the "Coordination of a Well Location with Public Resources" form 5500-PM-OG0076? If yes, attach a completed copy of the form.	☐	☒
12. Is the well site in a Special Protection High Quality (HQ) or Exceptional Value (EV) watershed?	☒	☐
13. Is this well part of a development where you need an Earth Disturbance Permit for Oil and Gas Activities disturbing more than 5 acres? If yes, attach a completed Erosion Sediment and Stormwater Control Module or list the number and date of the ESCGP-1 Approval. _____	☐	☒

DEP USE ONLY — Date Stamps/Notes
Auth 530957
Site 733315
Cint 277879
APS 717958
Acct 676721
PF 729777
SF 1012951

Signature of Applicant The person signing this form attests that they have the authority to submit this application on behalf of the applicant, and that the information, including all related submissions, is true and accurate to the best of their knowledge.

Signature of Person Authorized to Submit Application	(Print or Type)	Name of Signer: DONALD F. SLEETH Title: Drilling Manager	Date 4-6-10
Donald F. Sleeth			

Application Preparer/Contact: BETSY COLLINS Phone: 412-921-8250

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
Woodland Management Partners-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 --- Record of Notification / Written Consent

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

		Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates: Sent	Notification: Certified Mail Dates: Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Name: Donald and Marie Hartnett	Address: 841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Name: Woodland Management Partners	Address: 308 Egypt Rd. Tafton, PA 18464	X											X
Name: Alfred Cimino	Address: 124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X			3/25/10	4/1/10		
Name: Leon N Clouse, Sr.	Address: PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

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NORTHWEST REGIONAL OFFICE

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location	Date	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☑ water supply, or ☐ building within 200 feet	Date 3/6/10
Address (of above) Leon N Clouse	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

4-27-2007

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
Woodland Management Partners-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 --- Record of Notification / Written Consent

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

		Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates: Sent	Notification: Certified Mail Dates: Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Name: Donald and Marie Hartnett	Address: 841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Name: Woodland Management Partners	Address: 308 Egypt Rd. Tafton, PA 18464	X											X
Name: Alfred Cimino	Address: 124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X			3/25/10	4/1/10		
Name: Leon N Clouse, Sr.	Address: PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

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Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location: WOODLAND MANAGEMENT PARTNERS LP	Date: 3/4/2010	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location: WOODLAND MGT SERVICES INC General Partner	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

Richard L. Hitchcock
PRESIDENT

1987-2001

5500-PM-OG0002-DWG Rev. 09/2008

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program

WELL LOCATION PLAT

DEP USE ONLY	
DEP Application Tracking #	
Permit #	127-20017
Project #	

G: JL 5/3/10
C:

Denotes location of well on topo map.

True Latitude: NORTH
41 ° 45 ' 57.2 "

True Longitude: WEST
75 ° 06 ' 33.8 "

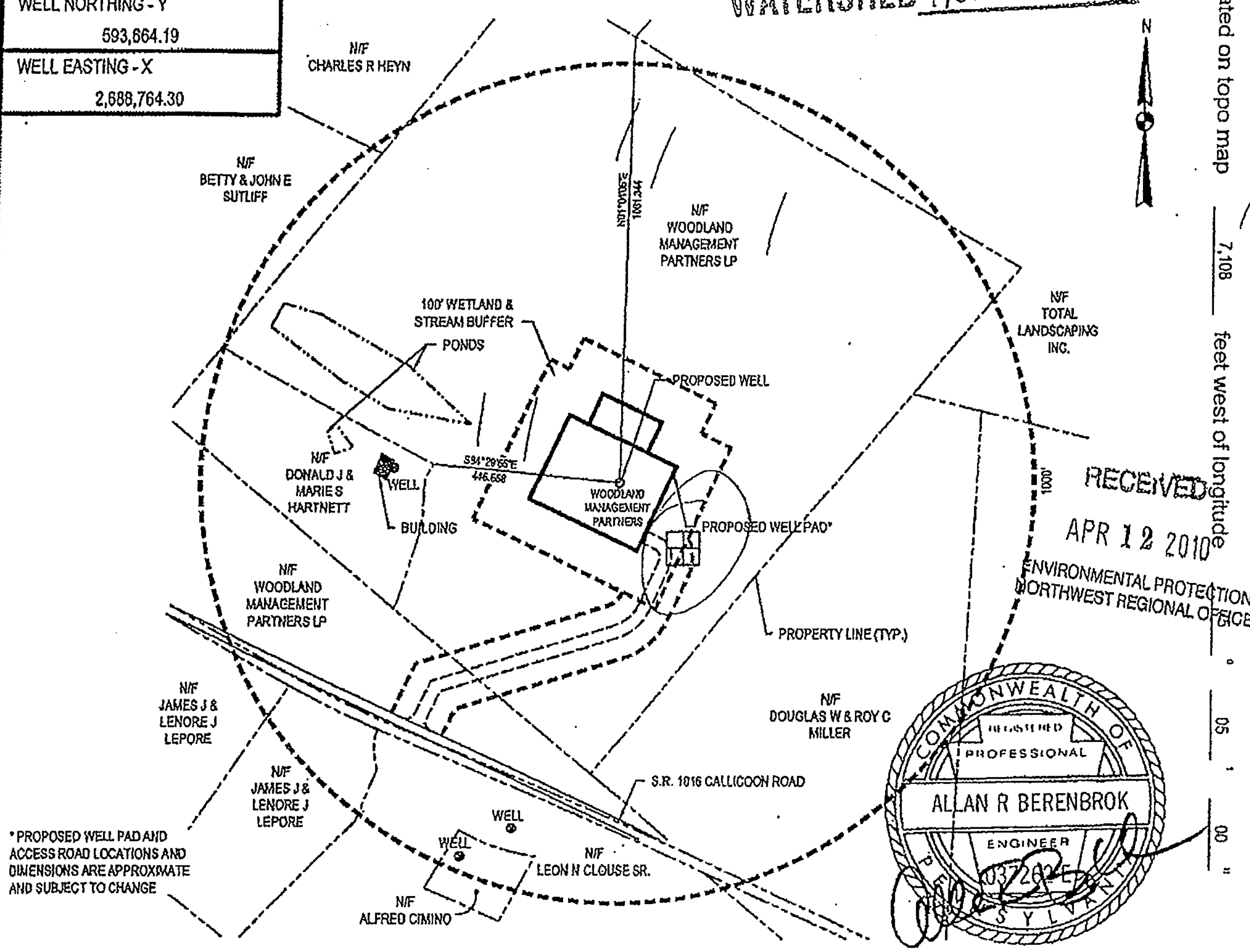
WELL NORTHING - Y
593,664.19

WELL EASTING - X
2,688,764.30

Well is located on topo map 9,393 feet south of latitude 41 ° 37 ' 30 "

Well is located on topo map 7,108 feet west of longitude ° 05 ' 00 "

HQ
WATERSHED HOLLISTER CREEK



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NORTHWEST REGIONAL OFFICE

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ALLAN R BERENBROK
ENGINEER
037262-E

Surveyor or Engineer: TETRA TECH | Phone # (412) 921-8673 | Dwg. # 1 | Date 4/6/2010 | Scale 1" = 400' | Tract Acreage

Lat. & Long Metadata: Method GPS, Accuracy +/- 1 ft. Datum NAD83	Elevation Metadata: Method GPS, Accuracy +/- 1 ft. Datum NAD83; Survey Date Jan. 2010
Applicant / Well Operator Name: Newfield Appalachia PA LLC	Well (Farm) Name: Woodland Management Partners; Well # 1-1; Serial #
Address: 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060	County - Code: Wayne; Municipality: Damascus; Well Type: Vertical Test
Surface Landowner / Lessor: Woodland Management Partners	USGS 7 1/2 Quadrangle Map Name: Callicoon, PA; Map Section 7; Surface Elevation 1193 ft.
Target Formation(s): Onondaga	Angle & Course of Deviation (Drilling): N/A; Anticipated Total Depth TVD 8,350 ft. TMD 8,350 ft.

Surface Owners of Water Supply within 1000 ft	Approximate Course and Distance to Water Supply	Owners/Lessees of Coal Seam to Workable Coal Seam	Name of Coal Seam Owner/Lessee/Operator
Donald and Marie Hartnett	N86d 22' 34"W 537'	N/A	N/A
Leon N. Clouse Sr.	S16d 46' 23"W 862'	N/A	N/A
Alfred Cimino	S22d 36' 51"W 965'	N/A	N/A
		N/A	N/A

R:_Marcellus Shale Projects\Newfield\2679 - Newfield Wells\Well Plat Permits\Permit Drawings\WMP Well Pad Plat Exhibit A.dwg PIT BEN.HOPPE 4/6/2010 10:54:04 AM

5500-PM-OG0002 Rev. 9/2008

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL LOCATION PLAT

(Attachment, if needed)

DEP USE ONLY	Auth ID #: 127-20017

Use only if you need additional space for listings.

Applicant / Well Operator Name	DEP ID#	Well (Farm) Name	Well #	Serial #

Surface Owner or Water Purveyor with a Water Supply within 1000 feet	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased or Operated

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NORTHWEST REGIONAL OFFICE

5500-FM-OG0001A Rev. 11/2007

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 830957
Watershed Name: Hollister Creek	Quality HQ:

Permittee	OGO.#	Permit Number	Date Issued
NEWFIELD APPALACHIA PA LLC	OGO-67425	37-127-20017-00	05/27/2010

Address	Farm Name & Well Number	Well Serial #
363 N SAN HOUSTON PKWY E	WOODLAND MGMT PARTNERS 1 1	
SUITE 2020	Municipality: Damascus / County: Wayne	
HOUSTON, TX 77060-2424	7½' Quadrangle Name: Callicoon	Map Section #: 7

Phone	Project #	Latitude	Longitude
(281) 847-6031		41-45-57.2000	-75-6-33.8000

Surf Elev at Site	Anticipated Total Depth	Well Type	Offset distances referenced to NE corner of map section.
1193 feet	8350 feet	GS	South 9393 feet West 7108 feet

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires 05/27/2011 unless drilling is commenced on or before that date and prosecuted with due diligence.

S. Craig Lobb
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-PM-OG0001 Rev. 10/2009

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

DEP USE ONLY	
AUTH #	CNC
Check # 1010142887	Amount $ 1500

1950
200
50
$1500

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

DEP USE ONLY

Notes			
	OGO # 67425	Objection Date - Do not issue before: 5/3/10	Well Permit # 127-20017
	Bond # 12382		Special Cond. A B C D E F
	C: 4/13/10 n6ms 5/3/10 SC	Date Approved: 5/11/10	Watershed Name: HOLLISTER CREEK
	INV: 5-27-10		Designation: (HQ) EV

Please read instructions before you begin filling in this form.

Applicant (Operator) Name	DEP Client ID#	Phone	FAX	Check if new address. ☐
Newfield Appalachia PA LLC	277879	281-847-6031	281-847-6160	
Mailing Address (Street or PO Box)	City	State	Zip +4	Country (if not USA)
363 N. Sam Houston Pkwy E. Suite 2020	Houston	TX	77060-2424	

(Well) Farm Name	Well #	Serial #
Woodland Management Partners	1-1	

County	Municipality	Project # (from DEP)
WAYNE	DAMASCUS	

If you are applying for a permit to redrill, drill deeper, or alter a well that was previously permitted or registered, *or for a well site that was previously permitted but not drilled,* check this box ☐ and enter the permit or registration number here:

If applying for a permit to rework an existing well not registered or permitted, check this box ☐ and enter date drilled, if known:________ (see instructions)

PNDI Attached: ☒ Any "hit" must include accepted mitigation plan from applicable agency.

PERMIT TYPE
Check applicable.
Application is to:
- ☒ Drill a new well
- ☐ Deepen a well
- ☐ Redrill a well
- ☐ Alter a well
- ☐ E&S Control Module
- ☐ Other (specify)

TYPE OF WELL
Check one.
- ☐ Gas
- ☐ Oil
- ☐ Comb. (gas & oil)
- ☐ Injection, recovery
- ☐ Injection, disposal
- ☐ Coalbed Methane
- ☐ Gas Storage
- ☒ Other (specify) vertical test well

APPLICATION FEE
Check applicable.
- ☐ Marcellus Well: Non-Vertical
- ☐ Marcellus Well: Vertical
- ☐ Non-Marcellus Well: Non-Vertical
- ☒ Non-Marcellus Well: Vertical
- ☐ $200 (Home Use Well)
- ☐ $500 E&S Fee
- ☐ $ 0 (Rehab orphan)
- ☒ Vertical: Length 8350 ft.
- ☐ Marcellus: Length____ft.
- ☐ Non-Vertical: Length____ft.

Total Application Fee $ 1500

COORDINATION WITH REGULATIONS AND OTHER PERMITS	Yes	No
1. Will the well be subject to the Oil and Gas Conservation Law? If "No," go to 2).	☒	☐
a. If "Yes" to #1, is the well at least 330 feet from outside lease or unit boundary?	☒	☐
b. Does the location fall within an area covered by a spacing order?	☐	☒
2. Will the well penetrate a workable coal seam? If "No," include justification and supporting documentation.	☐	☒
3. If the well will penetrate a workable coal seam, and the well is a "non-conservation" gas well, does the location comply with the distance requirements of Section 7 of the Coal and Gas Resource Coordination Act? (At least 1,000 feet from all existing wells).	☐	☐
a. If "No," is the required exception request attached? (Check here if re-working an existing well: ☐ N/A)	☐	☐
4. Will the well be drilled at a location where the coal has been removed?	☐	☒
5. Will the well be drilled through an active (operating or projected) coalmine, or within 1,000 feet of the boundary?	☐	☒
a. If "Yes," print the names of: Mine: Operator:		
6. Will the well penetrate or be within 2,000 feet of an active gas storage reservoir boundary?	☐	☒
a. If Yes, print the names of: Storage Field: Operator:		
7. Is the proposed well location within the permitted area of a landfill?	☐	☒
8. Will the well site be within 100 feet (measured horizontally) of a stream, spring or body of water identified on the most current 7½' topographic map?	☐	☒
a. If "Yes," is a request for a waiver (form 5500-FM-OG0057), and E&S control plan attached?	☐	☐
9. Will the well site be within 100 feet of a wetland or in a wetland?	☐	☒
a. Is the well site within 100 feet of a wetland greater than one acre in size?	☐	☐
If yes, is a waiver request (form 5500-FM-OG0057) and E&S control plan attached?	☐	☐
10. Will the well be drilled within 200 feet (horizontally) from any existing building or an existing water supply?	☐	☒
a. If "Yes," is written consent from the owner attached?	☐	☐
b. If written consent is not attached, is a variance request (form 5500-FM-OG0058) attached?	☐	☐
11. Will the well be located where it may impact a public resource as outlined in the "Coordination of a Well Location with Public Resources" form 5500-PM-OG0076? If yes, attach a competed copy of the form.	☐	☒
12. Is the well site in a Special Protection High Quality (HQ) or Exceptional Value (EV) watershed?	☒	☐
13. Is this well part of a development where you need an Earth Disturbance Permit for Oil and Gas Activities disturbing more than 5 acres? If yes, attach a completed Erosion Sediment and Stormwater Control Module or list the number and date of the ESCGP-1 Approval. ________	☐	☒

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ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

DEP USE ONLY
Date Stamps/Notes
Auth 830957
Site 733315
Clnt 277879
APS 717958
Acct 676721
PF 729777
SF 1012151

Signature of Applicant The person signing this form attests that they have the authority to submit this application on behalf of the applicant, and that the information, including all related submissions, is true and accurate to the best of their knowledge.

Signature of Person Authorized to Submit Application	(Print or Type)	Name of Signer: DONALD F. SLEETH Title: Drilling Manager	Date 4-6-10
Donald F. Sleeth			

Application Preparer/Contact: BETSY COLLINS Phone: 412-921-8250

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
Woodland Management Partners-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 --- Record of Notification / Written Consent

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

		Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates: Sent	Notification: Certified Mail Dates: Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Name: Donald and Marie Hartnett	Address: 841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Name: Woodland Management Partners	Address: 308 Egypt Rd. Tafton, PA 18464	X											X
Name: Alfred Cimino	Address: 124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X			3/25/10	4/1/10		
Name: Leon N Clouse, Sr.	Address: PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

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APR 12 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location	Date	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☑ water supply, or ☐ building within 200 feet	Date: 3/6/10
Address (of above): Leon n Clouse	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

4-27-2011

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
Woodland Management Partners-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 --- Record of Notification / Written Consent

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

		Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates: Sent	Notification: Certified Mail Dates: Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Name: Donald and Marie Hartnett	Address: 841A Calicoon Rd. Damascus, PA 18415-3514						X			3/25/10	3/29/10		
Name: Woodland Management Partners	Address: 308 Egypt Rd. Tafton, PA 18464	X											X
Name: Alfred Cimino	Address: 124 Monroe St, Apt. 1 Archibald, PA 18403-1818						X			3/25/10	4/1/10		
Name: Leon N Clouse, Sr.	Address: PO Box 241 Stanhope, NJ 07874-0241						X						X
Name:	Address:												
Name:	Address:												
Name:	Address:												

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NORTHWEST REGIONAL OFFICE

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location WOODLAND MANAGEMENT PARTNERS LP	Date 3/4/2010	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location WOODLAND MGT SERVICES, INC General Partner	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

President

1971-2001

5500-PM-OG0002-DWG Rev. 09/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program

WELL LOCATION PLAT

DEP USE ONLY	DEP Application Tracking #	G: JL 5/3/10
	Permit # 127-20017	C:
	Project #	

Denotes location of well on topo map.

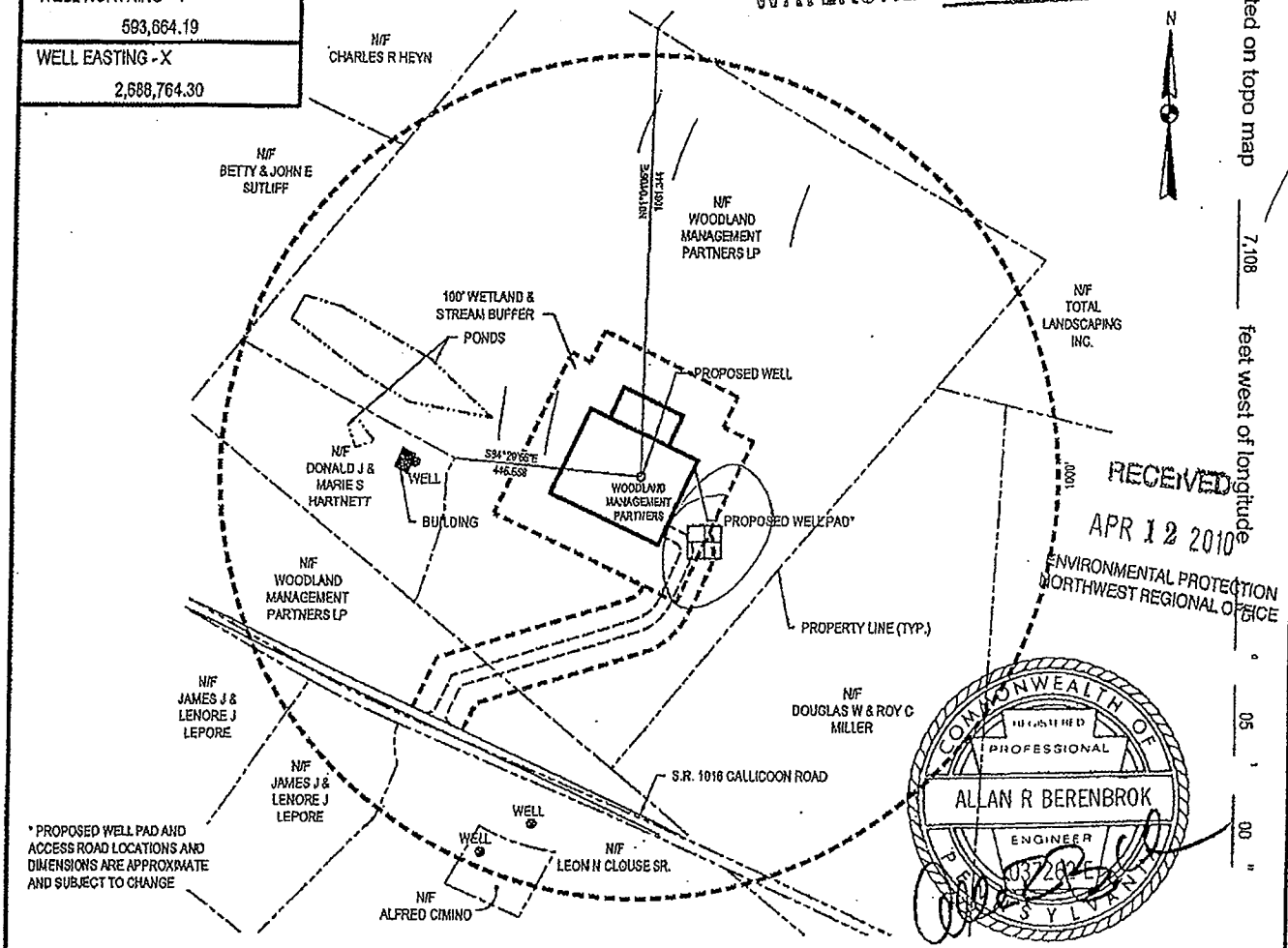
Well is located on topo map 9,393 feet south of latitude 41 ° 37 ' 30 "

True Latitude: NORTH	41 ° 45 ' 57.2 "
True Longitude: WEST	75 ° 06 ' 33.8 "
WELL NORTHING - Y	593,664.19
WELL EASTING - X	2,688,764.30

Well is located on topo map 7,108 feet west of longitude

HQ

WATERSHED HOLLISTER CREEK



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COMMONWEALTH OF REGISTERED PROFESSIONAL
ALLAN R BERENBROK
ENGINEER
PENNSYLVANIA

Surveyor or Engineer: TETRA TECH | Phone #: (412) 921-8873 | Dwg. #: 1 | Date: 4/6/2010 | Scale: 1" = 400' | Tract Acreage:

Lat. & Long Metadata Method: GPS	Accuracy: +/- 1 ft.	Datum: NAD83	
Elevation Metadata Method: GPS	Accuracy: +/- 1 ft.	Datum: NAD83	Survey Date: Jan. 2010
Applicant / Well Operator Name: Newfield Appalachia PA LLC		Well (Farm) Name: Woodland Management Partners	Well #: 1-1 / Serial #:
Address: 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060		County - Code: Wayne	Municipality: Damascus / Well Type: Vertical Test
Surface Landowner / Lessor: Woodland Management Partners		USGS 7 1/2 Quadrangle Map Name: Callicoon, PA	Map Section: 7 / Surface Elevation: 1193 ft.
Target Formation(s): Onondaga		Angle & Course of Deviation (Drilling): N/A	Anticipated Total Depth: TVD 8,350 ft. / TMD 8,350 ft.

Name of Water Purveyor or Surface Water Supply within 1000'	Approximate Distance from Water Source	Owner of Water Supply within 1000'	Name of Coal Seam Owned / Leased / Operated
Donald and Marie Hartnett	N86d 22' 34"W 537'	N/A	N/A
Leon N. Clouse Sr.	S16d 46' 23"W 862'	N/A	N/A
Alfred Cimino	S22d 36' 51"W 965'	N/A	N/A
		N/A	N/A

R:_Marcellus Shale Projects\Newfield\40679 - Newfield Wells\Well Plat Permits\Permit Drawings\WAP Well Pad Plat Exhibit A.dwg PIT BEN.HOPPE 4/6/2010 10:54:04 AM

5500-PM-OG0002 Rev. 9/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL LOCATION PLAT

(Attachment, if needed)

DEP USE ONLY	Auth ID #: 127-20017

Use only if you need additional space for listings.

Applicant / Well Operator Name	DEP ID#	Well (Farm) Name	Well #	Serial #

Surface Owner or Water Purveyor with a Water Supply within 1000 feet	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased or Operated

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NORTHWEST REGIONAL OFFICE

HIGHWAY OCCUPANCY PERMIT

PENNDOT

PERMIT NO.	04043824
ORGANIZATION	046
DATE ISSUED	051010
PERMIT FEES	25.00
ACCOUNT NO.	
COUNTY	63
TOWNSHIP/BORO	206

1

DESCRIPTION	512	
STATE ROUTE NO.	1016	
SEGMENT(S)	0090	0090
OFFSET TO OFFSET	0470	0470

2

DESCRIPTION		
STATE ROUTE NO.		
SEGMENT(S)		
OFFSET TO OFFSET		

3

DESCRIPTION		
STATE ROUTE NO.		
SEGMENT(S)		
OFFSET TO OFFSET		

4

TOWNSHIP/BORO		
DESCRIPTION		
STATE ROUTE NO.		
SEGMENT(S)		
OFFSET TO OFFSET		

PERMITTEE: WOODLAND MANAGEMENT PARTNERS LP

ADDRESS: 308 EGYPT ROAD

POST OFFICE: TAFTON PA ZIP CODE: 18464-

COUNTY: WAYNE

TOWNSHIP/BORO: DAMASCUS

BOND/AGREEMENT NUMBER:

ALL WORK UNDER THIS PERMIT MAY BE STARTED ON: 05/10/10

AND SHALL BE COMPLETED ON OR BEFORE: 05/10/11

Immediately upon completion of the work, Permittee shall notify the permit office where application was made. Subject to all the conditions, restrictions, and regulations prescribed by the Pennsylvania Department of Transportation, (see in particular 67 Pa. Code, Chapter 203/212, 441 and 459) and subject to the plans, special conditions, or restrictions herein set forth or attached hereto. This permit shall be located at the work site and shall be available for inspection by any police officer or department representative.

DESCRIPTION OF WORK

INSTALL MINIMUM USE DRIVEWAY WITH DRAINAGE FACILITIES AT SR 1016 SEG 0090 OFFSET 0470 TO SEG 0090 OFFSET 0470
THIS PERMIT AUTHORIZES WORK ONLY IN DEPARTMENT HIGHWAY RIGHT OF WAY.
IT IS THE PERMITTEE'S RESPONSIBILITY TO KEEP VEGETATION TRIMMED IN ORDER TO MAINTAIN MINIMUM SIGHT DISTANCE. NO OBJECTS MAY BE PLACED WITHIN THE LINE OF SIGHT.
SHOULDERS MUST BE RESTORED IN ACCORDANCE WITH APPROPRIATE SECTION OF PUB. 408 AND ROADWAY CONSTRUCTION STANDARD RC-25.
SURFACE DRAINAGE MAY NOT BE DIRECTED ONTO STATE HIGHWAY RIGHT OF WAY.
PERMITTEE MUST MAINTAIN ACCESS FROM THE PAVEMENT EDGE TO AT LEAST 20 FEET OUTSIDE THE HIGHWAY RIGHT OF WAY.
ALL DISTURBED AREAS OUTSIDE THE PAVEMENT OR SHOULDER SHALL BE RESTORED TO A CONDITION AT LEAST EQUAL TO THAT WHICH EXISTED BEFORE THE START OF WORK.
MINIMUM WORK ZONE TRAFFIC CONTROL TO BE IN ACCORDANCE WITH PUB. 213, FIGURE(S): 5, 7, & 10A. SEE PUB 213 FOR ADDITIONAL DETAILS.
DRAINAGE INSTALLED BY THIS PERMIT IS THE RESPONSIBILITY OF THE PERMITTEE TO CONTINUALLY MAINTAIN OR REPLACE.
DEPARTMENT MUST BE NOTIFIED IN WRITING UPON COMPLETION OF WORK.

THIS PERMIT IS NOT VALID UNTIL SIGNED BY THE DISTRICT ENGINEER OR HIS AUTHORIZED REPRESENTATIVE

Acknowledgement of Completion

Permitted work has been completed.

Date _____ By _____

for ALLEN D. BIEHLER, P.E. 5/3/10

Secretary of Transportation

GEORGE ROBERTS, P.E., D.E.

