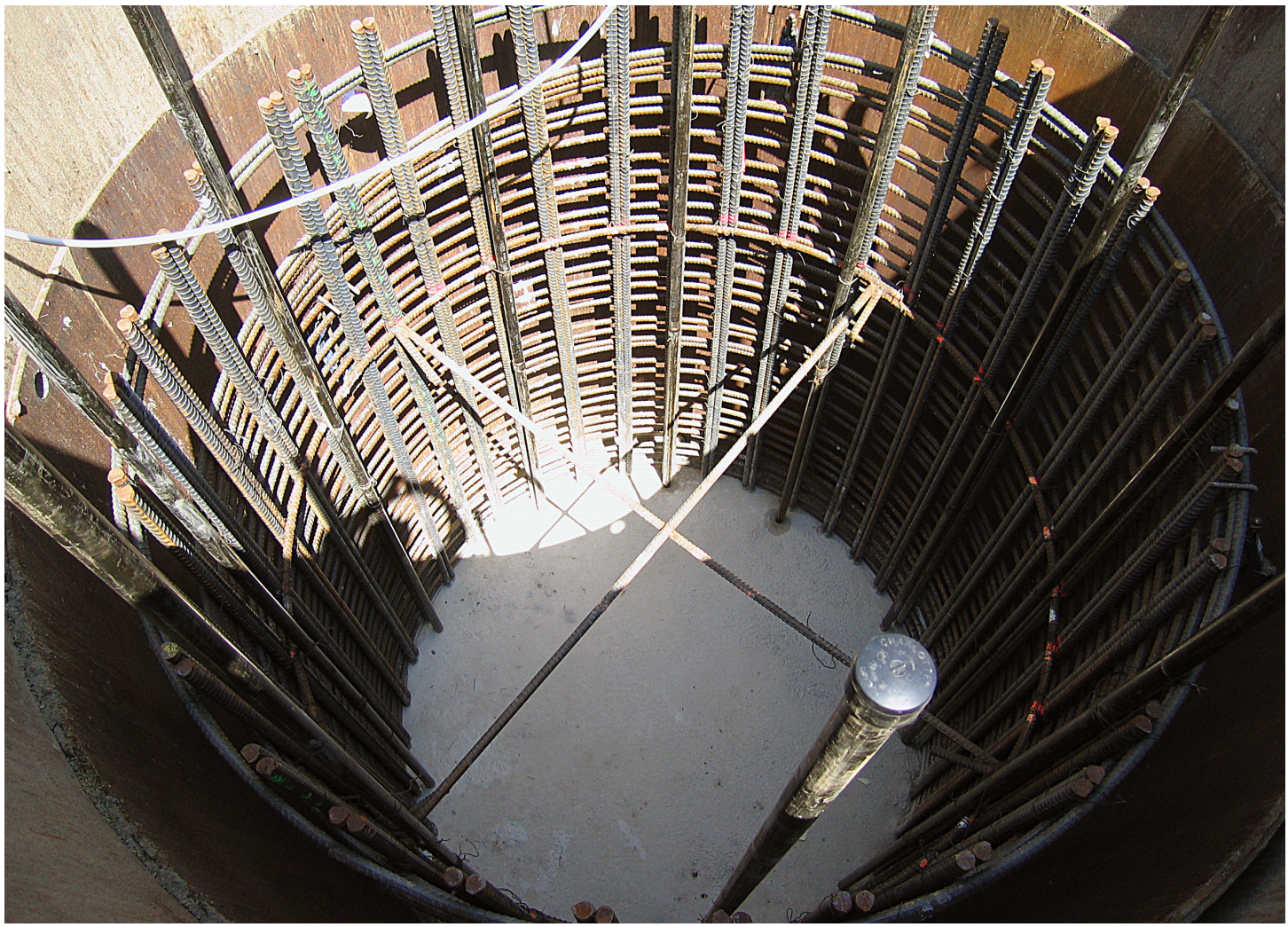
Impact of Drilled Shaft Synthetic Slurries on Groundwater Quality

WA-RD 773.1

Akram Hossain
William Cofer
David Yonge

June 2011



Washington State Department of Transportation
Office of Research & Library Services

WSDOT Research Report

FINAL REPORT

IMPACT OF DRILLED SHAFT SYNTHETIC SLURRIES ON GROUNDWATER QUALITY

Phase I: Literature Survey

Authors:

Akram Hossain, William Cofer, and David Yonge

Department of Civil and Environmental Engineering
Washington State University

Prepared for

Washington State Department of Transportation
Paula J. Hammond, Secretary
Olympia, WA 98504-7372

June 2011

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENTS CATALOG NO
WA-RD 773.1		

4. TITLE AND SUBTITLE	5. REPORT DATE
Impact of Drilled Shaft Synthetic Slurries on Groundwater Quality	June 2011
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Akram Hossain, William Cofer, and David Yonge	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
Washington State Transportation Center (TRAC) Washington State University Dept. of Civil and Environmental Engineering Pullman, WA 99164-2910	11. CONTRACT OR GRANT NO. T4120-18
12. CO-SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Washington State Department of Transportation Research Office Olympia, WA 98504-7372 Research Manager: Kim Willoughby 360.705.7978	Final Report 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

