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REMEDIAL ACTION WORK PLAN
ASH ROAD PROPERTIES
221 SYCAMORE ROAD
TOWN OF VESTAL, NEW YORK
NYSDEC BCP SITE #C704032

Prepared For:

WEST COVINA ROYALE, LP
AND
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Prepared By:

GEOLOGIC NY, INC.
P.O. BOX 350
HOMER, NEW YORK

March 2015
Project No. 209183

GeoLogic

3/11/15

Kenneth J. Teter, P.E. Date

3/11/15

Forrest C. Earl Date
Principal Hydrogeologist
GeoLogic NY, Inc.

3-11-15

Susan M. Cummins Date
Project Manager
GeoLogic NY, Inc.

For:

REMEDIAL ACTION WORK PLAN
Ash Road Properties
221 Sycamore Road
Town of Vestal, New York
NYSDEC Site #C704032
March 2015

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APPENDICES

1 INTRODUCTION

1.1 General

This Remedial Action Work Plan (RAWP) for Ash Road Properties located at 221 Sycamore Road in the Town of Vestal, Broome County, New York was prepared by GeoLogic NY, Inc. (GeoLogic) on behalf of West Covina Royale, LP. This Site is being managed under the Brownfield Cleanup Program (BCP) in accordance with the Brownfield Cleanup Agreement (BCA) between West Covina Royale, LP and New York State Department of Environmental Conservation (NYSDEC). The NYSDEC identification number for the Site is C704032. The location of Ash Road Properties is shown on Drawing No. 1.

This RAWP has been prepared in accordance with the general requirements of NYSDEC Technical Guidance for Site Investigation and Remediation (DER-1).

1.2 Purpose and Objective

The purpose of this RAWP is to incorporate the information collected during previous investigations and the completion of an interim remedial measure, and develop guidelines for implementing the remedy proposed in the Alternative Analysis Report (AAR), dated February 2014, revised October 2014. The recommended remedy in the February 2014 AAR is entitled, “Natural Attenuation, Groundwater Monitoring, Engineering and Institutional Controls”. The NYSDEC requested that the recommended remedy include enhancement to the biodegradation that is apparent at the Site through the injection of a biostimulant. The revised remedy presented in the revised October 2014 AAR is entitled, “In-Situ Bioremediation, Groundwater Monitoring, Engineering and Institutional Controls”.

2 BACKGROUND

2.1 Site Description and History

The Ash Road Properties occupies a portion of the Lowe’s Home Center 14.47-acre property, tax map number 158.10-2-13. The Site has been identified by four tax map

parcel designations prior to the incorporation of these four parcels, as well as other parcels into the one current 14.47-acre parcel. The Site encompasses perimeter parking for the Lowe's Home Center. The majority of the Site is covered with asphalt pavement with intermittent grass areas along the southern and western perimeters (see Drawing No. 1, Appendix A). There is no current planned future use of the Site other than for parking. Anticipated future use of the Site would be for commercial use.

The Site is roughly rectangular in shape and encompasses about 1.54 acres with Ash Road forming the southern property boundary and Sycamore Road forming the western property boundary. Further south is a restaurant, an automotive supply business, and an automotive rental and repair business. Parking area for the Lowe's Homer Center borders the Site on the north with the Lowe's Home Center building located approximately 300 feet north. Residential properties border the Site on the east. Further west are retail businesses.

Commercial buildings were formerly present on the Site since at least 1965. The buildings were demolished in 1996.

The Site was formerly occupied by two businesses, Town Square Body Shop and Hall Plumbing. Town Square Body Shop performed auto-body repairs as well as automotive painting, washing and waxing. The Hall Plumbing building was occupied by a contractor's office and warehouse.

As indicated above, the Site is part of a larger parcel, and its limits have not been designated through a survey. As determined by previous investigations and the findings presented in the RI/IRM report, the extent of environmental impact is limited to the west portion of the Site limits.

2.2 Geology and Hydrogeology

The Site is located in the Susquehanna River Basin within the Susquehanna River Valley. The Susquehanna River is located about 2,000 feet north of the Site. Surficial deposits beneath the Site are mapped as sand and gravel glacial outwash that is covered by 5 to 15 feet of fine sand and silt in low lying areas (Muller Ernest H. and D. H. Cadwell, 1986). Underlying bedrock is mapped as West Falls Group shale and siltstone (Rickard,

Lawrence and Donald W. Fisher, 1970). Depth to bedrock is anticipated to be at least 75 feet below ground surface in the general vicinity of the Site. Previous subsurface evaluations that have been completed at the Site have encountered stratified sands, with variable silt and gravel content.

The Site overlies the NYSDEC Endicott-Johnson City Area Primary Water Supply Aquifer. Broome County Health Department, Environmental Health Services identifies the Site is not within a Critical Environmental Area, which means that the Site does not overlie the area of the aquifer that contributes groundwater to the municipal well.

The general direction of mapped groundwater flow within the aquifer is to the northwest toward the Susquehanna River. The local direction of groundwater flow at the Site is also to the northwest, as determined during recent and previous evaluations at the Site. Groundwater has been encountered within 20 feet below ground surface.

There is an intermittent stream located along the north side of the Site. The stream bed was channelized through a culvert during the development of the Lowe's Home Center, and underlies the Lowe's parking lot. This channel flows from east to west across the northern limits of the Site, and receives storm water runoff from the Lowe's paved parking area. There is a sanitary sewer pumping station located directly west and within 65 feet of the Site.

3 COMPLETED INVESTIGATIONS

3.1 Evaluations by NYSDEC

The Site Characterization Report, Ash Road Site (7-04-032), Vestal, New York prepared by EA Engineering, P.C. in September 2009 for NYSDEC, indicated that there was a limited shallow source area of primarily chlorinated compounds located in the western portion of the Site. The highest contaminant concentration was observed near the southwest corner of the former Town Square Body Shop building. The source area appears to have impacted groundwater quality migrating northwesterly in the direction of groundwater flow. EA recommended interim remedial measures including the excavation of soil in the identified source area, and additional remedial investigation of the Site.

3.2 Evaluations under the BCP

Investigations and studies that have been completed at Ash Road Properties under the BCP have included:

- A remedial investigation of impact to soil and groundwater quality by the contaminants of concern (COC), delineation of the source area, delineation of the on-site groundwater contaminant plume, and removal of the source area in accordance with the approved *Remedial Investigation and Interim Remedial Action Work Plan*, dated August 2010, revised September 2010. The COCs for the Site are chlorinated volatile organic compounds associated with tetrachloroethene;
- *Remedial Investigation and Interim Remedial Measure Report*, *Ash Road Properties*, (November 2013, GeoLogic);
- Additional remedial investigation to evaluate the potential of contaminant migration off-site via soil vapor, and additional groundwater monitoring events were completed. *Remedial Investigation and Interim Remedial Measure Report*, *Ash Road Properties*, (Revised October 2014, GeoLogic); and
- *Alternative Analysis Report, Ash Road Properties*, (February 2014, revised October 2014, GeoLogic*)*.

4 SUMMARY OF REMEDIAL INVESTIGATION REPORT

The following sections summarize and discuss the analytical results generated during the RI/IRM. Soil and groundwater were collected to characterize the nature and extent of contamination.

The concentrations of COCs in groundwater exceed the NYS Standards, Criteria and Guidance values for groundwater (SCGs), therefore the NYCRR Part 375 Restricted Use Soil Cleanup Objectives for the Protection of Groundwater (Restricted SCOs) will be used for the COCs.

4.1 Summary of IRM and Soil Analyses

The quality of soils beneath the Site was evaluated by comparing the analytical results to both SCOs for Commercial Use and for the Protection of Groundwater. These comparisons found that the COCs that exceeded the Restricted SCOs for the Protection of Groundwater were tetrachloroethene, trichloroethene *cis*-1,2-dichloroethene, and vinyl chloride. The only COC that exceeded the Commercial SCO was tetrachloroethene in near surface soils at the source.

The soils that exhibited the highest COC concentrations including those that exceeded the Commercial SCOs were removed through the excavation of approximately 197 tons of impacted soil during the IRM. The remaining soils that exceed the SCOs for the Protection of Groundwater are generally within the capillary fringe and saturated zones (see Drawing No. 1).

Based on all the observations made during the RI/IRM, the source of the COCs was from a surface release. No other source areas of COCs were identified during the RI or during the previous evaluations at the Site.

The number of samples analyzed, the range in COC concentrations observed both pre and post-IRM, and the number of samples that exceeded the SCOs are summarized in the following table.

Table 4-1
Soil Contaminant Concentration Summary

Contaminant	Concentration Range Detected *[ppm]*	Restricted SCO[1] *[ppm]*	No. of Excursions	No. Exceeding Restricted SCO
COCs				
Tetrachloroethene	0.01823 to 240	1.3	23	5
Trichloroethene	0.0031J to 1.0	0.470	23	1
cis-1,2-Dichloroethene	0.003J to 9.4	0.250	23	4
Vinyl Chloride	0.011U to 0.03	0.02	23	1

1 -SCO – Part 375-6.8 (b) Restricted Soil Cleanup Objective for the Protection of Groundwater

4.2 Groundwater Summary

Nine monitoring wells including three well pairs are present on the Site; four of which were installed during a previous evaluation at the Site. Six of these monitoring wells were installed with the screened section straddling the water table, and three deeper piezometric wells were installed with the screened section placed at or into a confining layer. Three monitoring wells were installed off-site during the previous evaluation, one down gradient of the Site and two upgradient of the Site. Groundwater at these off-site monitoring well locations was also evaluated during the RI.

The groundwater sampling results indicate that the primary COCs are tetrachloroethene and its transformation products trichloroethene, *cis*-1,2-dichloroethene and vinyl chloride. Contaminant concentrations in groundwater are elevated above SCGs. The contaminant concentration gradient decreases with depth.

The number of samples analyzed, the range in COC concentrations observed, and the number of samples that exceeded the SCG are summarized in the following the table.

Table 4-2
Groundwater Contaminant Summary

COC	Concentration Range *[ppb]*	SCG *[ppb]*	No. of Excursions	No. Exceeding SCG
Tetrachloroethene	1U to 42,000	5	44	20
Trichloroethene	1U to 7,100	5	44	15
cis-1,2-Dichloroethene	1U to 15,000	5	44	18
Vinyl Chloride	1U to 2,900	2	42	9
1,1,2-Trichloroethane	1U to 410J	1	40	1
1.1-Dichloroethene	1U to 13	5	42	2

Anaerobic biodegradation of tetrachloroethene is apparent based on the presence of the noted COCs in groundwater. Transformation products of tetrachloroethene have accounted for as much as 90% of the contaminant distribution in groundwater samples when tetrachloroethene is present. The percentages of transformation products to the total concentrations have also remained generally consistent over the 2-year monitoring period from 2012 to 2014 further supporting a viable anaerobic biodegradation environment.

Table 4-3
Groundwater Contaminant Distribution

Contaminant	Percentage Range of Total Concentrations *[ppb]*
Tetrachloroethene	7 to 10
Trichloroethene	6 to 11
cis-1,2-Dichloroethene	60 to 80
Vinyl Chloride	6 to 13

The last monitoring event in June 2014 reported an increase in the percentage of tetrachloroethene to total concentrations, suggesting a continuing on-going source possibly within soils south of the excavated source area.

4.3 Soil Vapor Summary

The potential for soil vapor intrusion resulting from the presence of site-related COCs in soil and groundwater was evaluated. Soil vapor samples were collected at the Site's boundaries for analyses (see Drawing No. 3, Appendix A). The concentrations of the COCs that were detected above the quantitation limits are presented in the following table.

Table 4-4
Analytical Testing Summary
Soil Vapor

Detected Constituent	Soil Gas Concentration Range (ug/m^3)			
	SVP-1 (West)	SVP-2 (South)	SVP-3 (East)	SVP-4 (North)
Tetrachloroethene	19	40	4.7	90
Trichloroethene	590	55	<0.82	73
cis-1,2-Dichloroethene	600	140	11	160
1,1-Dichloroethene	37	23	<0.62	<0.62
Vinyl Chloride	<0.39	110	<0.39	<0.39

The sample with the highest concentrations was SVP-1, located over the groundwater contaminant plume. The COCs detected in the soil vapor samples were also detected in the groundwater samples historically collected at the Site. The distribution of COCs in soil vapor further demonstrates that degradation of tetrachloroethene is occurring within the soil and groundwater systems at the Site.