District Executive

PERMITTEE

APPLICATION FOR MINIMUM USE DRIVEWAY

A Minimum Use Driveway Is A Residential Or Other Driveway Which Is Expected To Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T)

APPL. NO. 075293

SEE PUBLICATION 312 GUIDE

APPLICANT/PROPERTY OWNER		
Woodlands Management Partners LP		
ADDRESS		
308 Egypt Road		
POST OFFICE		ZIP CODE
Tafton PA		18464
PHONE	FEE	CHECK NO.
570-857-1072	25.00	5049

APPLICATION IS MADE TO

☒ CONSTRUCT A NEW DRIVEWAY ☐ ALTER AN EXISTING DRIVEWAY

DATE WORK SCHEDULED TO BEGIN May 15, 2010

DATE WORK SCHEDULED TO BE COMPLETED August 31, 2010

LOCATION OF PROPOSED DRIVEWAY

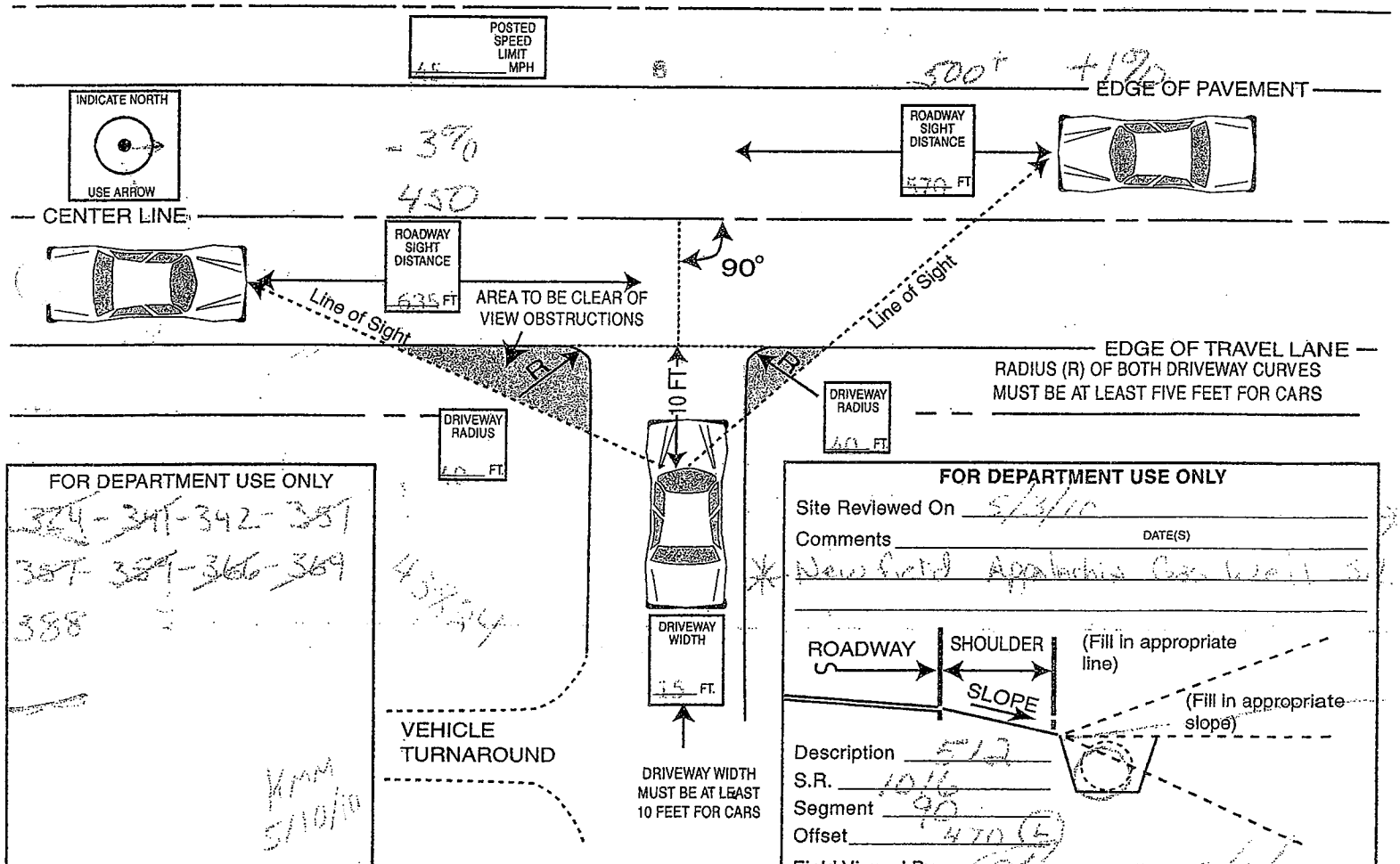
County Wayne 63

Township/Boro Damascus 206

Route No. S.R. 1016 (Callicoon Rd)

Name of Nearest Intersection Little Equinunk Creek

Distance to Nearest Intersection in Feet 3520 ft.



FOR DEPARTMENT USE ONLY

324-341-342-357
357-359-366-369
358

KMM 5/10/10

FOR DEPARTMENT USE ONLY

Site Reviewed On 5/3/10 DATE(S)

Comments New Cntd Appalachia Gas Well S

ROADWAY SHOULDER (Fill in appropriate line)

SLOPE (Fill in appropriate slope)

Description SR2

S.R. 1016

Segment 90

Offset 470 (L)

Field Viewed By SIGNATURE DATE

Is any portion of the property reserved for a person with a disability or a severely disabled veteran? ☐ YES ☒ NO

Under and subject to all the conditions, restrictions and regulations prescribed by the Pennsylvania Department of Transportation and the issued Permit, Form M-945P.

The applicant certifies that all statements contained herein are true and correct.

By X _____ 4/14/2010
SIGNATURE(S) DATE

Visit our website at: www.dot.state.pa.us

ROADWAY USE AND MAINTENANCE AGREEMENT

AND NOW THIS 21 day of June, 2010, it is agreed by and between Damascus Township, Wayne County, Pennsylvania, by and through its Board of Supervisors and New Field Exploration, a duly formed corporation with its principal place of residence at 363 Sam Houston, Houston, TX, (jointly "the Parties") to enter into this agreement regarding the use and maintenance of township roadways necessary for transportation and travel of equipment and personnel to and from oil and gas wells on various leaseholds within the Township;

WHEREAS, Damascus Township, (Hereinafter reference to as the "Township") has control and jurisdiction of various Township owned roadways with its boundaries; and

WHEREAS, the NewField (Hereinafter referred to as the "Operator"), is the owner of certain oil and gas leaseholds in Wayne County, Pennsylvania; and

WHEREAS, the Township and Operator are desirous of entering into a formal agreement for the use of Township roadways for the purposes of providing ingress, regress and egress to various leaseholds for which excess traffic and equipment transportation is necessary for the development of said oil and gas wells on said leaseholds, and

WHEREAS, the Township and Operator are desirous of addressing the excess road maintenance costs and expenditures necessary for and incurring from construction, drilling and completion stages of gas and oil operations utilizing said Township roadways.

NOW THEREFORE, in consideration of a faithful performance of each party of mutual covenants and promises hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged as follows:

1. The Operator agrees to identify those Township roads or portions of roads to be used by its vehicles and equipment prior to the commencement of operations.

2. After receiving from the Operator a list of such roads, the Parties agree to jointly inspect the pertinent roadways promptly to determine the road structure, its condition and the existence of any buried utility lines, and to depict any surface characteristics. Operator will prepare a pre-use road inspection report documenting the road conditions and characteristics.

3. The Operator agrees to restore any affected roadways to a condition equal or better than the pre-use condition of said road(s) within 180 days of the conclusion of Operator's use, weather permitting; provided that Operator's liability shall be limited to only that portion of the cost of repair and restoration which exceeds normal and routine maintenance, costs, and which is caused by the Operator's vehicles and equipment.

4. In the event that the pre-use condition of any roadway requires or warrants repaving or improvements prior to use, the Operator shall be liable for such improvements only to the extent that the parties agree that such improvements would reduce damage caused by the Operator's use, and agree on ratably sharing the costs of such improvements.

5. In the event that the Township incurs additional costs associated with maintenance of said roadway as a direct result of the Operator's activities (including those of their agents, employees and contractors), including dust suppression needed during peak activity periods, the Township will provide prior notice of such additional maintenance needed, and if possible, obtain a cost estimate, and deliver the same to the Operator. Operator will only be liable for such maintenance costs to the extent that the parties agree that such maintenance is necessary and that the parties shall share the costs.

6. The Operator agrees to reimburse the Township for reasonable additional costs agreed upon in a reasonable and prompt period of time, but not to exceed forty-five (45) days.

7. Upon completion of all improvements called for in the final inspection report, the Operator shall submit a certification of the improvements made to the Township, and such certification shall be deemed approved unless the Township gives

written notice of objections to the certification within ten days of receipt of the certification.

8. Upon conclusion of the drilling activities anticipated by this Agreement, both parties will promptly inspect the roadways utilized and make a determination as to what, if any, improvements or maintenance need to be performed by the Operator to discharge the obligations required by this Agreement. This final report then shall be deemed to be a complete list of improvements needed to discharge this Agreement, binding upon all parties.

9. In the event that future drilling activities occur utilizing the same or part of a Township roadway(s) previously improved by virtue of this agreement, then the future contemplated activities shall cause the provisions of this agreement to resume as if said roadway(s) were being initially contemplated, with a new pre-use road inspection report, and such follow up requirements as previously herein set forth.

10. The Operator shall be given the option of having any agreed upon repair work performed by a contractor of its choice.

11. This Agreement is entered into in lieu of the Township incurring the cost and inconvenience of implementing a state compliant road bonding system and shall survive any future creation of any such system as to the Operator and remain the operative relationship between the Township and the Operator until terminated by the mutual agreement of the Township and the Operator.

12. This agreement shall be binding upon the successors and assigns of the parties hereto and shall be deemed to be a covenant running with the roads described above. This agreement shall not be transferred or assigned by the Operator without the consent in writing of the Township, which consent will not be unreasonably withheld.

IN WITNESS WHEREOF, this instrument has been executed by the undersigned the Pr Production Manage, this 21 day of June, 2010.

TOWNSHIP:

Damascus Township Supervisors

By: _____

By: _____

By: _____

OPERATOR:

New Field Exploration

(Company Name)

By: _____

Company Representative

DAMASCUS TOWNSHIP, WAYNE COUNTY, PA.

ROAD INSPECTION REPORT

PRINT NAME: _____ DATE: _____

SIGN: _____ COMPANY: _____

[ ] PRE- INSPECTION

[ ] POST INSPECTION

[ ] VIDEO RECORD: [ ] YES

[ ] NO

ROAD CONDITION: _____

_____

_____

ROAD SURFACE: ACP \ ASBC \ CRUDE \ GRAVEL:

_____

DRAINAGE [CENTERLINE, CULVERTS, APPROACHES] :

_____

_____

_____

SIGNAGE: _____

_____

EXISTING DUST CONTROL: [ ] YES

[ ] NO: _____

OTHER FACTORS EFFECTING THE ROADWAY: _____

_____

_____

WILL THE COMPANY PROVIDE A GRADER TO MAINTAIN THE DRIVING SURFACE? YES [ ] OR NO [ ]

COMMENTS: _____

_____

PREPAREDNESS, PREVENTION, AND CONTINGENCY PLAN
WAYNE COUNTY FIELD
WAYNE COUNTY, PENNSYLVANIA

Prepared for:

NEWFIELD APPALACHIA PA LLC
363 N. Sam Houston Pkwy E., Suite 2020
Houston, TX 77060

Prepared by:

TETRA TECH NUS INC
116 N. Washington Avenue
Scranton, PA 18503

May 2010

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 DESCRIPTION OF FACILITY

1.1 DESCRIPTION OF THE INDUSTRIAL OR COMMERCIAL ACTIVITY

Newfield Appalachia PA LLC (Newfield) is a natural gas exploration company with operations planned for Wayne County, Pennsylvania. Operations will involve natural gas exploration of the Marcellus Shale formation, which will include site preparation, drilling, and well development and production activities. Wastes generated during these activities will be typical for gas drilling operations and will include drill cuttings, produced water, drilling and frac fluids, waste oil, municipal waste and trash. No hazardous waste is expected to be generated at the Newfield sites.

Newfield is currently in the exploratory phase of operations, which will require construction activities for new natural gas well pads and access roads.

This Prevention, Preparedness and Control (PPC) Plan applies to all well sites in Wayne County, Pa.

The attached map (Figure 1) in Appendix B shows the area covered under this PPC Plan Figure 2 is the required 7.5 topographic map of the specific well site. The proposed Site Plan (Figure 3) shows the site layout, the well site boundaries, material storage areas, waste storage areas, dike drains and drainage that leads away from the well site, and the entrances and exits to the well site.

During the different stages of site preparation, construction, drilling, well development and production, the site will store various fuels, oils and chemicals on-site. A chemical and container inventory for the specific well site is located in Table 1 of Appendix C.

1.2 DESCRIPTION OF EXISTING EMERGENCY RESPONSE PLANS

This is a new facility and this plan has been prepared prior to construction of the well pad. There are no previous emergency response plans.

A separate Spill Prevention Control and Countermeasure (SPCC) Plan will be prepared for each facility meeting the requirements defined in 40 CFR§112.

1.3 MATERIAL AND WASTE INVENTORY

Information in this section is used to evaluate the prevention, containment, mitigation, cleanup, and disposal measures which would be used in the event of a spill, discharge, explosion, or fire. Oils, chemicals and other hazardous materials anticipated to be used and stored at the facility during site preparation and construction, drilling, well development and production are listed in Table 1.

MSDS's will be maintained onsite for chemicals and compounds used at the facility in accordance with the Occupational Safety and Health Administration (OSHA) worker right-to-know requirements, as appropriate.

1.4 POLLUTION INCIDENT HISTORY

Newfield has not had any reportable incidents for this facility.

1.5 IMPLEMENTATION SCHEDULE FOR PLAN ELEMENTS NOT CURRENTLY IN PLACE

All plan elements are in place.

1.6 PURPOSE AND IMPLEMENTATION OF PPC PLAN

Newfield has developed and will implement this PPC Plan for effective action to minimize and abate hazards to human health and the environment from fire, explosion, and emission or discharge of pollutants to air, soil, surface water or groundwater. This plan was prepared to satisfy the requirements set forth in 25 PA Code Section 78.

The Drilling Manager serves as the Primary Emergency Coordinator and is responsible for the preparation and implementation of the PPC Plan. The PPC Plan has been prepared and implemented in general accordance with Pennsylvania Department of Environmental Protection (PADEP) guidelines, and will be submitted to PADEP for approval at such time as the PADEP may prescribe.

This PPC Plan identifies and describes any arrangements with police departments, fire departments, hospitals, contractors, and state, county, and local emergency response teams to coordinate emergency services.

The PPC Plan lists names, addresses and phone numbers of all persons identified to act as Emergency Coordinator. One person is named as the Primary Emergency Coordinator and others are listed in the order in which they will assume responsibility as alternates. The PPC Plan also includes a list of emergency equipment at the facility, the location and a physical description of emergency equipment, and a brief outline of emergency equipment capabilities.

1.7 PLAN REVISIONS

This PPC Plan will be reviewed and amended, annually, or whenever:

- Applicable PADEP regulations are revised;
- The plan fails in an emergency;
- The list of Emergency Coordinators changes;
- The list of emergency equipment changes; and
- Construction, operation, maintenance, or other circumstances change in a manner that materially increases the potential for fires, explosions, or releases of toxic or hazardous constituents; or which changes the response necessary in an emergency.

2.0 IMPLEMENTATION OF PPC PLAN

2.1 ORGANIZATIONAL STRUCTURE OF FACILITY FOR IMPLEMENTATION

The Drilling Manager has been designated as the Primary Emergency Coordinator. The Primary Emergency Coordinator is responsible for the following:

- Coordination of spill cleanup activities;
- Notification of appropriate authorities; and
- Tank and chemical storage area inspections.

The Drilling Manager has administrative responsibility for updating, maintaining, and implementing this PPC Plan. Specifically, these responsibilities include:

- Identification of materials and wastes handled during site operation (inventory);
- Identification of potential spill sources (risk assessment);
- Establishment of spill reporting procedures;
- Coordination of the visual inspection program;
- Review of past incidents, spills, and countermeasures employed;
- Coordination and implementation of the PPC Plan goals;
- Training/educational programs and updates;
- Ensuring periodic review of the PPC Plan for adequacy and appropriateness;
- Administration and institution of appropriate changes at regular intervals;
- Review of new construction and process changes relative to the PPC Plan;
- Evaluation of PPC Plan effectiveness prior to, during and subsequent to its implementation; and
- Instituting improvements to the PPC Plan.

The Production Manager is designated as Secondary Emergency Coordinator, and, in the absence of the Drilling Manager, will assume the role of emergency coordinator for emergencies. The Secondary Emergency Coordinator will report directly to the Primary Emergency Coordinator in matters regarding this plan, and can assist with implementing the above-listed items.

2.2 LIST OF EMERGENCY COORDINATORS

As required by 25 PA Code 265.55, there will be at least one employee, either on the construction site or on call, with the responsibility for coordinating emergency response measures. The Primary and Secondary Emergency Coordinators will be thoroughly familiar with this PPC Plan, site operations and activities, the location and characteristics of materials and wastes, the location of the facility's records, and the layout of the facility. The Emergency Coordinators have the authority to commit the resources necessary to carry out the PPC Plan and for coordinating emergency response measures. In the event of a spill or release, one of the Emergency Coordinators will be immediately notified. The following individuals have been designated to act as Emergency Coordinators:

Primary Emergency Coordinator

Name: Don Sleeth
Title: Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Secondary Emergency Coordinator

Name: Jack Cochran
Title: Production Manager
Office: 814-437-2344
Cell: 814-671-1557

2.3 DUTIES AND RESPONSIBILITIES OF THE EMERGENCY COORDINATOR

As required by 25 PA Code 265.56 and the PPC Plan Guidance Documents, whenever there is an imminent or actual emergency situation, the Emergency Coordinator or his designee must immediately:

1. Notify all facility personnel.
2. Notify appropriate state or local agencies with designated response roles and contracted emergency response companies if additional assistance is required.
3. Identify the problem. Is it a physical emergency such as a fire, explosion, or spill? Is it a natural disaster such as a flood, tornado, or other severe weather? Is it a social emergency such as a bomb threat, riot, or vandalism?

4. Assess the health or environmental hazards and how this problem or condition will affect employees or its affect on the surrounding community.

5. Take all reasonable measures to stabilize the situation. The Emergency Coordinator will take all reasonable measures to ensure that the fire, explosion, emission, or discharge does not reoccur or spread to other materials at the site. These measures can include, when appropriate, stopping operations, collecting and containing released materials or wastes, and removing or isolating containers.

Whenever there is an emission, discharge, fire, or explosion, the Emergency Coordinator or his designee must immediately attempt to identify the character, exact source, amount, and aerial extent of emitted or discharged materials. He/she may do this by observation, by review of facility records or manifests, and, if necessary, by instrumental and chemical analysis. Concurrently, the Emergency Coordinator or his designee must assess possible hazards to human health or the environment that may result from emission, discharge, fire, or explosion. This assessment must consider both direct and indirect effects of the emission, discharge, fire, or explosion.

If the Emergency Coordinator determines that the facility has had an emission, discharge, fire, or explosion which would threaten human health or the environment (beyond the limits of the site) and if evacuation of local areas may be advisable, he/she must immediately notify the applicable local authorities (police, fire, etc.); he/she must also immediately notify the PADEP by telephone at (800) 541-2050 (24-hour number), PADEP Northeast Region at (570) 826-2511 (24-hrs), the National Response Center at (800) 424-8802, Wayne County Emergency Management Agency (EMA) at (570) 253-1622, and the Pennsylvania Emergency Management Agency at (717) 651-2001, and report the following information:

- Name of the person reporting the incident;
- Name and location of the facility;
- Telephone number where the person reporting the spill can be reached;
- Date, time, and location of the incident;
- A brief description of the incident, nature of the materials involved, extent of any injuries, and possible hazards to human health or the environment;
- The estimated quantity of the materials spilled; and
- The extent of contamination of land, water, or air, if known.

If spills or discharges of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance in greater than reportable quantities has occurred, the Emergency Coordinator must notify DEP at (800) 541-2050 and the National Response Center at (800) 424-8802 and report the above information. For an offsite release (spill or discharge) of a reportable quantity of a CERCLA hazardous substance or a Superfund Amendments and Reauthorization Act Extremely Hazardous Substance, the Emergency Coordinator must immediately notify the National Response Center at (800) 424-8802 and report the above information.

If a release occurs from a storage tank which enters a water supply or which threatens the water supply of downstream users, the Emergency Coordinator must immediately notify the Wayne County EMA (570) 253-1622, the Pennsylvania Emergency Management Agency at (717) 651-2001, and DEP at (800) 541-2050. If appropriate, the Emergency Coordinator may assist the Emergency Management Agencies in notifying the downstream water users. The priorities for notification will be by closest proximity to the release site.

During an emergency, the Emergency Coordinator will take all reasonable measures necessary to ensure that fire, explosion, emission, or discharge do not occur, recur, or spread to other materials at the facility. These shall include, where applicable, stopping facility operations, collecting and containing released materials, and removing or isolating containers. If the facility stops operations in response to a fire, explosion, emission, or discharge, the Emergency Coordinator must ensure that adequate monitoring is conducted for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment whenever this is appropriate.

The Emergency Coordinator will oversee and direct facility personnel in the performance of their responsibilities for addressing the emergency situation. Immediately following an emergency, the Emergency Coordinator (with PADEP approval) must provide for treating, storing, or disposing residues, contaminated soil, etc., from an emission, discharge, fire, or explosion at the construction site. The Emergency Coordinator must ensure that in the affected areas of the facility, no material incompatible with the emitted or discharged residues is processed, stored, treated, or disposed until cleanup procedures are completed and that all emergency equipment utilized in implementation of the PPC Plan is cleaned and fit for its intended use before operations are resumed. Newfield will notify PADEP and the appropriate State or local

authorities that the facility is in compliance before operations are resumed in the affected areas of the facility. Newfield will note the time, date and details of an incident that requires implementing the PPC Plan.

Within 15 days after the incident, Newfield will submit a written report on the incident to PADEP and the U.S. Environmental Protection Agency regional administrator. The report must be submitted to:

Director - Bureau of Water Quality Management
Pennsylvania Department of Environmental Protection
909 Elmerton Avenue
Harrisburg, PA 17110

Regional Administrator
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103

Director - PADEP Northeast Office
Pennsylvania Department of Environmental Protection
2 Public Square
Wilkes-Barre, PA 18711

The report should include the following information:

- Name, address, and telephone number of the individual filing the report;
- Name, address, and telephone number of the facility;
- Date, time, type, and location of incident;
- A brief description of the circumstances causing the incident;
- Description and estimated quantity (by weight) of materials or wastes involved;
- The extent of injuries, if any;
- An assessment of actual or potential threat to human health or the environment and assessment of contamination of land, water, or air, where applicable;
- Estimated quantity and disposition of recovered materials or wastes that resulted from the incident; and
- A description of what actions Newfield intends to take to prevent a similar occurrence in the future.

2.4 CHAIN OF COMMAND

Facility personnel must report emergency situations to the Emergency Coordinators. A Chain of Command flow chart (Table 5, Appendix C) has been developed and should be implemented during an emergency. The Emergency Response Chain of Command flow chart will be posted

next to all telephones onsite, posted in areas where potential emergency situations could arise, and placed in onsite company vehicles, as appropriate.

2.5 DISTRIBUTION OF THIS PPC PLAN

A copy of this PPC Plan and subsequent revisions will be distributed to:

- Drilling Manager (Primary Emergency Coordinator)
- Production Manager (Secondary Emergency Coordinator)

The PPC Plan will be reviewed and amended, if necessary, based on the criteria described earlier in Section 1.7.

3.0 SPILL AND LEAK PREVENTION AND RESPONSE

The site will be maintained and operated to minimize the possibility of a fire, explosion or discharge of oils, hazardous materials or their constituents to air, soil, surface water or groundwater which could threaten human health or the environment, in accordance with the requirements of 25 PA Code Section 265.31.

3.1 PRE-RELEASE PLANNING

The following sections discuss specific locations where the potential exists for accidental spills of oils and/or chemicals. The controls that are in place to minimize the potential for an uncontrolled release to the environment are also discussed. In the event that an uncontrolled spill of hazardous substances occurs, the procedures described in Section 4.0 will be followed.

To enhance spill prevention at the facility, great care will be exercised in handling oil and other materials covered in this PPC Plan. Any unusual conditions observed by any employees or contractors will be reported to one of the Emergency Response Coordinators. Management personnel whose responsibilities include involvement with the materials discussed in this document will also be familiar with this plan and the procedures recommended for spill prevention.

Spill Prevention Measures: Procedures that are to be followed to prevent and/or minimize oil spills at the Newfield facility include:

- ASTs and/or containers will be stored in secondary containment with sufficient volume;
- ASTs and regulated material containers will be visually inspected weekly for leaks;
- Special care will be taken when transferring regulated materials to prevent product loss;
- Regulated materials will be stored in a manner that minimizes the potential for contact with stormwater;
- Absorbent and spill control materials shall be maintained on-site for emergency use;

- Emergency response personnel will be familiar with procedures to follow in the case of a spill; and

- In cases where there may be leaking equipment or operations where oil or oil-related compounds are leaked, spilled, or otherwise released, containment booms or absorbent materials shall be used and equipment shall be repaired.

In the event that an uncontrolled spill of oil or a hazardous material occurs, the procedures described in Section 4.0 will be followed. Responses should be coordinated with federal, state and local agencies as appropriate.

3.2 MATERIAL COMPATIBILITY

The majority of materials received on-site in totes, drums, pails or other small containers are stored in the containers supplied by the manufacturer.

Construction materials used for the ASTs have been selected and designed to be compatible with the materials that are being stored and are typical for the natural gas industry.

3.3 INSPECTIONS AND MONITORING PROGRAM

Operating equipment will be inspected daily, and a copy of the inspection and maintenance form is included in Appendix A. Employees are responsible for detecting and reporting potential problems on the inspection and maintenance form.

Storage tank inspections will be conducted weekly and include evaluation of the following: pumps, valves, and fittings for leaks; the tank condition for evidence of corrosion; secondary containment; evidence of spilled materials; and effectiveness of housekeeping practices.

Completed inspection forms and inspection reports will be maintained in the Primary Emergency Coordinator's office. Noncompliance issues identified during the comprehensive site evaluation will be addressed in a timely manner. If additional control measures are required, implementation of the measures will generally occur within 90 days of the site evaluation. Compliance issues that require revisions to the PPC Plan (description of additional pollutant sources, measures, or controls) will be incorporated into the plan within approximately 15 days of the site evaluation.

Stormwater Management System: Stormwater inspections will include an evaluation of best management practices (BMPs), where appropriate. In accordance with the erosion and sedimentation control plan prepared for the site, erosion and sedimentation control (ESC) measures will be implemented where there is the potential for sediment or soil particles to impact stormwater quality. Repairs will be made, as necessary, following the site inspection.

Storage Tanks and Drum Storage Areas: Tanks and drum storage areas will be accessed daily. Spills or leaks that may occur will be contained by secondary containment and noted as part of routine facility operations. To enhance the daily observations, periodic inspections will be performed for the tank and drum storage areas as described in Table 2. The inspections will include observation of spill and/or leaks and observations of the condition of associated secondary containment structures. Records for the inspections will be maintained in the Primary Emergency Coordinator's office.

3.4 PREVENTIVE MAINTENANCE

Newfield will ensure that preventative maintenance of operating machinery on each construction site is performed regularly.

3.5 HOUSEKEEPING PROGRAM

The Newfield Construction Manager will be responsible for general construction site housekeeping. Specific steps taken under this program will include:

- Debris and/or sediment removal, as necessary.
- Regular refuse pickup and disposal.
- Proper filling and emptying of storage containers, tanks, and equipment to minimize spill potential.
- Periodic review of good housekeeping procedures in the employee-training program.

Once completed, the Production Manager will have overall responsibility for housekeeping at the facility. Newfield currently does not anticipate that bulk quantities of hazardous waste materials will be stored at the facility.

3.6 SECURITY

The facility is not fully fenced but is located in a remote location with limited access except via the site access road. The facility is normally manned during drilling and well development.

Flow and drain valves are locked and in the off position when in non-operational or non-standby status. The starter controls for each oil pump are locked in the off position when in non-operating or non-standby status. Master flow/drain valves are all located on the Facility and monitored by staff.

Any loading/unloading connections of facility piping is capped or blind flanged when not in service or is in standby service for an extended amount of time.

The facility has lighting sufficient for detection of spills during nighttime operations. Consideration has been given to: (a) discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel, and (b) prevention of spills occurring through acts of vandalism.

3.7 EXTERNAL FACTOR PLANNING

External factors are not anticipated to increase the risk of a spill or release that would impact human safety or the environment. Power outages, adverse weather conditions, or employee strikes could result in discontinuation of earth moving, drilling or well preparation activities. The Emergency Coordinator will monitor operations and initiate their orderly shutdown when necessary.

Access road conditions may be impacted by adverse weather conditions, possibly increasing the risk of a release of materials being delivered or removed. Truck drivers should report poor road conditions to the Construction or Drilling Manager. If conditions deteriorate to where they may impact safe movement of materials, the construction or Drilling Manager will review the conditions and initiate repairs or road closure as deemed necessary.