This study was conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

16. ABSTRACT

The overall objective of this project is to evaluate the effect of the aforementioned synthetic slurries on groundwater quality. The objective of Phase I (this report), however, was to conduct a comprehensive literature survey to gather data to evaluate the effect of the WSDOT approved synthetic slurries on groundwater quality. Since chemical and bioassay information exists for only two products and the analyses were performed in 1991 and 1998, it is our recommendation that the slurries currently being used by WSDOT contractors be tested again for priority pollutants and toxicity. New testing would result in a consistent data set as all samples would undergo the same, most recent EPA protocol. Analysis should be performed on samples that are representative of field conditions (at the working concentration and containing any additives). The results would be used to assist in evaluation of potential groundwater contamination as well as slurry disposal issues.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
Polymer slurry, drilled shafts, groundwater quality	No restrictions.

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
None	None	90	

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

TABLE OF CONTENTS

INTRODUCTION	5
OBJECTIVE	5
SURVEY METHODOLOGY	5
RESULTS	6
The MSDS	6
Chemical Analysis and Bioassay Test Results	7
SUMMARY	9
RECOMMENDATION	10
Appendix A: List of Documents Sent by the WSDOT	11
Appendix B: Material Safety Data Sheet	15
NOVAGEL	16
Shore PAC	21
Slurry Pro CDP	26
Super Mud	30
Appendix C: Bioassay and Analytical Test Results	35
Shore PAC	36
Super Mud	65

INTRODUCTION

The Washington State Department of Transportation (WSDOT) constructs about 150 large diameter drilled shafts to support bridge foundations and retaining walls annually. Shafts are generally uncased, 30 to 200 feet deep, and 2-10 feet in diameter. Construction of uncased drilled shafts requires the use of thousands of gallons of synthetic slurry for stability.

The WSDOT approves the use of "Novagel", "Shore Pac GCV", "SlurryPro CDP", and "Super Mud" as synthetic slurries to construct drilled shafts. There is always some loss of synthetic slurries in the surrounding soils under the groundwater table. The impact of loss of WSDOT approved synthetic slurries on groundwater quality is not known and needs to be investigated.

OBJECTIVE

The overall objective of this project is to evaluate the effect of the aforementioned synthetic slurries on groundwater quality. The objective of Phase I (this report), however, was to conduct a comprehensive literature survey to gather data to evaluate the effect of the WSDOT approved synthetic slurries on groundwater quality.

SURVEY METHODOLOGY

The survey was comprised, primarily, of a review of documents sent by the WSDOT, consulting with the manufacturers for relevant information, and a survey of published scientific literature of interest.

The World Wide Web connected by "Google" was explored for any published information on the synthetic slurries of interest. Scientific databases subscribed by the Washington State University (WSU) were also explored. Further, the webpages maintained by the manufacturers were investigated for pertinent information.

The WSDOT provided a boxful of documents on the following synthetic slurries.

1. Polybore™ polymer
2. Shore Pac GCV

3. Slurry Pro CDP
4. Super Mud

The documents are listed in Appendix A. Some documents were supplied in duplicate as indicated in the Appendix.

RESULTS

The review enabled us to obtain material safety data sheets (MSDS) of the slurries of concern. The MSDS obtained are included in Appendix B. The review also made it possible to obtain bioassay and chemical analysis data for some of the slurries. These data are included in Appendix C.

The MSDS

Novagel is described as a mixture based on acrylate/acrylamide copolymer and is not considered a hazardous waste, according to the manufacturer. It can be disposed as a non-hazardous liquid waste in compliance with state and local regulations. It is reported to be a very low toxicity substance.

Shore Pac GCV is described as a copolymer of sodium acrylate and acrylamide. It is considered neither hazardous nor carcinogenic. The product is claimed to have no known adverse effect on human health. The material is not expected to be harmful to aquatic life under normal use. However, ecological injuries are not known or are not expected under normal use. This product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide, and low molecular weight hydrocarbons upon decomposition.

Slurry Pro CDP is reported to belong to the “chemical family” of “vinyl polymer”. It is reported to be neither hazardous nor regulated. It is reported to have low toxicity on fish. If incinerated, thermal decomposition byproducts would include low levels of carbon monoxide, carbon dioxide, and various nitrous oxides.

Super Mud is described as an "anionic polyacrylamide in water-in-oil emulsion". It is reported to contain 24% petroleum distillate. Its acute oral (rat) and acute dermal (rabbit) LD50 is reported to be grater than 10 ml/kg. It is highly volatile (~70% by weight). Acute overexposure to petroleum distillate may cause eye and throat irritation. Severe skin irritation is expected with direct skin contact of the petroleum distillate. Pertinent information of these slurries obtained from the respective MSDS are presented in Table 1.