5 REMEDIAL ACTION GOALS AND OBJECTIVES

The data collected at the Site indicates that one identified contaminant source area (Ash Road Properties) and one class of contaminants (chlorinated volatile organic compounds) are present in subsurface soils at concentrations exceeding the Restricted SCOs for the Protection of Groundwater, but below the Commercial SCOs for the Protection of Public Health. Concentrations of COCs in groundwater at the Site exceed SCGs.

There are no points of exposure identified for direct dermal contact, ingestion or inhalation with impacted soil or groundwater at the Site under current conditions either to Site occupants or to the community. There is the potential for future exposure to COCs through inhalation to Site occupants if future development includes the construction of a building in the western section of the Site.

The Remedial Action Objectives (RAOs) that have been developed for the Site are based on considerations specific to the Site (e.g. site use, detected constituents and potential exposure pathways). RAOs are identified to maintain and/or achieve conditions that are protective of public health and the environment. The RAOs that have been developed for the Site are consistent with the remedy selection process described in *Technical Guidance for Site Investigation and Remediation*, NYSDEC Program Policy DER-10 (DER-10, May 2010).

The RAOs developed for the Site are presented in the following table.

Table 5-1
Remedial Action Objectives

Media	Remedial Action Objective
Soil	RAOs for Public Health Protection: • Prevent ingestion/direct contact with impacted subsurface soils. • Prevent inhalation of or exposure to persons to COCs from impacted soil.
Groundwater	RAOs for Public Health Protection: • Prevent ingestion of groundwater with COCs levels exceeding SCGs. • Prevent contact with or inhalation of COCs from impacted groundwater. RAO for Environmental Protection: • Reduce contaminant concentrations within the plume.
Soil Vapor	RAO for Public Health Protection: • Prevent migration of COCs from soil or groundwater via soil vapor to indoor air.

6 REMEDY IMPLEMENTATION PLAN

The remedy identified in the Alternative Analysis Report (AAR) would provide mechanisms to potentially accelerate the biological degradation that is currently occurring to the COCs that remain in soil and groundwater at the Site, and to control future use limitations of the Site through the placement of institutional controls and, if warranted, engineering controls. Groundwater monitoring is a component of this remedy.

While the source area has been removed to the extent feasible and natural degradation processes are currently active, the acceleration of these processes through enhanced in-situ bioremediation may increase the rate of reductive dechlorination thereby reducing the on-going impact to groundwater quality both at the Site and off-site. Because chlorinated compounds are used as electron acceptors during reductive dechlorination, there must be an appropriate source of carbon for microbial growth in order for reductive dehalogenation to occur. The carbon source at the Site is likely from the naturally occurring organic matter within the organic soils that are present. Based on the presences of *cis*-1,2-dichloroethene and vinyl chloride, and the availability of this carbon source within the contaminated zone, it suggests that an anaerobic degradation process is prevalent. With sufficient quantities or appropriate types of electron donors (e.g., slow but steady H_2-production), the final end-product of anaerobic reductive dechlorination can be ethane.

It is likely that additional degradation processes of tetrachloroethene and/or its transformation products are also likely occurring including aerobic and abiotic degradation; however, analyses of intermediaries had not been part of the remedial investigation scope to confirm these processes.

6.1 Objective of Enhanced In-Situ Bioremediation

The objective of enhanced in-situ bioremediation is to increase activity of a targeted biological biomass throughout the contaminated aquifer, thereby achieving effective biodegradation of contaminants. While the purpose of bioremediation is to increase the viability of a population of a particular group of microbes to degrade a particular contaminant, this process is already occurring within the groundwater system at the Site,

indicating that the existing geochemical conditions are favorable for anaerobic biodegradation. The enhanced in-situ bioremediation will be through the introduction of biostimulant(s); no bioaugmentation will be implemented. Biostimulation can be achieved through the addition of an auxiliary substrate (carbon source) that is converted to hydrogen (an electron donor) by fermentative bacteria present in the microbial community.

There are several types of commercially available electron donor products that include, but are not limited to, HRC®, CAP 18®, food grade molasses, and emulsified vegetable oil. These carbon-source/hydrogen producing products are released into the aquifer to stimulate the growth of targeted indigenous bacteria that are efficient in degrading chlorinated contaminants. These biostimulants can be augmented with trace nutrients or minerals required to support biological growth, if needed.

6.2 Pre-Injection Evaluation of Groundwater

Pre-injection evaluation of groundwater will be conduct prior to the selection of the biostimulant. The analysis of pre-injection conditions in groundwater may include dissolved gases (i.e. oxygen, hydrogen, nitrogen), light hydrocarbon gases (ex. methane, ethane), and anion and cations (alkalinity, total/soluble organic carbon, iron, manganese, nitrate, nitrite, sulfate, sulfide). Field measurements of groundwater will include dissolved oxygen (DO), redox potential (ORP), pH and temperature. The pre-injection evaluation will assist in evaluating whether complete dechlorination of tetrachloroethene is currently being achieved under naturally-occurring anaerobic conditions.

Also, groundwater samples from select monitoring wells will be analyzed by EPA Method 6280 for volatile compounds on the Target Compound List (TCL) to evaluate COC concentration trends.

6.3 Injection of Biostimulants

The pre-injection findings will provide a basis for the selection of the biostimulant and the scope of the injection.

The application of the biostimulant(s) into the subsurface will be through pressure injection using direct-push equipment based on known subsurface conditions and vendor recommendations. It is anticipated that the injection locations will be in a grid-pattern within the proximity of the IRM excavation area (see Drawing No. 1 and 2). The direct-push rods will be advanced to a depth of approximately between 8 and 20 feet below ground surface (bgs) terminating at the top of the clayey silt and sand with embedded gravel glacial till unit. The injection will commence in a bottom up fashion starting at approximately at the glacial till interface. The biostimulant will be injected using a hydraulic-powered pump through a pressure activated injection probe attached to the end of the sealed rods. The mass of biostimulant to be injected is anticipated to be between 1% and 3% of the mass of the soil in the injection zone. Once the bottom injection interval is completed, additional biostimulant may be injected as the rods are pulled out of the ground. The boring will be allowed to collapse in on itself as the rods are removed. The remaining open bore hole will be the sealed with a granular bentonite.

Confirmation of the dispersion of the biostimulant will be verified during injection through the monitoring of groundwater parameters at well location MW-09S and at a temporary wells that may be installed north of the injection zone. Field adjustments will be made to the locations of the injection points and/or spacing of the injection locations, if needed.

A pre-injection plan will be submitted to NYSDEC for review that will include the vendor information on the biostimulant, the anticipated quantity of biostimulant to be injected, and an injection location plan.

6.4 Post-Injection Monitoring and Sampling

The anticipated post-injection monitoring of groundwater will be conduct over a three month period.

Post-injection groundwater monitoring parameters will be similar to pre-injection evaluation parameters. Field parameters that will include DO, ORP, pH and temperature will be conducted on a weekly basis for the first month and then monthly for the following two months. Analysis of dissolved gases, cations and anions in groundwater will be measured monthly for three months.

Also, groundwater samples from select monitoring wells will be analyzed for TCL volatile compounds one month and three months after injection.

After completing the three month post-injection monitoring period, the data will be evaluated to determine the scope of further post-injection monitoring and the on-going viability of the biostimulant. A post-injection monitoring report summarizing the injection process and post injection findings will be submitted to NYSDEC for review.

6.5 Community Air Monitoring Plan

Air monitoring program will be implemented during the remedial activities to protect the health and safety of site workers. A brief summary of the monitoring program that is presented in the HASP includes both work area and perimeter air monitoring for vapor using a photoionozation detector (PID).

7 FINAL ENGINEERING REPORT

Once the Site remediation and post-injection monitoring has been completed, a Final Engineering Report (FER) will be prepared and submitted to the NYSDEC. The purpose of the FER is to fully document the implementation of the Site remedy and to certify, by a registered professional engineer, that the remedial program activities were implemented in conformance with the Department-approved Remedial Action Work Plan. The FER will include a description of the selected remedy, details and supporting documentation of remedial actions performed, and required certifications. In addition, a NYSDEC-prepared FER Template will be used to prepare the FER to achieve consistency with NYSDEC expectations and to expedite NYSDEC review and approval of the FER.

8 SITE MANAGEMENT PLAN AND ENVIRONMENTAL EASEMENT

A Site Management Plan will be developed and an environmental easement will be implemented for the Site to enforce deed restrictions on land use and groundwater use, and to notify potential buyers of institutional and engineering controls associated with the property. The environmental easement will:

- Ensure that restrictions on land use and groundwater use are included on the deed;

- Reference the Site Management Plan (SMP), which will include an Institutional and Engineering Control Plan, an Excavation Plan, and a Property Survey; and

- Set forth the requirements for the periodic certification that any institutional or engineering controls for the Site will remain in-place, are in the NYSDEC-approved form, and nothing has occurred that would impair the ability for the controls to protect public health and the environment.

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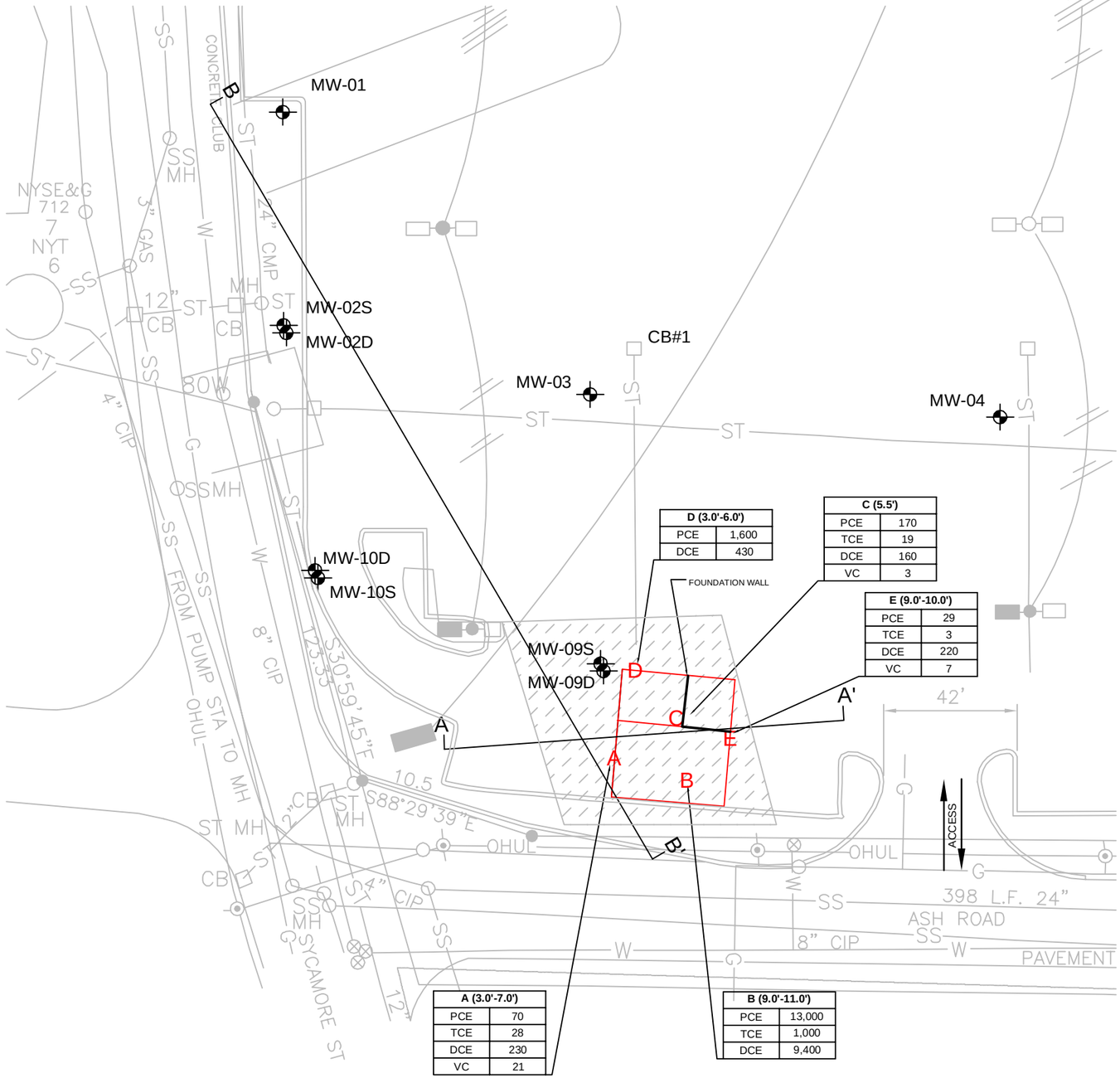
APPENDIX A

DRAWINGS



D (3.0'-6.0')	
PCE	1,600
DCE	430

C (5.5')	
PCE	170
TCE	19
DCE	160
VC	3

E (9.0'-10.0')	
PCE	29
TCE	3
DCE	220
VC	7

A (3.0'-7.0')	
PCE	70
TCE	28
DCE	230
VC	21

B (9.0'-11.0')	
PCE	13,000
TCE	1,000
DCE	9,400

NOTE: THIS DRAWING BASED ON BOUNDARY, BUILDING & UTILITIES LOCATION SURVEY BY WHISTLE, PREPARED BY GARY W. WHISTLE, DATED 11-15-06.