3.8 EMPLOYEE TRAINING PROGRAM

Newfield's employee training program enables employees to understand the processes and materials with which they are working, the safety and health hazards, the practices for preventing spills, and the procedures for responding properly and rapidly to spills. It also familiarizes personnel with emergency procedures.

All Newfield employees receive job specific training. Emergency Coordinators, Well Tenders, and other oil or hazardous material handling employees receive annual training on the facility's PPC and SPCC plans.

Job specific training includes preventive maintenance, inspection and monitoring activities, shut down procedures and housekeeping practices. PPC training will include spill/release recognition, initial response, initial notifications and follow-up. The training program is designed to ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communications and alarms systems; response to fires and explosions; site evacuation procedures; and shutdown of operations.

Annual right-to-know training for all facility employees is conducted relevant to the materials present at the facility. Employees will be given detailed instructions regarding the materials and wastes with which they are working; including safety and health hazards, handling methods, proper disposal procedures, and emergency procedures. The location of MSDS's for on-site materials will be identified to all employees.

Training records will be maintained at the facility and in the employee's personnel file.

4.0 COUNTERMEASURES

4.1 COUNTERMEASURES TO BE UNDERTAKEN BY FACILITY

The following sections present general spill response practices to be implemented at the Newfield facility, as appropriate.

4.1.1 Spill Clean-Up Procedures - General

Incidental spills should be contained and cleaned up when discovered per the employees job related training. Clean up material should be placed into a marked container and the Construction or Drilling Manager notified appropriately.

For large spills or spills of oils or hazardous materials which may reach surface water or impact the environment, the employee who first discovers the spill should contact the Emergency Coordinator. He should then work to contain and clean-up the spill.

Spill clean-up involves three steps: containment, removal, and disposal. In the event of a spill, it is very important that the material be contained to the maximum extent possible in order to minimize the effect of the spill and the cost of clean-up. **NOTE: ANY SHEEN ON A WATERBODY (STREAM, RIVER, OR WETLAND) IS A REPORTABLE RELEASE.** Once the spill is contained, the spilled material and contaminated material must be collected and physically removed from the area

4.1.2 Spill Clean-Up Procedures - Specific

The employee should do the following:

- Contain the spill to the smallest area possible using absorbent materials, earthen dikes or other diversion or containment structures. Stormwater collection structures will be either blocked or pumped.
- Block off the area to prevent traffic or employees from entering the area.
- For oils and other organic materials, apply a non-reactive sorbent material, such as Oil-Dri or Kitty Litter, to the spill.
- In the case of a spill of acids hazardous waste, check the MSDS and then neutralize with lime or soda ash if appropriate.
- If a leaking tank is involved, stop liquid flows as appropriate and dike the tank area with earth or absorbent material.

- If a leaking pail, drum or other small container is involved, place it in an over-pack container.
- Clean up spilled material and place it in a marked container.
- Work with the emergency coordinator to properly store the material and arrange for proper disposal

4.1.3 Fire or Explosion

In the case of a fire or explosion, the local fire department should be notified by calling 911. Employees may attempt to extinguish fires using handheld fire extinguishers based upon their job training.

The Emergency Coordinator will determine if evacuation per section 4.4 is required.

4.2 COUNTERMEASURES TO BE UNDERTAKEN BY CONTRACTORS

The following list shows area emergency response contractors to contact should the facility require outside help.

Company: Minuteman Spill Response, Inc.
Address: P.O. Box 10
Mifflinville, PA 18631
Telephone Number: 570-759-3658
Response Time: Approximately 2 to 3 hrs
Equipment and Services: Hazardous Materials Emergency Response

4.3 INTERNAL AND EXTERNAL COMMUNICATIONS AND ALARM SYSTEM

This section describes the internal communications or alarm used to provide immediate emergency instruction (voice or signal) to installation personnel, and the external communications or alarm system used to summon emergency assistance from local police or fire departments.

Newfield facilities in Wayne County are remote and generally do not have land-line telephone systems or alarm systems. The primary means of communication is via voice or mobile telephones. Mobile phones are provided to the Drilling and Production Managers (Primary and Secondary Emergency Coordinators).

Fire, police, and emergency service can be summoned by calling the 911 or per the numbers listed in Table 3.

4.4 EVACUATION PLAN

In the unlikely event that the site must be evacuated, the Emergency Coordinator will alert personnel to re-group at the pre-designated location for attendance taking. The Emergency Coordinator is responsible to verify that all site workers are accounted for during an evacuation. Periodic drills will be conducted, if deemed necessary, to evaluate the effectiveness of this evacuation plan.

If an emergency situation requires evacuation of personnel, the Emergency Coordinator will implement the following evacuation procedures:

1. The Emergency Coordinator will provide evacuation instructions to facility personnel via the construction site communications network, as appropriate.

2. Personnel evacuation will typically proceed as follows:

   a. If downwind of incident: Evacuate via the most accessible route perpendicular to the prevailing wind direction.
   b. If upwind of incident: Evacuate in an upwind direction.

3. Personnel will reassemble at the public road at the facility entrance as shown on Figure 3 or an alternate assembly point identified by the Emergency Coordinator, that is upwind of the incident location, and remain at this location until the Emergency Coordinator has accounted for all personnel.

4. The names of employees and the destination of employees transported to hospitals, etc. for treatment will be recorded by the Emergency Coordinator, first aid personnel or fire officials.

Once on public roadways, evacuation routes are left up to the individual.

4.5 EMERGENCY EQUIPMENT AVAILABLE FOR RESPONSE

This section provides a list of available emergency equipment, and procedures for maintenance and decontamination of emergency equipment. Newfield's emergency equipment at the facility will allow personnel to respond safely and quickly to emergency situations. Equipment will be inspected and maintained by Construction Manager to assure recommended quantities are available and its proper operation in time of emergency. After an emergency, equipment will be decontaminated, cleaned, and re-fit for its intended use before normal operations resume.

The Newfield facility will be equipped with the following emergency response equipment:

(1) Mobile telephones are provided to the Drilling and Production Mangers and are immediately available at the scene of operations for summoning emergency assistance from local police departments, fire departments or State or local emergency response teams.

(2) Portable fire extinguishers, fire control equipment, spill control equipment and decontamination equipment. This equipment is detailed in Table 4 of Appendix C.

5.0 EMERGENCY SPILL CONTROL NETWORK

5.1 ARRANGEMENTS WITH LOCAL EMERGENCY RESPONSE AGENCIES AND HOSPITALS

This section provides a list of local emergency response agencies and hospitals, and associated phone numbers. Arrangements can be made, as appropriate, to inform local emergency response agencies and hospitals concerning the type of materials handled at the Newfield facility and the potential need for services.

If appropriate, arrangements can be made to designate who will be the primary emergency response agency and who will provide support services during emergencies. Efforts can be made to familiarize police, fire departments, emergency response teams, and the Wayne County Emergency Management Agency (EMA) Coordinator with the layout of the site, the properties and dangers associated with any hazardous materials handled, places where personnel would normally be working, entrances to roads inside the site, and potential evacuation routes.

If considered appropriate by Newfield's Emergency Coordinator, agreements with hospitals and emergency response agencies can be made and included in the periodic updating or amending of the PPC Plan. The agreements and/or arrangements include efforts to familiarize area agencies and emergency responders with facility operations and potential emergency operations. The following agencies can be contacted and provided with a copy of this PPC Plan, at the discretion of the Newfield Emergency Coordinator.

- Local fire companies;
- Local county emergency response personnel;
- Local ambulance personnel; and
- Local hospital.

Table 3 lists local emergency response agencies to be contacted in the event of an emergency or reportable spill. In the unlikely event that a widespread emergency exists, the Wayne County EMA would be contacted first, and the Coordinator in turn could contact appropriate emergency response agencies through their communications network.

The Wayne County Emergency Management Agency can be contacted at (570) 253-1622. Routing of injured persons will be performed by emergency medical services personnel based on the number and type of injuries requiring treatment. The emergency medical services coordinator may be provided with a copy of this PPC Plan to assist in planning. The nearest hospitals are Catskill Regional Medical Hospital in Callicoon, New York, and Wayne County Memorial Hospital in Honesdale, Pennsylvania. The nearest fire departments are Callicoon Fire District in Callicoon, New York, Protection Engine Co No. 3 in Honesdale, Pennsylvania, and Narrowsburg Fire Department, in Narrowsburg, New York. The nearest police departments are the Honesdale Police Department, located in Honesdale, Pennsylvania, and Waymart Police Department in Honesdale Pennsylvania. All emergency response departments shall be reached through the 911 system.

5.2 NOTIFICATION LISTS

If the Emergency Coordinator determines that the facility has had an emission, discharge, fire, or explosion that could threaten human health or the environment, he will contact and report as necessary his findings to the appropriate agencies listed in Table 3. When calling any of the agencies listed in Table 3, the following information should be available for reporting to the identified agencies:

- Company name and location;
- Name of person reporting the spill, title, and telephone number;
- The type of material released;
- Estimated or exact (if known) quantity of material released (i.e., gallons, pounds, etc.);
- A brief description of the incident, including type of incident, nature of hazardous material involvement, and possible hazards to human health and the environment outside the facility;
- Probable source and location of the spill source;
- Date and time of the spill;
- Location of entry point into surface water and amount reaching the waterway (if applicable);
- The name of the receiving water and the downstream water bodies of which it is a tributary;
- Confirmation that release has been stopped or, if not, when will it be stopped;
- Mitigation/containment actions initiated;
- Direction of material movement;

- Potential population affected by the release;
- Name of person to contact on behalf of the company who will be at the scene and will be directing response measures;
- Telephone number where the on-scene coordinator can be reached; and
- The extent of injuries, if any.

A reporting form is attached in Appendix D for use by the Emergency Coordinator.

A written report including the above listed information, and other information that may be required by the applicable regulations (see 25 PA Code Section 265.56) regarding the spilled material, will need to be transmitted within 15 days to the following agencies:

U.S. Environmental Protection Agency
Region III
Spill Response Section
1650 Arch Street
Philadelphia, PA 19103

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management
2 Public Square
Wilkes-Barre, Pennsylvania 18711

6.0 WASTE DISPOSAL PRACTICES

Produced water will be removed periodically from the tanks at each well site and transported by a licensed residual waste hauler to a permitted disposal facility. Other wastes generated onsite will include used hydraulic oil that will be reclaimed from operating equipment and transported offsite for recycling. All wastes will be disposed in accordance with applicable local, state, and federal regulations.

7.0 STORMWATER MANAGEMENT PRACTICES

Newfield implements several Best Management Practices (BMPs) at each well site to reduce the potential for stormwater runoff of suspended solids and other contaminants. These BMPs include routine visual inspections, preventive maintenance, good housekeeping, and management of stormwater run-on and runoff. Routine inspection and monitoring, preventive maintenance, and good housekeeping programs are discussed in Sections 3.3, 3.4, and 3.5 of this PPC Plan. These programs prevent accidental releases of contaminants and reduce contaminant migrations via stormwater discharges. Stormwater management activities are discussed in Section 3.1 of this PPC Plan. The certification statement regarding the evaluation of discharges and confirmation that they will be comprised solely of stormwater is presented at the beginning of this Plan. Potential "significant sources of non-stormwater at the site" may include condensate, brine, hydraulic oil drums and tanks, gasoline and diesel fuel. Storage areas for these significant sources will be inspected on a daily basis.

8.0 SEDIMENT AND EROSION PREVENTION

Erosion and sedimentation controls are managed in accordance with PADEP requirements. Copies of the site E&S Plan are available at the Newfield office in Honesdale, PA and at each well site.

APPENDIX A

INSPECTION FORMS

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Facility:	Inspector Name:
Date of Inspection:	

Instructions: Indicate yes or no. If no, record observations describing the specific equipment and discrepancy.

Aboveground Storage Tanks		
• Equipment appears adequately supported	Yes ☐	No ☐
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes ☐	No ☐
• Coating condition appears satisfactory	Yes ☐	No ☐
• Corrosion appears acceptable	Yes ☐	No ☐
• Level gauages/alarms are operative	Yes ☐	No ☐
• Containers are labeled	Yes ☐	No ☐
Observations:		

Processing Equipment		
• Equipment appears adequately supported	Yes ☐	No ☐
• No evidence of active or past leaks from equipment, piping, connections, vales, vents, etc.	Yes ☐	No ☐
• Coating condition appears satisfactory	Yes ☐	No ☐
• Corrosion appears acceptable	Yes ☐	No ☐
Observations:		

Other Facility Equipment is Checked for: ❖ No evidence of active or past leaks ❖ Condition of equipment appears to be satisfactory (i.e., not damaged, deteriorated, or worn), and ❖ Corrosion appears to be acceptable.		
• Wellheads	Yes ☐	No ☐
• Gathering systems	Yes ☐	No ☐
• Well test stations	Yes ☐	No ☐
• Traps/Sumps	Yes ☐	No ☐
• Drainage systems and nearby ditches	Yes ☐	No ☐
• Applicable flowlines including right-of-way areas	Yes ☐	No ☐
• Containment systems	Yes ☐	No ☐
• Facility piping	Yes ☐	No ☐
Observations:		

NEWFIELD APPALACHIA PA LLC
Weekly Facility Inspection Form

Secondary Containment		
• Passive containment (berm) has adequate capacity and integrity as intended	Yes ☐	No ☐
• Active containment measures are adequate	Yes ☐	No ☐
• No evidence of active or past leaks (i.e., staining, sheen)	Yes ☐	No ☐
• Any valves are closed and plugged	Yes ☐	No ☐
• Active containment is free from a significant quantity of rain/snow	Yes ☐	No ☐
Observations:		

Security		
• Lighting is adequate to observe leaks, spills, and vandalism	Yes ☐	No ☐
• Pumps, valves, nozzles are locked	Yes ☐	No ☐
Observations:		

Spill Response		
• Spill response kits are stocked and located in readily accessible areas	Yes ☐	No ☐
Observations:		

Signature:	Date:

E&S INSPECTION FORM

The E&S plan contains a maintenance program which provides for inspection of BMPs (Best Management Practices such as filter sock, vegetation, construction entrances, etc.) on a weekly basis and after each measurable rainfall event, including the repair of BMPs to ensure effective and efficient operation. The maintenance program for both the temporary and permanent erosion and sediment control BMPs, including disposal of materials removed from the BMPs or project area, has been included in the narrative. The type of maintenance, such as cleanout, repair, replacement, regrading, re-stabilizing, etc. for each of the BMPs is included in the plan. **NOTE: This inspection report must be kept up to date and onsite.**

INSPECTION DATE	INITIALS	RAINFALL OR WEEKLY?	LOCATION OF E&S CONTROL(S)	CONDITION NOTED	CORRECTIVE MEASURES TAKEN

Facility: _____ **Inspector:** _____ **Signed:** _____ **Date:** _____

Print *Signature*

Tank Truck Loading and Unloading Checklist

Date: _____ Material being loaded/unloaded: _____

Driver/Loader present during loading or unloading of material _____
(signature)

_____ Current volume in storage tank was checked prior to loading.

_____ Fill hose inspected for condition prior to loading.

_____ Wheel chocks in place prior to loading.

_____ Tanker valve(s) were inspected for leakage prior to filling and departure.

_____ The loading of the tanker was monitored.

_____ Hoses were replaced and capped after loading.

_____ No material was spilled onto the containment pad or ground.

- These forms must be completed for every tank truck shipment and must be filed in the facility PPC Plan.
- All spills should be immediately reported to at least one of the following Newfield personnel:

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Burl Eakle
Cell: 918-448-1296

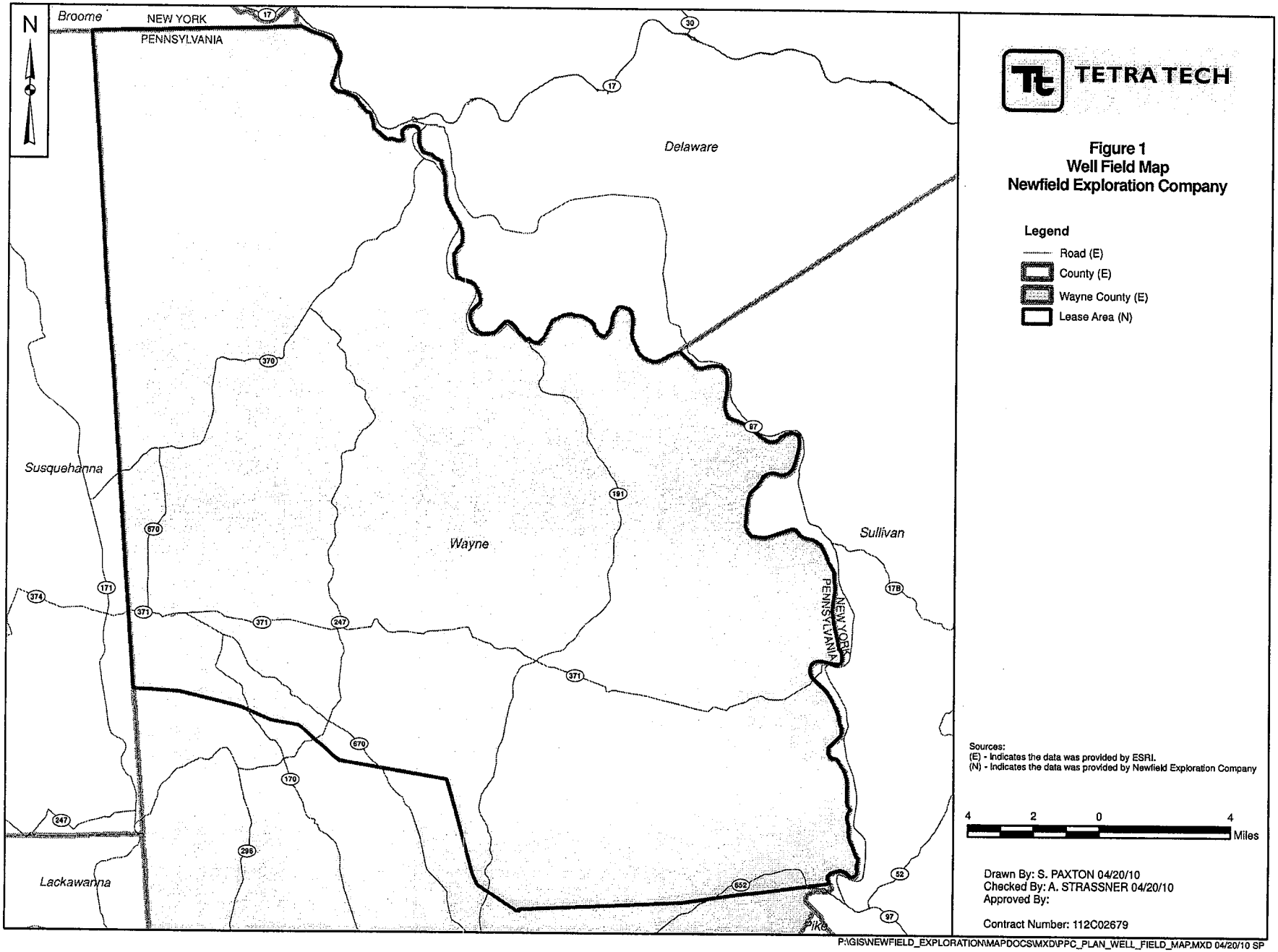
Delivery Information

Invoice No. _____

Load No. _____

Company _____

APPENDIX B
FIGURES



TETRA TECH

Figure 1
Well Field Map
Newfield Exploration Company

Legend

- Road (E)
- County (E)
- Wayne County (E)
- Lease Area (N)

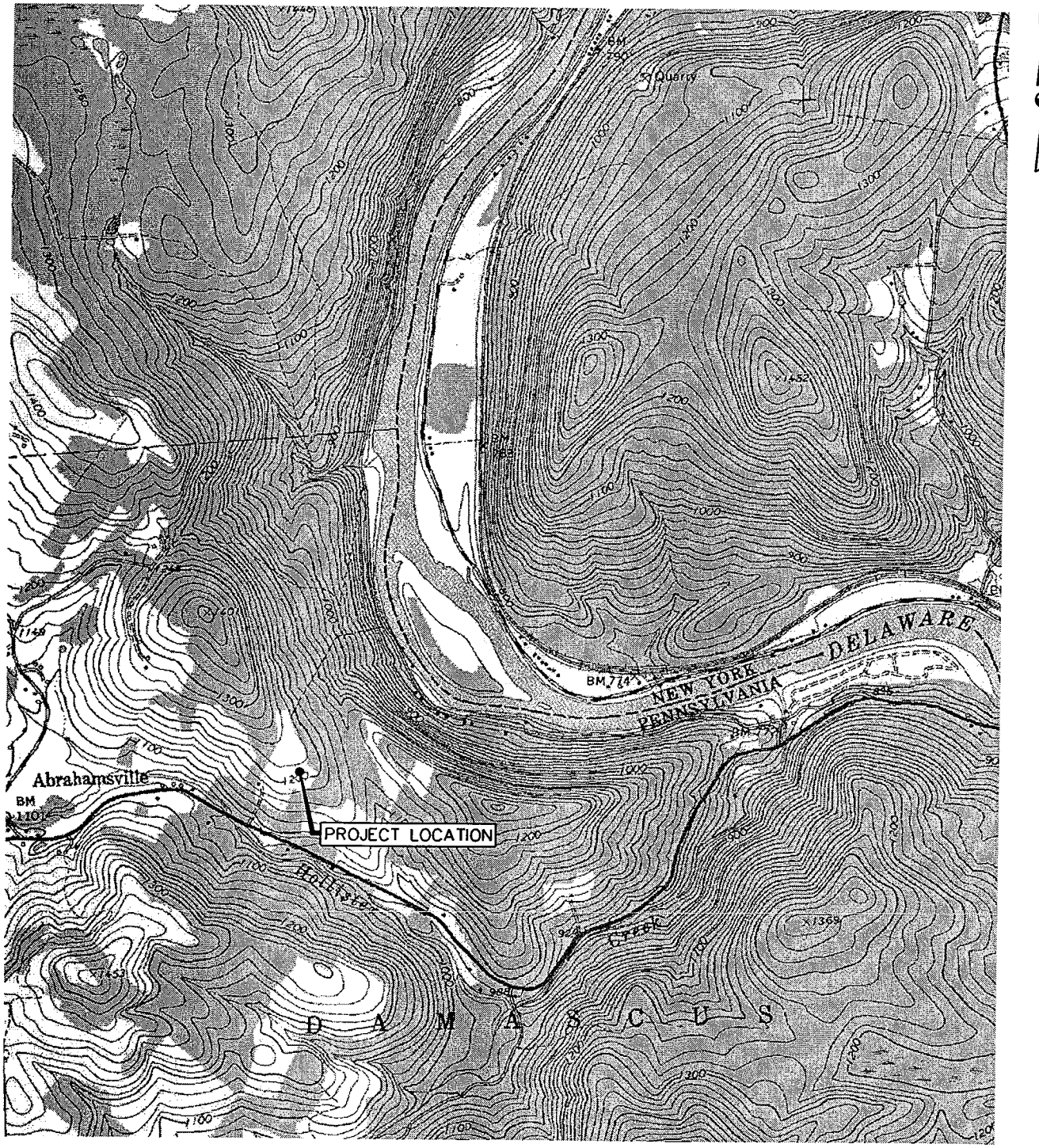
Sources:
(E) - Indicates the data was provided by ESRI.
(N) - Indicates the data was provided by Newfield Exploration Company

4 2 0 4 Miles

Drawn By: S. PAXTON 04/20/10
Checked By: A. STRASSNER 04/20/10
Approved By:

Contract Number: 112C02679

P:\GIS\NEWFIELD_EXPLORATION\MAPDOCS\MXD\PPC_PLAN_WELL_FIELD_MAP.MXD 04/20/10 SP



C:\Documents and Settings\ben.hoppe\My Documents\CAD Work\2568\Woodland Management Partners Well\Figures\2568FG001.dwg PIT BEN.HOPPE 3/3/2010 4:01:53 PM

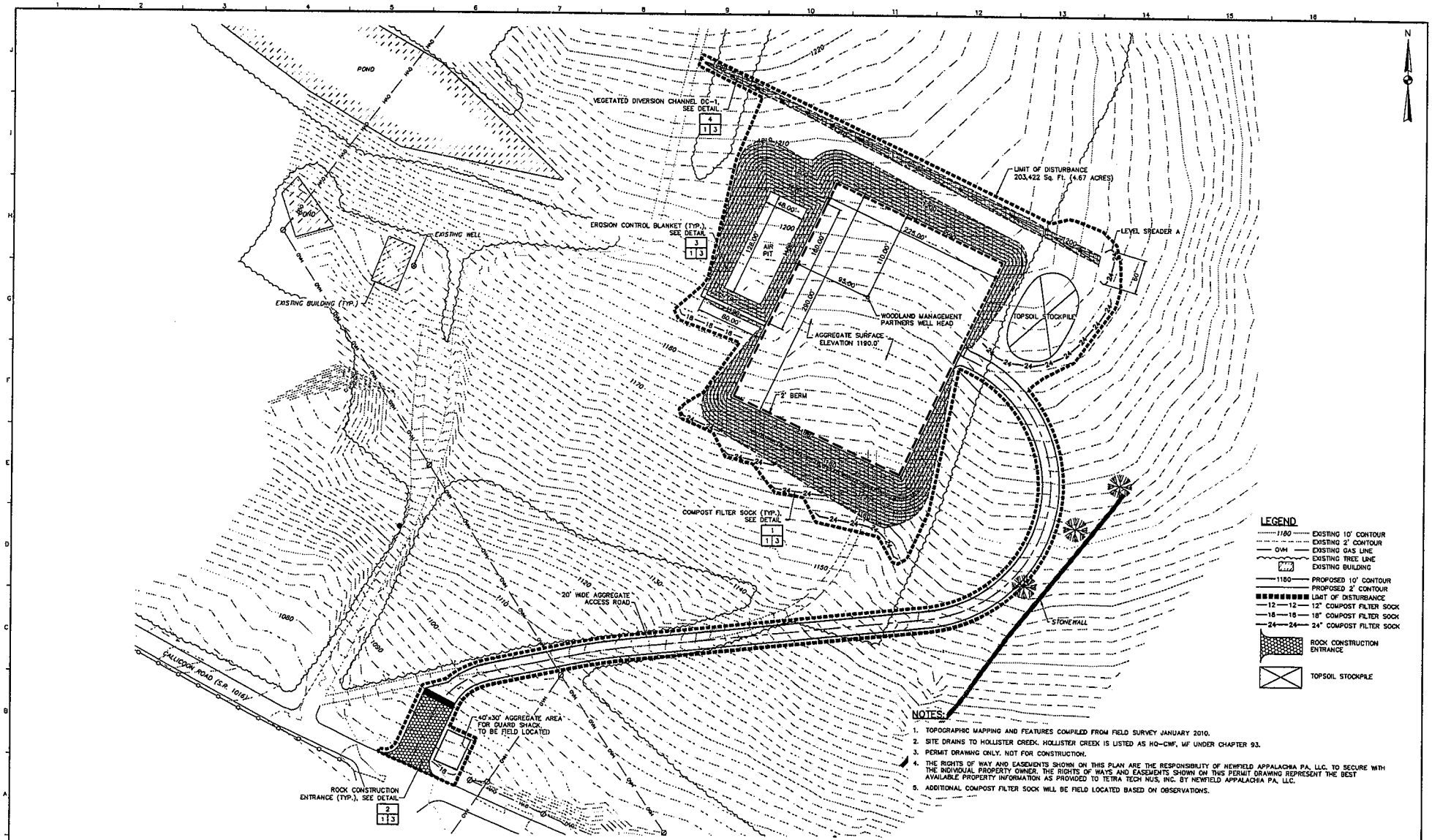
TETRA TECH
WWW.TETRATECH.COM
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

NEWFIELD APPALACHIA PA, LLC
WAYNE COUNTY, PENNSYLVANIA
WOODLAND MANAGEMENT PARTNERS
WELL PAD
LOCATION MAP

SCALE: 1" = 2000'

DATE:	3/4/10
PROJECT NO.:	112C02568
DESIGNED BY:	RAL
DRAWN BY:	BH
CHECKED BY:	RAL
SHEET:	1 OF 2

FIGURE 2



NOTES:

1. TOPOGRAPHIC MAPPING AND FEATURES COMPILED FROM FIELD SURVEY JANUARY 2010.
2. SITE DRAINS TO HOLLISTER CREEK. HOLLISTER CREEK IS LISTED AS HQ-CWF, MF UNDER CHAPTER 93.
3. PERMIT DRAWING ONLY. NOT FOR CONSTRUCTION.
4. THE RIGHTS OF WAY AND EASEMENTS SHOWN ON THIS PLAN ARE THE RESPONSIBILITY OF NEWFIELD APPALACHIA PA, LLC. TO SECURE WITH THE INDIVIDUAL PROPERTY OWNER. THE RIGHTS OF WAYS AND EASEMENTS SHOWN ON THIS PERMIT DRAWING REPRESENT THE BEST AVAILABLE PROPERTY INFORMATION AS PROVIDED TO TETRA TECH NUS, INC. BY NEWFIELD APPALACHIA PA, LLC.
5. ADDITIONAL COMPOST FILTER SOCK WILL BE FIELD LOCATED BASED ON OBSERVATIONS.