Table 1. Pertinent Information from MSDS Datasheets.

Slurry	**Chemical Family**	**Skin & Eye Irritation**	**Flammability**	**pH**	**Aquatic Toxicity**	**Source**
Novagel	Acrylate/acrylamide	Minor	Not flammable	6-8[1]	Very low	MSDS 3/15/03
Shore PAC	Sodium acrylate/acrylamide	Yes	Not available	Not available	Expected not to be harmful	MSDS 1/29/09
SlurryPro CDP	Vinyl Polymer	Yes (Appears to be)	Not flammable	Not available	Low	MSDS 08/03/07
Super MUD	Anionic polyacrylamide	Minimal eye and moderate skin	Flash point > 200ºF	Not available[2]	Not available	MSDS

[1]pH of a simple system (simple system is not defined in the MSDS)
[2]In a CD, the optimum pH is reported to be 8-10

Chemical Analysis and Bioassay Test Results

Shore Pac GCV and Super Mud were tested for a host of chemical constituents and toxicity. The results are summarized below and the detailed test results are presented in Appendix C.

Shore PAC GCV Slurry

A 1 lb per 500 gal slurry of Shore PAC was sent for chemical testing in October of 1998 and was tested by Great Lakes Analytical in Buffalo Grove, IL. We are assuming that the pound/500 gal concentration is representative of the slurry used during field application. The slurry was analyzed for chemical oxygen demand (COD), biochemical oxygen demand (BOD), pH, oil and grease, and priority pollutants. The priority pollutant scan includes cyanide, a list 13 metals, polychlorinated biphenyls (PCB), volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) and organochlorine pesticides. Standard EPA protocol was used for all

analyses. The pH of the slurry was reported as 7.3. The only constituents that were above the method detection limits were acetone (noted as likely being an artifact from laboratory contamination), bromodichloromethane (4.4 µg/L) and chloroform (7.6 µg/L). The latter two compounds are in the VOC group. It was noted in the analytical report that the concentrations of these two VOCs are "characteristic of those found in chlorinated drinking water".

The Shore PAC slurry was also tested for toxicity using the fathead minnow as the test species under standard toxicity testing protocol. The slurry was diluted, per protocol, with synthetic moderately hard water. The dilutions ranged from 0% (moderately hard water only) up to 10%. We are assuming that the percentage is reported on a volume basis. The number of deaths is reported after a 96 hour exposure period. Essentially no deaths occurred at the highest (10%) concentration. As a result, the lethal concentration that results in 50% of the test organisms dying (LC50) was reported as > 10%. Table 2 summarizes the results for Shore PAC and the actual test results can be found in Appendix C.

Table 2. Chemical Analysis Results for Shore PAC GCV.

Analyte	EPA Method	Results/Comments
BOD_5	405.1	ND[1]
COD	410.4	ND
pH	150.1	7.3
Oil and Grease		ND
Metals	3015	ND
Pesticides	8081	ND
PCB's	8082	ND
VOC's	8260	ND except acetone (15A)[2], bromodichloromethane (4.4 µg/L), chloroform (7.6 µg/l)
Semi-VOC's	8270	ND
Cyanide	9012	ND

[1] non-detectable concentration
[2] not described in the report

Super Mud

Super Mud was also tested for priority pollutants and toxicity, but unlike Shore PAC, the pure product was tested. The only constituents that tested above detection limits were cyanide (4.8 mg/kg) and copper (3.9 mg/kg). In the analysis report supplied by the manufacturer, they present comparisons to California and Federal allowable drinking water concentrations. We are confused regarding this comparison because the drinking water standards are in mg/L units but

the reported constituent concentrations are in mg/kg and µg/kg. It is not clear, therefore, if this comparison can be made.

Super Mud was also tested for toxicity in a similar fashion as Shore PAC. However, it was tested by making dilutions into moderately hard water using the full-strength product, not the field strength product (diluted at 1 gal per 800 gal). The reported LC50 was 3.2%. Table 3 summarizes the results for Super Mud and the actual test results can be found in Appendix C.

Table 3. Chemical Analysis Results for Super Mud.

Analyte[1]	**EPA Method**[3]	**Results/Comments**
VOC's	624	ND[2]
Acid Extractable Organics	625	ND
Base Neutral Compounds	625	ND
Pesticides	608	ND
PCB's	608	ND
Cyanide		4.8 mg/kg
Copper		3.9 mg/kg
pH		8 – 10 (optimum zone)

[1] The priority pollutant list testing was performed on PURE PRODUCT. In usage "the product is diluted to 800 parts water to one part Super Mud." These statements are taken directly from the report.
[2] non-detectable concentration
[3] The numbers were assumed to be referring to EPA methods

It appears that similar tests were done for Slurry Pro CDP, however, we were unable to obtain the test results.