THIS MAP DOES NOT CONSTITUTE A SURVEY AND IS INTENDED TO CONVEY APPROXIMATE SAMPLE LOCATIONS AND SITE FEATURES.

\..\209183\TECH\DRAWING\COC Soil Concentrations 01-14-15.dwg

LEGEND

- DECORATIVE WOOD FENCE
- CHAIN LINK FENCE
- GUIDE RAIL
- SANITARY SEWER (SS)
- STORM SEWER (ST)
- WATER LINE (W)
- OVERHEAD UTILITY LINES (OHUL)
- UNDERGROUND ELECTRIC (UE)
- UNDERGROUND TELEPHONE (UT)
- GAS LINE (G)
- UNDERGROUND SITE ELECTRIC
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN
- LIGHT POLE
- UTILITY POLE
- CONCRETE SLAB OR SIDEWALK
- CONCRETE CURB
- TITLE LINES
- OUTSIDE PROPERTY BOUNDARY
- NUMBER OF PARKING SPACES (33)
- CAPPED 5/8"REBAR SET
- LIBER AND PAGE OF RECORD (1864/872)
- MONITORING WELL LOCATION
- LIMITS OF EXCAVATION
- SAMPLE LOCATION (A)
- CROSS SECTION
- PROPOSED AREA OF INJECTION

N

SAMPLE ID (DEPTH OF SAMPLE)	
COMPOUND	CONCENTRATION (ug/kg)

PCE - Tetrachloroethene
TCE - Trichloroethene
DCE - cis-1,2-Dichloroethene
VC - Vinyl Chloride

C (5.5')	
PCE	170
TCE	19
DCE	160
VC	3

APPROXIMATE SCALE:

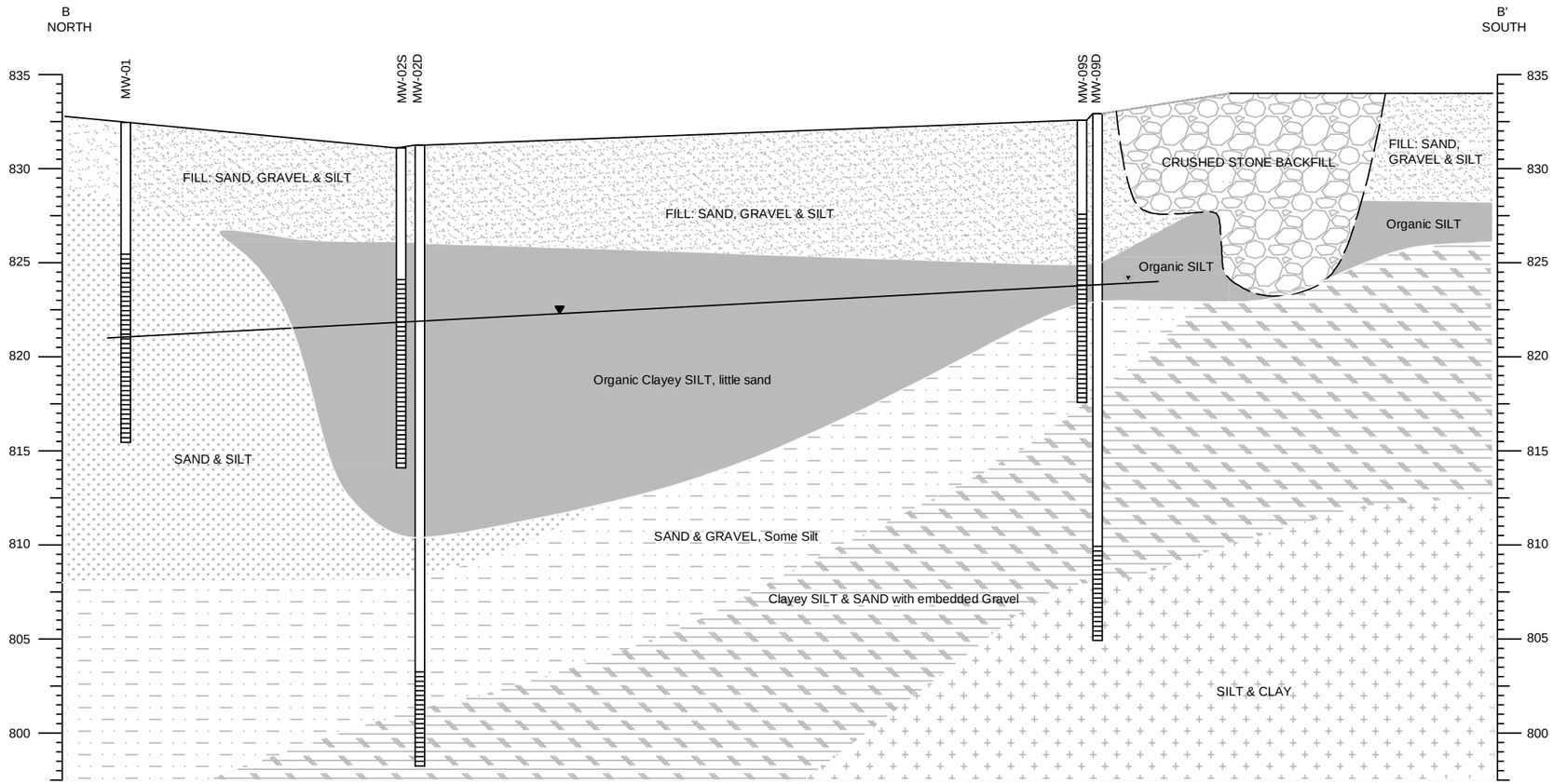
0' 10' 40' 80'

GeoLogic

GeoLogic NY, Inc., Homer, New York

COC SOIL CONCENTRATIONS
ASH ROAD PROPERTIES
TOWN OF VESTAL, NEW YORK
BCP SITE #C704032

DRAWN BY:	SCALE:	PROJECT NO.:
SMC/SDW	AS SHOWN	209183
REVIEWED BY:	DATE: JAN. 2015	DRAWING NO.: 1



WATER TABLE ELEVATION

APPROXIMATE HORIZONTAL SCALE:

0' 10' 30' 60'

APPROXIMATE VERTICAL SCALE: 4 X

GeoLogic

GeoLogic NY, Inc., Homer, New York

CROSS SECTION B-B'
ASH ROAD PROPERTIES
TOWN OF VESTAL, NEW YORK
BCP SITE #C704032

DRAWN BY:	SCALE:	PROJECT NO.:
SMC/SDW	AS SHOWN	209183
REVIEWED BY:	DATE: JAN. 2015	DRAWING NO.: 2

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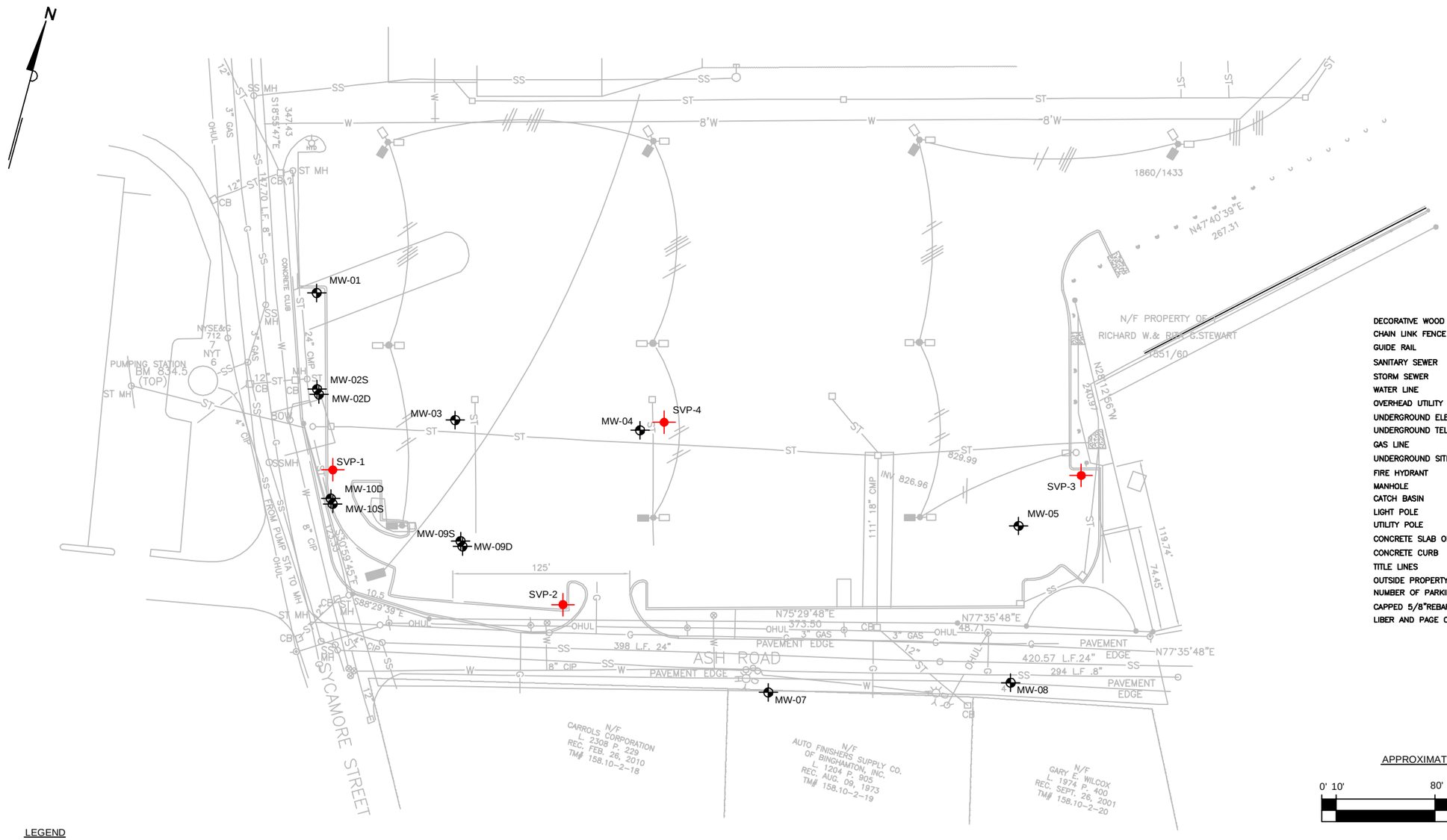

KEY

- DECORATIVE WOOD FENCE
- CHAIN LINK FENCE
- GUIDE RAIL
- SANITARY SEWER — SS
- STORM SEWER — ST
- WATER LINE — W
- OVERHEAD UTILITY LINES — OHUL
- UNDERGROUND ELECTRIC — UE
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- CONCRETE SLAB OR SIDEWALK
- CONCRETE CURB
- TITLE LINES
- OUTSIDE PROPERTY BOUNDARY
- NUMBER OF PARKING SPACES — (33)
- CAPPED 5/8"REBAR SET
- LIBER AND PAGE OF RECORD — 1864/872

APPROXIMATE SCALE:

0' 10' 80' 160'

LEGEND

- MONITORING WELL LOCATION
- SOIL VAPOR POINT LOCATION

NOTE: THIS DRAWING BASED ON BOUNDARY, BUILDING & UTILITIES LOCATION SURVEY BY WHISTLE, PREPARED BY GARY W. WHISTLE, DATED 11-15-06.