0 50 100
SCALE: 1" = 50'

TETRA TECH
www.tetratech.com
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

MARK	DATE	DESCRIPTION	BY

NEWFIELD APPALACHIA PA LLC.
WAYNE COUNTY, PENNSYLVANIA

WOODLAND MANAGEMENT PARTNERS WELL PAD
EROSION & SEDIMENT CONTROL PLAN

SCALE: 1" = 50'

DATE:	5/6/10
PROJECT NO.:	112C02679
DESIGNED BY:	RL
DRAWN BY:	BH
CHECKED BY:	RL
SHEET:	1 OF 7

FIGURE 3

APPENDIX C
TABLES

TABLE 1

LIST OF MATERIALS & WASTES

CONSTUCTION

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	250 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	180 gallons	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

DRILLING

POLLUTIONAL MATERIAL	VOLUME OR QUANTITY	LOCATION ONSITE	SPILL CONTAINMENT MATERIALS ONSITE/LOCATION
Diesel Fuel	2000 gallons	Well Pad	Sorbent pads; shovels/Gang box
Lubricants	320 gallons	Well Pad	Sorbent pads; shovels/Gang box
DURATONE HT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
GELTONE V	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Lime	7,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
OIL ABSORBANT	2,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
Base Fluid	300 bbl	Well Pad	Sorbent pads; shovels/Gang box
Rig Wash	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Calcium Chloride (CaCl-)	4,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
RHEMOD L	1,770 lbs	Well Pad	Sorbent pads; shovels/Gang box
LE SUPERMUL	8,500 lbs	Well Pad	Sorbent pads; shovels/Gang box
BARACARB 25, 50 (2 pallets each)	12,600 lbs	Well Pad	Sorbent pads; shovels/Gang box
WALNUT	2,400 lbs	Well Pad	Sorbent pads; shovels/Gang box
DRILTREAT	1,900 lbs	Well Pad	Sorbent pads; shovels/Gang box
Liquid Mud	1,500 bbl	Well Pad	Sorbent pads; shovels/Gang box
BAROID REGULAR / **BAROID BULK (barite)	125,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Trash & Debris	2,000 lbs	Well Pad	Sorbent pads; shovels/Gang box
Drill Cuttings	100,000 lbs	Air Pit	Sorbent pads; shovels/Gang box
Cement	130,000 lbs	Well Pad	Sorbent pads; shovels/Gang box

TABLE 2

INSPECTION AND MONITORING ACTIVITIES

Activity	Frequency
Erosion and Sedimentation Control Measures	Weekly or after a significant rain event
Aboveground Storage Tanks	Daily
Drum Storage Areas	Daily
Best Management Practices (BMPs)	Per BMP requirements
Dust Control Measures	Daily
Preparedness, Prevention, and Contingency (PPC) Plan Compliance Evaluation Inspections and Update of PPC Plan, as Appropriate	Annually

TABLE 3
AGENCY NOTIFICATION LIST

The following agencies are to be contacted, as appropriate, in the event of an emergency, accident, or chemical release.

Agency	Telephone No.
PADEP Northeast Regional Office	570-826-2511
PADEP Southcentral Office (Harrisburg)	877-333-1904
Pennsylvania Emergency Management Agency	717-651-2001
Police Department	9-1-1
Volunteer Fire Department	9-1-1
U.S. Environmental Protection Agency	215-814-5700
U.S. Coast Guard National Response Center	800-424-8802
U.S. Coast Guard (local)	570-421-1191
Pennsylvania Fish and Boat Commission	814-445-8974
Chemical Transportation Emergency Center:	
* Chemical Exposure Information	800-424-9300

LOCAL EMERGENCY RESPONSE:

Fire Department – Callicoon Fire District in Callicoon, New York, Protection Engine Co No. 3 in Honesdale, Pennsylvania Narrowsburg Fire Department, in Narrowsburg, New York.	9-1-1
Police Department – Honesdale Police Department, Honesdale, Pennsylvania Waymart Police Department, Honesdale Pennsylvania	9-1-1
Hospitals-Wayne County Memorial Hospital, Honesdale, Pennsylvania	570-251-6672
Catskill Regional Medical Hospital in Callicoon, New York	845-887-5530
Local Emergency Management Wayne County EMA	570-253-1622

TABLE 4

On-Site Emergency Response Equipment

On-Site Emergency Response Equipment
Fire Extinguishers
Tyvek Suits
Nitrile Gloves
Hearing Protection
Particulate Adsorbent
Absorbent Pads
Shovels
Earth Moving Equipment
Decontamination Equipment

TABLE 5
CHAIN OF COMMAND

Primary Emergency Coordinator

Don Sleeth
Drilling Manager
Office: 281-674-2501
Cell: 281-974-0051

Secondary Emergency Coordinator

Jack Cochran
Production Manager
Office: 814-437-2344
Cell: 814-671-1557

Construction Manager
Burl Eakle
Cell: 918-448-1296

Offsite Emergency Response Contractors

Company: Minuteman Spill Response, Inc.
Telephone Number: 800-905-7788

APPENDIX D
REPORTING FORM

Spill Response Notification Form

GENERAL REPORTING INFORMATION

Prepared _____
(First) (M.I.) (Last) (Position)

Daytime phone: (xxx) xxx-xxxx Evening phone: (xxx) xxx-xxxx

Newfield Appalachia PA LLC
(Company) (Address) (City) (State) (Zip)

Calling for responsible party? Yes Were materials discharged? Yes Confidential? No

Meeting Federal obligations to report: Yes

INCIDENT DESCRIPTION

Source and/or cause:

Date of Incident:Time of Incident:

Incident Location/Address

Nearest City: XXXX, PA XXXXX (XXXXXXX County)

Distance from City: In city limits Direction from City: In city limits

Facility Oil Storage Capacity: XXXXXX gallons

Container Type:Container Capacity: (gals)

Facility Latitude: xx° xx' xx" Longitude xx° xx' xx"

MATERIAL

Name (or CHRIS Code):

Discharged Quantity (Units): Discharged to Water (Units):

RESPONSE ACTION

Actions taken to correct, control or mitigate incident:

IMPACT

No. of Injuries: No. of Deaths: Other:

Evacuation (Y/N): Damage (Y/N): Amount ($):

Medium Affected: Description: Additional Information:

AGENCY NOTIFIED

NRC 800-424-8802 Date: Time: Contact:

PADEP (570) 826-2511 Date: Time: Contact:

USCG Date: Time: Contact:

Other Date: Time: Contact:

ADDITIONAL INFORMATION:

APPENDIX E
MSDS SHEETS

MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

EMERGENCY OVERVIEW
CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED

Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer. If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800) 424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Diesel Fuel (68476-34-6)	100
Naphthalene (91-20-3)	Typically < 0.01

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

SKIN
May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	> 125 °F (> 52 °C) minimum PMCC
AUTOIGNITION POINT:	494 °F (257 °C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%):	0.6
UPPER EXPLOSIVE LIMIT (%):	7.5

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static

Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ["Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Components (CAS No.)	Source	Exposure Limits TWA/STEL	Note
Diesel Fuel: (68476-34-6)	OSHA	5 mg/m, as mineral oil mist	
	ACGIH	100 mg/m^3 (as totally hydrocarbon vapor) TWA	A3, skin
Naphthalene (91-20-3)	OSHA	10 ppm TWA	
	ACGIH	10 ppm TWA / 15 ppm STEL	A4, Skin

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE

Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR

Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	320 to 690 oF (160 to 366 °C)
VAPOR PRESSURE:	0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1):	> 1.0
SPECIFIC GRAVITY (H_2O = 1):	0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Slow; varies with conditions
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY

Acute dermal LD50 (rabbits): > 5 ml/kg
Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits)
Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)

This material has been positive in a mutagenicity study.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	Diesel Fuel	Placard (International Only):
HAZARD CLASS and PACKING GROUP:	3, PG III	
DOT IDENTIFICATION NUMBER:	NA 1993 (Domestic) UN 1202 (International)	
DOT SHIPPING LABEL:	None	

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the *de minimis* levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITON 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Diesel Engine Exhaust (no CAS Number listed)	10/01/1990

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING

HEALTH:	0
FIRE:	2
REACTIVITY:	0

Refer to NFPA 704 "Identification of the Fire Hazards of Materials" for further information

HMIS® HAZARD RATING

HEALTH:	1 *	* Chronic
FIRE:	2	
PHYSICAL:	0	

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212) 642-4900
API	American Petroleum Institute (202) 682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

MATERIAL SAFETY DATA SHEET

Review Date: 04/23/2007

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

MSDS NUMBER: 614348LU - 1
PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

MANUFACTURER
SOPUS Products
P.O. Box 4427
Houston, TX. 77210-4427

TELEPHONE NUMBERS
Spill Information: (877) 242-7400
Health Information: (877) 504-9351
MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

INGREDIENTS	CAS#	CONCENTRATION
Heavy Duty Motor Oil		
Highly refined petroleum oils	Mixture	90 - 99 %volume
Zinc Dialkyldithiophosphate	68649-42-3	1 - 5 %volume
Proprietary additives	Mixture	1 - 5 %volume

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Appearance & Odor: Bright and clear liquid. Mild odor.
Health Hazards: No known immediate health hazards.
Physical Hazards: No known physical hazards.
NFPA Rating (Health, Fire, Reactivity): 0, 1, 0
Hazard Rating: Least - 0 Slight - 1 Moderate - 2 High - 3 Extreme - 4

Inhalation:
Inhalation of vapors (generated at high temperatures only) or oil mist may cause mild irritation of the nose, throat, and respiratory tract.

Eye Irritation:
Lubricating oils are generally considered no more than minimally irritating to the eyes.

Skin Contact:
May cause slight irritation of the skin. If irritation occurs, a temporary burning sensation and minor redness and/or swelling may result.

Ingestion:

Lubricating oils are generally no more than slightly toxic if swallowed.

Other Health Effects:
The International Agency for Research on Cancer (IARC) has determined there is sufficient evidence for the carcinogenicity in experimental animals of used gasoline motor oils. Handling procedures and safety precautions in the MSDS should be followed to minimize exposure to the used product.

Signs and Symptoms:
Irritation as noted above.

Aggravated Medical Conditions:
Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

For additional health information, refer to section 11.

SECTION 4 FIRST AID MEASURES

Inhalation:
Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.

Skin:
Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

Eye:
Flush with water. If irritation occurs, get medical attention.

Ingestion:
Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

Note to Physician:
In general, emesis induction is unnecessary in high viscosity, low volatility products such as oils and greases.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point [Method]: >400 °F/>204.44 °C [Pensky-Martens Closed Cup]

Extinguishing Media:
Material will float and can be re-ignited on surface of water. Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames. Do not use a direct stream of water.

Fire Fighting Instructions:
Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure, NIOSH approved, self-contained breathing apparatus. This material is non-flammable.

Unusual Fire Hazards:
Material may ignite when preheated.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures:
May burn although not readily ignitable.

Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

Spill Management:
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

Place in container for proper disposal. Remove contaminated soil to remove contaminated trace residues. Dispose of in same manner as material.

Reporting:
CERCLA: Product is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion. Releases to air, land, or water are not reportable under CERCLA (Superfund).

CWA: This product is an oil as defined under Section 311 of EPA's Clean Water Act (CWA). Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 1-800-424-8802.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures:
Wash with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet. Launder contaminated clothing before reuse. Properly dispose of contaminated leather articles such as shoes or belts that cannot be decontaminated. Avoid heat, open flames, including pilot lights, and strong oxidizing agents. Use explosion-proof ventilation to prevent vapor accumulation. Ground all handling equipment to prevent sparking.

Storage:
Do not store in open or unlabeled containers. Store in a cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.

Container Warnings:
Keep containers closed when not in use. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical	Limit	TWA	STEL	Ceiling	Notation
Oil mist, mineral	ACGIH TLV	5 mg/m3	10 mg/m3		
Oil mist, mineral	OSHA PEL	5 mg/m3			

Exposure Controls

Provide adequate ventilation to control airborne concentrations below the exposure guidelines/limits.

Personal Protection

Personal protective equipment (PPE) selections vary based on potential exposure conditions such as handling practices, concentration and ventilation. Information on the selection of eye, skin and respiratory protection for use with this material is provided below.

Eye Protection:
Chemical Goggles, or Safety glasses with side shields

Skin Protection:
Use protective clothing which is chemically resistant to this material. Selection of protective clothing depends on potential exposure conditions and may include gloves, boots, suits and other items. The selection(s) should take into account such factors as job task, type of exposure and durability requirements.

Published literature, test data and/or glove and clothing manufacturers indicate the best protection is provided by:
Neoprene, or Nitrile Rubber

Respiratory Protection:
If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, an approved respirator must be worn. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Types of respirator(s) to be considered in the selection process include:
For Mist: Air Purifying, R or P style NIOSH approved respirator.
For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Bright and clear liquid. Mild odor.
Substance Chemical Family: Petroleum Hydrocarbon

Flash Point	> 400 °F [Pensky-Martens Closed Cup]	**Pour Point**	-20 °F
Solubility (in Water)	Insoluble	**Specific Gravity**	0.88 - 0.89
Stability	Stable	**Viscosity**	103 cSt @ 40 °C

SECTION 10 REACTIVITY AND STABILITY

Stability:
Material is stable under normal conditions.

Conditions to Avoid:
Avoid heat and open flames.

Materials to Avoid:
Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:

Thermal decomposition products are highly dependent on combustion conditions. A complex mixture of airborne solids, liquids and gases will evolve when this material undergoes pyrolysis or combustion. Aldehydes, Carbon Monoxide, Carbon Dioxide, Hydrogen Sulfide, Ketones, Nitrogen Oxidesand other unidentified organic compounds may be formed upon combustion.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity

TEST	Result	OSHA Classification	Material Tested
Dermal LD50	>5.0 g/kg(Rabbit)	Non-Toxic	Based on components(s)
Oral LD50	>5.0 g/kg(Rat)	Non-Toxic	Based on components(s)

Carcinogenicity Classification

Chemical Name	NTP	IARC	ACGIH	OSHA
Heavy Duty Motor Oil	No	Not Reviewed by IARC	Not Reviewed	No

SECTION 12 ECOLOGICAL INFORMATION

Environmental Impact Summary:
There is no ecological data available for this product. However, this product is an oil. It is persistent and does not readily biodegrade. However, it does not bioaccumulate.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

Under RCRA, it is the responsibility of the user of the material to determine, at the time of the disposal, whether the material meets RCRA criteria for hazardous waste. This is because material uses, transformations, mixtures, processes, etc. may affect the classification. Refer to the latest EPA, state and local regulations regarding proper disposal.

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

International Air Transport Association
Not regulated under IATA rules.

International Maritime Organization Classification
Not regulated under International Maritime Organization rules.

SECTION 15 REGULATORY INFORMATION

Federal Regulatory Status

OSHA Classification:
Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Ozone Depleting Substances (40 CFR 82 Clean Air Act):
This material does not contain nor was it directly manufactured with any Class I or Class II ozone depleting substances.

Superfund Amendment & Reauthorization Act (SARA) Title III:
There are no components in this product on the SARA 302 list.

SARA Hazard Categories (311/312):

Immediate Health	Delayed Health	Fire	Pressure	Reactivity
NO	NO	NO	NO	NO

SARA Toxic Release Inventory (TRI) (313):
Zinc compounds

Toxic Substances Control Act (TSCA) Status:
All component(s) of this material is(are) listed on the EPA/TSCA Inventory of Chemical Substances.

Other Chemical Inventories:
Component(s) of this material is (are) listed on the Australian AICS, Canadian DSL, Chinese Inventory, European EINECS, Korean Inventory, Philippines PICCS,

State Regulation

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

SECTION 16 OTHER INFORMATION

Revision#: 1
Review Date: 04/23/2007
Revision Date: 12/19/2006
Revisions since last change (discussion): This Material Safety Data Sheet (MSDS) has been reviewed to fully comply with the guidance contained in the ANSI MSDS standard (ANSI Z400.1-2003). We encourage you to take the opportunity to read the MSDS and review the information contained therein.

SECTION 17 LABEL INFORMATION

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

PRODUCT CODE(S): 5071324, 5071325, 5071326, 5071369, 5071371

PENNZOIL™ LONG-LIFE™ Motor Oil (All Grades)

ATTENTION!

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE OIL ACNE OR DERMATITIS. USED GASOLINE ENGINE OIL HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS.

Precautionary Measures:
Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid breathing of vapors, fumes, or mist. Use only with adequate ventilation. Wash thoroughly after handling.

FIRST AID

Inhalation: If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.
Skin Contact: Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
Eye Contact: Flush with water. If irritation occurs, get medical attention.
Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO_2) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK

Dike and contain spill.
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

CONTAINS: Highly refined petroleum oils, Mixture; Zinc Dialkyldithiophosphate, 68649-42-3; Proprietary additives, Mixture

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

TRANSPORTATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LE SUPERMUL**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LE SUPERMUL
Synonyms: None
Chemical Family: Blend
Application: Emulsifier

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Diethylene glycol monobutyl ether	112-34-5	1 - 5%	Not applicable	Not applicable
Ethylene glycol monobutyl ether	111-76-2	1 - 5%	20 ppm	50 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview

May cause eye and skin irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation

If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes

In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion

Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician

Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200**Min:** > 200
Flash Point/Range (C):	> 100**Min:** > 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Use water spray to cool fire exposed surfaces. Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 2, Flammability 1, Reactivity 0
HMIS Ratings:	Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.
Storage Information	Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor respirator. In high concentrations, supplied air respirator or a self-contained breathing apparatus.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Amber
Odor:	Mild
pH:	2.6
Specific Gravity @ 20 C (Water=1):	0.924
Density @ 20 C (lbs./gallon):	7.7
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	20
Freezing Point/Range (C):	-6.6
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	280-300
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea. May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Lung disorders. Skin disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause reproductive system damage. Repeated overexposure may cause liver and kidney effects.

Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® OIL ABSORBENT**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® OIL ABSORBENT
Synonyms: None
Chemical Family: Mineral
Application: Suspending Agent

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Magnesium silicate	1343-90-4	60 - 100%	Not applicable	Not applicable
Crystalline silica, quartz	14808-60-7	2-6	0.025 mg/m^3	10 mg/m^3 %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granules
Color:	Gray to tan
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.6
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32-38
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact None known.

Eye Contact May cause eye irritation.

Ingestion May be harmful if swallowed.

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **RHEMOD L**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: RHEMOD L
Synonyms: None
Chemical Family: Tall oil fatty acid
Application: Viscosifier

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fatty acids, C18-unsatd., trimers	68937-90-6	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	518
Flash Point/Range (C):	270
Flash Point Method:	COC
Autoignition Temperature (F):	> 425
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 1, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Wash hands after use.
Storage Information	Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Organic vapor respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark
Odor:	Fatty acid
pH:	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	0.96
Density @ 20 C (lbs./gallon):	8
Bulk Density @ 20 C (lbs/ft3):	57.30
Boiling Point/Range (F):	> 572
Boiling Point/Range (C):	> 300
Freezing Point/Range (F):	< -4
Freezing Point/Range (C):	< 25
Vapor Pressure @ 20 C (mmHg):	< 0.001
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	0
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	1849 @ 25C
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye and skin contact.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID® RIG WASH**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID® RIG WASH
Synonyms: None
Chemical Family: Blend
Application: Surfactant

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Isopropanol	67-63-0	1 - 5%	200 ppm	400 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion If swallowed dilute with 1-2 glasses of milk or water and then induce vomiting.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined**Min:** > 220
Flash Point/Range (C):	Not Determined**Min:** > 104
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.
Storage Information	Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear blue
Odor:	Slight Alcohol
pH:	9.5

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	1.025
Density @ 20 C (lbs./gallon):	8.5
Bulk Density @ 20 C (lbs/ft3):	63.6
Boiling Point/Range (F):	> 212
Boiling Point/Range (C):	> 100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	May cause headache, dizziness, nausea, vomiting, gastrointestinal irritation and central nervous system depression.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Glycol Ethers//34398-01-1 Isopropanol//67-63-0
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FWCA CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FWCA CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polysaccharide
Application: Free Water Control Additive

Manufacturer/Supplier Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	770
Autoignition Temperature (C):	410
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage information Store away from oxidizers. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	6.5
Specific Gravity @ 20 C (Water=1):	1.39
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Aldehydes. Carboxylic acids. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 322 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 322 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Blend
Application: Cement Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium formate	141-53-7	1 - 5%	Not applicable	Not applicable
Cellulose derivative		10 - 30%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Red
Odor:	Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.28
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	35.2
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HALAD® 344 CEMENT ADDITIVE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HALAD® 344 CEMENT ADDITIVE
Synonyms: None
Chemical Family: Polymer
Application: Fluid Loss Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified acrylamide copolymer		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water spray, dry chemical, or foam.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust. Do not swallow. Avoid contact with eyes, skin, or clothing.

Storage Information Store in a cool, dry location. Store away from oxidizers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Nitrile gloves. Polyvinylchloride gloves. Neoprene gloves. Rubber gloves. Butyl rubber gloves. Cloth gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to off white
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.37
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	25-35
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	18
Freezing Point/Range (C):	-8
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	<5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	>600

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide. Oxides of sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Prolonged or repeated contact may cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	No adverse health effects are expected from swallowing.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	Not determined

Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	BOD(28 Day): 3% of COD
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM48: 2000 mg/l (Arcatia tonsa)
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	EC50: 3300 mg/l (Skeletonema costatum)
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-5**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-5
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modifed lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Black
Odor:	Molasses
pH:	9.5-10.3
Specific Gravity @ 20 C (Water=1):	1.32

9. PHYSICAL AND CHEMICAL PROPERTIES

Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	29.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1000 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HR-601**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HR-601
Synonyms: None
Chemical Family: Lignosulfonate
Application: Cement Retarder

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modifed lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.2
Flammability Limits in Air - Upper (%):	Not Determined
Flammability Limits in Air - Upper (oz./ft3):	3.5

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMIS Ratings: Health 1, Flammability 1, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Woody
pH:	7.8
Specific Gravity @ 20 C (Water=1):	1.08
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30.5
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mechanical irritation to eye.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM48: > 1000 mg/l (Daphnia magna)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **KCL POTASSIUM CHLORIDE**

Revision Date: 04-Jan-2010

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: KCL POTASSIUM CHLORIDE
Synonyms: None
Chemical Family: Inorganic Salt
Application: Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Potassium chloride	7447-40-7	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid breathing vapors.
Storage Information	Store in a cool, dry location. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area.
Respiratory Protection	Dust/mist respirator. (95%)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Dust proof goggles.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White to gray
Odor:	Odorless
pH:	9.2
Specific Gravity @ 20 C (Water=1):	1.99
Density @ 20 C (lbs./gallon):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Bulk Density @ 20 C (lbs/ft3):	72.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	25.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.55

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause moderate skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: 100-330 ppm (Crangon crangon)
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **POZ STANDARD CEMENT 50/50**

Revision Date: 05-Jan-2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: POZ STANDARD CEMENT 50/50
Synonyms: None
Chemical Family: Cement
Application: Cement

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Fly ash	68131-74-8	30 - 60%	Not applicable	Not applicable
Bentonite	1302-78-9	1 - 5%	Not applicable	Not applicable
Portland cement	65997-15-1	30 - 60%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Not Determined
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure

Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact

Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact

May cause severe eye irritation.

Ingestion

None known

Aggravated Medical Conditions

Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory — All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances — Not applicable

EPA SARA (311,312) Hazard Class — Acute Health Hazard
Chronic Health Hazard

EPA SARA (313) Chemicals — This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).

EPA CERCLA/Superfund Reportable Spill Quantity — Not applicable.

EPA RCRA Hazardous Waste Classification — If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 — The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law — One or more components listed.

NJ Right-to-Know Law — One or more components listed.

PA Right-to-Know Law — One or more components listed.

Canadian Regulations

Canadian DSL Inventory — All components listed on inventory.

WHMIS Hazard Class — E Corrosive Material
D2A Very Toxic Materials
Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information — For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement — This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **CEMENT - CLASS H - PREMIUM**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: CEMENT - CLASS H - PREMIUM
Synonyms: None
Chemical Family: Cement
Application: Cement

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Portland cement	65997-15-1	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	<3	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	None - does not burn.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Gray
Odor:	Odorless
pH:	12.4
Specific Gravity @ 20 C (Water=1):	3.15
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	94
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.5
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from any contact with water.
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact Can dry skin. May cause an allergic skin reaction. May cause alkali burns with confined contact.

Eye Contact May cause severe eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	E Corrosive Material D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 25**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 25
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier
Baroid Drilling Fluids
a Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	168
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 50**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 50
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier

Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Limestone	1317-65-3	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	72-112
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BAROID®**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BAROID®
Synonyms: None
Chemical Family: Mineral
Application: Weight Additive

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Barium sulfate	7727-43-7	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Flammability 0, Reactivity 0, Health 1*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Pink to tan to gray
Odor:	Odorless
pH:	8-9-
Specific Gravity @ 20 C (Water=1):	4.2
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	100- 155
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	233.4

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact None known.

Eye Contact May cause mild eye irritation.

Ingestion May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 7500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 132.6 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **LIME**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LIME
Synonyms: None
Chemical Family: Inorganic
Application: pH Control

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium hydroxide	1305-62-0	60 - 100%	5 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye and skin burns. May cause respiratory irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin
Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Fire-Fighters Not Determined

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from acids. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	12.2
Specific Gravity @ 20 C (Water=1):	2.24
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	75
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined

9. PHYSICAL AND CHEMICAL PROPERTIES

Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.2
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	74.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	Causes severe skin irritation. May cause skin burns on prolonged contact.
Eye Contact	Causes severe eye irritation May cause eye burns.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 7340 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 100-500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: 478,520 ppm (Mysidopsis bahia) SPP @ 8 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Empty container completely. Transport with all closures in place. Return for reuse or dispose in a sanitary landfill according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WALNUT HULLS**

Revision Date: 02-Jan-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WALNUT HULLS
Synonyms: None
Chemical Family: Nut Hulls
Application: Loss Circulation Material

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Walnut hulls	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation.

4. FIRST AID MEASURES

Inhalation Under normal conditions, first aid procedures are not required.

Skin Under normal conditions, first aid procedures are not required.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Lower (oz./ft3):	0.07
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0, Reactivity 0, Health 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Safety glasses.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Brown
Odor:	Characteristic

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.1
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	None known.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Biodegradable
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	TLM96: > 1,000,000 ppm (Mysidopsis bahia) SPP @ 10 ppb
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

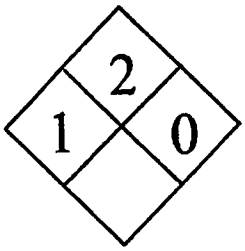
For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

INTEGRITY INDUSTRIES INC.



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MATERIAL SAFETY DATA SHEET

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SECTION I - MANUFACTURER

Integrity Industries, Inc.
2710 E. Corral St.
Kingsville, Texas 78363
Emergency Phone: (361) 595-5561

Revised Date: 06/05/2008
Supercedes: new

THIS DOCUMENT IS PREPARED PURSUANT TO THE OSHA HAZARDOUS COMMUNICATION STANDARD (29 CFR 1910.1200). ALSO, OTHER SUBSTANCE NOT DEEMED "HAZARDOUS" PER THIS MSDS MAY BE LISTED.

SECTION II - MATERIAL IDENTIFICATION

Trade Name: **SYNVERT Base Oil**
Synonyms/Other Designations: Synthetic Drilling Fluid / Polymer Suspension Base
Placard: Not Applicable
Hazard(s): non-hazardous

Component	CAS Number	Weight
Paraffin/Olefin blend	Mixture	100%

SECTION III - PHYSICAL & CHEMICAL DATA

Boiling Point: IBP > 300 °F
Specific Gravity (H2O=1): 0.766
Vapor Density (Air=1): n/a
Appearance: Clear, oily liquid

Pour Point: ND
Vapor Pressure (mm Hg @ 68 °F): 0.135
Solubility in H2O: Insoluble
Viscosity (cSt @104 °F): 1.4

SECTION IV - REACTIVITY

Stability: Stable
Incompatibility: Heat, sparks, open flame. May react with strong acids/strong oxidizing agents, chlorates, nitrates, peroxides.
Hazardous Decomposition Products: Oxides of carbon. Hazardous Polymerizations: will not occur

SECTION V - FIRE & EXPLOSION DATA

Flash Point (ASTM D-93): > 200 °F
Autoignition: n/a
Extinguishing Media: Water spray, Dry Chemical, Foam, CO2
Special Fire Fighting Procedures: Respirators/eye protection and full firefighting protective gear.
Unusual Fire Hazards: Remove containers from source of heat.