SUMMARY

Based on the results of the priority pollutant analysis and toxicity testing for Shore PAC and Super Mud, one can conclude, as it was concluded by the manufacturer, that these products, when used at field concentrations, are unlikely to pose a threat to groundwater quality. However, the state of Washington has its own groundwater standard and the testing was done in other states. Further, geochemical environment can change the chemistry and associated toxicity of the slurries.

RECOMMENDATION

Since chemical and bioassay information exists for only two products and the analyses were performed in 1991 and 1998, it is our recommendation that the slurries currently being used by WSDOT contractors be tested again for priority pollutants and toxicity. New testing would result in a consistent data set as all samples would undergo the same, most recent EPA protocol. Analysis should be performed on samples that are representative of field conditions (at the working concentration and containing any additives). The results would be used to assist in evaluation of potential groundwater contamination as well as slurry disposal issues. In summary, the following analytical testing is suggested.

1. Test the fresh slurries for priority pollutants, toxicity, pH, alkalinity, biochemical oxygen demand (BOD, and chemical oxygen demand (COD) at field concentrations and containing any additives.
2. Test for priority pollutants, toxicity, pH, alkalinity, BOD, COD, and total suspended solids (TSS) of the used slurries prior to preparing them for disposal.
3. Test for priority pollutants, toxicity, pH, alkalinity, BOD, COD, and TSS of the slurries following preparation for disposal.

The priority pollutant testing includes testing for 128 compounds (organics, metals, asbestos, and total cyanide). The list of compounds is outlined in volume 40 of the Code of Federal Regulations (40 CFR), Part 423. The recommended toxicity testing is the 96 hour acute toxicity using trout and daphnia. It is suggested that these tests be performed at laboratories certified in Washington state and would be done on representative samples for field application.

The recommended testing would also assist in making decisions regarding ultimate disposal of the used slurries. In addition to toxicity and priority pollutants, values of pH, alkalinity, BOD, COD and TSS would be important if disposal is considered in a wastewater treatment facility.

Appendix A

Documents Sent by the WSDOT

POLYBORE™ POLYMER

[1] Characterization of the effect of Poly-Bore™ polymer on the construction and performance of drilled shaft foundations: Phase I. (*2 copies*)
Prepared by Alaa Ata and Michael O'Neill, Department of Civil and Environmental Engineering, University of Houston, Houston, Texas 77204-4791, May, 1997.

[2] Characterization of the effect of Poly-Bore™ polymer on the construction and performance of drilled shaft foundations, Phase II. (*2 copies*)
Prepared by Alaa Ata and Michael O'Neill, Department of Civil and Environmental Engineering, University of Houston, Houston, Texas 77204-4791, October, 1997

[3] ADSC-WSDOT Task Force: A Discussion of potential issues to Drilling Shafts Under Slurry versus Open or Cased Drilling Methods: Sidewall Friction Capacity, Reinforcing Steel Bond, "Boney Ground", and Environmental Issues. (*2 copies*)
Prepared by Chris Burnell, Baroid Industrial Drilling Products, PO Box 287, Winnemucca, NV 89446, chris.burnell@halliburton.com .

SHORE PAC GCV

[4] Shore Pac GCV Final Report for Caltrans Approved List of Synthetic Drilling Slurry's.
Prepared by John H. Berry, Hydrogeolgist, CETCO, April 29, 1999.

[5] Pile Load Test Report: Caltrans Approval for Shore Pac GCV Synthetic Slurry: Central Viaduct Seismic Retrofit, San Francisco, California.
Prepared by Delta Geotechnical Services, 4408 G Street, Sacramento, CA 95819.

[6] Shore Pac GCV Drilling & Mixing Field Guide.
Prepared by CETCO Drilling Products, 1500 W. Shure Dr., Arlington Heights, IL 60004.

[7] An Untitled Document submitted to the WSDOT containing results of chemical analysis and biomonitoring report.

SLURRY PRO CDP

[8] A Technical Discussion & Historical Overview: A Slurry and Earth Stabilization system for the New Millennium. (Booklet)
Prepared by KB Technologies, Suite 107, 3648 FM 1960 West, Houston, TX 77068.

[9] A Technical Discussion & Historical Overview: A Slurry and Earth Stabilization system for the New Millennium. (Spiral Bound) (*2 copies*)
Prepared by KB Technologies, Suite 107, 3648 FM 1960 West, Houston, TX 77068.

[10] KB International's Response to ADSC/WASH DOT Questions.
Prepared by K. G. Goodhue, Director, Research and Marketing, KB International.

[11] General Operating, Product Application and Slurry Testing Procedures and Recommendations for Bored Piles in Normal Soil Contions.
Prepared by KB International LLC, P.O. Box 680648, Houston, TX 77268.

[12] Load Test Program: New Mexico DOT: I-25 Bridge over Cuchillo Negro River: Truth or Consequences, New Mexico. (*2 copies*)
Prepared by Albuquerque Caisson & Foundation Drilling.