THIS MAP DOES NOT CONSTITUTE A SURVEY AND IS INTENDED TO CONVEY APPROXIMATE SAMPLE LOCATIONS AND SITE FEATURES.

\..\209183\TECH\DRAWING\SOIL VAPOR POINT LOCATION PLAN 2015.DWG

GeoLogic

GeoLogic NY, Inc., Homer, New York

SOIL VAPOR POINT LOCATION PLAN
ASH ROAD PROPERTIES
TOWN OF VESTAL, NEW YORK
BCP SITE # C704032

DRAWN BY:	SCALE:	PROJECT NO.:
SMC/SDW	AS SHOWN	209183
REVIEWED BY:	DATE:	DRAWING NO.:
	JAN. 2015	3

APPENDIX B

HEALTH & SAFETY PLAN

HEALTH AND SAFETY PLAN (HASP)

The HASP takes into account the specific hazards inherent to this project and presents procedures for the exclusive use of GeoLogic NY, Inc., and its employees. Due to the potential hazards of this Site and the activities occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards, which may be encountered. Strict adherence to the health and safety guidelines set forth herein, will reduce, but may not eliminate, the potential for injury at this Site.

PROJECT NAME:	Ash Road Properties	**CLIENT ORGANIZATION:**	GeoLogic NY, Inc.
SITE ADDRESS:	221 Sycamore Road Town of Vestal, New York	**CLIENT ADDRESS:**	37 Copeland Avenue Homer, NY 13077
NYSDEC REGION:	7	**CLIENT CONTACT:**	Susan Cummins
PROJECT NUMBER:	NYSDEC ID #C704032	**CLIENT PHONE:**	607-749-5000
ORIGINAL HASP DATE:	1-21-15	**CONTACT:**	NA
REVISED DATE:	-	**CONTACT PHONE:**	NA
REVISION NUMBER:	-		

Table of Contents

1. SITE DESCRIPTION AND FEATURES:

The Ash Road Properties is located on Ash Road and Sycamore Road in the Town of Vestal, Broome County New York. The Ash Road Properties currently occupies a portion of the greater parking area for the Lowe's Home Center. The Property is located in a well-developed commercial district with adjacent commercial properties.

Nature and Extent of Contamination: The primary contaminants of concern at the Ash Road Properties are tetrachloroethene, trichloroethene, *cis*-1,2-dichloroethene and vinyl chloride.

These contaminants have impacted groundwater and soil quality at the site. The contaminants are present in soils at the former source area at concentrations ranging from 13 mg/kg or less.

Contaminants in groundwater are present near the source area and have been at concentrations of 42 mg/L or less. Current concentrations range from about 5 mg/L or less.

2. SITE HISTORY:

Two former occupants of the Ash Road Properties include Town Square Body Shop and Hall Plumbing. Town Square Body Shop performed auto-body repairs and Hall Plumbing was a contractor's office and warehouse.

Site Geology and Hydrogeology:

The Site is located in the Susquehanna River Basin within the Susquehanna River Valley. The Susquehanna River is located about 2,000 feet north of the Site. Depth to bedrock is anticipated to be at least 75 feet below ground surface in the general vicinity of the Site. The unconsolidated deposits consist of fill or re-worked soils overlying an organic silt layer. Underlying the organic silt stratified sands, with variable silt and gravel content and a silty sand with gravel glacial till are present

The Site overlies the NYSDEC Endicott-Johnson City Area Primary Water Supply Aquifer. The general direction of mapped groundwater flow within the aquifer is to the northwest toward the Susquehanna River. The local direction of groundwater flow at the Site is also to the northwest. Groundwater has been encountered within 20 feet below ground surface.

There is an intermittent stream located along the north side of the Site. The streambed was channelized through a culvert during the development of the Lowe's Home Center, and underlies the Lowe's parking lot. This channel flows from east to west across the northern limits of the Site, and receives storm water runoff from the Lowe's paved parking area.

3. HASP-SPECIFIC TASKS:

Groundwater sampling, Geoprobe operation with preparation and injection of biostimulant reagents, and decontamination of equipment will be performed by GeoLogic personnel.

4. SITE TYPE:

STATUS		TYPE	
Active	X	Monitoring wells	X
Inactive		Landfill	
Secure (Building)		Industrial	
Unsecure	X	Petroleum	
Enclosed space		Unknown	
Remediation	X	Military	
Other		Retail - Commercial	X

5. POTENTIAL HAZARDOUS MATERIAL SUMMARY: [Potential hazard –Shaded]

CHEMICALS	SOLIDS	SLUDGES	SOLVENTS	OILS	OTHER
Acids	Fly ash	Paints	Ketones	Oily wastes	Laboratory
Pickling Liquors	Mill or mine tailings	Pigments	Aromatics	Gasoline	Pharmaceutical
Caustics	Asbestos	Heavy Metal	Hydrocarbons	Diesel fuel	Hospital
Pesticides	Ferrous smelter	Aluminum	Alcohols	Lubricants	Radiological
Dyes / Inks	Non-ferrous smelter	Other-*specify*	Halogenated (chloroethenes)	Polynuclear aromatics	Municipal
Cyanides	Metals		Esters	PCB's	Construction
Phenols	Dioxins		Ethers	Heating oil	Munitions
Halogens	Other- *specify*		Other-*specify*	Other-*specify*	Other-*specify*
Other- *specify*					

WASTE TYPES:

	Liquid (groundwater)		**Solid** (soils)		**Sludge**		**Gas**		**Unknown**		**Other-None**

WASTE CHARACTERISTICS:

	Corrosive		**Toxic**		**Inert Gas**		**Flammable**		**Volatile**		**Reactive**		**Other**

MATERIALS TO BE BROUGHT ON SITE FOR THE IDENTIFIED SPECIFIC TASKS: See attached MSDS

Preservatives		Decontamination		Calibration		Remediation		Others	
■	HCL	■	Liquinox™		100ppm isobutylene		Sodium permanganate	■	Bentonite/Cement Grout
	Other-*specify*		Alconox™		pH standards		Hydrogen peroxide		
			Other-*specify*		Conductivity standards	■	Biostimulant	■	Diesel Fuel (equipment)
					Other-*Specify*			■	Gasoline (equipment)

KNOWN CONTAMINANTS:

CONTAMINANT	EXISTING HIGHEST KNOWN CONCENTRATION / MEDIA	PEL / TLV	IDLH	EXPOSURE ROUTES	PHYSICAL CHARACTERISTICS SYMPTOMS
Tetrachloroethene	Groundwater:42,000 ppb Soil: 13,000 ppb	OSHA PEL: 100 ppm – TWA 200 ppm -Ceiling 300 ppm/5min/3 hrs. max.	1000 ppm	Inhalation, Ingestion, Absorption	Colorless liquid; chloroform odor, / irritant to mucous membranes, skin irritant; headache, nausea, visual disturbance
Trichloroethene	Groundwater: 7,100 ppb Soil: 1,000 ppb	PEL: 100 ppm – TWA 300 ppm – 5 min. peak/2 hrs. TWA 50 ppm – TWA	1000 ppm	Inhalation, Ingestion, Absorption	Colorless liquid; chloroform odor, / irritant to mucous membranes, skin irritant; headache, nausea, visual disturbance
cis-1,2-Dichloroethene (DCE)	Groundwater:11,000 ppb Soil: 9,400 ppb	ACGIH: 5ppm	Not determined	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, throat; dizziness, headache, nausea, breathing difficulty
Vinyl chloride	Groundwater:690 ppb Soil: 21 ppb	1ppm 5ppm (15min)	Not determined	inhalation, ingestion, skin and/or eye contact	lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite

6. SITE HAZARD ASSESSMENT:

#	HAZARD	SITE-SPECIFIC CONDITIONS	MITIGATION METHODS	WARNINGS/SYMPTOMS	RESPONSE TO EXPOSURE
A	Heat Stress	-Vigorous physical work associated with excavation and soil staging activities -Warm temperatures -Confining personal protective equipment (PPE) such as tyvek.	-Regulate pace of work -Take regular breaks -Use shade when possible -Regular intake of cool fluids -Dress for task & conditions -Buddy system monitoring	Heat stress/heat stoke -Heavy perspiration -Dizziness -Nausea -Headache -Vertigo -Weakness and thirst -Heat stroke may include hot dry skin and confusion	-Rest in a cool place -Drink cool fluids -Seek immediate medical attention for heat stroke symptoms
B	Cold Stress	-Freezing temperatures during excavation activities -Exposure and wet clothing and gloves from working below the water table and during/ decontamination activities.	-Dress accordingly for task and conditions -Regulate clothing layers to keep body temp comfortable, avoid perspiration -Take breaks in warm areas -Buddy system monitoring	Hypothermia and frostbite -Shivering, tingling, numbness -Apathy or sleepiness, blanching or whitening of skin -Unconsciousness, tissue becomes pale and hard, frozen extremities	-Get out of the cold during the first stages of hypothermia or frostbite -Seek immediate medical attention if frostbite or advanced hypothermia is suspected
C	Explosive Flammable	N/A			
D	Oxygen Deficient	N/A			
E	Noise	- Geoprobe, Injection Pump	-Keep a reasonable distance from noisy equipment -Hearing protection PPE -Buddy system monitoring	-Difficulty hearing normal conversation 2-3 feet away -Increased heart rate -Muscle fatigue	-Move away from noise -Use hearing protection PPE
F	Inorganic Chemicals	N/A	Avoid physical contact/ exposure when possible -Stay up-wind of work zone -Review work plans and MSDS -Use proper PPE -Monitor for exposure -Remove potentially exposed PPE and wash hands whenever leaving the work zone -Buddy system monitoring		
G	Chemical Exposure	- Chlorinated Compounds - Biostimulant	-Avoid physical contact / exposure when possible -Stay up-wind of work zone -Review work plans and MSDS -Use proper PPE -Monitor for exposure -Remove potentially exposed PPE and wash hands whenever leaving the work zone -Buddy system monitoring	-Monitoring indicates unprotected exposure above exposure limit occurred -There is physical evidence of exposure (visual or odors) -Exposure symptoms occur (see Hazardous Material Summary above)	-Stop work and leave the work zone if possible exposure is suspected. -Reevaluate exposure mitigation methods (PPE level, Methodologies, etc.) -If exposure symptoms have occurred seek medical attention immediately

SITE HAZARD ASSESSMENT CONT'D:

#	HAZARD	SITE-SPECIFIC CONDITIONS	MITIGATION METHODS	WARNINGS/SYMPTOMS	RESPONSE TO EXPOSURE
H	Motorized Traffic	The site is located within a busy commercial retail shopping center.	-Define and secure all work areas with safety cones, safety tape, construction fence, other barriers, or signs as appropriate -If possible, set up work zone to maintain visual on traffic flow	-Review safety procedures with all job site personnel	-Review safety procedures with all job site personnel
I	Heavy Equipment	<u>Geoprobe and Trailer:</u> -Crush points -Entrapment in the machinery -Hitting overhead or underground utilities	-Only operators of the equipment are allowed in the work zone unless the operator is aware of another person and is maintaining eye contact -Operators must be familiar with equipment procedures for safe operation/ emergency stop features and test daily -Equipment not attended by the operator should be shut down and locked out from operation -Proper PPE must be used	-If mitigation methods are not followed -Close calls	-Review safety procedures with all job site personnel -Seek first aid or immediate medical attention as appropriate
J	Slips & Falls	-Uneven ground surface -Drill rig tools	-Keep known walking areas free of obstructions / hazards -Identify potential hazards (cones, signage, paint, etc.) -Walk slowly, surveying the ground ahead -Wear appropriate PPE	-If mitigation methods are not followed -Close calls	-Review safety procedures with all job site personnel -Seek first aid or immediate medical attention as appropriate
K	Power and hand tools	-Electric shocks - high pressure water stream (steam cleaner) -Burns (steam cleaner) -Cuts from blades	-Only operators of the tool are allowed in the work zone unless the operator is aware of another person and is maintaining eye contact -Operators must be familiar with equipment procedures for safe operation and inspect tool, cords and GFI operation before use -Equipment not attended by the operator should be unplugged and locked out from operation -Proper PPE must be used, including safety glasses, hearing protection and appropriate gloves	-If mitigation methods are not followed -Close calls	-Review safety procedures with all job site personnel -Seek first aid or immediate medical attention as appropriate
L	Waste Handling	-Drum moving and lifting -Pinch-point -Spillage	-Use of appropriate equipment/hand carts for the moving and staging of drums -Follow proper lifting procedures -Proper PPE must be used for the handling and staging of waste		-Review safety procedures with all job site personnel -Seek first aid or immediate medical attention as appropriate

7. LEVELS OF PROTECTION: *Shade minimum PPE for each level of protection used*

See section 10 for a summary of levels of protection for each activity.