SECTION VI - EMERGENCY & FIRST AID DATA

Inhalation: Move to well ventilated area; if breathing difficulties persist after 15 minutes seek medical assistance.
Eye Contact: Wash eye thoroughly for 15 minutes; if irritation persists seek medical assistance.
Skin Contact: Wash affected area with soap & water for 15 minutes; if irritation persists seek medical assistance.
Ingestion: Do not induce vomiting and seek medical advice.

SECTION VII - HEALTH HAZARDS DATA

Acute: May irritate eyes, skin, respiratory, & gastrointestinal tract. Chronic: Repeated/prolonged skin contact may irritate/redden skin, progressing to dermatitis.

SECTION VIII - SPILL & DISPOSAL DATA

Accidental Spill Procedures: Absorb in inert material and dispose of according to local, state & federal regulations. Spill into water should be contained to avoid runoff into waterways.
Handling & Storage: Keep container closed and store in cool dry place. Emptied container still contains material which may ignite with explosive violence if exposed to open flame.

SECTION IX - SPECIAL PROTECTION DATA

Respiratory Protection: Respirator in confined areas.
Ventilation: Desired Exhaust: Mechanical
Protective Gloves: Solvent/chemical resistant gloves
Eye Protection: Safety glasses, goggles.
Other Protection: As required to avoid skin contact.

SECTION X - TRANSPORT INFORMATION

The following may not apply to all shipping situations. Consult 49 CFR for more mode-specific or quantity-specific data.
DOT Proper Shipping Name: Not regulated
DOT Hazard Class or Division: Not regulated
DOT Identification Number: N/A
DOT Packaging Group: III
Type Label(s) Required. none
Placard: Not applicable
*For Limited Quantity requirements see DOT regulation 49 CFR.

SECTION XI - DISCLAIMERS

* SOME INFORMATION PROVIDED HEREIN WAS DRAWN FROM SOURCES OTHER THAN INTEGRITY INDUSTRIES.
THE INFORMATION PROVIDED HEREIN IS BELIEVED BY INTEGRITY INDUSTRIES, INC. TO BE CORRECT & RELIABLE; NO EXPRESSED OR IMPLIED WARRANTY IS PROVIDED HOWEVER.
* INTEGRITY INDUSTRIES, INC. ASSUMES NO RESPONSIBILITY AND DENIES ALL LIABILITY FOR ANY LOSS, DAMAGE, OR EXPENSE CONNECTED WITH CUSTOMERS' METHOD OF HANDLING, STORAGE, USE, AND DISPOSAL OF THIS PRODUCT.
* THE MSDS INFORMATION PROVIDED HEREIN IS APPLICABLE ONLY TO THIS PRODUCT.

TABLE 3
AGENCY NOTIFICATION LIST

The following agencies are to be contacted, as appropriate, in the event of an emergency, accident, or chemical release.

Agency	Telephone No.
PADEP Northeast Regional Office	570-826-2511
PADEP Southcentral Office (Harrisburg)	877-333-1904
Pennsylvania Emergency Management Agency	717-651-2001
Police Department	9-1-1
Volunteer Fire Department	9-1-1
U.S. Environmental Protection Agency	215-814-5700
U.S. Coast Guard National Response Center	800-424-8802
U.S. Coast Guard (local)	570-421-1191
Pennsylvania Fish and Boat Commission	814-445-8974
Chemical Transportation Emergency Center:	
* Chemical Exposure Information	800-424-9300

LOCAL EMERGENCY RESPONSE:

Fire Department – Wayne County Company #3,13, 21, 28, 43, and 65	9-1-1
Police Department – PSP, Honesdale, Pennsylvania	9-1-1
Hospitals/Ambulances-	
Damascus Township Ambulance, Pennsylvania MT Pleasant Ambulance Northern Wayne Ambulance Mobile 504	9-1-1
Wayne County Memorial Hospital, Honesdale, Pennsylvania	570-251-6672
CMC – Trauma Center, Scranton, Pennsylvania	570-969-8128
Catskill Regional Medical Hospital in Callicoon, New York	845-887-5530
Local Emergency Management Wayne County EMA	570-253-1622

Air Quality Concerns at Woodland Management Gas Drilling Site, Damascus, PA

15 September 2010

Greg Swartz and Tannis Kowalchuk

The drilling of the Woodland Management Gas well was completed about 2 weeks ago and the drilling rig has been moved to the Crum site in Milanville, PA. Our farm and home are located 0.3 miles from the Woodland site. This past Sunday September 5, we smelled a very strong chemical sulfuric odor. We were busy picking and packing vegetables for a farmers market and we did not do anything about the odor. Monday morning the odor was again present. Here is a summary of events:

September 5	7am	Smelled chemical sulfuric odor. Lessened by afternoon.
September 6	9am	Smelled chemical sulfuric odor
	9:38am	Telephoned the DEP Emergency Response Line. Call was answered by an answering service who indicated that they would page DEP personnel. We received no call back from the DEP.
	10:20am	Called 911 to report the odor
	10:30am	Equinunk Volunteer Fire Department responded. They confirmed the odor. The Chief immediately went to the Woodland well site and inspected the pad and waste pond. Chemical odor was evident. He spoke with security personnel there who indicated that the waste water pond was to be pumped on Tuesday (9-7). Fire Department indicated that they were not concerned about the air quality and they left.
September 7	10am	Smelled chemical sulfuric odor. Heavy tanker truck activity- ostensibly emptying the waste pond.
	12:58pm	Called DEP Northeast Regional Office. They had no record of our call and referred me to Northcentral office who handles oil and gas issues.

	12:59	Called DEP Northcentral Regional Office and left a message with the person I was directed to. We called without leaving a message several more times throughout the afternoon- no one answered.
	4:15pm	Called DEP Northcentral office again and left a message. We have still not received a call back.
September 8	9:00am	Chemical sulfuric odor not present. Called DEP Northcentral Regional Director, Nels Taber. His assistant connected us with Jennifer Means, DEP Northcentral Oil and Gas Program Manager. We related the events of the past 3 days. She had no record of our initial emergency call and indicated that normally she receives the emergency calls. She indicated that she would research what went wrong and that she would be back in touch with us. We requested that an inspection be done of the well site.
	4:10pm	We received a call from Denise Brinley (DEP Deputy Secretary) and Kerry Leib (DEP Emergency Management Coordinator) who were asking for further information. They said: 1) the answering service had no record of our call and they don't know why the communication breakdown occurred. 2) Northcentral staff person who I spoke with should have handled my call on Tuesday differently because they do in fact have inspection staff in Scranton 3) They issued an order to send an inspector to the site this morning at 11am. They weren't sure when s/he would arrive. 4) They will be back in touch to respond to the lack of response from the DEP and with a report from the inspector.
September 9	4:30pm	Kelly Hefner, DEP Deputy Secretary for Field Operations left a phone a message.

September 10	9:00am	Spoke with Kelly Hefner. She offered her "sincere apology" for the troubles we have had with DEP. She confirmed that they have no record of our call. She said that an inspector was on site on Tuesday and Wednesday. We asked for: Air quality tests, water tests, soil tests, location of waste water treatment. We also asked what chemicals used in the drilling process would cause the sulfur odor. She promised results by Monday.
September 13	12:30pm	Left message for Heffner
	5:30pm	Heffner left message for us
September 14	10:00am	Left message for Heffner
	1:47pm	Left message for Heffner
	5:15pm	Heffner left a message for us saying she was in meetings and too busy to call earlier.

We are deeply concerned about the environmental and health impacts of drilling, in particular for the health of our 2 year old son. This specific case of air quality is troubling. What is even more troubling is the DEP's lack of response to our call. We don't know exactly what has been flying in the air. It may or may not be acutely toxic. It was a significant enough event that the DEP should have investigated immediately. This event highlights that the DEP is not prepared to handle the environmental risks which are part and parcel of gas drilling. We are still waiting for an official response and explanation from the DEP. We can't help but wonder what will happen when there is a catastrophic gas drilling emergency and how long it will take DEP to respond? Our volunteer fire department was here almost immediately and professionally handled the situation. However, they are not trained in air quality monitoring or any of the other potential fallout from gas drilling.

Greg Swartz and Tannis Kowlachuk
25 Stone House Rd, Damascus, PA
570-224-8013
greg@willowwisporganic.com, tannis@nacl.org

9-16-10 Email Correspondence from PADEP Acting Deputy Secretary Kelly Hefner concerning my outstanding questions about odor at the Woodland site. Attached to this correspondence were the 2 inspection reports and water test from 8-10-10 (see below).

Good Afternoon Mr. Swartz:

As we have discussed the phone side of the matter and you have taken my word that it has been addressed (thank you), I will simply add I am sorry the call was mishandled, but we have been able to make some changes that will prevent this in the future.

As we have further discussed your concerns, I have attempted to address the questions you posed when we talked on Friday and to answer the questions you posed in your Thursday morning email. I apologize that we keep missing each other.

Attached please find the answers to the questions posed at the end of last week re: the pit on the Woodland Management Site, Operated by Newfield

1. Yes, the wastewater from the pit was sampled and those results are attached.

2. The water in the pit and tanks was hauled offsite by Koberlein Environmental. They are a DEP approved waste hauler. The water went to the waste disposal facilities of Eureka Resources LLC (Williamsport, Pa.) and Waste Treatment Corporation in Warren, Pa. Manifests are on file for every load of this water hauled and disposed of.

3. Air monitoring for hydrogen sulfide (H2S) gas was not conducted. There was no air quality monitoring by DEP or the Fire Department.

4. DEP has investigated these type of pits turning septic (anaerobic digestion which generates H2S) in other parts of the Commonwealth. As of now, there is not certainty about what the food source is for the bacteria, but we suspect that it might be from drilling fluids. Some companies have added sulfide scavengers to the pits to prevent the bacterial action.

It is fairly common for H2S to be released into the environment from natural decomposition and our staff encounters it fairly regularly. Similar to what occurs at a wetland, the sludge at the bottom of an impoundment can undergo anaerobic digestion and release H2S gas. Because H2S gas has a low odor threshold, humans smell it at very low concentrations. High concentrations are highly unusual in an outdoor, well-ventilated area.

DEP was not able to have air tests done prior to the removal of the fluids on the Tuesday after Labor Day. There are limited mobile units and they are deployed in other locations in the Northern Tier doing testing but were not there on Labor day or September 7th. The odor developed in just a few days (3) due to bacteria in the pit. The H2S indeed smells bad, and is certainly irritating, but it is very, unlikely to have caused any health impacts in this circumstance. Removing the water expeditiously was the correct response.

Inspection Summary (field report attached)

NEWFIELD APPALACHIA PA LLC
WOODLAND MGMT PARTNERS 1 1
Permit 127-20017
Spud date (initiation of drilling activities) was 06/25/2010
Damascus Township, Wayne County

In response to a complaint by Mr. Greg Swartz of sulphur odors emanating from the above referenced well site, on September 8, 2010, Oil & Gas Inspector Steve Watson inspected the site and documented the following. The service contractor on-site, H&K Construction, was in the process of dewatering the reserve pit. As they pump the fluid to the frac tanks and then to the tanker trucks for transport and disposal, odors from the pit are emitted through vents on the tanks. Also, stirring up the fluid in the pit allowed odors to release to the atmosphere as well. At the time of the inspection, 95% of the fluid had already been removed from the pit. They were planning on solidifying the pit and then folding over the liner to prepare for encapsulation on Thursday, September 9, 2010. The Department intends to complete an additional inspection of the site today Friday, September 10, 2010. At the time of this e-mail, the findings of this Friday inspection have not yet been reported back to the regional office.

The Department also inspected this site on Thursday September 2, 2010, prior to the initial complaint received on either Monday or Tuesday, September 6 or 7, 2010. During this inspection it was noted that the service contractor was the only party on site. Trucks were hauling off the last pieces of the drilling rig to be moved to the next planned drilling site. Two workers were observed skimming off an oil sheen on the pit fluids, the liner was inspected showing no holes or tears. Several frac tanks are located on site for temporary storage of the fluids being removed. The only odors detected during this vist were those that would be associated with drilling fluids and/or cuttings.

Text from Thursday 9/16 email

Good Morning Ms. Heffner,
Thank you for taking the time to send the pit water test results from 8-10-10. These results are of interest to me yet they do not represent pit contents after 8-10-10. I believe that drilling activities continued past that date. You will recall from our conversation on 9-10-10 that I requested the report and test results from your inspector's visit to the Woodland site the week of 9-6. I was told that you sent an inspector on 9-7 and 9-8. I respectfully again request the following information:

1) Inspector's full reports from 9-7 and 9-8. These are attached.
2) Pit water test results from that day(s). There is no additional water test data.
3) Air quality test results from that day(s) There is no site specific air quality data. DEP's MAU (Mobile Analytical Unit) is doing multi-area samplings across the Northern Tier over the next 4 weeks. As this information is synthesized, DEP will make it available.

4) Explanation of what chemical used in the drilling process would create the odor that we and 911 responders observed

At this time DEP is still unsure of the specific "chemical" that triggers the sulfide reaction. As I mentioned previously, DEP has seen this problem in other areas of the state.

5) Health implications of said odors

H2S is primarily an eye irritant. The H2S was very smelly; it was being released in a well ventilated area and there is limited

6) Destination of waste water which has been trucked off site. See number 2 above.

I have to leave the office early today, but will be in tomorrow

Kelly Heffner

Kelly Jean Heffner | Acting Deputy Secretary
Office of Field Operations
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.5028 | Fax: 717.772.3314
www.depweb.state.pa.us

5500-FM-OG0016a Rev. 5/2004

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

INSPECTION REPORT

DEP USE ONLY	Inspection Record #
Complaint Record #	Enforcement Record #

DEP Office	Scranton Phone 570-346-5511	Permit or Reg. #	127-20017
Address	101 Penn Ave Scranton PA 18503	Project #	
		Farm Name & Well #	Woodland Mgmt Partners I
Oper Name	Newfield Appalachia	County	Wayne
Address	119 Lincoln St. Honesdale PA 18431	Municipality	Damascus
		Latitude:	° ' " N
		Longitude:	° ' " W

Inspection Code:
- ☐ BDREL - Bond Release
- ☐ CEI - Compliance Evaluation
- ☐ COMPL - Complaint Inspection
- ☐ DRALT - Drilling or Alteration
- ☒ FLWUP - Follow-up
- ☐ PLUG - Plugging
- ☐ RDSPR - Road Spreading
- ☐ RESTR - Site Restoration
- ☐ RTNC - Routine

Other: ☐ Permit Expired ☐ Alt/Meth. ☐ Annulus Open ☐ Cement Returns ☐ Recommend Bond Release

Fold Line

Location	Insp.	Violation
Site ID Sign	X	
Well Tag		
Distance Restrict		
E/S Plan on Site		
E/S Controls		
Encroachments		
Site Restoration		
Drilling-Plugging		
Notification		
B.O.P.		
Casing		
Monument		
Waste Mgmt.		
Top Hole Water		
Fluids Mgmt.	X	
Impoundment/pit	X	
Pollution Prevent		
Residual Waste		

Driller's Log Information — Depth:

Fresh Water Amt / Depth	Salt Water Amt / Depth	Coal Thickness / Depth	Formations Oil / Depth	Formations Gas / Depth

Drilling / Plugging

Filling Material & Plugs	From	To

Casing & Tubing

Size	Pulled	Left

Compliance Assistance	Code	Code	Inspection Results	Code
				NOVIO

Remarks: Reponded to complaint of "Sulphur" odor coming from well site. At time of inspection construction crew on site sucking down fluid in pit. Fluid being pumped to frac tanks on site and then transported off site by tanker trucks. When pumping fluid, odor is emitted through vents in tanks. Weather conditions were windy over weekend and during inspection. Contractors planning to solidify pit tomorrow and then fold over liners on Friday. DEP will inspect pit prior to encapsulating.

Sample No.	Location / Description

DEP Rep: (signature) Stephen Watson (print name) Steve WATSON

Date: 9/8/10 Time: 14:15

☐ White – Regional File ☐ Yellow – Operator ☐ Pink – Inspector ☐ Goldenrod – Company File

5500-FM-OG0016a Rev. 5/2004

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

INSPECTION REPORT

DEP USE ONLY	Inspection Record #
Complaint Record #	Enforcement Record #

DEP Office	Scranton Phone 570 346-5534	Permit or Reg. #	127-20017
Address	101 Penn Ave	Project #	
	Scranton PA 18503	Farm Name & Well #	Woodland Mgt Partners 1
Oper Name	Newfield Appalachia	County	Wayne
Address	119 Lincoln Street	Municipality	Damascus
	Honesdale PA 18431	Latitude:	° ' " N
		Longitude:	° ' " W

Inspection Code:
- ☐ BDREL - Bond Release
- ☐ CEI - Compliance Evaluation
- ☐ COMPL - Complaint Inspection
- ☐ DRALT - Drilling or Alteration
- ☒ FLWUP - Follow-up
- ☐ PLUG - Plugging
- ☐ RDSPR - Road Spreading
- ☐ RESTR - Site Restoration
- ☐ RTNC - Routine

Other: ☐ Permit Expired ☐ Alt/Meth. ☐ Annulus Open ☐ Cement Returns ☐ Recommend Bond Release

Fold Line

Location	Insp.	Violation
Site ID Sign	X	
Well Tag		
Distance Restrict		
E/S Plan on Site		
E/S Controls		
Encroachments		
Site Restoration		
Drilling-Plugging		
Notification		
B.O.P.		
Casing		
Monument		
Waste Mgmt.		
Top Hole Water		
Fluids Mgmt.	X	
Impoundment/pit	X	
Pollution Prevent	X	
Residual Waste		

Driller's Log Information Depth:

Fresh Water Amt / Depth	Salt Water Amt / Depth	Coal Thickness / Depth	Formations Oil / Depth	Formations Gas / Depth

Drilling / Plugging

Filling Material & Plugs	From	To

Casing & Tubing

Size	Pulled	Left

Compliance Assistance	Code	Code	Inspection Results	Code
				NOV10

Remarks: Follow up inspection to determine activity on well. At time of inspection, trucks hauling off last few pieces of rig to next site (Crum). H+K contracting on site. Two workers skimming off oily sheen from reserve pit. Inspected liner - no tears were observed. Several Frac tanks on site are to be used to temporarily store fluid from pit as they pump it down. Plan to solidify and encapsulate next week sometime.

Sample No.	Location / Description

DEP Rep:
(signature) Stephen Watson
(print name) Steve WATSON

Date: 9/2/10
Time: @ 1:30

Page 1 of ____

☐ White – Regional File ☐ Yellow – Operator ☐ Pink – Inspector ☐ Goldenrod – Company File

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

DRBC Well Smp, Wayne County PA

Lot #: C0H110479

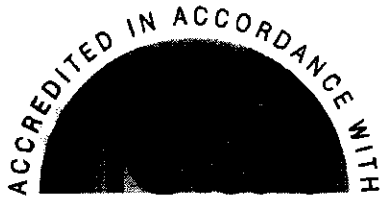
Steve Moyer

Tetra Tech NUS, Inc
116 N. Washington Avenue
Office 1G
Scranton, PA 18503

TESTAMERICA LABORATORIES, INC.

Veronica Bortot
Project Manager

August 18, 2010



NELAC REPORTING:

At the time of analysis the laboratory was in compliance with the current NELAC standards and held accreditation for all analyses performed unless noted by a qualifier. The labs accreditation numbers are listed below. The format and contents of the report meets all applicable NELAC standards except as noted in the narrative and shall not be reproduced except in full, without the written approval of the laboratory. The table below presents a summary of the certifications held by TestAmerica Pittsburgh. Our primary accreditation authority for the Non-potable water and Solid & Hazardous waste programs is Pennsylvania DEP. A more detailed parameter list is available upon request. Please ask your project manager for this information when required.

Certifying State/Program	Certificate #	Program Types	TestAmerica
DoD ELAP	ADE-1442	WW HW	X
US Dept of Agriculture	(#P330-10-00139)	Foreign Soil Import Permit	X
Arkansas	(#88-0690)	WW HW	X X
California – NELAC	04224CA	WW HW	X X
Connecticut	(#PH-0688)	WW HW	X X
Florida – NELAC	(#E871008)	WW HW	X X
Illinois – NELAC	(#002319)	WW HW	X X
Kansas – NELAC	(#E-10350)	WW HW	X X
Louisiana – NELAC	(#04041)	WW HW	X X
New Hampshire – NELAC	(#203010)	WW --	X --
New Jersey – NELAC	(PA-005)	WW HW	X X
New York – NELAC	(#11182)	WW HW	X X
North Carolina	(#434)	WW HW	X X
Pennsylvania - NELAC	(#02-00416)	WW HW	X X
South Carolina	(#89014002)	WW HW	X X
Utah – NELAC	(STLP)	WW HW	X X
West Virginia	(#142)	WW HW	X X
Wisconsin	998027800	WW HW	X X

The codes utilized for program types are described below:

HW Hazardous Waste certification
WW Non-potable Water and/or Wastewater certification
X Laboratory has some form of certification under the specific program. Many states certify laboratories for specific parameters or tests within a category. The information in the table indicates the lab is certified in a general category of testing. Please contact the laboratory if parameter specific certification information is required.

Updated: 05/19/10 N:\Reporting\NELAC NARRATIVE Pttsburgh_Updated 051910.doc

CASE NARRATIVE
TETRA TECH

Lot #: C0H110479

Sample Receiving:
TestAmerica's Pittsburgh laboratory received one sample on August 11, 2010. The cooler was received within the proper temperature range.

If project specific QC was not required for samples contained in this report, when batch QC was completed on these samples, anomalous results will be discussed below.

GC/MS Volatiles:
All non-CCC compounds that have >15% RSD were evaluated to see if a better curve could be drawn using a quadratic curve. All compounds <30% RSD will use an average response factor curve if no visible improvement is accomplished using a quadratic curve. A quadratic curve will be used for a compound where it is determined to be the "best-fit" evaluation.

Metals:
The sample and associated matrix spikes were over the instrument's linear range for sodium and strontium and was analyzed at a dilution.

The method blanks had analytes detected at concentrations between the MDL and the reporting limit. The results were flagged with a "B" qualifier. Any sample associated with a method blank that had the same analyte detected had the result flagged with a "J" qualifier.

For the matrix spike and matrix spike duplicate, potassium, sodium and strontium recoveries were not calculated due to the concentration of analyte in the sample being >4 times the concentration of spike added.

The matrix spikes recovered outside control limits for aluminum.

General Chemistry:
The test for pH is a field parameter. The laboratory pH analysis was completed at the request of the client.

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratory location: ____________________
Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other ____________

TestAmerica Laboratories, Inc.
COC No:

Client Contact			
Company Name: Tetra Tech NUS	Client Project Manager: Beth Witowski	Site Contact: Veronica Bortot →	Lab Contact:
Address: 116 N Washington Ave	Telephone: (610) 588 6731	Telephone:	Telephone:
City/State/Zip: Scranton, PA, 18503			
Phone: 570-344-1148			
Project Name: DBC well sampling Tophole	Method of Shipment/Carrier: Fedex		
Project Number:	Shipping/Tracking No:		
PO# 112G05836			

TAT if different from below ____
☐ 3 weeks
☐ 2 weeks
☒ 1 week (circled)
☐ 2 days
☐ 1 day

Analyses: Cond., metals, VOA, TPH

Sample Identification	Sample Date	Sample Time	Marks	Analyses marks
WMP-Tophole 081010	8/10/10	1345	X X X X X	X X X X X

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal By Lab ☐ Archive For ____ Months

Special Instructions/QC Requirements & Comments:
* 1 Liter sample being tested for CN is not preserved. Short hold.

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	8/19/10; 1745			
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by: [signature]	TA-Pitt	8/19/10

TAL-0018 (1008)

METHODS SUMMARY

C0H110479

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
pH (Electrometric)	SM20 4500-H+B	SM20 4500-H B
Biochemical Oxygen Demand 5210B	SM20 5210B	SM20 5210B
Mercury (Manual Cold Vapor Technique)	MCAWW 245.1	MCAWW 245.1
N-Hexane Ext. Material, Silica Gel Treated-1664A	CFR136A 1664A S	EPA 1664A
Total Cyanide	MCAWW 335.4	MCAWW 335.4
Total Suspended Solids SM 2540 D	SM20 2540D	SM20 2540D
Trace Inductively Coupled Plasma (ICP) Metals	MCAWW 200.7	MCAWW 200.7
Volatile Organics by GC/MS	SW846 8260B	SW846 5030B

References:

CFR136A "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SM20 "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER", 20TH EDITION."