[13] Nine CDs: one on the product, one on environmental and toxicological information, and seven on load tests.
Prepared by KB International LLC, P.O. Box 680648, Houston, TX 77268.

SUPER MUD

[14] Super MUD & Super MUD Dry Polymer Drilling Slurry: WSDOT Submittal: August 2003. (*2 copies*)
Submitted by Robert G. Ryan, President, PDSCo Polymer Drilling System, Prepared by PDSCo Polymer Drilling System, P.O. Box 507 El Dorado, AR 71731, August 21, 2003.

[15] Super MUD Polymer Slurry for Excavation Protection.
Prepared by PDSCo Polymer Drilling System, P.O. Box 507 El Dorado, AR 71731.

[16] Data Report on Drilling Shaft Load Testing (OSTERBERG Method): Production Shaft 1-01- Four seasons Hotel 1441 Brickell Avenue, Miami FL (LT-8536-4). (*2 copies*)
Prepared by Deep Foundation Test, Equipment & Services, 2631-D NW 41st Street, Gainsville, FL 32606.

Appendix B

Material Safety Data Sheet (MSDS)

MSDS for NOVAGEL

MATERIAL SAFETY DATA

Geo-Tech Drilling Fluids
22 Free Street
Hingham, MA 02043, USA
1-781-875-1140
1-888-932-3299
info@geotech.us

1. CHEMICAL PRODUCT IDENTIFICATION

Product Name:	**NOVAGEL™ Drilling Fluid**
Synonyms:	"Polymer slurry"
Chemical Family:	Mixture based on acrylate/acrylamide copolymer
CAS Reg. No.:	None
Formula:	Mixture
Emergency Phone No.:	1-781-875-1140, 1-888-932-3299

2. COMPOSITION/INGREDIENTS

NAME	CAS Nº	%
Aqueous solution of water-soluble polymer(s). Trade secret. Basic fluid contains Novagel™ polymer and water. Optional formulations may contain pH buffers, Sand Magnet™ additive, Depth Charge™ additive, mineral flour, et al.		100

3. HEALTH HAZARD INFORMATION

Inhalation:	Not applicable.
Ingestion:	May cause discomfort or gastrointestinal disturbance. Low oral toxicity.
Skin:	May cause minor irritation, especially after prolonged or repeated contact.
Eyes:	Contact may cause temporary blurring of vision and/or minor irritation.
Permissible Conc. in Air:	Not applicable.
Unusual Chronic Toxicity:	None known.

4. EMERGENCY AND FIRST AID PROCEDURES

Skin:	Wash off with water. Wipe and dry skin with paper towel or cotton towel.
Eyes:	Immediately flush with water for 5 minutes. If there is irritation, seek medical attention.
Ingestion:	If conscious, immediately give 2 to 4 glasses of water. Get medical attention.

5. FIRE AND EXPLOSION DATA

FLAMMABLE PROPERTIES

Flash Point:	Not flammable
Flammable Limits:	Not flammable
Autoignition Temp:	Not applicable
Decomposition Temp:	Not available

6. PHYSICAL AND CHEMICAL PROPERTIES

Material is (at normal conditions):	Liquid
Appearance and Odor:	Clear viscous liquid ("thick water"). Odorless.
pH:	pH of simple system 6 to 8. With buffers may range between 7 and 11.
Boiling Point:	>200° F
Melting Point:	Not applicable
Specific Gravity:	1.00 – 1.20
Vapor Pressure:	Negligible (at 20° C / 68° F)
Vapor Density:	1.00 absolute
Solubility in Water:	Material is a water solution/dispersion.
% Volatiles by Weight:	>99.5% in unweighted formulations
Evaporation Rate:	Less than butyl acetate

7. STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid:	None known
Incompatibility (materials to avoid):	If pH of fluid is above 10, may cause corrosion to aluminum, or to galvanized metal parts.
Hazardous Decomposition Products:	None known.
Hazardous Polymerization:	Will not occur.

8. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:	None required for prepared fluid.
Ventilation:	Ventilation is not a major concern, but should be provided in closed areas.
Eye & Face Protection:	Goggles advised.
Hands, Arms, & Body:	Standard work clothing adequate for handling prepared fluid.