D-level		***D modified-level (D-M)***		***C-level***		***B-level***	
	Steel Toe Boots		*All D Items Selected*		*All D Modified Selected*		*Not Used*
	Work Gloves		*Rubber Boots*		*Rubber Boots*		
	Hard Hat		*Latex/Vinyl Disposable Gloves*		*Half-face APR*		
	Safety Glasses		*Nitrile Gloves*		*Full-Face APR*		
	Hearing Protection		*Tyvek Coverall*		*Tyvek Coverall*		
			Splash Suit		*Splash Suit*		
			Safety Glasses		*Face shield*		
			Face Shield		*Other*		
			Hearing Protection				
			Other				

8. SITE WORKER & COMMUNITY AIR MONITORING PLAN (CAMP):

This air monitoring plan provides minimum information to comply with NYSDOH requirements identified in Appendix 1A of DER-10.

Work Zone and Perimeter monitoring for volatile compounds will be performed.

No Fugitive Dust and Particulate Monitoring will be performed due to the low-impact intrusive nature of the proposed fieldwork.

WORK ZONE:	For the purpose of this HASP, the Work Zones (WZ) will be defined as the area within a 10-foot radius of ongoing excavation work. All Work Zones are mobile, should be established in consideration of prevailing wind direction and will be moved as the work crew advances to new locations within the Project Site.		
SUPPORT ZONE:	Support Zones will be all areas outside of current Work Zones.		
INTRUSIVE:	For the purpose of this HASP, intrusive activities will be those that have the ability to unearth identified impacted soils.		
NON-INTRUSIVE:	Any activity, which is not defined as intrusive.		
PERIODIC MONITORING:	Monitoring at regular intervals with periods of time in between where no monitoring takes place (recording a PID reading at half-hour intervals).		
CONTINUOUS MONITORING:	Non-stop real time monitoring with equipment capable of calculating a running average over no less than 15-minute intervals and log monitoring data over no less than an 8-hour work day, which can be downloaded or printed.		
MONITORING REQUIREMENTS:	**VOC MONITORING**		**FUGITIVE DUST & PARTICULATE MONITORING**
INTRUSIVE	Photoionization detector (10.6 ev lamp)		Reasonable fugitive dust suppression techniques must be employed during all site activities, which may generate fugitive dust. Dust suppression techniques may include covering soil piles, wetting of haul pathways, and the use of potable water spray during intrusive activities. Particulate concentrations will be measured continuously at the upwind and downwind perimeters of the Work Zone at temporary particulate monitoring stations. Real time monitoring equipment will be utilized, capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating a 15-minute period for comparison to the particulate action level. The action level is 150 micrograms-per-cubic-meter (ug/m^3) (15 minutes average). If the downwind PM-10 level is 100 ug/m^3 greater than background (upwind perimeter) for the 15-minute period or if air-borne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mg/m^3 above background. Should the action level of 150 ug/m^3 continue to be exceeded, work must stop until dust suppression techniques prove adequate or weather conditions change.
	CONDITION	**RESPONSE**	
	<5ppm over background	-PPE Level D-M -Continuous monitoring, downwind perimeter of WZ -Continue working	
	>5 to 25ppm for less than 15 minutes	-PPE Level D-M -Continuous monitoring, downwind perimeter of WZ -Stop work, move upwind of WZ and monitor downwind concentrations	
	>5 to 25ppm for 15 minutes or more	-PPE Level C -Continuous monitoring, downwind perimeter of WZ -Respirator use review meeting -Resume work in level C	
	>25ppm	-PPE Level C -Continuous monitoring, downwind perimeter of WZ -Stop work, move upwind of WZ and monitor downwind concentrations	
NON-INTRUSIVE	<5ppm over background	-PPE Level D or D-M (see Work Task Summary) -Periodic monitoring, downwind perimeter of WZ (not required for survey work) -Continue working	Not required.
	>5ppm over background	Revert to intrusive conditions and responses	

9. DECONTAMINATION:

TYPE	METHOD	CONTAINMENT & DISPOSAL
GEOPROBE AND TOOLING	Hand-washing with potable water and Liquinox	Based on the type of working being performed, not containerization of wash water is anticipated.
SAMPLING EQUIPMENT	Liquinox solution and tap water rinse	Soils generated from the macro-core sampler will be placed back into the borehole.
PERSONNEL	-Remove PPE avoiding contact with skin -Wash hands first and then face with soap and warm water	Wash water for personnel will be directed to the sanitary sewer. All one-time use PPE will be discarded into disposable garbage bags for disposal in GeoLogic's office dumpster. Any multiple use PPE will be inspected daily and decontaminated prior to starting work each day using disposable bio-degradable wipes.

10. WORK TASK SUMMARY:

This Section summarizes information from Sections 6-9 for each site specific Task.

TASK	PPE LEVEL See section 7	MONITORING	HAZARDS See Section 6	DECONTAMINATION See Section 9
1. Monitoring Well Sampling	D	**See Section 8**	G, H, J	Personnel
2. Geoprobe/Injection	D, D-M	**See Section 8**	E, G, H, I, J, K	Heavy Equipment, Personnel
3. Biostimulant Preparation	D, D-M	**See Section 8**	G, H, K	Power/Hand Tool, Personnel

11. SITE EMERGENCY / CONTINGENCY PLAN:

The following Site Emergency / Contingency Plan provide responses and contact information if an accident or injury should occur. All accidents or injuries must be reported within a 24-hour period to the Health and Safety Officer. This includes even minor cuts and abrasions. Failure to immediately report accidents and injuries sustained on the job may result in the loss of workers compensation and disability benefits. All employees reporting an accident or injury will be required to fill out an accident report form.

All on-site workers must become familiar with the provisions of this HASP and sign the attached Training and Acknowledgement section.

Should any worker observe hazards that are not addressed in this plan or that they are unprepared for, they should withdraw immediately and consult with the Health & Safety Officer before resuming work.

SITE EMERGENCY / CONTINGENCY PLAN CONT'D:

FIRST AID:

The safety of employees working around construction/sampling equipment should be maintained at all times. In the event that an injury or accident occurs, a first aid kit must be kept on the site within a reasonable distance of personnel at all times. GeoLogic employees will have basic first aid and basic CPR training.

Seek emergency medical attention as soon as possible when appropriate. Directions to the nearest emergency medical facility and emergency phone numbers are provided below.

FIRE:

Fire extinguishers are located on GeoLogic's trucks and drill rigs. GeoLogic personnel will be familiar with their location and operation. Emergency contact information for fire response is provided below.

SITE SECURITY:

None

EMERGENCY CONTACT	DESCRIPTION	PHONE
Police		911
Fire Department		911
Ambulance		911
Hospital	UHS/Binghamton Memorial Regional Hospital	607-762-6000
Poison Control Center	Nationwide	800-222-1222
NYSDEC Spill Hotline	Spills must be reported within 2 hours of their discovery	800-457-7362
Medical Consultant	Industrial Medical Associates	315-478-1977

MEDICAL EMERGENCY:

United Health Services/Wilson Memorial Regional Medical
33-57 Harrison Street, Johnson City, New York
607-763-6000

Directions to hospital: Exit the site on to Sycamore Road heading south, taking a left at the traffic light on to Route 434; proceed east about 1.5 to 2 miles; enter Route 201 from the right lane and proceed north to the Route 17C exit ramp; at bottom of ramp take a right and proceed less than 1 mile; take a right on to Baldwin Street (past Harrison Street) for ambulatory services.

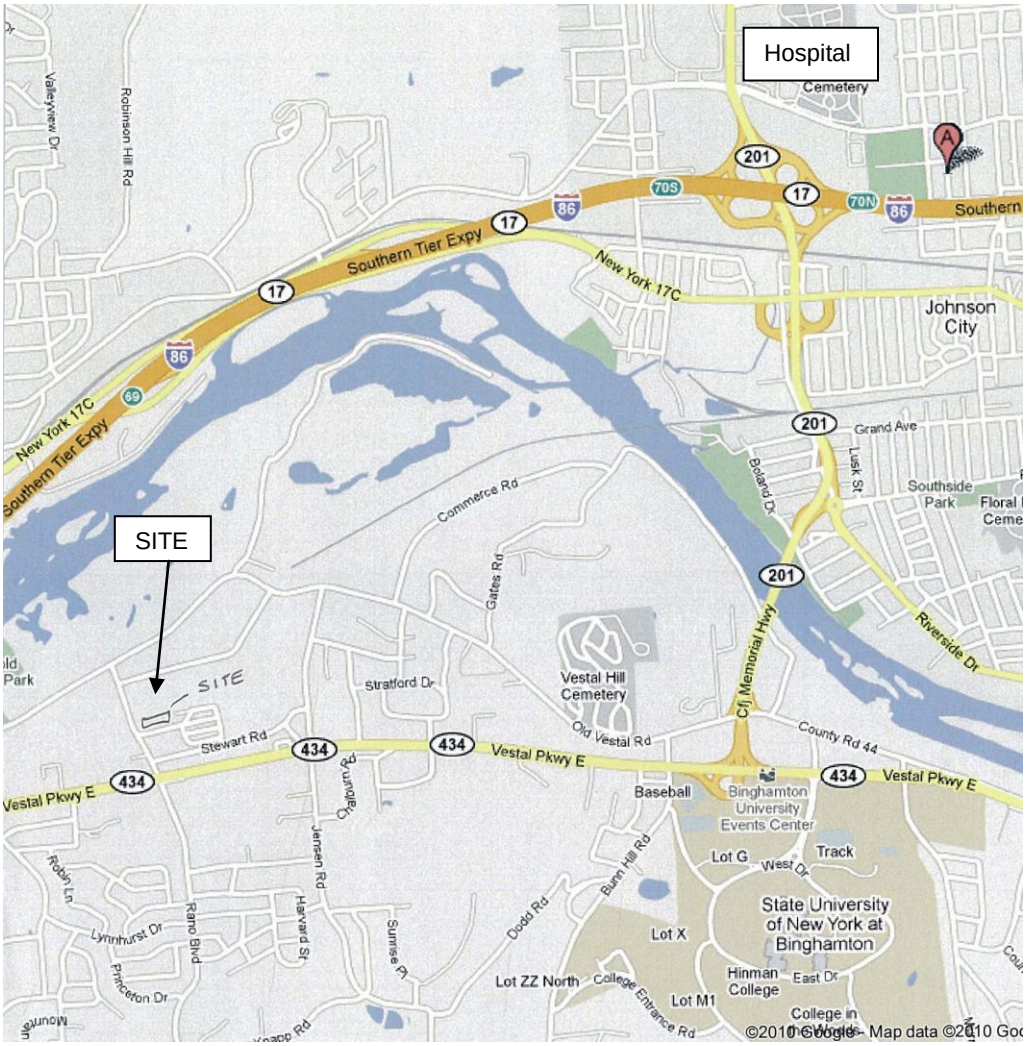
EVACUATION:

In the event of a situation requiring emergency evacuation of the site such as a contaminant release above the highest action levels or an underground gas line break, the following procedures should be followed:

1. Activate emergency stop feature on operating equipment
2. Notify all personnel of the need to leave the site immediately
3. Immediately walk up wind, if a contaminate release has occurred.
4. Contact emergency services / personnel