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

C0H110479

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
L5EXN	001	WMP-TOPHOLE 081010	08/10/10	13:45

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

GC/MS Volatiles

Lot-Sample #...: C0H110479-001 **Work Order #...:** L5EXN1A4 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10 **MS Run #.....:** 0228124
Prep Date.....: 08/16/10 **Analysis Date..:** 08/16/10
Prep Batch #...: 0228193 **Analysis Time..:** 09:28
Dilution Factor: 1

Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Benzene	ND	5.0	ug/L
Ethylbenzene	ND	5.0	ug/L
Toluene	ND	5.0	ug/L
Xylenes (total)	ND	15	ug/L

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	107	(62 - 123)
Toluene-d8	96	(80 - 120)
4-Bromofluorobenzene	92	(75 - 120)
Dibromofluoromethane	104	(80 - 120)

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C0H110479 **Work Order #...:** L5L921AA **Matrix.....:** WATER
MB Lot-Sample #: C0H160000-193
Prep Date.....: 08/16/10 **Analysis Time..:** 07:06
Analysis Date..: 08/16/10 **Prep Batch #...:** 0228193
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	5.0	ug/L	SW846 8260B
Ethylbenzene	ND	5.0	ug/L	SW846 8260B
Toluene	ND	5.0	ug/L	SW846 8260B
Xylenes (total)	ND	15	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	117	(62 - 123)
Toluene-d8	94	(80 - 120)
4-Bromofluorobenzene	101	(75 - 120)
Dibromofluoromethane	97	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C0H110479 **Work Order #...:** L5L921AC **Matrix.....:** WATER
LCS Lot-Sample#: C0H160000-193
Prep Date.....: 08/16/10 **Analysis Date..:** 08/16/10
Prep Batch #...: 0228193 **Analysis Time..:** 07:43
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
1,1-Dichloroethene	**82**	**(69 - 127)**	**SW846 8260B**
Trichloroethene	**98**	**(80 - 120)**	**SW846 8260B**
Chlorobenzene	**89**	**(83 - 120)**	**SW846 8260B**
Benzene	**95**	**(80 - 120)**	**SW846 8260B**
Toluene	**83**	**(80 - 124)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	112	(62 - 123)
Toluene-d8	95	(80 - 120)
4-Bromofluorobenzene	97	(75 - 120)
Dibromofluoromethane	108	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C0H110479 **Work Order #...:** L5E0M1C7-MS **Matrix.....:** WATER
MS Lot-Sample #: C0H110483-001 L5E0M1C8-MSD
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10 **MS Run #.....:** 0228124
Prep Date.....: 08/16/10 **Analysis Date..:** 08/16/10
Prep Batch #...: 0228193 **Analysis Time..:** 08:07
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
1,1-Dichloroethene	**86**	**(69 - 127)**			**SW846 8260B**
	93	**(69 - 127)**	**8.4**	**(0-20)**	**SW846 8260B**
Trichloroethene	**98**	**(80 - 120)**			**SW846 8260B**
	110	**(80 - 120)**	**11**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**99**	**(83 - 120)**			**SW846 8260B**
	98	**(83 - 120)**	**1.2**	**(0-20)**	**SW846 8260B**
Benzene	**105**	**(80 - 120)**			**SW846 8260B**
	105	**(80 - 120)**	**0.0**	**(0-20)**	**SW846 8260B**
Toluene	**90**	**(80 - 124)**			**SW846 8260B**
	89	**(80 - 124)**	**0.22**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	115	(62 - 123)
	117	(62 - 123)
Toluene-d8	95	(80 - 120)
	94	(80 - 120)
4-Bromofluorobenzene	94	(75 - 120)
	94	(75 - 120)
Dibromofluoromethane	108	(80 - 120)
	115	(80 - 120)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

TOTAL Metals

Lot-Sample #...: C0H110479-001 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 0224387						
Silver	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AA
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Aluminum	**2420 J**	**200**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AH**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Arsenic	**11.4**	**10.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AJ**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Barium	**1830**	**200**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AK**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Beryllium	ND	4.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AL
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Boron	**249**	**200**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AM**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Calcium	**108000 J**	**5000**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AN**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Cadmium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5EXN1AP
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Cobalt	**1.6 B**	**50.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AQ**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Chromium	**9.6**	**5.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AR**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Copper	**10 B**	**25.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AC**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Iron	**3010**	**100**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AD**
		Dilution Factor: 1		Analysis Time..: 16:34	MS Run #.....: 0224231	

(Continued on next page)

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

TOTAL Metals

Lot-Sample #...: C0H110479-001 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Potassium	**249000**	**5000**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AE**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Lithium	**3190**	**50.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AF**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Magnesium	**2730 B,J**	**5000**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AG**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Manganese	**101**	**15.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/16/10**	**L5EXN1AT**
		Dilution Factor: 1		Analysis Time..: 12:07	MS Run #.....: 0224231	
Molybdenum	**89.9**	**40.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AU**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Sodium	**801000**	**25000**	**ug/L**	**MCAWW 200.7**	**08/12-08/16/10**	**L5EXN1AV**
		Dilution Factor: 5		Analysis Time..: 12:26	MS Run #.....: 0224231	
Nickel	**7.6 B**	**40.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AW**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Lead	**22.6**	**3.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1AX**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Selenium	**5.5**	**5.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1A0**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	
Strontium	**10800 J**	**250**	**ug/L**	**MCAWW 200.7**	**08/12-08/16/10**	**L5EXN1A1**
		Dilution Factor: 5		Analysis Time..: 12:26	MS Run #.....: 0224231	
Zinc	**21.3**	**20.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5EXN1A2**
		Dilution Factor: 1		Analysis Time..: 13:43	MS Run #.....: 0224231	

Prep Batch #...: 0230021

Mercury	**0.35**	**0.20**	**ug/L**	**MCAWW 245.1**	**08/18/10**	**L5EXN1A3**
		Dilution Factor: 1		Analysis Time..: 07:59	MS Run #.....: 0230010	

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: C0H120000-387 **Prep Batch #...:** 0224387						
Aluminum	**67.6 B**	**200**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5HKP1AH**
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Arsenic	ND	10.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AJ
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Barium	ND	200	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AK
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Beryllium	**0.31 B**	**4.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5HKP1AL**
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Boron	ND	200	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AM
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Cadmium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AP
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Calcium	**87.9 B**	**5000**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5HKP1AN**
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Chromium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AR
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Cobalt	ND	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AQ
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Copper	ND	25.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AC
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Iron	ND	100	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AD
		Dilution Factor: 1				
		Analysis Time..: 16:12				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Lead	ND	3.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AX
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Lithium	ND	50.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AF
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Magnesium	**54.5 B**	**5000**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5HKP1AG**
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Manganese	ND	15.0	ug/L	MCAWW 200.7	08/12-08/16/10	L5HKP1AT
		Dilution Factor: 1				
		Analysis Time..: 11:55				
Molybdenum	ND	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AU
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Nickel	ND	40.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AW
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Potassium	ND	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AE
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Selenium	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1A0
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Silver	ND	5.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AA
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Sodium	ND	5000	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1AV
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Strontium	**0.44 B**	**50.0**	**ug/L**	**MCAWW 200.7**	**08/12-08/13/10**	**L5HKP1A1**
		Dilution Factor: 1				
		Analysis Time..: 13:26				
Zinc	ND	20.0	ug/L	MCAWW 200.7	08/12-08/13/10	L5HKP1A2
		Dilution Factor: 1				
		Analysis Time..: 13:26				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: C0H180000-021 **Prep Batch #...:** 0230021						
Mercury	ND	0.20	ug/L	MCAWW 245.1	08/18/10	L5P4D1AA
		Dilution Factor: 1				
		Analysis Time..: 07:56				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: C0H120000-387 **Prep Batch #...:** 0224387					
Silver	92	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A3
		Dilution Factor: 1	Analysis Time..: 13:30		
Copper	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A4
		Dilution Factor: 1	Analysis Time..: 13:30		
Iron	89	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A5
		Dilution Factor: 1	Analysis Time..: 16:17		
Potassium	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A6
		Dilution Factor: 1	Analysis Time..: 13:30		
Lithium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A7
		Dilution Factor: 1	Analysis Time..: 13:30		
Magnesium	97	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A8
		Dilution Factor: 1	Analysis Time..: 13:30		
Aluminum	100	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1A9
		Dilution Factor: 1	Analysis Time..: 13:30		
Arsenic	101	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CA
		Dilution Factor: 1	Analysis Time..: 13:30		
Barium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CC
		Dilution Factor: 1	Analysis Time..: 13:30		
Beryllium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CD
		Dilution Factor: 1	Analysis Time..: 13:30		
Boron	101	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CE
		Dilution Factor: 1	Analysis Time..: 13:30		
Calcium	99	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CF
		Dilution Factor: 1	Analysis Time..: 13:30		
Cadmium	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CG
		Dilution Factor: 1	Analysis Time..: 13:30		
Cobalt	99	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CH
		Dilution Factor: 1	Analysis Time..: 13:30		

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Chromium	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CJ
		Dilution Factor: 1	Analysis Time..: 13:30		
Manganese	95	(85 - 115)	MCAWW 200.7	08/12-08/16/10	L5HKP1CK
		Dilution Factor: 1	Analysis Time..: 11:59		
Molybdenum	95	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CL
		Dilution Factor: 1	Analysis Time..: 13:30		
Sodium	97	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CM
		Dilution Factor: 1	Analysis Time..: 13:30		
Nickel	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CN
		Dilution Factor: 1	Analysis Time..: 13:30		
Lead	98	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CP
		Dilution Factor: 1	Analysis Time..: 13:30		
Selenium	104	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CQ
		Dilution Factor: 1	Analysis Time..: 13:30		
Strontium	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CR
		Dilution Factor: 1	Analysis Time..: 13:30		
Zinc	96	(85 - 115)	MCAWW 200.7	08/12-08/13/10	L5HKP1CT
		Dilution Factor: 1	Analysis Time..: 13:30		

LCS Lot-Sample#: C0H180000-021 **Prep Batch #...:** 0230021

Mercury	100	(85 - 115)	MCAWW 245.1	08/18/10	L5P4D1AC
		Dilution Factor: 1	Analysis Time..: 07:57		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C0H110479-001 **Prep Batch #...:** 0224387							
Aluminum	153 N	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CQ
	147 N	(70 - 130)	2.3	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CR
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Arsenic	114	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CT
	111	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CU
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Barium	106	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CV
	102	(70 - 130)	2.1	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CW
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Beryllium	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CX
	97	(70 - 130)	3.8	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C0
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Boron	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C1
	99	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C2
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Cadmium	98	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C5
	95	(70 - 130)	3.4	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C6
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Calcium	101	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C3
	94	(70 - 130)	2.1	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C4
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Chromium	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C9
	98	(70 - 130)	2.0	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DA
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Cobalt	111	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1C7
	107	(70 - 130)	3.5	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1C8
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Copper	103	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CE
	99	(70 - 130)	3.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CF
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Iron	116	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CG
	117	(70 - 130)	0.33	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CH
		Dilution Factor: 1					
		Analysis Time..: 16:45					
		MS Run #.....: 0224231					
Lead	105	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DL
	101	(70 - 130)	3.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DM
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Lithium	111	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CL
	104	(70 - 130)	1.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CM
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Magnesium	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CN
	96	(70 - 130)	3.7	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CP
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	101	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DC
	99	(70 - 130)	1.8	(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DD
		Dilution Factor: 1					
		Analysis Time..: 12:16					
		MS Run #.....: 0224231					
Molybdenum	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DE
	97	(70 - 130)	2.4	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DF
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Nickel	109	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DJ
	105	(70 - 130)	3.3	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DK
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Potassium	NC	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CJ
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CK
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Selenium	115	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DN
	111	(70 - 130)	3.6	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DP
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Silver	102	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1CC
	100	(70 - 130)	2.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1CD
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					
Sodium	NC	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DG
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DH
		Dilution Factor: 5					
		Analysis Time..: 12:35					
		MS Run #.....: 0224231					

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Strontium	NC	(70 - 130)			MCAWW 200.7	08/12-08/16/10	L5EXN1DQ
	NC	(70 - 130)		(0-20)	MCAWW 200.7	08/12-08/16/10	L5EXN1DR
		Dilution Factor: 5					
		Analysis Time..: 12:35					
		MS Run #.....: 0224231					
Zinc	100	(70 - 130)			MCAWW 200.7	08/12-08/13/10	L5EXN1DT
	98	(70 - 130)	2.2	(0-20)	MCAWW 200.7	08/12-08/13/10	L5EXN1DU
		Dilution Factor: 1					
		Analysis Time..: 13:52					
		MS Run #.....: 0224231					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

NC The recovery and/or RPD were not calculated.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C0H110483-001 **Prep Batch #...:** 0230021							
Mercury	95	(70 - 130)			MCAWW 245.1	08/18/10	L5E0M1DG
	87	(70 - 130)	7.6	(0-20)	MCAWW 245.1	08/18/10	L5E0M1DH

Dilution Factor: 1
Analysis Time..: 08:02
MS Run #.....: 0230010

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Tetra Tech NUS, Inc

Client Sample ID: WMP-TOPHOLE 081010

General Chemistry

Lot-Sample #...: C0H110479-001 **Work Order #...:** L5EXN **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH	**8.2**	--	--	**SM20 4500-H+B**	**08/16/10**	**0228263**
		Dilution Factor: 1		Analysis Time..: 14:06	MS Run #.....: 0228171	
Biochemical Oxygen Demand (BOD)	**436**	**2.0**	**mg/L**	**SM20 5210B**	**08/12-08/17/10**	**0224155**
		Dilution Factor: 1		Analysis Time..: 12:25	MS Run #.....: 0224080	
Total Cyanide	ND	0.010	mg/L	MCAWW 335.4	08/13/10	0225143
		Dilution Factor: 1		Analysis Time..: 10:56	MS Run #.....: 0225056	
Total Suspended Solids	**238**	**4.0**	**mg/L**	**SM20 2540D**	**08/16-08/17/10**	**0228259**
		Dilution Factor: 1		Analysis Time..: 07:30	MS Run #.....: 0228163	
TPH (SGT-HEM)	ND	5.8	mg/L	CFR136A 1664A SGT	08/12/10	0224136
		Dilution Factor: 1.15		Analysis Time..: 09:01	MS Run #.....:	

METHOD BLANK REPORT

General Chemistry

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Biochemical Oxygen Demand (BOD)		Work Order #: L5GAD1AA		MB Lot-Sample #:	C0H120000-155	
	ND	2.0	mg/L	SM20 5210B	08/12-08/17/10	0224155
		Dilution Factor: 1				
		Analysis Time..: 12:25				
Total Cyanide		Work Order #: L5H171AA		MB Lot-Sample #:	C0H130000-143	
	ND	0.010	mg/L	MCAWW 335.4	08/13/10	0225143
		Dilution Factor: 1				
		Analysis Time..: 10:56				
Total Suspended Solids		Work Order #: L5MFX1AA		MB Lot-Sample #:	C0H160000-259	
	ND	4.0	mg/L	SM20 2540D	08/16-08/17/10	0228259
		Dilution Factor: 1				
		Analysis Time..: 07:30				
TPH (SGT-HEM)		Work Order #: L5F871AA		MB Lot-Sample #:	C0H120000-136	
	ND	5.0	mg/L	CFR136A 1664A SGT	08/12/10	0224136
		Dilution Factor: 1				
		Analysis Time..: 09:01				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: C0H110479 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Biochemical Oxygen Demand (BOD)	WO#:L5GAD1AC-LCS/L5GAD1AD-LCSD					LCS Lot-Sample#: C0H120000-155	
	92	(85 - 115)			SM20 5210B	08/12-08/17/10	0224155
	91	(85 - 115)	0.55	(0-20)	SM20 5210B	08/12-08/17/10	0224155
	Dilution Factor: 1				Analysis Time..: 12:25		
TPH (SGT-HEM)	WO#:L5F871AC-LCS/L5F871AD-LCSD					LCS Lot-Sample#: C0H120000-136	
	89	(64 - 132)			CFR136A 1664A SGT	08/12/10	0224136
	86	(64 - 132)	2.8	(0-34)	CFR136A 1664A SGT	08/12/10	0224136
	Dilution Factor: 1				Analysis Time..: 09:01		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479 **Matrix.....:** WATER

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH		Work Order #: L5MG11AA	LCS Lot-Sample#: C0H160000-263		
	100	(99 - 101)	SM20 4500-H+B	08/16/10	0228263
		Dilution Factor: 1	Analysis Time..: 14:04		
Total Cyanide		Work Order #: L5H171AC	LCS Lot-Sample#: C0H130000-143		
	103	(90 - 110)	MCAWW 335.4	08/13/10	0225143
		Dilution Factor: 1	Analysis Time..: 10:56		
Total Suspended Solids		Work Order #: L5MFX1AC	LCS Lot-Sample#: C0H160000-259		
	83	(80 - 120)	SM20 2540D	08/16-08/17/10	0228259
		Dilution Factor: 1	Analysis Time..: 07:30		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479 **Matrix.....:** WATER
Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Cyanide		WO#: L5EXN1DV-MS/L5EXN1DW-MSD				MS Lot-Sample #: C0H110479-001	
	105	(90 - 110)			MCAWW 335.4	08/13/10	0225143
	100	(90 - 110)	4.6	(0-20)	MCAWW 335.4	08/13/10	0225143

Dilution Factor: 1
Analysis Time..: 10:56
MS Run #.....: 0225056

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479 **Work Order #...:** L5EKJ-SMP L5EKJ-DUP **Matrix.....:** WATER

Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Suspended Solids						SD Lot-Sample #: C0H110430-001		
	75.0	73.0	mg/L	2.7	(0-20)	SM20 2540D	08/16-08/17/10	0228259

Dilution Factor: 1 Analysis Time..: 07:30 MS Run Number..: 0228163

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: C0H110479 **Work Order #...:** L5EXN-SMP L5EXN-DUP **Matrix.....:** WATER

Date Sampled...: 08/10/10 **Date Received..:** 08/11/10

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
pH						SD Lot-Sample #: C0H110479-001		
	8.2	8.2	--	0.12	(0-2.0)	SM20 4500-H+B	08/16/10	0228263
			Dilution Factor: 1			Analysis Time..: 14:06	MS Run Number..: 0228171	
Biochemical Oxygen Demand (BOD)						SD Lot-Sample #: C0H110479-001		
	436	490	mg/L	12	(0-20)	SM20 5210B	08/12-08/17/10	0224155
			Dilution Factor: 1			Analysis Time..: 12:25	MS Run Number..: 0224080	

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 826657
Watershed Name: Shehawken Rattlesnake Creek	Quality: HQ

Permittee: NEWFIELD APPALACHIA PA LLC	OGO.#: OGO-67425		Permit Number: 37-127-20013-	Date Issued: 04/23/2010
Address: 363 N SAM HOUSTON PKWY E STE 2020			Farm Name & Well Number: DL TEEPLE 1 1	Well Serial #
			Municipality: Manchester	County: Wayne
HOUSTON, TX 770602424			7½ ' Quadrangle Name: Long Eddy	Map Section #: 1
Phone: (281) 847-6031	Project #		Latitude: 41-49-39.9000	Longitude: -75-11-53.3300
Surf Elev at Site: 1516 feet	Anticipated Total Depth: 8350 feet	Well Type: GS	Offset distances referenced to NE corner of map section. South 2304 feet West 8580 feet	

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires **04/23/2011** unless drilling is commenced on or before that date and prosecuted with due diligence.

Staci Gustafson for S. Craig Lobins
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

DEP USE ONLY	
AUTH #	CNC
Check # 106345	Amount $ 1500.00

$1250 + 250 = $1500

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

DEP USE ONLY

Notes			
Vertical Test Well	OGO # 67425	Objection Date - Do not issue before: 4/5/10	Well Permit # 127-20013
	Bond # 12382	Date Approved: 4/20/10 JS	Special Cond. A B C D E F
	C: 3/11/10 Del G: 4/5/10 JCO		Watershed Name: Shehawken Rattlesnake Creek
	INV: 4-22-10		Designation: (HQ) EV

Please read instructions before you begin filling in this form.

Applicant (Operator) Name	DEP Client ID#	Phone	FAX	Check if new address.
Newfield Appalachia PA LLC	277879	281-847-6031	281-847-6160	☐
Mailing Address (Street or PO Box)	**City**	**State**	**Zip +4**	**Country (if not USA)**
363 N. Sam Houston Pkwy E. Suite 2020	Houston	TX	77060-2424	

(Well) Farm Name	Well #	Serial #
D.L. Teeple	1-1	

County	Municipality	Project # (from DEP)
WAYNE	MANCHESTER	

If you are applying for a permit to redrill, drill deeper, or alter a well that was previously permitted or registered, ***or for a well site that was previously permitted but not drilled,*** check this box ☐ and enter the permit or registration number here:

If applying for a permit to rework an existing well not registered or permitted, check this box ☐ and **enter date drilled**, if known: _____ (see instructions)

PNDI Attached: ☒ Any "hit" must include accepted mitigation plan from applicable agency.

PERMIT TYPE
Check applicable.
Application is to:
- ☒ Drill a new well
- ☐ Deepen a well
- ☐ Redrill a well
- ☐ Alter a well
- ☐ E&S Control Module
- ☐ Other (specify)

TYPE OF WELL
Check one.
- ☐ Gas
- ☐ Oil
- ☐ Comb. (gas & oil)
- ☐ Injection, recovery
- ☐ Injection, disposal
- ☐ Coalbed Methane
- ☐ Gas Storege
- ☒ Other (specify)

vertical test well

APPLICATION FEE
Check applicable.
- ☐ Marcellus Well: Non-Vertical
- ☐ Marcellus Well: Vertical
- ☐ Non-Marcellus Well: Non-Vertical
- ☒ Non-Marcellus Well: Vertical
- ☐ $200 (Home Use Well)
- ☐ $500 E&S Fee
- ☐ $ 0 (Rehab orphan)
- ☒ Vertical: Length 8350 ft.
- ☐ Marcellus: Length _____ ft.
- ☐ Non-Vertical: Length _____ ft.

Total Application Fee $ 1500

COORDINATION WITH REGULATIONS AND OTHER PERMITS	Yes	No
1. Will the well be subject to the **Oil and Gas Conservation Law**? If "No," go to 2).	☒	☐
a. If "Yes" to #1, is the well at least 330 feet from outside lease or unit boundary?	☒	☐
b. Does the location fall within an area covered by a spacing order?	☐	☒
2. Will the well penetrate a **workable coal seam**? If "No," include justification and supporting documentation.	☐	☒
3. If the well will penetrate a **workable coal seam**, and the well is a "non-conservation" gas well, does the location comply with the distance requirements of Section 7 of the Coal and Gas Resource Coordination Act? (At least 1,000 feet from all existing wells).	☐	☐
a. If "No," is the required exception request attached? (Check here if re-working an existing well: ☐ N/A)	☐	☐
4. Will the well be drilled at a location where the **coal** has been removed?	☐	☒
5. Will the well be drilled through an **active (operating or projected) coalmine**, or within 1,000 feet of the boundary?	☐	☒
a. If "Yes," print the names of: Mine: Operator:		
6. Will the well penetrate or be within 2,000 feet of an active **gas storage reservoir** boundary?	☐	☒
a. If Yes, print the names of: Storage Field: Operator:		
7. Is the proposed well location within the permitted area of a **landfill**?	☐	☒
8. Will the well site be within 100 feet (measured horizontally) of a **stream, spring or body of water** identified on the most current 7½' topographic map?	☐	☒
a. If "Yes," is a request for a waiver (form 5500-FM-OG0057), and E&S control plan attached?	☐	☐
9. Will the well site be within 100 feet of a **wetland** or in a **wetland**?	☐	☒
a. Is the well site within 100 feet of a wetland greater than one acre in size?	☐	☐
If yes, is a waiver request (form 5500-FM-OG0057) and E&S control plan attached?	☐	☐
10. Will the well be drilled within 200 feet (horizontally) from any existing **building** or an existing **water supply**?	☒	☐
a. If "Yes," is written consent from the owner attached?	☐	☐
b. If written consent is not attached, is a variance request (form 5500-FM-OG0058) attached?	☐	☐

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NORTHWEST REGIONAL OFFICE

DEP USE ONLY
Date Stamps/Notes
Auth 826651
Site 731937
Clnt 277879
APS 715262
Acct 674710

PF 728625
SF 101026

	Yes	No
11. Will the well be located where it may impact a public resource as outlined in the **"Coordination of a Well Location with Public Resources"** form 5500-PM-OG0076? If yes, attach a competed copy of the form.	☐	☒
12. Is the well site in a **Special Protection** High Quality (HQ) or Exceptional Value (EV) watershed?	☒	☐
13. Is this well part of a development where you need an **Earth Disturbance Permit** for Oil and Gas Activities disturbing more than 5 acres? If yes, attach a completed Erosion Sediment and Stormwater Control Module or list the number and date of the ESCGP-1 Approval. _____	☐	☒

Signature of Applicant The person signing this form attests that they have the authority to submit this application on behalf of the applicant, and that the information, including all related submissions, is true and accurate to the best of their knowledge.

Signature of Person Authorized to Submit Application	*(Print or Type)*	Name of Signer: DONALD F. SLEETH Title: Drilling Manager	Date
Donald F. Sleeth III			3-5-10

Application Preparer/Contact: BETSY COLLINS Phone: 412-921-8250

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
D.L. Teeple-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 — Record of Notification / Written Consent

127-20013

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

		Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates Sent	Notification: Certified Mail Dates Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Name: Lookout Veterans Home Corp	Address: 3785 Hancock Hwy Equinunk, PA 18417						X						X
Name: Carl Keesler	Address: 12 Legion Road, Equinunk, PA 18417						X			2-18-10	2-22-10		
Name: Dale L & Ella E Teeple	Address: 13 Teeple Rd Equinunk, PA 18417-3514	X					X						X
Name: Alan W & Mary E Hazen	Address: 7 Legion Rd Equinunk, PA 18417-3325						X						X
Name: Henry and Rita Hazen	Address: 9 Legion Rd Equinunk, PA 18417-3325						X						X
Name: Diane Day	Address: 3542 Hancock Hwy Equinunk, PA 18417						X						X
Name:	Address:												

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NORTHWEST REGIONAL OFFICE

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☑ Landowner with water supply within 1,000 ft. Dale L Teeple Ella E. Teeple	Date 2-8-10	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft. Allan Hazen Mary Hazen	Date 2/8/10	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft. Rita Hazen	Date 2/8/10	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft. Ronald E Lange	Date 2-17-10	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location Dale L Teeple	Date 2-8-10	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location Ella E. Teeple	Date 2-8-10	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL & GAS MANAGEMENT PROGRAM

Farm Name - Well #	
D.L. Teeple-Well #1-1	
Applicant Name	DEP ID#
Newfield Appalachia PA LLC	277879
DEP USE ONLY	APS #

PERMIT APPLICATION FOR DRILLING OR ALTERING A WELL

Page 2 --- Record of Notification / Written Consent

127-20013

List the following: surface landowner; all landowners or water purveyors whose water supplies are within 1,000 feet of this proposed well location; gas storage operator if within 2000 feet; all coal owners and lessees of all underlying workable coal seams; operators of underground coal mines at the proposed location; and coal operators with a deep mine within 1,000 feet. Mark the boxes, "X," which show the parties' interests. Use additional forms if you need more space. You are required to notify each of these parties.

Name	Address	Surface Landowner	Coal Owner	Coal Lessee	Coal Mine Operator	Gas Storage Operator	Within 1,000 feet: Surf Owner with Water	Within 1,000 feet: Water Purveyor	Within 1,000 feet: Coal Mine Operator	Notification: Certified Mail Dates: Sent	Notification: Certified Mail Dates: Return Receipt	Notification: Address Affidavit	Notification: Written Consent
Lookout Veterans Home Corp	3785 Hancock Hwy Equinunk, PA 18417						X						X
Carl Keesler	12 Legion Road,Equinunk, PA 18417						X			2-18-10	2-22-10		
Dale L & Ella E Teeple	13 Teeple Rd Equinunk, PA 18417-3514	X					X						X
Alan W & Mary E Hazen	7 Legion Rd Equinunk, PA 18417-3325						X						X
Henry and Rita Hazen	9 Legion Rd Equinunk, PA 18417-3325						X						X
Diane Day	3542 Hancock Hwy Equinunk, PA 18417						X						X

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NORTHWEST REGIONAL OFFICE

Optional: Signature below indicates the party's approval of the well location, and waives the 15-day objection period. Check applicable box.

☐ Water Purveyor or ☒ Landowner with water supply within 1,000 ft.	Date 3/17/10	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
☐ Water Purveyor or ☐ Landowner with water supply within 1,000 ft.	Date	Coal ☐ Operator, ☐ Owner, or ☐ Lessee	Date
Surface Landowner at proposed location	Date	Coal Operator within 1,000 feet of proposed location	Date
Surface Landowner at proposed location	Date	Gas Storage Operator within 2,000 feet	Date

Signature below indicates written consent. Check applicable box.

Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	
Owner of: ☐ water supply, or ☐ building within 200 feet	Date
Address (of above)	

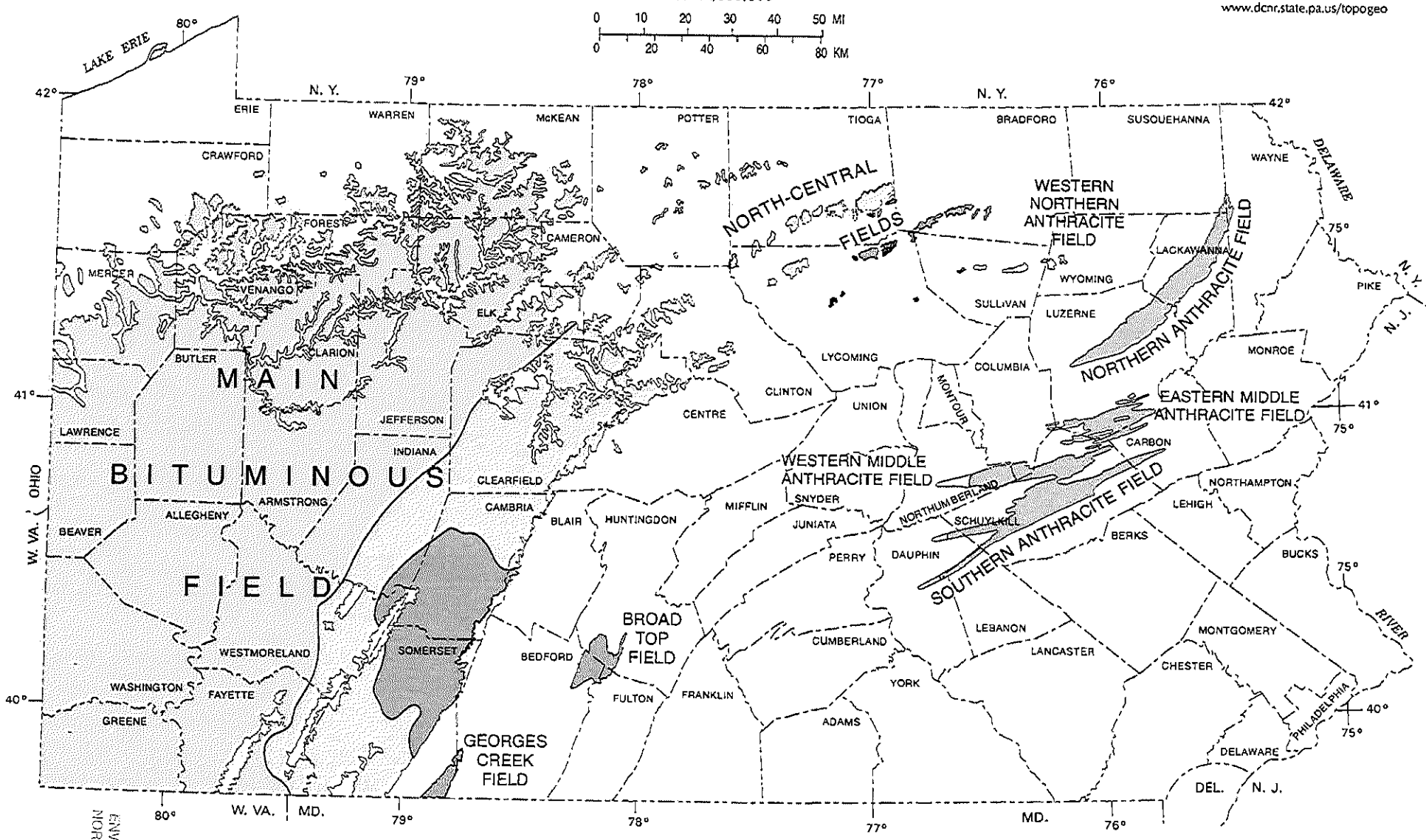
MAP 11

DISTRIBUTION OF PENNSYLVANIA COALS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF
CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
www.dcnr.state.pa.us/topogeo

SCALE 1:2,000,000

0 10 20 30 40 50 MI
0 20 40 60 80 KM



EXPLANATION

BITUMINOUS FIELDS

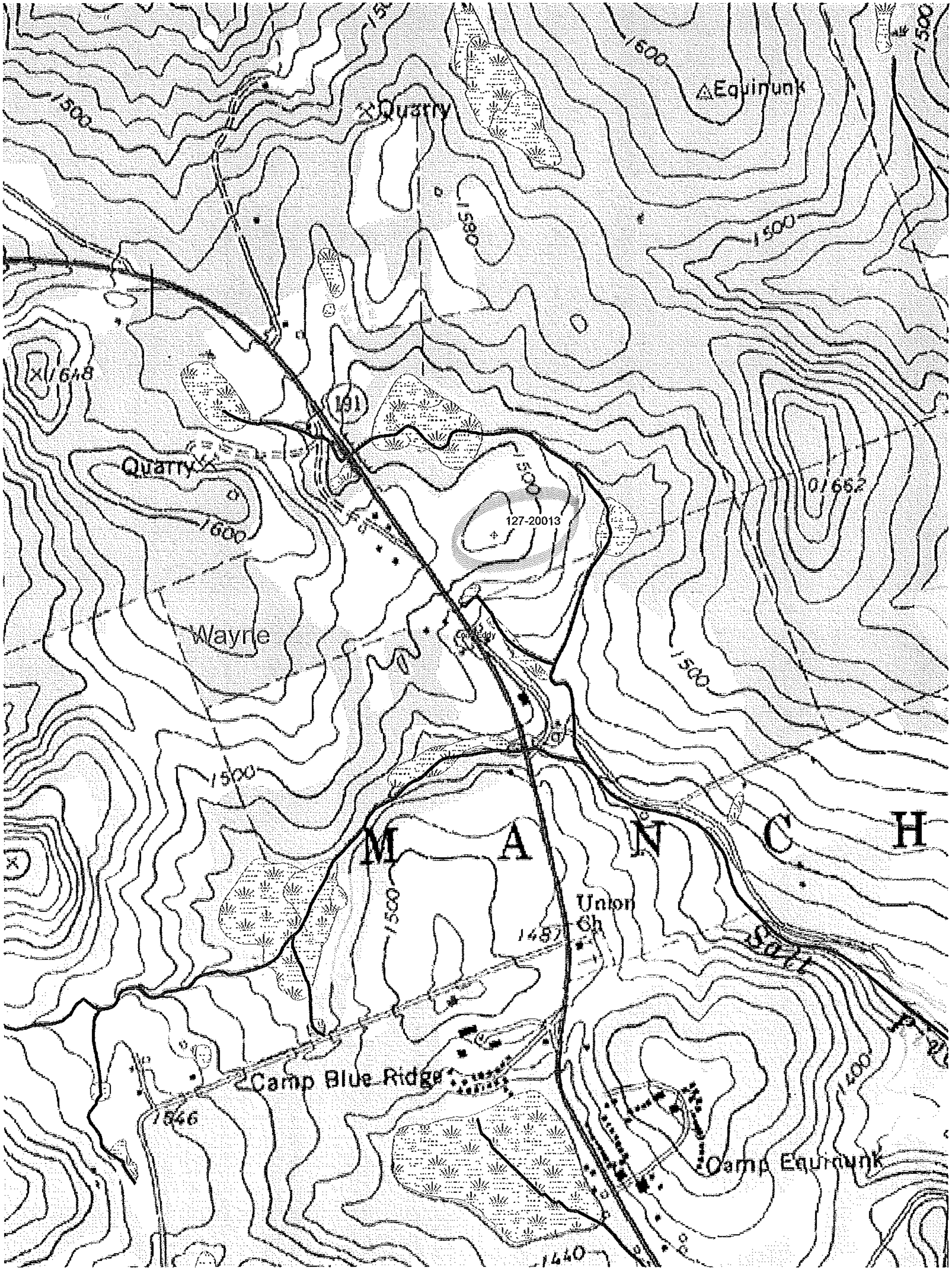
- High-volatile bituminous coal
- Medium-volatile bituminous coal
- Low-volatile bituminous coal

ANTHRACITE FIELDS

- Semi-anthracite
- Anthracite

Prepared by Bureau of Topographic and Geologic Survey.
Third Edition, Revised, 2000; Third Printing, 2008.

2200-MP-DCNR0855
Printed on Recycled Paper

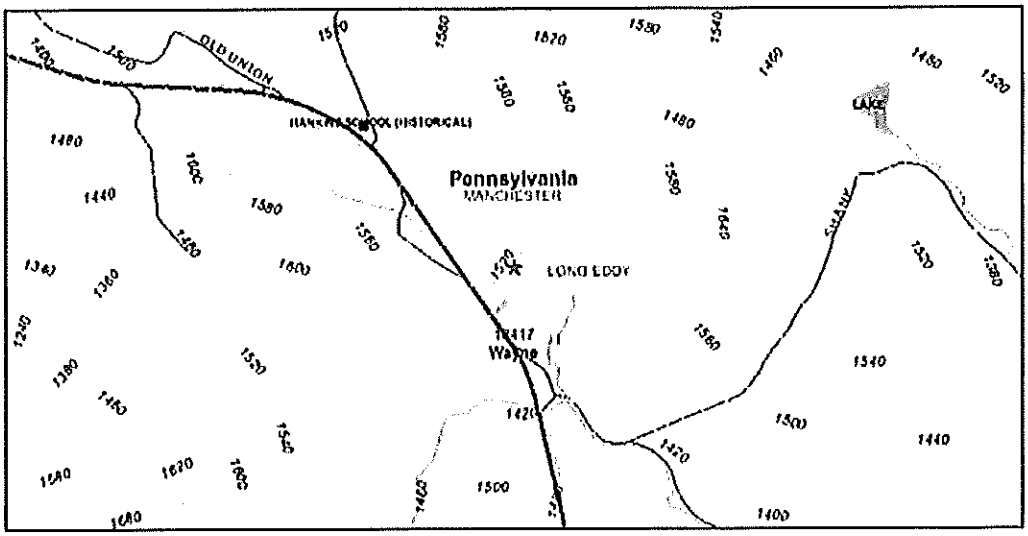


Equinunk
Quarry
1500
1600
1580
1648
191
Quarry
1600
127-20013
1662
Wayne
Cold Eddy
1500
M A N C H
Union Ch
1487
1500
Camp Blue Ridge
1546
Camp Equinunk
1400
1440

PNDI Project Environmental Review Receipt Project Search ID: 20100202227314

1. PROJECT INFORMATION

Project Name: **Newfield-1-Teeple**
Date of review: **2/2/2010 2:27:54 PM**
Project Category: **Mining,Oil or Gas (including roads and pipelines),New Well**
Project Area: **N/A**
County: **Wayne** Township/Municipality: **Manchester**
Quadrangle Name: **LONG EDDY**
ZIP Code: **18417**
Decimal Degrees: **41.82775 N, --75.198147 W**
Degrees Minutes Seconds: **41° 49' 39.90" N, -75° 11' 53.33" W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate no known impacts to threatened and endangered species and/or special concern species and resources within the project area. Therefore, based on the information you provided, no further coordination is required with the jurisdictional agencies. This response does not reflect potential agency concerns regarding impacts to other ecological resources, such as wetlands.

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for one year** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt.

PA Game Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE: No impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: No impacts to federally listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt, a completed PNDI form and a USGS 7.5 minute quadrangle map with the project boundaries delineated on the map. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at

http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service
Endangered Species Section
315 South Allen Street, Suite 322, State College, PA. 16801-4851
NO Faxes Please.

PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name: Stephen Moyer
Company/Business Name: Tetra Tech NUS
Address: 661 Anderson Drive Foster Plaza 7
City, State, Zip: Pittsburgh, PA 15220
Phone:(570) 344-1140 Fax:( )
Email: Steve.Moyer@tetratech.com

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

applicant/project proponent signature

2/2/10
date

USPS

Confirmation Services

Package ID: 9171082133393775231599
Destination ZIP Code: 77584
Customer Reference:
Recipient: BILLY W COCKRELL
Address: 17214 HARKEY RD COUNTY RD 103
PEARLAND, TX 77584

E-CERTIFIED
1STCL REGULAR FLAT
PBP Account #: 13945647
Serial #: 4253999
FEB 17 2010 12:46P

D. FINLEY

Confirmation Services

Package ID: 9171082133393775231605
Destination ZIP Code: 77584
Customer Reference:
Recipient: BILLY W. COCKRELL
Address: 17214 HARKEY RD COUNTY RD 103
PEARLAND, TX 77584

E-CERTIFIED
1STCL REGULAR FLAT
PBP Account #: 13945647
Serial #: 4253999
FEB 17 2010 12:46P

RECEIVED
MAR 08 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

D. FINLEY

Confirmation Services

Package ID: 9171082133393775231612
Destination ZIP Code: 78245
Customer Reference:
Recipient: LATOYA ALEXANDER
Address: 1231 OLD FORREST ST.
SAN ANTONIO, TX 78245

E-CERTIFIED
1STCL REGULAR FLAT
PBP Account #: 13945647
Serial #: 4253999
FEB 17 2010 12:46P

D. Finley

Confirmation Services

Package ID: 9171082133393775231629
Destination ZIP Code: 90043
Customer Reference:
Recipient: Jeannie Alexander
Address: 6321 7th Avenue
Los Angeles, CA 90043

E-CERTIFIED
1STCL REGULAR FLAT
PBP Account #: 13945647
Serial #: 4253999
FEB 18 2010 4:10P

Amie Faul

Confirmation Services

Package ID: 9171082133393775231636
Destination ZIP Code: 18417
Customer Reference:
Recipient: Mr. Carl Keesler
Address: 12 Legion Road
Equinunk, PA 18417

E-CERTIFIED
1STCL REGULAR FLAT
PBP Account #: 13945647
Serial #: 4253999
FEB 19 2010 12:27P

Confirmation Services

Confirmation Services

Confirmation Services

Confirmation Services

Confirmation Services

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Carl Keesler
12 Legion Road
Equinunk, PA 18417

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) John Zona Jr. C. Date of Delivery 2-22-10

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☑ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service lat 91 7108 2133 3937 7523 1636

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

5500-PM-OG0002-DWG Rev. 09/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program

WELL LOCATION PLAT

DEP USE ONLY	DEP Application Tracking #	G: ACO 4/19/10
	Permit # 127-20013	C:
	Project #	

Denotes location of well on topo map.

Well is located on topo map 2,034 feet south of latitude 41 ° 50 ' 00 "

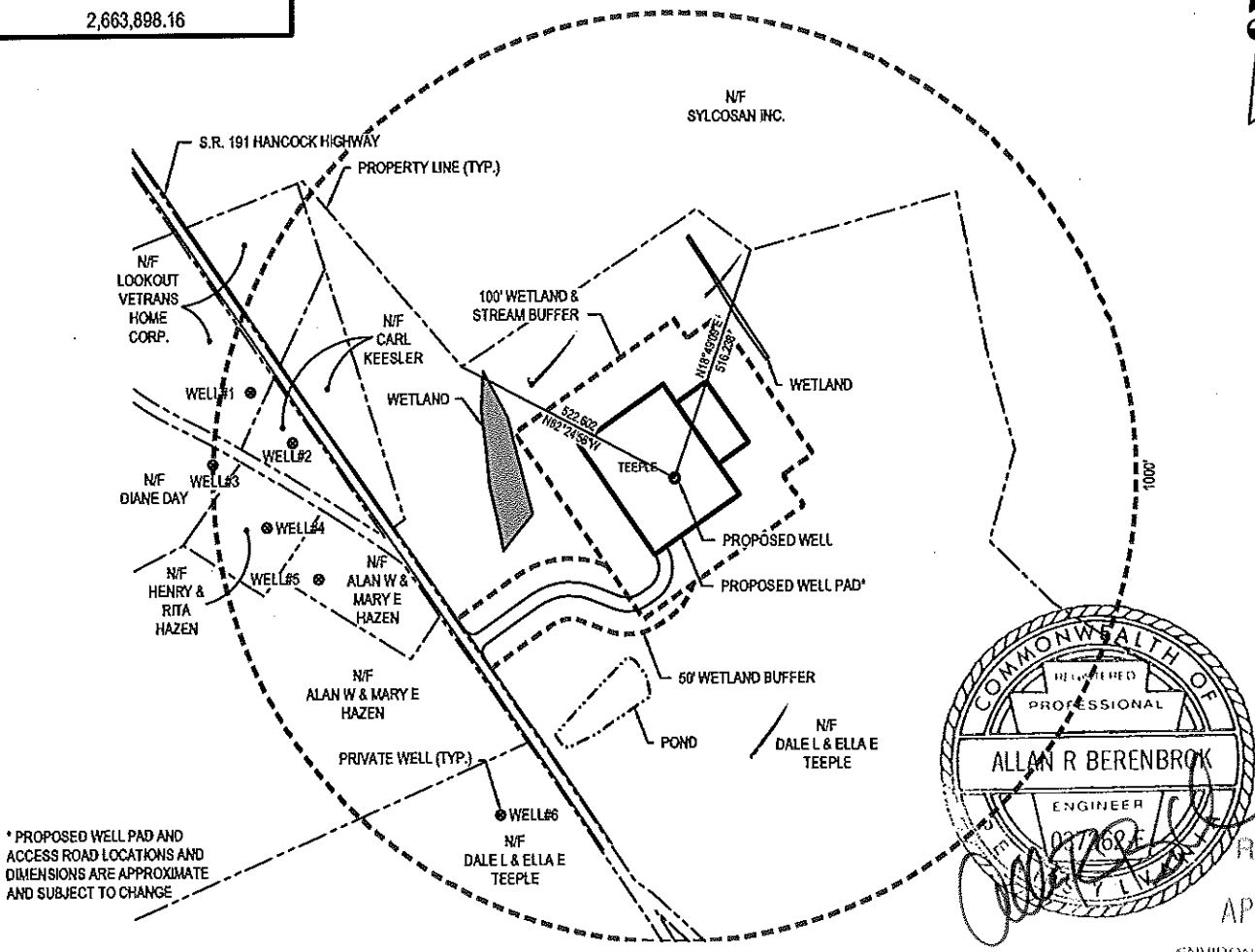
Well is located on topo map 8,580 feet west of longitude 75 ° 10 ' 00

True Latitude: NORTH	True Longitude: WEST	WELL NORTHING - Y	WELL EASTING - X
41 ° 49 ' 39.90 "	75 ° 11 ' 53.33 "	615,470.64	2,663,898.16

HQ WATERSHED

She hawken

Rattlesnake Creek



COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ALLAN R BERENBROK ENGINEER 027768E

RECEIVED
APR 19 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Surveyor or Engineer: TETRA TECH | Phone #: (412) 921-8673 | Dwg. #: 1 | Date: 4/16/2010 | Scale: 1" = 400' | Total Acreage:

Lat. & Long Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83

Elevation Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83 Survey Date Jan. 2010

Applicant / Well Operator Name: Newfield Appalachia PA LLC

Well(Farm) Name: D.L. Teeple | Well # 1-1 | Serial #

Address: 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060

County - Code: Wayne | Municipality: Manchester | Well Type: Vertical Test

Surface Landowner / Lessor: Dale and Ella Teeple

USGS 7 1/2 Quadrangle Map Name: Long Eddy, NY 0444 | Map Section: 5 | Surface Elevation: 1516 ft.

Target Formation(s): Onondaga

Angle & Course of Deviation (Drilling): N/A | Anticipated Total Depth: TVD 8,350 TMD 8,350

Surface Owner or Water Purveyor with a Water Supply within 1,000 ft.	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased, or Operated
Lookout Veterans Home Corp.	N78d 20' 44"W 938'	N/A	N/A
Carl Keesler	N84d 27' 43"W 832'	N/A	N/A
Dale L & Ella E Teeple	S27d 51' 49"W 816'	N/A	N/A
Alan W Mary E Hazen	S74d 33' 6"W 802'	N/A	N/A

R:_Marcellus Shale Projects\Newfield\12679 - Newfield Wells\Well Plat Permits\Permit Drawings\Teeple Well Pad Plat Exhibit A.dwg PIT BEN.HOPPE 4/16/2010 12:43:02 PM

5500-PM-OG0002-DWG Rev. 09/2008

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program

WELL LOCATION PLAT

(Attachment, if needed)

DEP USE ONLY	DEP Application Tracking #	G: 4/19/10
	Permit # 127-20013	C:
	Project #	

Use only if you need additional space for listings.

Applicant / Well Operator Name	Well(Farm) Name	Well #	Serial #
Newfield Appalachia PA LLC	D.L. Teeple	1-1	

Surface Owner or Water Purveyor with a Water Supply within 1,000 ft.	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased, or Operated
Henry and Rita Hazen ✓	S83d 23' 28"W 890'	N/A	N/A
Diane Day ✓	N88d 2' 27"W 1000'	N/A	N/A

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APR 19 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

R:_Marcellus Shale Projects\Newfield\02679 - Newfield Wells\Well Plat Permits\Permit Drawings\Teeple Well Pad Plat Exhibit C.dwg PIT SCOTT.CALTON 4/9/2010 12:05:06 PM

5500-PM-OG0002-DWG Rev. 09/2008

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program
WELL LOCATION PLAT

DEP USE ONLY	DEP Application Tracking #	G:
	Permit #	
	Project #	C:

Denotes location of well on topo map.

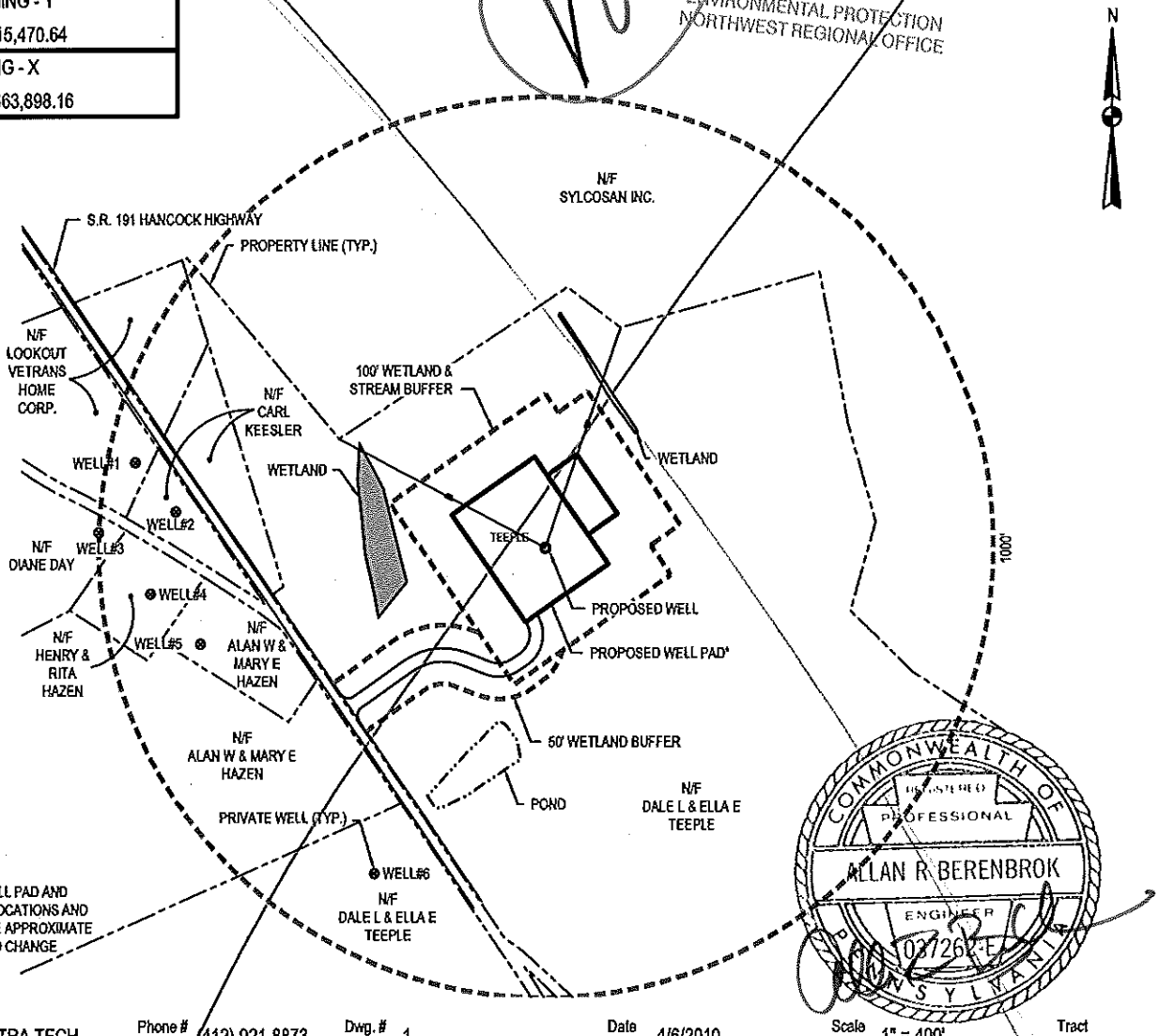
Well is located on topo map 2,034 feet south of latitude 41 ° 50 ' 00 "

Well is located on topo map 8,580 feet west of longitude 75 ° 10 ' 00 "

True Latitude: NORTH	True Longitude: WEST	WELL NORTHING - Y	WELL EASTING - X
41 ° 49 ' 39.90 "	75 ° 11 ' 53.33 "	615,470.64	2,663,898.16

VOID

RECEIVED
APR 12 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE



Surveyor or Engineer: TETRA TECH | Phone #: (412) 921-8873 | Dwg. #: 1 | Date: 4/6/2010 | Scale: 1" = 400' | Tract Acreage:

Lat. & Long Metadata			Elevation Metadata			Survey Date
Method GPS	Accuracy +/- 1	ft. Datum NAD83	Method GPS	Accuracy +/- 1	ft. Datum NAD83	Jan. 2010

Applicant / Well Operator Name	Well(Farm) Name	Well #	Serial #
Newfield Appalachia PA LLC	D.L. Teeple	1-1	

Address	County - Code	Municipality	Well Type
363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060	Wayne	Manchester	Vertical Test

Surface Landowner / Lessor	USGS 7 1/2 Quadrangle Map Name	Map Section	Surface Elevation
Dale and Ella Teeple	Long Eddy, NY	5	1516 ft.

Target Formation(s)	Angle & Course of Deviation (Drilling)	Anticipated Total Depth
Onondaga	N/A	TVD 8,350 TMD 8,350

Surface Owner or Water Purveyor with a Water Supply within 1,000 ft.	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased, or Operated
Lookout Veterans Home Corp.	N78d 20' 44"W 938'	N/A	N/A
Carl Keesler	N84d 27' 43"W 832'	N/A	N/A
Dale L & Ella E Teeple	S27d 51' 49"W 818'	N/A	N/A
Alan W Mary E Hazen	S74d 33' 6"W 802'	N/A	N/A

R:_Marcellus Shale Projects\Newfield\2679 - Newfield Wells\Well Plat Permits\Permit Drawings\Teeple Well Pad Plat Exhibit A.dwg PIT SCOTT.CALTON 4/9/2010 12:07:34 PM

5500-PM-OG0002-DWG Rev. 09/2008

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Oil and Gas Management Program

WELL LOCATION PLAT

DEP USE ONLY	DEP Application Tracking #	G:
	Permit #	
	Project #	C:

Denotes location of well on topo map.

True Latitude: NORTH
41 ° 49 ' 39.90 "

True Longitude: WEST
75 ° 11 ' 53.33 "

WELL NORTHING - Y
615,470.64

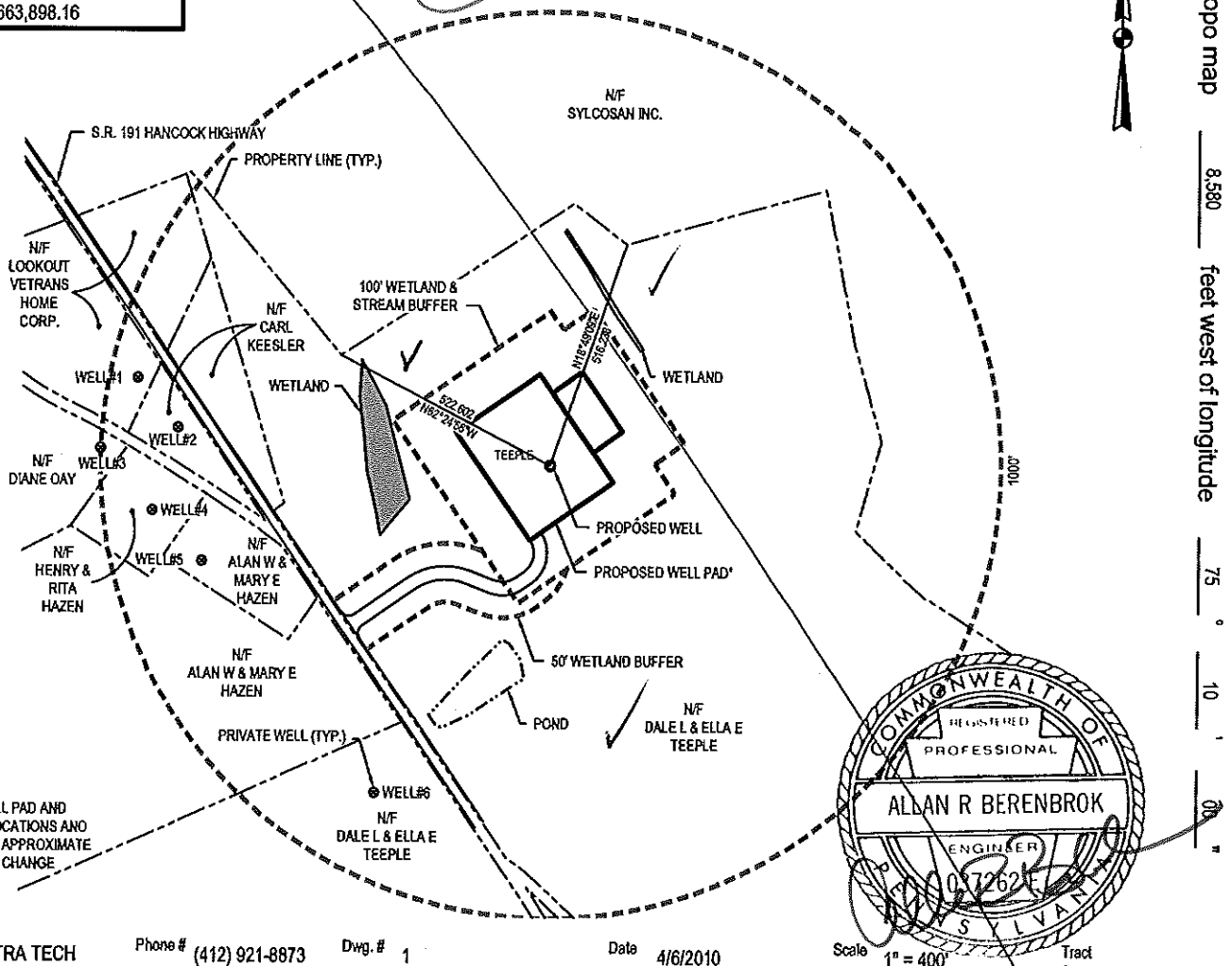
WELL EASTING - X
2,663,898.16

Well is located on topo map 2,034 feet south of latitude 41 ° 50 ' 00 "

Well is located on topo map 8,580 feet west of longitude 75 ° 10 ' 00 "

RECEIVED
APR 0 9 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

VOID



COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ALLAN R BERENBROK
ENGINEER
PE 037262E

Surveyor or Engineer: TETRA TECH | Phone #: (412) 921-8873 | Dwg. #: 1 | Date: 4/6/2010 | Scale: 1" = 400' | Tract Acreage:

Lat. & Long Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83		Elevation Metadata Method GPS Accuracy +/- 1 ft. Datum NAD83	Survey Date Jan. 2010
Applicant / Well Operator Name: Newfield Appalachia PA LLC		Well(Farm) Name: D.L. Teeple	Well # 1-1 / Serial #
Address: 363 N. Sam Houston Parkway E., Suite 2020, Houston, TX 77060		County - Code: Wayne	Municipality: Manchester / Well Type: Vertical Test
Surface Landowner / Lessor: Dale and Ella Teeple		USGS 7 1/2 Quadrangle Map Name: Long Eddy, NY	Map Section: 1 / Surface Elevation: 1516 ft.
Target Formation(s): Onondaga		Angle & Course of Deviation (Drilling): N/A	Anticipated Total Depth: TVD 8,350 TMD 8,350

Surface Owner or Water Purveyor with a Water Supply within 1,000 ft.	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased, or Operated
Lookout Veterans Home Corp.	N78d 20' 44"W 852'	N/A	N/A
Carl Keester	N84d 27' 43"W 757'	N/A	N/A
Dale L & Ella E Teeple	S27d 51' 49"W 882'	N/A	N/A
Alan W Mary E Hazen	S74d 33' 6"W 769'	N/A	N/A

R:_Marcellus Shale Projects\Newfield\2679 - Newfield Wells\Well Plat Permits\Permit Drawings\Teeple Well Pad Plat Exhibit A.dwg PIT BEN.HOPPE 4/8/2010 10:50:31 AM

5500-PM-OG0002 Rev. 9/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL LOCATION PLAT

DEP USE ONLY	Auth ID #:	
	Permit #: 127-20013	
	Project #:	

100 G 4/5/10 C:

Denotes location of well on topo map.