9. PRECAUTIONS & PROCEDURES

Fire Extinguishing Agents Recommended:	Not applicable. The fluid is not flammable.
Fire Extinguishing Agents to Avoid:	None.
Special Fire Fighting Precautions:	Not applicable.
Ventilation:	Natural ventilation is normally adequate, as this fluid is normally used outdoors. In enclosed areas, provide positive ventilation.
Normal Handling:	Minimize contact with skin, eyes or clothing. Use normal personal hygiene and housekeeping.
Storage:	Store prepared fluid in open or closed vessels.
Spill or Leak	Use available soil or sand as absorbent to soak up spilled fluid. Dike up with same soil. Scoop up and dispose of in suitable manner. Destroy any slippery residue on spill surface by soaking with bleach water (1 par Clorox to 4 parts water). Hose off with clean water.
Special Precautions / Procedures / Label Instructions:	**CAUTION! Novagel fluids are extremely slippery!**

10. ENVIRONMENTAL

Aquatic Toxicity:	96-hour LC_{50} fathead minnows >750,000 mg/L (very low toxicity)
Octanol/Water Partition Coefficient:	Not determined
Waste Disposal Methods:	Dispose as non-hazardous liquid waste in compliance with state and local regulations.
RCRA Status of Unused Material if Discharged:	Not a "Hazardous Waste".
Hazardous Waste Number:	NA
DOT Status:	Not regulated.
Reportable Quantity:	EPA 40 CFR 302 (CERCLA 102): NA
Threshold Planning Quantity:	EPA 40 CFR 355 (SERA 311-304): NA
Toxic Chemical Release Reporting:	EPA 40 CFR 372 (SERA 311-313): NA
EPA Hazard Classification Code:	Acute - No; Chronic - No; Fire - No; Pressure - No; Reactive - No

11. TRANSPORT INFORMATION

	D.O.T. SHIPPING INFORMATION	IMO SHIPPING INFORMATION
SHIPPING NAME	Not Applicable/Not Regulated	Not Applicable/Not Regulated
HAZARD CLASS/PACKING GROUP	Not Applicable	Not Applicable
UN NUMBER	Not Applicable	Not Applicable
IMDG PAGE	Not Applicable	Not Applicable
D.O.T. HAZARDOUS SUBSTANCES	Not Applicable	Not Applicable
TRANSPORT LABEL REQUIRED	None Required	None Required

12. OTHER INFORMATION

NFPA (National Fire Protection Assoc) Hazard Ratings:

	NFPA	
Fire	0	Fire: Non-flammable material
Health	0	Health: Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.
Reactivity	0	Reactivity: Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Special	–	

This information is given without any warranty or representation, and the user of this information should satisfy himself as to its accuracy and completeness. We assume no legal responsibility. Users should read product labels carefully and seek guidance from the seller of the product as needed.

MSDS for SHORE PAC

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	SHORE PAC®
Version #	11
Revision date	29-January-2009
Chemical name	Copolymer of Sodium Acrylate and Acrylamide
Chemical description	Powder
CAS #	Mixture
Manufacturer	CETCO Construction Drilling Products 2870 Forbs Avenue Hoffman Estates, IL 60192 US safetydata@amcol.com http://www.constructiondrilling.com/ General Information (800) 527-9948 CHEMTREC® (800) 424-9300

2. Hazards Identification

Emergency overview	Health injuries are not known or expected under normal use. No hazards resulting from the material as supplied.
OSHA regulatory status	This product is considered not hazardous under 29 CFR 1910.1200 (Hazard Communication).
Potential health effects	
Eyes	Contact with eyes may cause irritation.
Skin	This product may cause irritation to the skin.
Inhalation	Inhalation of dusts may cause respiratory irritation.
Ingestion	Health injuries are not known or expected under normal use.

3. Composition / Information on Ingredients

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

Composition comments	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

4. First Aid Measures

First aid procedures	
Eye contact	Flush eyes with water as a precaution. Get medical attention if irritation develops or persists.
Skin contact	Wash off with soap and water. Launder contaminated clothing before reuse. Get medical attention if irritation develops or persists.
Inhalation	Remove to fresh air. Call a physician if symptoms develop or persist.
Ingestion	Have victim rinse mouth thoroughly with water. If ingestion of a large amount does occur, seek medical attention.
General advice	If you feel unwell, seek medical advice (show the label where possible).

5. Fire Fighting Measures

Extinguishing media	
Suitable extinguishing media	Small Fires: Dry chemical, CO2, water spray or regular foam. Large Fires: Water spray, fog or regular foam.

6. Accidental Release Measures

Environmental precautions	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Sweep up or gather material and place in appropriate container for disposal. Avoid dust formation. Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

7. Handling and Storage

Handling	Handle and open container with care. Minimize dust generation and accumulation.
Storage	Keep the container tightly closed and dry.

8. Exposure Controls / Personal Protection

Personal protective equipment

Eye / face protection	Avoid contact with eyes. Wear dust goggles.
Skin protection	Not normally needed. Wear suitable protective clothing.
Respiratory protection	No personal respiratory protective equipment normally required. Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.

9. Physical & Chemical Properties

Appearance	Free flowing wettable powder.
Color	White.
Odor	Not available.
Odor threshold	Not available.
Physical state	Solid.
Form	Solid. Powder.
pH	Not available.
Melting point	Not available.
Freezing point	Not available.
Boiling point	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	0.8 - 1
Relative density	Not available.
Solubility (water)	Solubility limited by viscosity
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
VOC	0 % estimated
Percent volatile	0 % estimated

10. Chemical Stability & Reactivity Information

Chemical stability	Stable at normal conditions.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Further information	This product has no known adverse effect on human health.