12. MAP TO HOSPITAL:

UHS/Wilson Memorial Regional Hospital
33-57 Harrison Street
Johnson City, New York



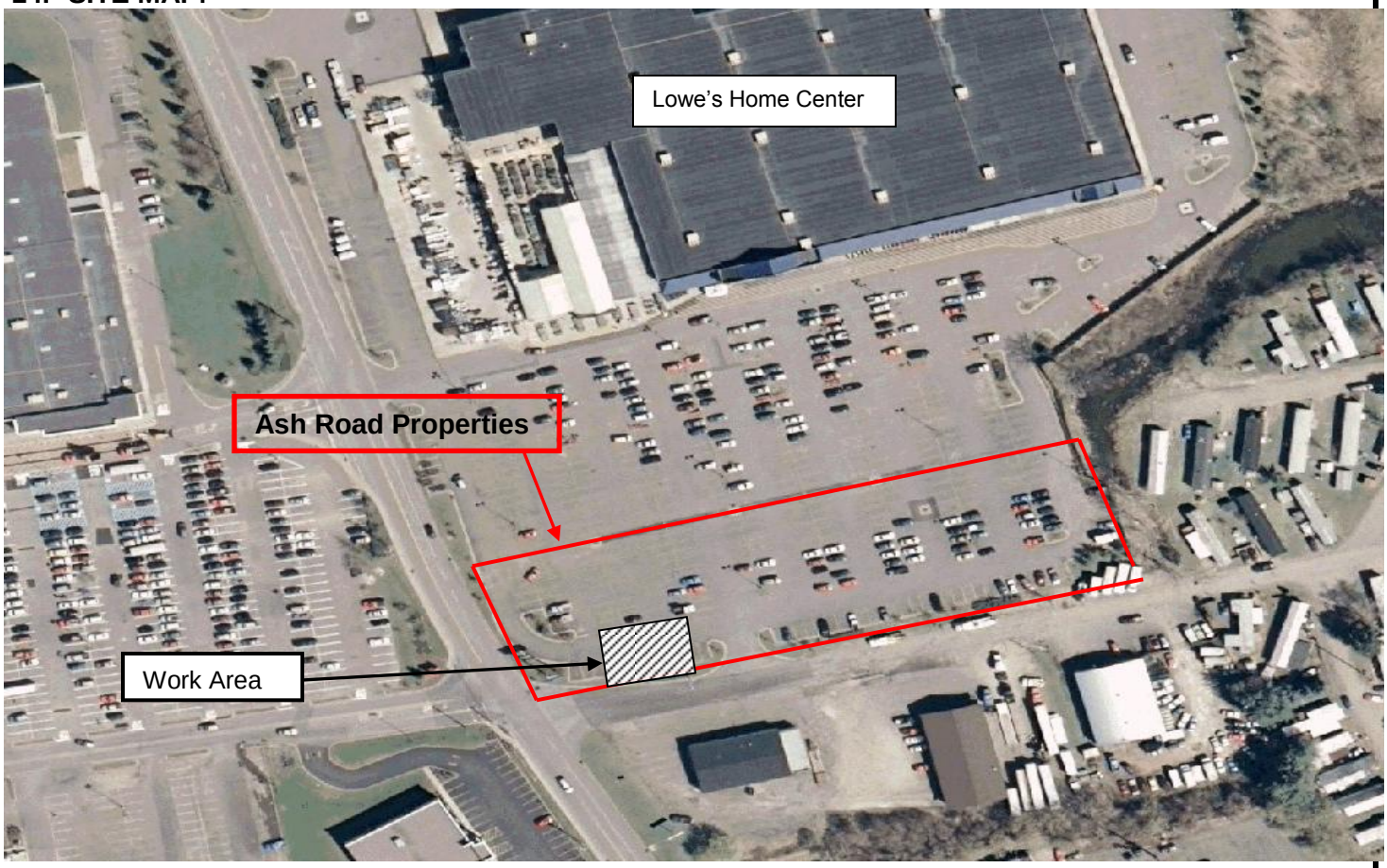
13. TRAINING AND PLAN ACKNOWLEDGEMENT:

Any GeoLogic personnel working at this Site, that is involved in the identified tasks must have completed the basic 40-hour OSHA health and safety training course and, if applicable, the supplemental yearly 8-hour refresher courses.

GeoLogic personnel authorized to work at this Site include:

CREW MEMBER	RESPONSIBILITIES	SIGNATURE
Steven Laramee	Driller	
Scott Breeds	Driller	
John Winks	Driller Helper	
Susan Cummins	Oversight	
Joseph Menzel	Geologist	
Christopher Gabriel	Oversight	

14. SITE MAP:



Safety Data Sheet

Material Name: Diesel Fuel, All Types

SDS No. 9909
US GHS

Synonyms: Ultra Low Sulfur Diesel; Low Sulfur Diesel; No. 2 Diesel; Motor Vehicle Diesel Fuel; Non-Road Diesel Fuel; Locomotive/Marine Diesel Fuel

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 3
Skin Corrosion/Irritation – Category 2
Germ Cell Mutagenicity – Category 2
Carcinogenicity - Category 2
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Aspiration Hazard – Category 1
Hazardous to the Aquatic Environment, Acute Hazard – Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Flammable liquid and vapor.
Causes skin irritation.
Suspected of causing genetic defects.
Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.

Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapours/spray.

Response
In case of fire: Use water spray, fog or foam to extinguish.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.
If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting.
IF exposed or concerned: Get medical advice/attention.

Storage
Store in a well-ventilated place. Keep cool.
Keep container tightly closed.
Store locked up.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

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

CAS #	Component	Percent
68476-34-6	Fuels, diesel, no. 2	100
91-20-3	Naphthalene	<0.1

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher.

* * * Section 4 - First Aid Measures * * *

First Aid: 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.

First Aid: Skin
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.

First Aid: 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.

First Aid: 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.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

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.

Hazardous Combustion Products

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

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, and other gaseous agents.

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.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/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.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

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.

Emergency Measures

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.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

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.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, excessive temperatures and open flame! No smoking or open flame in storage, use or handling areas. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

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."

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: 100 mg/m3 TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)
Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: 10 ppm TWA
15 ppm STEL
Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA: 10 ppm TWA; 50 mg/m3 TWA
NIOSH: 10 ppm TWA; 50 mg/m3 TWA
15 ppm STEL; 75 mg/m3 STEL

Engineering Measures

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

Personal Protective Equipment: Respiratory

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.

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.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

Personal Protective Equipment: Eyes

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

Personal Protective Equipment: Skin and Body

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.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Clear, straw-yellow.	**Odor:**	Mild, petroleum distillate odor
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	0.009 psia @ 70 °F (21 °C)	**Vapor Density:**	>1.0
Boiling Point:	320 to 690 °F (160 to 366 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.83-0.876 @ 60°F (16°C)
Evaporation Rate:	Slow; varies with conditions	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	>125 °F (>52 °C) minimum	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.5	**Lower Flammability Limit (LFL):**	0.6
Burning Rate:	ND	**Auto Ignition:**	494°F (257°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

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

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Naphthalene (91-20-3)

Inhalation LC50 Rat >340 mg/m3 1 h; Oral LD50 Rat 490 mg/kg; Dermal LD50 Rat >2500 mg/kg; Dermal LD50 Rabbit >20 g/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

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

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Contact with eyes may cause mild irritation.

Potential Health Effects: Ingestion

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.

Potential Health Effects: 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.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This material has been positive in a mutagenicity study.

Carcinogenicity

A: General Product Information

Suspected of causing cancer.

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.

B: Component Carcinogenicity

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

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.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

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

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Fuels, diesel, no. 2 (68476-34-6)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	35 mg/L [flow-through]	

Naphthalene (91-20-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]	
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]	

96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [Flow through]
48 Hr EC50 Daphnia magna	1.09 - 3.4 mg/L [Static]

Persistence/Degradability
No information available.

Bioaccumulation
No information available.

Mobility in Soil
No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions
See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information
Shipping Name: Diesel Fuel
NA #: 1993 **Hazard Class:** 3 **Packing Group:** III
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Naphthalene (91-20-3)

CERCLA: 100 lb final RQ; 45.4 kg final RQ

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.

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Fuels, diesel, no. 2	68476-34-6	No	No	No	Yes	No	No
Naphthalene	91-20-3	Yes	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

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

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

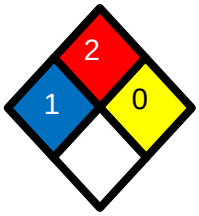
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Fuels, diesel, no. 2	68476-34-6	Yes	DSL	EINECS
Naphthalene	91-20-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	2
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	2	Moderate
Physical	0	Minimal
		*Chronic

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Literature References

None

Other Information

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

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

End of Sheet

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades

MSDS No. 9950

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

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 (Environment, Health, Safety) Internet Website www.hess.com

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS *

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME).

Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

3. HAZARDS IDENTIFICATION

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

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

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
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

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. 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, ensure an open airway and 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:	-45 ^{o}F (-43^{o}C)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 ^{o}F (>280 ^{o}C)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. 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.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 “Low Expansion Foam - 1994 Edition.”

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 SPILL CONTINGENCY or EMERGENCY 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

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable 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.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

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

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Exposure Limits Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	1000	--	Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	Skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	20	--	A4
1,2,4- Trimethylbenzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

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 or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is 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-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 and limitations.

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

A translucent, straw-colored or light yellow liquid

ODOR
A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 ^{o}F (39 to 200 ^{o}C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 ^{o}F (38 ^{o}C) (275-475 mm Hg @ 68 ^{o}F (20 ^{o}C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %
SOLUBILITY (H_2O):	Non-oxygenated gasoline - negligible (< 0.1% @ 77 ^{o}F). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 ^{o}F); ethanol is readily soluble in water

10. STABILITY and REACTIVITY)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS
Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY
Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

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 federal, state, or local regulations; 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 contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3

n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS

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

INGREDIENT NAME (CAS NUMBER)	Date Listed
Benzene	2/27/1987
Ethyl benzene	6/11/2004
Toluene	1/1/1991

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	PHYSICAL:	0	Minimal
			* CHRONIC

SUPERSEDES MSDS DATED: 07/01/06

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	CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
AIHA	American Industrial Hygiene Association	DOT	U.S. Department of Transportation [General Info: (800)467-4922]
ANSI	American National Standards Institute (212)642-4900	EPA	U.S. Environmental Protection Agency
API	American Petroleum Institute (202)682-8000	HMIS	Hazardous Materials Information System

IARC	International Agency For Research On Cancer	REL	Recommended Exposure Limit (NIOSH)
MSHA	Mine Safety and Health Administration	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
NFPA	National Fire Protection Association (617)770-3000	SCBA	Self-Contained Breathing Apparatus
NIOSH	National Institute of Occupational Safety and Health	SPCC	Spill Prevention, Control, and Countermeasures
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	STEL	Short-Term Exposure Limit (generally 15 minutes)
NTP	National Toxicology Program	TLV	Threshold Limit Value (ACGIH)
OPA	Oil Pollution Act of 1990	TSCA	Toxic Substances Control Act
OSHA	U.S. Occupational Safety & Health Administration	TWA	Time Weighted Average (8 hr.)
PEL	Permissible Exposure Limit (OSHA)	WEEL	Workplace Environmental Exposure Level (AIHA)
RCRA	Resource Conservation and Recovery Act	WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

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

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

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **HOLEPLUG® 3/8**

Revision Date: 06-Jan-2005

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HOLEPLUG® 3/8
Synonyms: None
Chemical Family: Mineral
Application: Fluid Loss Additive

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, cristobalite	14464-46-1	0 - 1%	0.05 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	0 - 5%	0.05 mg/m^3	$\frac{10\ mg/m^3}{\%SiO2 + 2}$
Bentonite	1302-78-9	60 - 100%	Not applicable	Not applicable

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 Treat symptomatically.

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 0*

6. ACCIDENTAL RELEASE MEASURES

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

Environmental Precautionary Measures None known.