Well is located on topo map 2,304 feet south of latitude 41° 50' 00"

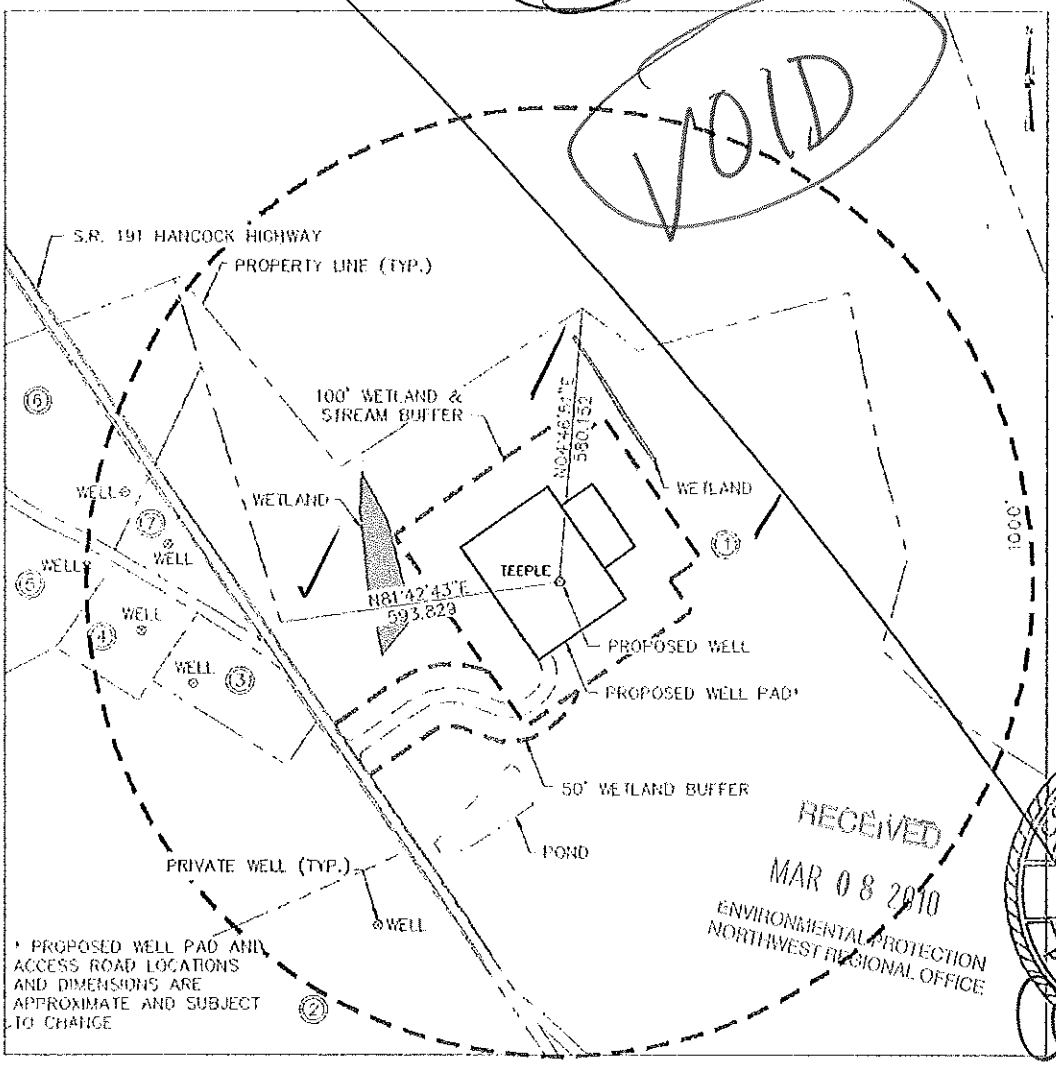
True Latitude: NORTH
41°49' 39.90"

True Longitude: WEST
75° 11' 53.33"

Well Northing – Y
615470.64

Well Easting – X
2663898.16

VOID



1. N/F DALE L & ELLA E TEEPLE 022555 65.462067
2. N/F DALE L & ELLA E TEEPLE 022556 43.559532
3. N/F ALAN W & MARY E HAZEN 022553 1.222088
4. N/F HENRY & RITA HAZEN 022552 1.041061
5. N/F DIANE DAY 022549 4.389164
6. N/F LOOKOUT VETERANS HOME CORP. 021002 2.885954
7. N/F CARL KEESLER 022548 0.688145

RECEIVED
MAR 08 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ALLAN R BERENBROK
ENGINEER
037262-E

Well is located on topo map 8,580 feet west of longitude 75° 10' 00"

Surveyor or Engineer: Tetra Tech | Phone #: 412-921-8873 | Dwg #: 1 | Date: 02-02-2010 | Scale: 400 | Tract Acreage:

Lat & Long Metadata — Method GPS | Accuracy +/- 1 ft. | Datum NAD83
Elevation Metadata — Method GPS | Accuracy +/- 1 ft. | Datum NAD83 | Survey Date Jan 2010

Applicant / Well Operator Name: Newfield Appalachia PA LLC	DEP ID#: 277879	Well (Farm) Name: D.L. TEEPLE	Well #: 1-1 / Serial #:
Address: 363 N. Sam Houston Pkwy E. Suite 2020, Houston, TX, 77060	County: WAYNE	Municipality: MANCHESTER	Well Type: Vertical Test
Surface Landowner / Lessor: Dale and Ella Teeple	USGS 7½' Quadrangle Map Name: LONG EDDY, NY 0444	Map Section: 1	Surface Elevation: 1516 ft.
Target Formation(s): Onondaga	Angle & Course of Deviation (Drilling): N/A	Anticipated Total Depth ft.: TVD 8350 ft.	TMD 8350 ft.

Surface Owner or Water Purveyor with a Water Supply within 1000 ft.	Approximate Course and Distance to Water Supply	Owner, Lessee, or Operator of Workable Coal Seam	Name of Coal Seam Owned, Leased, or Operated
Lookout Veterans Home Corp	N78d 20' 44"W 852'	N/A	N/A
Carl Keesler	N84d 27' 43"W 757'	N/A	N/A
Dale L & Ella E Teeple	S27d 51' 49"W 882'	N/A	N/A

Tetra Tech NUS

Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220-2745
Tel: (412) 921-7090
Fax: (412) 921-4040

LETTER OF TRANSMITTAL

DATE: 16 April 2010	JOB NO.: 112C02679
ATTENTION: Aaron O'Hara	
RE: Newfield – Teeple 1-1 and Schweighofer Well Plat	

TO

Pa DEP Northwest Regional Office

230 Chestnut Street

Meadville, Pa 16335

814-332-6870

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1			Teeple Well Plat 1-1 – sealed original
1			Schweighofer Well Plat – sealed original

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit ___ copies for approval

[x] For your use [ ] Approved as noted [ ] Submit ____copies for distribution

[ ] As requested [ ] Returned for corrections [ ] Return ____ corrected prints

[ ] For review and comment [ ] For Your Signature

[ ] **FOR BIDS DUE** _____ **19** ___ [ ] **PRINTS RETURNED AFTER LOAN TO US**

REMARKS:

Attached is the revised original Teeple and Schweighofer well plat with the revisions based upon our telephone conversation on 16 April 2010. Should you require any additional information, please contact me (412) -921-8873 at any time.

SIGNED _____

Allan R. Berenbrok, P.E.

CC: file (w/a)
Andrew Strassner (w/a)
Don Sleeth (w/a)

Tetra Tech NUS
Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220-2745
Tel: (412) 921-7090
Fax: (412) 921-4040

LETTER OF TRANSMITTAL

DATE: 9 April 2010	JOB NO.: 112C02679
ATTENTION: Aaron O'Hara	
RE: Newfield – Teeple 1-1 Well Plat	

TO

Pa DEP Northwest Regional Office

230 Chestnut Street

Meadville, Pa 16335

814-332-6870

WE ARE SENDING YOU [*X*] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1			Teeple Well Plat 1-1 – sealed original

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit ___ copies for approval

[x] For your use [ ] Approved as noted [ ] Submit ____copies for distribution

[ ] As requested [ ] Returned for corrections [ ] Return ____ corrected prints

[ ] For review and comment [ ] For Your Signature

[ ] **FOR BIDS DUE** _____ **19** ___ [ ] **PRINTS RETURNED AFTER LOAN TO US**

REMARKS:

Attached is the revised original Teeple well plat with the revisions based upon our telephone conversation on 9 April 2010. Should you require any additional information, please contact me (412) -921-8873 at any time.

SIGNED _____

Allan R. Berenbrok, P.E.

CC: file (w/a)
Andrew Strassner (w/a)
Don Sleeth (w/a)

Tetra Tech NUS

Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220-2745
Tel: (412) 921-7090
Fax: (412) 921-4040

LETTER OF TRANSMITTAL

DATE: 8 April 2010	JOB NO.: 112C02679
ATTENTION: Aaron O'Hara	
RE: Newfield – Teeple 1-1 Well Plat	

TO

Pa DEP Northwest Regional Office

230 Chestnut Street

Meadville, Pa 16335

814-332-6870

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1			Teeple Well Plat 1-1 – sealed original

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit ___ copies for approval

[x] For your use [ ] Approved as noted [ ] Submit ____copies for distribution

[ ] As requested [ ] Returned for corrections [ ] Return ____ corrected prints

[ ] For review and comment [ ] For Your Signature

[ ] **FOR BIDS DUE** _____ **19** ___ [ ] **PRINTS RETURNED AFTER LOAN TO US**

REMARKS:

Attached is the revised original Teeple well plat with the revisions based upon our telephone conversation on 6 April 2010. Should you require any additional information, please contact me (412) -921-8873 at any time.

SIGNED _____

Allan R. Berenbrok, P.E.

CC: file (w/a)
Andrew Strassner (w/a)
Don Sleeth (w/a)

Phone Contact Log

Date/Time: 4/5/10 **Permit Number(s):** 127-2013

Company: Tetratech

Contact: Betsy Collins

Phone: 412-921-8250

Deficiencies Addressed:

Plat offsets, topo mark, course and distance to water supplies

Map section, new plats will be sent in

Map section, topo, water supplies

4/12/10 New plats received - Course and distance to well

left message Allen Berenbrok

4/19/10 New plats Received

Denial Date:

NEWFIELD

April 1, 2010

PADEP Oil & Gas Management
230 Chestnut St.
Meadville, PA 16335

RECEIVED
APR 02 2010
ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Subject: Newfield Appalachia PA LLC – DEP ID# 277879
D.L. Teeple Well #1-1

To Whom It May Concern:

Please include this letter of clarification as part of our permit application associated with the above captioned well.

This permit is to develop a well which is intended solely for exploratory purposes. A core is to be taken from several formations throughout the drilling process of this well and additional scientific study is to be performed on multiple formations including, but not limited to, geophysical logs, micro-seismic studies and fluid sampling. As permitted and configured, this well is not to be completed for production, not to be hydraulically fractured and is not to produce gas. In the future, this wellbore will either be plugged and abandoned per PADEP regulations, converted to inactive status and utilized as a monitoring well, or reconfigured and converted to a production well. Prior to either plugging and abandonment, conversion to inactive status or reconfiguration and conversion to production, we acknowledge that additional permitting will be necessary with approvals from the PADEP and other regulatory bodies with jurisdiction.

Sincerely,

Donald F. Sleeth
Drilling Manager

5500-FM-OG0001A Rev. 11/2007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

WELL PERMIT

DEP USE ONLY	
Permittee's eFACTS ID: 277879	Auth ID: 826657
Watershed Name: Shehawken Rattlesnake Creek	Quality HQ:

Permittee: NEWFIELD APPALACHIA PA LLC	OGO #: OGO-67425	Permit Number: 37-127-20013-	Date Issued: 04/23/2010
Address: 363 N SAM HOUSTON PKWY E STE 2020		Farm Name & Well Number: DL TEEPLE 1 1	Well Serial #
		Municipality: Manchester	County: Wayne
HOUSTON, TX 770602424		7½' Quadrangle Name: Long Eddy	Map Section #: 1
Phone: (281) 847-6031	Project #	Latitude: 41-49-39.9000	Longitude: -75-11-53.3300
Surf Elev at Site: 1516 feet	Anticipated Total Depth: 8350 feet / Well Type: GS	Offset distances referenced to NE corner of map section.	South 2304 feet West 8580 feet

This permit covering the well operator and well location shown above is evidence of permission granted to conduct activities in accordance with the Oil and Gas Act and the Oil and Gas Conservation Law, if the well is subject to that act and any rules and regulations promulgated thereunder, subject to the conditions contained herein and in accordance with the application submitted for this permit. This permit does not convey any property rights.

This permit and the permittee's authority to conduct the activities authorized by this permit are conditioned upon operator's compliance with applicable law and regulations.

Notification must be given to the district oil and gas inspector, the surface landowner and political subdivision of the date well drilling will begin at least 24 hours prior to commencement of drilling activities.

The permittee hereby authorizes and consents to allow, without delay, employees or agents of the Department to have access to and to inspect all areas upon presentation of appropriate credentials, without advance notice or a search warrant. This includes any property, facility, operation or activity governed by the Oil and Gas Act, the Oil and Gas Conservation Law, the Coal and Gas Resource Coordination Act and other statutes applicable to oil and gas activities administered by the Department. The authorization and consent shall include consent to the Department to collect samples of wastewaters or gases, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation and disposal, and to inspect and copy documents required by the Department to be maintained. The authorization and consent includes consent to the Department to examine books, papers, and records pertinent to any matter under investigation pursuant to the Oil and Gas Act or pertinent to a determination of whether the operator is in compliance with the above referenced statutes. This condition in no way limits any other powers granted to the Department under the Oil and Gas Act and other statutes, rules and regulations applicable to these activities as administered by the Department.

This permit does not relieve the operator from the obligation to comply with the Clean Streams Law and all statutes, rules and regulations administered by the Department.

Special Permit Conditions:

This permit expires 04/23/2011 unless drilling is commenced on or before that date and prosecuted with due diligence.

Stacie Gustafson for S. Craig Lobins
Regional Oil and Gas Program Manager

Stephen Watson
Oil & Gas Inspector

2 Public Square
Wilkes-Barre, PA 18711-0790

570-826-2320
Telephone

5500-FM-OG0004 Rev. 1/2010

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Site ID	Primary Fac ID 728625
Client Id 277879	Subfacility Id

Well Record and Completion Report

ll Operator	DEP ID#	Well API # (Permit / Reg)	Project Number	Acres
NEWFIELD APPALACHIA PA LLC	277879	37-127-20013-		
Address		Well Farm Name & Well #		Serial #
363 N SAM HOUSTON PKWY E STE 2020,		DL TEEPLE 1 1		
City	**State**	**Zip Code**	**County**	**Municipality**
HOUSTON	TX	770602424	Wayne	Manchester
Phone	**Fax**		USGS 7.5 min. quadrangle map	
(281) 847-6031			Long Eddy	

Check all that apply: ☐ Original Well Record ☐ Original Completion Report ☐ Amended Well Record ☐ Amended Completion Report

WELL RECORD

Also complete the Log of Formations on back (page 2)

Well Type ☐ Gas ☐ Oil ☐ Combination Oil & Gas ☐ Injection ☐ Storage ☐ Disposal

Drilling Method ☐ Rotary – Air ☐ Rotary – Mud ☐ Cable Tool

Date Drilling Started	Date Drilling Completed	Surface Elevation	Total Depth – Driller	Total Depth - Logger
		ft.	ft.	ft.

Casing and Tubing

Cement returned on surface casing? ☐ Yes ☐ No

Cement returned on coal protective casing? ☐ Yes ☐ No ☐ N/A

Hole Size	Pipe Size	Wt.	Thread / Weld	Amount in Well (ft)	*Material Behind Pipe* Type and Amount	*Packer / Hardware / Centralizers* Type	Size	Depth	Date Run

COMPLETION REPORT

Perforation Record

Date	Interval Perforated From	To

Stimulation Record

Date	Interval Treated	*Fluid* Type	Amount	*Propping Agent* Type	Amount	Average Injection

Natural Open Flow	Natural Rock Pressure	Hours	Days
After Treatment Open Flow	After Treatment Rock Pressure	Hours	Days

Well Service Companies -- Provide the name, address, and phone number of all well service companies involved.

Name	Name	Name
Address	Address	Address
City - State – Zip	City - State – Zip	City - State – Zip
Phone	Phone	Phone

5500-FM-OG0004 Rev. 1/2010

LOG OF FORMATIONS

Well API#: 37-127-20013--

(If you will need more space than this page, please photocopy the blank form before filling it in.)

Formation Name or Type	Top (feet)	Bottom (feet)	Gas at (feet)	Oil at (feet)	Water at (fresh / brine; ft.)	Source of Data

I do hereby certify to the best of my knowledge, information and belief that the well identified on this Well Record and Completion Report has been properly cased and cemented in accordance with the requirements of 25 Pa. Code Chapter 78 and any conditions contained in the permit for this well. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

5500-FM-OG0075 Rev. 8/2001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OIL AND GAS MANAGEMENT PROGRAM

Well Site Restoration Report

DEP USE ONLY	
Site ID	Primary Fac ID: 728625
Client Id: 277879	Subfacility Id

A. Operator and Well Information

Please read instructions on back before completing this form.

Well Operator: NEWFIELD APPALACHIA PA LLC
DEP ID#: 277879
Address: 363 N SAM HOUSTON PKWY E STE 2020,
City: HOUSTON
State: TX
Zip Code: 770602424
Phone: (281) 847-6031
Fax:

Well API # (Permit / Reg): 37-127-20013-
Well Farm Name & Well #: DL TEEPLE 1 1
Serial #:
County: Wayne
Municipality: Manchester

B. Land Application of Tophole Water

Date applied:
pH:
Volume (bbls):
Spec. cond. (µmhos/cm):

C. Off-site Waste Disposal

Type: ☐ Drilling Fluid (803) Amount: bbls
☐ Fracing Fluid (804) bbls
☐ Other, specify: Qty: bbls or tons

Method of disposal or reuse

☐ Disposal Well (04)
☐ Landfill (05)
☐ Sewage Treatment Plant (10)
☐ Brine Treatment Plant (12)
☐ Other (08)

Facility Information

Name:
Permit #:

Hauler Information

Name:
Address:
City:
State:
Zip Code:

D. On-site Disposal – Drill Cuttings or Waste

Location of center of disposal area in relation to the well:

Course: degrees
Distance: feet

Describe the **material disposed**, including additives.

Specify disposal method

☐ Unlined pit, complete Section E.
☐ Lined pit, complete Section E.
☐ Land application, complete Section F.
☐ Dusting
☐ Solidification
☐ Other

E. Pit Disposal

Describe pit closure procedures.

Subbase, material: Thickness: inches
Pit liner, material: Thickness: mils
Pit dimensions (feet) Length: Width: Depth:

F. Land Application

Area: Length: feet Width: feet

Waste-to-soil ratio (by volume):

Chemical analysis of waste

Cadmium (Cd)	ppm	Nickel (Ni)	ppm
Copper (Cu)	ppm	Zinc (Zn)	ppm
Chromium (Cr)	ppm	Oil and Grease	%
Lead (Pb)	ppm	Spec. Cond.	µmhos/cm
Mercury (Hg)	ppm		

Well Operator's Signature

Title: Date:

DEP USE ONLY

Reviewed by: Date:

Comments:

Instructions for Well Site Restoration Report

Form 5500-FM-OG0075

Use this form to file the Well Site Restoration Report as required under 25 Pa. Code § 78.65(3). This report is to be filed with the department within 60 days after the restoration of the well site.

Section A. Operator and Well Information

Enter the name, address and telephone number of the well operator/permittee.

Provide the requested well information.

Section B. Land Application Of Tophole Water

Land application of tophole water must be performed in accordance with 25 Pa. Code § 78.60.

Provide the date(s) when tophole water was applied to the land, the estimated volume discharged, and the pH and specific conductance readings of the tophole water.

Section C. Off-site Waste Disposal

If disposing of residual waste off-site, complete this section.

Check the box next to each type of waste taken off-site for disposal. More than one box may be checked. Identify the number of barrels of drilling or fracing fluid removed. If checking "other", identify the waste and show the amount in either barrels or tons. Circle the appropriate unit of measurement.

Check the box next to the type of facility or site receiving the waste. Provide the name and permit number of the facility.

Provide the name and address of the person or company hauling the waste.

Section D. On-site Disposal – Drill Cuttings or Waste

If disposing of drill cuttings and/or residual waste on-site in accordance with 25 Pa. Code § 78.61 (Disposal of drill cuttings), § 78.62 (Disposal of residual waste—pits), or § 78.63 (Disposal of residual waste—land application), complete this section.

Locate the approximate center of the disposal area by giving the course in degrees and the distance in feet from the wellhead.

Describe the types of materials that were disposed on-site. Include drill cuttings above the surface casing seat, drill cuttings below the surface casing seat, cement returns, drilling muds, frac sands, and any other material that is being disposed on-site. Indicate any additives that were in the materials being disposed.

Additives are usually present to modify the performance of cement, drilling muds or frac sands. An example might be salt or oil in drilling muds.

Check the box next to the on-site disposal methods used. If "other" is checked, briefly describe the method of disposal.

Section E. Pit Disposal

If disposing of drill cuttings under 25 Pa. Code § 78.61 (Disposal of drill cuttings) complete the pit dimensions part of this section. If disposing of drill cuttings and/or residual waste under 25 Pa. Code § 78.62 (Disposal of residual waste—pits), complete all of this section.

Describe the procedures used to close the pit. The procedures should conform to requirements in 25 Pa. Code § 78.62.

Describe the type of material and thickness used for the subbase and pit liner. The manufacturer should be identified when describing the type of material used for the pit liner.

Provide the dimensions of the pit, giving the appropriate length, width, and depth in feet.

Section F. Land Application

If disposing of drill cuttings and/or residual waste including contaminated drill cuttings under 25 Pa. Code § 78.63, complete this section.

Provide the approximate length and width of the land application area in feet. Indicate the ratio of waste to soil by volume. As an example, if a 3-inch layer of waste was mixed into a 6-inch layer of soil the ratio would be 1/2. In no case may the ratio exceed 1/1.

Complete the chemical analysis information if it is requested by the department. The analysis is to be performed on the waste soil mixture after land application has occurred. See the guidelines for land application in the "Oil and Gas Operators Manual" for taking samples and for analysis methods.

If more room is needed to complete any section, provide the information on 8 ½" by 11" sheets of paper and attach to this form. Indicate the sections the information applies to.

Please note that the most recent revision of the Application for Drilling or Altering a Well must be submitted with all drilling applications. Please check the website below for the most recent revisions for all forms.
http://www.dep.state.pa.us/dep/deputate/minres/oilgas/o_gforms.htm

The Erosion, Sediment& Storm water Control Module is no longer being accepted for ESCGP-1 applications. Please submit the complete ESCGP-1 application for any projects. The most recent revisions must be submitted along with the application fee of $500.00

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE

Dear Operator:

Enclosed please find well permit(s) issued for drilling or altering a well. Developing this resource in a safe and environmentally protective manner is of utmost importance. As you may be aware, there have been several recent incidences where water supplies have been affected by natural gas migration. In order to prevent future impacts to the Commonwealth's water resources and provide a mechanism for ensuring public safety, the Department is providing the following information as a reminder of the cementing requirements for oil and gas wells.

Cementing

Properly cementing the casing of a well is critical to protecting water resources, preventing gas migration, and ensuring well integrity. If the casing is improperly cemented or if insufficient cement is used, such as when cement is not returned to the surface, the operator should notify the Department pursuant to 25 Pa. Code § 78.86.

In addition, when cementing surface casing, 25 Pa. Code § 78.85 states that the cement must be allowed to set for at least 8 hours *and* until the cement attains a compressive strength of at least 350 psi. While the cement is setting, the casing must not be disturbed. This includes any activity that may cause movement or pressure changes to the casing or the cement sheath surrounding the casing. After the cement is set, care must be taken when drilling through the plug to prevent damaging the seal at the casing seat. Disturbing the casing while cement is setting or damaging the seal at the casing seat may provide a mechanism for gas and other fluids to escape from the well and contaminate groundwater and water supplies. If this occurs, the operator must notify the Department.

In addition, the Department also reminds you of the following reporting requirements for oil and gas wells.

Reporting

1. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(a) of Chapter 78 of the Oil and Gas Regulations, a **Well Record** must be submitted to the Department within thirty (30) days of cessation of drilling or altering a well.

2. Pursuant to Section 212(b) of the Oil and Gas Act and Section 78.122(b) of Chapter 78 of the Oil and Gas Regulations, a **Completion Report** must be submitted to the Department within thirty (30) days of completion of the well. A copy of the Well Record and Completion Report is enclosed with this letter. This is a newly revised form which requires the operator to certify that the well has been cased and cemented according to the requirements of 25 Pa. Code Chapter 78. Well Record and Completion Report forms that do not contain this certification will not be accepted by the Department. Additional copies of this form can be obtained from the Department's eLibrary at http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9841

3. Pursuant to Section 212(a) of the Oil and Gas Act, a report specifying the well status and production on the most well-specific basis available is to be provided to the Department. Section 78.121 of Chapter 78 details the reporting time frames required for various well types, waste reporting, and the acceptable format for the **Well and Waste Production Report** submissions.

4. Also note that pursuant to Section 212(b) of the Oil and Gas Act, the Department has the authority to request and docs hereby request you submit a digital copy on CD of **ALL Well Logs** (temperature, electrical, radioactive, gamma ray, neutron, induction, resistivity, multi-arm caliper, acoustic, optical, etc.) that have been run on this well.

The above records and logs are to be submitted to the Department of Environmental Protections, Oil and Gas Management, 230 Chestnut St., Meadville, Pa 16335-3481 to the attention of the Regional Oil and Gas Manager.

Thank you for your cooperation in this matter.

Sincerely,

S. Craig Lobins
Regional Manager
Oil and Gas Management

http://www.ahs2.dep.state.pa.us/eFACTSWeb/searchResults_singleViol.aspx?InspectionID=1890758

Violation Details for Inspection ID: 1890758

Facility: DL TEEPLE 1 1 (728625)
Program: Oil & Gas

Disclaimer: The dollar amounts listed below are for the entire related enforcement, and may encompass many sites/facilities. The *Total Amount Collected* may or may not be related to the *Penalty Amount Assessed*, depending on how your program or regional office records payments in eFACTS. Questions regarding payments or penalties should be directed to the eFACTS Help Desk at:

(717) 705−3768 or mailto:ra-epefactshelp@state.pa.us

Violation ID	Date	Violation Description
589311	05/26/2010	Improperly lined pit
		Resolution:
		PA Code Legal Citation: 25 Pa. Code 78.56(a)(4); 78.57(c)(2);91.35(a) : PA Code Website
		Violation Type: Administrative
		Enforcement Type: No Enforcement Data

Violation ID	Date	Violation Description
589310	05/26/2010	Failure to minimize accelerated erosion, implement E&S plan, maintain E&S controls. Failure to stabilize site until total site restoration under OGA Sec 206(c)(d)
		Resolution:
		PA Code Legal Citation: 25 Pa. Code 102.4 : PA Code Website
		Violation Type: Environmental Health & Safety
		Enforcement Type: No Enforcement Data