12. Ecological Information

Ecotoxicity	This material is not expected to be harmful to aquatic life.
Environmental effects	Ecological injuries are not known or expected under normal use.
Persistence and degradability	Not available.

13. Disposal Considerations

Disposal instructions	Dispose in accordance with all applicable regulations.

14. Transport Information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations

This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazarc Communication Standard, 29 CFR 1910.1200.
CERCLA/SARA Hazardous Substances - Not applicable.

OSHA Process Safety Standard: This material is not known to be hazardous by the OSHA Highly Hazardous Process Safety Standard, 29 CFR 1910.119.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of New and Existing Chemicals (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

16. Other Information

Further information

This safety datasheet only contains information relating to safety and does not replace any product information or product specification.

Recommended restrictions

Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations.

HMIS ratings

NFPA ratings

Health: 0
Flammability: 0
Instability: 0

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The manufacturer expressly does not make any representations, warranties, or guarantees as to its accuracy, reliability or completeness nor assumes any liability, for its use. It is the user's responsibility to verify the suitability and completeness of such information for each particular use.

Third party materials: Insofar as materials not manufactured or supplied by this manufacturer are used in conjunction with, or instead of this product, it is the responsibility of the customer to obtain, from the manufacturer or supplier, all technical data and other properties relating to these and other materials and to obtain all necessary information relating to them. No liability can be accepted in respect of the use of this product in conjunction with materials from another supplier. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Issue date

29-January-2009

This data sheet contains changes from the previous version in section(s):

Other Information: Disclaimer
Other Information: Other information
Other Information: Recommended restrictions
Other Information: Further information

Other information

CETCO is an AMCOL International company.

MSDS for SLURRYPRO CDP

Material Safety Data Sheet: SlurryPro® CDP™

August 3, 2007

KB International LLC
735 Broad St., Suite 209
Chattanooga, TN 37402
Phone: (281) 880-7505 Fax: (832) 201-9196 email: info@kbtech.com

1. MATERIAL IDENTIFICATION

Product Name:	SlurryPro® CDP™
Chemical Family:	Vinyl polymer
CAS Reg. No.:	Proprietary
Formula:	Proprietary
Emergency Phone No.:	(1) (281) 880-7505

2. HAZARDOUS INGREDIENTS

Material or Component	Wt %	Hazard Data
No hazardous components		NA

3. PHYSICAL DATA

Material is (at normal conditions):	Solid	
Appearance and Odor:	White granular solid. Odorless.	
pH:	NA	
Boiling Point:	NA	
Melting Point:	ND	
Specific Gravity:	1.00-1.25 (Water = 1.0)	
Vapor Pressure:	NA	(mg Hg / 20°C)
Vapor Density:	NA	(Air = 1.0)
Solubility in Water:	1%	(% by weight)
% Volatiles by Volume:	ND	(at 20°C)
Evaporation Rate:	NA	(Butyl Acetate = 1) (Ether = 1)

4. REACTIVITY DATA

Stability:	Stable
Conditions to Avoid:	NA
Incompatibility (materials to avoid):	Oxidizing agents - may cause exothermic reaction.
Hazardous Decomposition Products:	If incinerated at high temperature under controlled conditions, thermal decomposition byproducts would include low levels of carbon monoxide, carbon dioxide, various nitrous oxides.
Hazardous Polymerization:	Will not occur.

Revision Date: August 3, 2007 NR=Not Required NE=Not Established NA=Not Applicable ND=Not Determined

5. FIRE AND EXPLOSION DATA

Flash Point:	Not flammable
Auto Ignition Temperature:	ND
Flammable Limits in Air % by Volume:	ND
Unusual Fire and Explosion Hazards:	See decomposition products

6. HEALTH HAZARD INFORMATION

Inhalation:	Dust may irritate respiratory tract.
Ingestion:	May cause discomfort or gastrointestinal disturbance. Low oral toxicity.
Skin:	May cause irritation, especially after prolonged or repeated contact.
Eyes:	Dust contact and solution contact may cause irritation.
Permissible Concentration in Air:	None published for polymer.
Unusual Chronic Toxicity:	None known.

7. EMERGENCY AND FIRST AID PROCEDURES

Inhalation:	Remove to fresh air. Apply mouth-to-mouth artificial respiration if not breathing. Get immediate medical attention.
Skin:	Flush with plenty of soap and water for at least 15 minutes. If irritation persists, get medical attention.
Eyes:	Immediately flush with water, continuing for 15 minutes. Get medical attention.
Ingestion:	If conscious, immediately give 2 to 4 glasses of water. Get medical attention.

8. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:	If dusty conditions are encountered, wear NIOSH approved dust respirator.
Ventilation:	General room ventilation should be satisfactory.
Eye & Face Protection:	Safety glasses for normal handling conditions. Goggles when handling solutions. Do not wear contact lens.
Hands, Arms, & Body:	Rubber gloves and full work clothing. Add protective (rubber) clothing if splashing or repeated contact with solution is likely.