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

7. HANDLING AND STORAGE

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

Storage Information Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. 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:	Various
Odor:	Odorless
pH:	7.5
Specific Gravity @ 20 C (Water=1):	2.12
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	51
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 May cause mechanical 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: 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 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*****

LIQUINOX MSDS

Section 1 : MANUFACTURER INFORMATION

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/02/24

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): @ 20°C (68°F).
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Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C):	100 (212F)
Freezing point (°C):	Not available.
pH:	8.5
Specific gravity @ 20 °C:	(water = 1). 1.083
Solubility in water (%):	Complete.
Coefficient of water\oil dist.:	Not available.
VOC:	None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability:	Not flammable.
Conditions of flammability:	Surrounding fire.
Extinguishing media:	Carbon dioxide, dry chemical, foam. Water Water fog.
Special procedures:	Self-contained breathing apparatus required. Firefighters should wear the usual protective gear. Use water spray to cool fire exposed containers.
Auto-ignition temperature:	Not available.
Flash point (°C), method:	None
Lower flammability limit (% vol):	Not applicable.
Upper flammability limit (% vol):	Not applicable.

Not available.

Sensitivity to mechanical impact:	Not available.
Hazardous combustion products:	Oxides of carbon (COx). Hydrocarbons.
Rate of burning:	Not available.
Explosive power:	Containers may rupture if exposed to heat or fire.

Section 5 : REACTIVITY DATA

Chemical stability:	Product is stable under normal handling and storage conditions.
Conditions of instability:	Extreme temperatures.
Hazardous polymerization:	Will not occur.
Incompatible substances:	Strong acids. Strong oxidizing agents.
Hazardous decomposition products:	See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry:	Skin contact, eye contact, inhalation and ingestion.
Effects of Acute Exposure	
Eye contact:	May cause irritation.
Skin contact:	Prolonged and repeated contact may cause irritation.
Inhalation:	May cause headache and nausea.
Ingestion:	May cause vomiting and diarrhea. May cause gastric distress.
Effects of chronic exposure:	See effects of acute exposure.
LD50 of product, species & route:	> 5000 mg/kg rat oral.
LC50 of product, species & route:	Not available.
Exposure limit of material:	Not available.
Sensitization to product:	Not available.
Carcinogenic effects:	Not listed as a carcinogen.
Reproductive effects:	Not available.
Teratogenicity:	Not available.
Mutagenicity:	Not available.
Synergistic materials:	Not available.
Medical conditions aggravated by exposure:	Not available.
First Aid	
Skin contact:	Remove contaminated clothing. Wash thoroughly with soap and water. Seek medical attention if irritation persists.
Eye contact:	Check for and remove contact lenses. Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
Inhalation:	Remove victim to fresh air. If irritation persists, seek medical attention.
Ingestion:	Do not induce vomiting, seek medical attention. Dilute with two glasses of water. Never give anything by mouth to an unconscious person.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill:	Contain the spill. Prevent entry into drains, sewers, and other waterways. Wear appropriate protective equipment. Small amounts may be flushed to sewer with water. Soak up with an absorbent material. Place in appropriate container for disposal. Notify the appropriate authorities as required.
Waste disposal:	In accordance with local and federal regulations.
Handling procedures and equipment:	Protect against physical damage. Avoid breathing vapors/mists. Wear personal protective equipment appropriate to task.

Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Wear appropriate gloves.

Respiratory / Type: None required under normal use.

Eye / Type:

Safety glasses recommended.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

U.S. SILICA COMPANY

Material Safety Data Sheet

Product Name: Silica Sand and Ground Silica
Product Description: Crystalline Silica

1. Identification of the substance/preparation and of the company/undertaking

1.1. Identification of the substance or preparation

Product Name/Trade Names:
Sand and Ground Silica Sand (sold under various names: ASTM TESTING SANDS • GLASS SAND • FILPRO® · FLINT SILICA • DM-SERIES • F-SERIES • FOUNDRY SANDS • FJ-SERIES H-SERIES • L-SERIES • N-SERIES • NJ SERIES • OK-SERIES • P-SERIES • T-SERIES • hydraulic fracturing sand, all sizes • frac sand, all sizes • MIN-U-SIL® Fine Ground Silica • MYSTIC WHITE® • #1 DRY • #1 SPECIAL • PENN SAND® • PRO WHITE® · SILURIAN® · Q-ROK® • SIL-CO-SIL® Ground Silica • MICROSIL® • SUPERSIL® • MASON SAND • GS SERIES • PER-SPEC • proppant, all sizes • SHALE FRAC® - SERIES • KOSSE WHITE® • OTTAWA WHITE® • OPTIJUMP®.

Chemical Name or Synonym:
Crystalline Silica (Quartz), Sand, Silica Sand, Flint, Ground Silica, Silica Flour.
White or tan sand or ground silica with no odor.

1.2. Use of the Substance/Preparation

Main Applications (non-exhaustive list): brick, ceramics, foundry castings, glass, grout, hydraulic fracturing sand, frac sand, proppant, mortar, paint and coatings, silicate chemistry, silicone rubber, thermoset plastics.

DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING.

1.3. Company / Producer

U.S. Silica Company
8490 Progress Drive, Suite 300
Frederick, MD 21701
U.S.A.

Phone: 800-243-7500
Emergency Phone: 301-682-0600
Fax: 301-682-0690

2. Hazards Identification

2.1. EMERGENCY OVERVIEW:

The material is white or tan sand, or ground sand; the ground sand looks like white powder. It has no odor and is not flammable, combustible or explosive. It does not cause burns or severe skin or eye irritation. A single exposure will not result in serious adverse health effects. Crystalline silica is not known to be an environmental hazard.

Personal protective equipment – respirator -- is not required unless the concentration of respirable silica dust exceeds applicable occupational exposure levels.

Crystalline silica (quartz) is incompatible with hydrofluoric acid, fluorine, chlorine trifluoride or oxygen difluoride.

2.2. OSHA REGULATORY STATUS
This material is considered hazardous under the OSHA Hazard Communications Standard (29 CFR 1910.1200).

2.3. POTENTIAL HEALTH EFFECTS: The potential health effects are CHRONIC; the route of exposure is INHALATION; the hazards described are associated with respirable crystalline silica dust – respirable dust particles are less than 10 microns in aerodynamic diameter.
.

2.3.1. Inhalation:
a. Silicosis: The prolonged repeated inhalation of respirable crystalline silica can cause silicosis, a fibrosis (scarring) of the lungs.

Silicosis may be progressive; it may lead to disability and death.

b. Lung Cancer: Crystalline silica is classified as carcinogenic to humans.

c. Tuberculosis: Silicosis increases the risk of tuberculosis.

d. Autoimmune and Chronic Kidney Diseases: Some studies show excess numbers of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis, chronic kidney diseases and end-stage kidney disease in workers exposed to respirable crystalline silica.

e. Non-Malignant Respiratory Diseases (other than silicosis): Some studies show an increased incidence in chronic bronchitis and emphysema in workers exposed to respirable crystalline silica.

2.3.2. Eye Contact:
Crystalline silica (sand or ground silica) may cause abrasion of the cornea.

2.3.3. Skin Contact:
Not applicable.

2.3.4. Ingestion:
Not applicable.

2.3.5. Chronic Effects:
The adverse health effects -- silicosis, lung cancer, autoimmune and chronic kidney diseases, tuberculosis, and non-malignant respiratory diseases -- are chronic effects.

2.3.6. Signs and Symptoms of Exposure:
Generally, there are no signs or symptoms of exposure to crystalline silica; silicosis may result in shortness of breath, especially upon exertion. See Section 11 for additional information.

2.3.7. Medical Conditions Generally Aggravated by Exposure:
The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure.

2.3.8 **Potential Environmental Effects**
None known.

See Section 11, Toxicological Information, for additional detail on potential adverse health effects.

3. Composition / Information on Ingredients

Component / CAS #		%	Hazardous under OSHA Haz Comm Standard?
Crystalline Silica (quartz)	14808-60-7	99.0 – 99.9	Yes
Aluminum Oxide	1344-28-1	<1.0	No
Iron Oxide	1309-37-1	<0.1	No
Titanium Oxide	13463-67-7	<0.1	No

4. First Aid Measures

4.1. Eye Exposure:
Wash immediately with plenty of water. If irritation persists, seek medical attention.

4.2. Skin Exposure:
Not applicable

4.3. Inhalation:
No specific first-aid is necessary since the adverse health effects associated with inhalation of respirable crystalline silica result from chronic exposures. If there is a gross inhalation of crystalline silica, remove the person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

4.4. Ingestion:
Not applicable

5. Fire Fighting Measures

5.1. Fire Hazard Data:

Auto ignition: Not Applicable

Flash Point: Not Applicable

Flammability Limits (vol/vol%): **Lower:** Not Applicable **Upper:** Not Applicable

Extinguishing Media:
Product is not flammable, combustible or explosive. Use extinguishing media appropriate for surrounding fire.

Special Fire Fighting Procedures:
Not applicable.

Unusual Fire and Explosion Hazards:
None

6. Accidental Release Measures

6.1. Personal precautions:

Avoid generating dust. If the concentration of respirable silica dust exceeds the OSHA PEL or other applicable limit (if lower than the PEL), wear respirator specified in Section 8 of this Safety Data Sheet.

Environmental precautions: No specific precautions. Discard any product, residue, disposable container or liner in compliance with regulatory requirements.

Methods for cleaning up: Avoid dry sweeping. Do not use compressed air to clean spilled sand or ground silica. Use water spraying/flushing or ventilated or HEPA filtered vacuum cleaning system. Dispose of in closed containers.

7. Handling and Storage

7.1. Handling:

Avoid generating dust. Do not breathe dust. Do not rely on your sight to determine if dust is in the air. Respirable crystalline silica dust may be in the air without a visible dust cloud.

Use adequate exhaust ventilation and dust collection. Maintain and test ventilation and dust collection equipment. Use all available work practices to control dust exposures, such as water sprays. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Keep airborne dust concentrations below permissible exposure limits.

Where necessary to reduce exposures below the PEL or other applicable limit (if lower than the PEL), wear a respirator approved for silica containing dust when using, handling, storing or disposing of this product or bag. See Section 8, for further information on respirators.. Do not alter the respirator. Do not wear a tight-fitting respirator with facial hair such as a beard or mustache that prevents a good face to face piece seal between the respirator and face. Maintain, clean, and fit test respirators in accordance with applicable standards. Wash or vacuum clothing that has become dusty.

Participate in training, exposure monitoring, and health surveillance programs to monitor any potential adverse health effects that may be caused by breathing respirable crystalline silica.

The OSHA Hazard Communication Standard, 29 CFR Sections 1910.1200, 1915.1200, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right-to-know" laws and regulations should be strictly followed.

DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING.

7.2. Storage

Use dust collection to trap dust produced during loading and unloading. Keep containers closed and store bags to avoid accidental tearing, breaking, or bursting.

7.3. Specific uses

Apply safe handling recommendations in Section 7.1.

8. Exposure Controls / Personal Protection

8.1. Local Exhaust Ventilation:
Use sufficient local exhaust ventilation to reduce the level of respirable crystalline silica to below the OSHA PEL or other applicable limit (if lower than PEL). See ACGIH "Industrial Ventilation, A Manual of Recommended Practice" (latest edition).

8.2. Respiratory Protection:
If it is not possible to reduce airborne exposure levels to below the OSHA PEL or other applicable limit with ventilation, use the table below to assist you in selecting respirators that will reduce personal exposures to below the OSHA PEL. This table is part of the NIOSH Respirator Selection Logic, 2004, Chapter III, Table 1, "Particulate Respirators". The full document can be found at www.cdc.gov/niosh/npptl/topics/respirators; the user of this MSDS is directed to that site for information concerning respirator selection and use. The assigned protection factor (APF) is the minimum anticipated level of protection provided by each type of respirator worn in accordance with an adequate respiratory protection program. For example, an APF of 10 means that the respirator should reduce the airborne concentration of a particulate by a factor of 10, so that if the workplace concentration of a particulate was 150 ug/m^3, then a respirator with an APF of 10 should reduce the concentration of particulate to 15 ug/m^3.

Assigned protection factor [1]	Type of Respirator (Use only NIOSH-certified respirators)
10	Any air-purifying elastomeric half-mask respirator equipped with appropriate type of particulate filter. [2] Appropriate filtering facepiece respirator. [2,3] Any air-purifying full facepiece respirator equipped with appropriate type of particulate filter. [2] Any negative pressure (demand) supplied-air respirator equipped with a half-mask.
25	Any powered air-purifying respirator equipped with a hood or helmet and a high efficiency (HEPA) filter. Any continuous flow supplied-air respirator equipped with a hood or helmet.
50	Any air-purifying full facepiece respirator equipped with N-100, R-100, or P-100 filter(s). Any powered air-purifying respirator equipped with a tight-fitting facepiece (half or full facepiece) and a high-efficiency filter. Any negative pressure (demand) supplied-air respirator equipped with a full facepiece. Any continuous flow supplied-air respirator equipped with a tight-fitting facepiece (half or full facepiece). Any negative pressure (demand) self-contained respirator equipped with a full facepiece.
1,000	Any pressure-demand supplied-air respirator equipped with a half-mask.

1. The protection offered by a given respirator is contingent upon (1) the respirator user adhering to complete program requirements (such as the ones required by OSHA in 29CFR1910.134), (2) the use of NIOSH-certified respirators in their approved configuration, and (3) individual fit testing to rule out those respirators that cannot achieve a good fit on individual workers.
2. Appropriate means that the filter medium will provide protection against the particulate in question.
3. An APF of 10 can only be achieved if the respirator is qualitatively or quantitatively fit tested on individual workers.

8.3. Exposure controls

8.3.1. Occupational exposure controls / guidelines

Component	CAS No.	OSHA PEL		ACGHI TLV		NISOSH REL		
		TWA	STEL	TWA	STEL	TWA	STEL	Unit
Crystalline Silica (quartz)	14808-60-7	$\frac{10}{\%\ SiO_2 + 2}$	None	0.025	None	0.05	None	mg / m^3

If crystalline silica (quartz) is heated to more than 870°C, quartz can change to a form of crystalline silica known as tridymite; if crystalline silica (quartz) is heated to more than1470°C, quartz can change to a form of crystalline silica known as cristobalite. It OSHA PEL for crystalline silica as tridymite or cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

Engineering Controls:
Ventilation must be adequate to maintain the crystalline silica concentrations in the workplace air below the exposure limit(s) outlined in Section 8.3.1 of this Safety Data Sheet.

Respiratory Protection
In case of exposure to dust, and in any case if such exposure is above regulatory limits (see above), wear a personal respirator as outlined in Section 8.2 above.

Eye / Face Protection:
If eye contact while using product may be anticipated, wear appropriate safety glasses with side shields or chemical goggles [as described by European Standard EN 166].

Skin Protection
Maintain good industrial hygiene. Protection recommended for workers suffering from dermatitis or sensitive skin.

8.3.2. Environmental Exposure Controls

No special requirements. There is no reported ecotoxicity for silica, a naturally occurring substance abundantly present in nature.

9. Physical and Chemical Properties

9.1. General Information

Physical State:	White or tan sand: granular, crushed or ground to a powder.
Odor:	None

9.2. Important Health, Safety and Environmental Information

pH:	6 - 8
Specific Gravity:	2.65 g/cc
Melting Point:	3110°F/1710°C
Freezing Point	Not Applicable
Boiling Point:	4046°F/2230°C
Flashpoint:	Not Applicable
Flammability:	Not Applicable
Explosive properties:	Not Applicable
Oxidizing properties:	contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, and oxygen difluoride may cause fires.
Vapor Pressure:	None
Relative Density:	Not Applicable
Solubility*:*	Silica will dissolve in hydrofluoric acid and produce a corrosive gas, silicon tetrafluoride
Water Solubility:	Insoluble
Percent Volatiles by Volume:	Not Applicable
Viscosity:	Not Applicable

Vapor density:	Not Applicable
Molecular Weight:	60.08
Evaporation rate:	Not Applicable

10. Stability and Reactivity

10.1. Chemical Stability:
Stable

10.2. Conditions to Avoid:
Contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, and oxygen difluoride may cause fires.

10.3. Materials / Chemicals to Be Avoided:
Contact with powerful oxidizing agents, such as fluorine, chlorine trifluoride and oxygen difluoride, may cause fires.

10.4. Hazardous Decomposition Products:
Will not occur.

10.5. Hazardous Polymerization:
Will not occur.

11. Toxicological Information

The method of exposure that can lead to the adverse health effects described below is inhalation.

A. SILICOSIS

The major concern is silicosis, caused by the inhalation of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years (15 to 20 or more) of prolonged repeated inhalation of relatively low levels of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis. Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF). Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath and cough. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (cor pumonale).

Accelerated Silicosis can occur with prolonged repeated inhalation of high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of initial exposure. Progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that lung lesions appear earlier and progression is more rapid.

Acute Silicosis can occur after the repeated inhalation of very high concentrations of respirable crystalline silica over a short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough, weakness and weight loss. Acute silicosis is fatal.

B. CANCER

IARC - The International Agency for Research on Cancer ("IARC") concluded that "crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (Group 1)". For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C,"A Review of Human Carcinogens: Arsenic, Metals, Fibres and Dusts " (2011).

The American College of Occupational and Environmental Medicine ("ACOEM") notes: "In 1996, [IARC] re-classified silica as a Class I human lung carcinogen, based on sufficient animal and human data. Although the degree of increased risk varies (with relative risks ranging from 1.3 to 6.9), the risk appears to be greatest in workers with silicosis who smoke. The cancer risk to silica-exposed workers without silicosis (especially if they are not smokers) is less clear despite continuing research, some of which has yielded disparate results." ACOEM, "Medical Surveillance of Workers Exposed to Crystalline Silica", June 2005.

The EU Scientific Committee for Occupational Exposure Limits (SCOEL) concluded in June 2002 (SCOEL Sum Doc. 94-final): "The main effect in humans of inhalation of respirable silica dust is silicosis. There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore preventing the onset of silicosis will also reduce the cancer risk."

C. AUTOIMMUNE DISEASES

Several studies have reported excess cases of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis -- among silica-exposed workers.).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to tuberculosis bacteria. Individuals with chronic silicosis have a three-fold higher risk of contracting tuberculosis than similar individuals without silicosis.

E. KIDNEY DISEASE

Several studies have reported excess cases of kidney diseases, including end stage renal disease, among silica-exposed workers. For additional information on the subject, the following may be consulted: "Kidney Disease and Silicosis", Nephron, Volume 85, pp. 14-19 (2000).

F. NON-MALIGNANT RESPIRATORY DISEASES

The reader is referred to Section 3.5 of the NIOSH Special Hazard Review cited below, for information concerning the association between exposure to crystalline silica and chronic bronchitis, emphysema and small airways disease. There are studies that disclose an association between dusts found in various mining occupations and non-malignant respiratory diseases, particularly among smokers. It is unclear whether the observed associations exist only with underlying silicosis, only among smokers, or result from exposure to mineral dusts generally (independent of the presence or absence of crystalline silica, or the level of crystalline silica in the dust).

Sources of information:

The ***NIOSH Hazard Review - Occupational Effects of Occupational Exposure to Respirable Crystalline Silica*** published in April 2002 summarizes and discusses the medical and epidemiological literature on the health risks and diseases associated with occupational exposures to respirable crystalline silica. The *NIOSH Hazard Review* should be consulted for additional information, and citations to published studies on health risks and diseases associated with occupational exposure to respirable crystalline silica. The *NIOSH Hazard Review* is available from NIOSH - Publications Dissemination, 4676 Columbia Parkway, Cincinnati, OH 45226, or through the NIOSH web site, www.cdc.gov/niosh/topics/silica, then click on the link "NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica".

For a more recent review of the health effects of respirable crystalline silica, the reader may consult *Fishman's Pulmonary Diseases and Disorders*, Fourth Edition, Chapter 57. "Coal Workers' Lung Diseases and Silicosis".

12. Ecological Information

12.1. Ecotoxicological Information:
Crystalline silica (quartz) is not known to be ecotoxic; i.e., no data suggests that crystalline silica (quartz) is toxic to birds, fish, invertebrates, microorganisms or plants.

13. Disposal Considerations

13.1. Waste Disposal Method:
Discard any product, residue, disposable container or liner in full compliance with national regulations.

13.2. Container Handling and Disposal:
Dispose of container and unused contents in accordance with national regulations.

14. Transportation Information

Shipping Name:

ADR/RID/IMO/ICAO /US DOT	**Proper Shipping Name**	Not Regulated
	Hazard Class	Not Regulated
	ID Number	Not Regulated
	Packaging Group	Not Regulated

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

15. Regulatory Information

Silica sand has no harmonized classification & labeling under Directives 67/548/EEC and 1999/45/EC. Because the respirable fraction is high (10% and more) in ground silica (flour), the preparation is self-classified as Xn (harmful). In such case, the following risk and safety phrases are applicable.

Risk Phrases:
R 48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation.
Safety Phrases:
S 22: Do not breathe dust.
S 38: In case of insufficient ventilation, wear suitable respiratory equipment.

UNITED STATES (FEDERAL AND STATE)

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act (SARA Title III): Crystalline silica (quartz) is not an extremely hazardous substance under Section 302 and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by U.S. Silica Company is not processed with or does not contain any Class I or Class II ozone depleting substances.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).

NTP: Silica, crystalline (respirable size) is classified as Known to be a Human Carcinogen.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

California Proposition 65: Crystalline silica (airborne particles of respirable size) is classified as a substance known to the State of California to be a carcinogen.

California Inhalation Reference Exposure Level (REL): California established a chronic REL of 3 µg for silica (crystalline, respirable). A chronic REL is an airborne level of a substance at or below which no adverse health effects are anticipated in individuals indefinitely exposed to the substance at that level.

Massachusetts Toxic Use Reduction Act: Silica, crystalline (respirable size, <10 microns) is “toxic” for purposes of the Massachusetts Toxic Use Reduction Act.

Pennsylvania Worker and Community Right to Know Act: Quartz is a hazardous substance under the Act, but it is not a special hazardous substance or an environmental hazardous substance.

CANADA

Domestic Substances List: U. S. Silica Company products, as naturally occurring substances, are on the Canadian DSL.

WHMIS Classification: D2A

OTHER

EINECS No.: 238-878-4

EEC Label (Risk/Safety Phrases): R 48/20, S22, S38

CLP Label (Hazard Class/Hazard Statement/Precaution Statements):
STOT RE 1/ H372/ P260, P285, P501

IARC: Crystalline silica (quartz) is classified in IARC Group 1.

Australian Inventory of Chemical Substances (AICS): All of the components of this product are listed on the AICS inventory or exempt from notification requirements.

Japan Ministry of International Trade and Industry (MITI): All of the components of this product are existing chemical substances as defined in the Chemical Substance Control Law Registry Number 1-548.

Korea Existing Chemicals Inventory (KECI) (set up under the Toxic Chemical Control Law): Listed on the ECL with registry number 9212-5667.

Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed for PICCS.

National, state, provincial or local emergency planning, community right-to-know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

16. Other Information

16.1 Hazardous Material Information System (HMIS):

Health	*
Flammability	0
Reactivity	0
Protective Equipment	E

* For further information on health effects, see Sections 2, 8 and 11 of this MSDS.

16.2 National Fire Protection Association (NFPA):

Health	0
Flammability	0
Reactivity	0

16.3 Web Sites with Information about Effects of Crystalline Silica Exposure:

The U. S. Silica Company web site will provide updated links to OSHA and NIOSH web sites addressing crystalline silica issues: www.ussilica.com, click on “Info Center”, then click on “Health & Safety”.

The U.S. National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) maintain sites with information about crystalline silica and its potential health effects. For NIOSH, http://www.cdc.gov/niosh/topics/silica; for OSHA, http://www.osha.gov/dsg/topics/silicacrystalline/index.

The IARC Monograph concerning crystalline silica, Volume 100C, can be accessed in PDF form at the IARC web site, http://monographs.iarc.fr/ENG/Monographs/PDFs/index.php.

U. S. Silica Company Disclaimer

The information and recommendations contained herein are based upon data believed to be up-to-date and correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects that may be caused by purchase, resale, use or exposure to our silica. Customers and users of silica must comply with all applicable health and safety laws, regulations, and orders. In particular, they are under an obligation to carry out a risk assessment for the particular work places and to take adequate risk management measures in accordance with the national implementation legislation of EU Directives 89/391 and 98/24.

Date: March 2012