9. PRECAUTIONS & PROCEDURES

Fire Extinguishing Agents Recommended:	Foam, carbon dioxide, or dry chemical
Fire Extinguishing Agents to Avoid:	Water may cause extremely slippery conditions.
Special Fire Fighting Precautions:	Wear self-contained breathing apparatus. Solutions of product are extremely slippery.
Ventilation:	Local exhaust if dusting occurs. Natural ventilation - adequate in absence of dust.

Revision Date: August 3, 2007 NR=Not Required NE=Not Established NA=Not Applicable ND=Not Determined

9. PRECAUTIONS & PROCEDURES - Continued

Normal Handling:	Avoid contact with skin, eyes or clothing. Do not inhale dusts. Use normal personal hygiene and housekeeping.
Storage:	Store in a cool, dry place.
Spill or Leak (Always Wear Personal Protective Equipment):	Sweep up or shovel into metal or plastic container. Immediately cover with commercial or other available absorbent. Close and store as above. Water may be used to complete cleaning. Large spill: Dike up with same material. Mop up or pump into same container and so forth.
Special Precautions / Procedures / Label Instructions:	Product solutions are extremely slippery.

10. ENVIRONMENTAL

Degradability / Aquatic Toxicity:	In combination with UV light for 48 hours, the resulting test solutions are biodegradable in 38 days to at least 29% to <3,000 Daltons (size of mass fragments) in a certified test study. The product is rated as a low toxicity to fish, LC 50/96 hours is 357 mg/L to Brachydanio; Bioaccumulation partition coefficient (Pow)=0 ; No potential to bio accumulate.
Octanol/Water Partition Coefficient:	Not determined
Waste Disposal Methods:	Dispose as non-hazardous solid waste in compliance with state, and local regulations.
RCRA Status of Unused Material if Discharged:	Not a "Hazardous Waste".
Hazardous Waste Number:	NA
DOT Status:	Not regulated.
Reportable Quantity:	EPA 40 CFR 302 (CERCLA 102): NA
Threshold Planning Quantity:	EPA 40 CFR 355 (SERA 311-304): NA
Toxic Chemical Release Reporting:	EPA 40 CFR 372 (SERA 311-313): NA
EPA Hazard Classification Code:	Acute - No; Chronic - No; Fire - No; Pressure - No; Reactive - No

HMIS & NFPA Ratings:	**HMIS**	**NFPA**
Health	1	1
Flammability	0	0
Reactivity	1	1
Special	NA	NA

NJTSRN - KBT -0001 **Vinyl Resin Copolymer** **Water 7732-18-5**

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer re-labels this product, legal counsel should be consulted to insure proper health, safety, and other necessary information is included on the container. Seller provides no warranties, either expressed or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein.

Revision Date: August 3, 2007 NR=Not Required NE=Not Established NA=Not Applicable ND=Not Determined

MSDS for SUPER MUD

MATERIAL SAFETY DATA

1. CHEMICAL PRODUCT AND COMPANY INDENTIFICATION

PRODUCT NAME	:	**Super Mud**
SYNONYMS	:	Anionic polyacrylamide in water-in-oil emulsion
CHEMICAL FAMILY	:	Anionic polyacrylamide copolymer
MOLECULAR FORMULA	:	Mixture
MOLECULAR WEIGHT	:	Mixture

PDSCo, P.O. BOX 507, WEST SHARP STREET, EL DORADO, AR 71730 USA
EMERGENCY PHONE: For emergency call PDSCo: 1 (800) 243-7455

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Petroleum distillate Hydrotreated light	064742-47-8	24	400 ppm	OSHA

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR	:	White, viscous, opaque liquid; slight hydrocarbon odor
STATEMENTS OF HAZARD	:	WARNING! MAY CAUSE SKIN IRRITATION IMPORTANT! SPILLS OF THIS PRODUCT ARE VERY SLIPPERY WHEN WET

POTENTIAL HEALTH EFFECTS

EFFECTS OF OVEREXPOSURE:
Acute oral (rat) LD50 and acute dermal (rabbit) LD50 of > 10 ml/kg. Direct contact with this material may cause minimal eye and moderate skin irritation.
Refer to Section 11 for toxicology information on the OSHA regulated components of this product.

4. FIRST AID MEASURES

In case of skin contact, wash affected areas of skin with soap and water. Do not reuse clothing without laundering.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT	:	>200^{0}F (>93.3^{0}C)	METHOD	:	Pensky-Martens Closed Cup
FLAMMABLE LIMITS (% BY VOL)	:	Not applicable			
AUTOIGNITION TEMP	:	Not available			
DECOMPOSITION TEMP	:	Not available			

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTIONS

Use water spray, carbon dioxide or dry chemical to extinguish fires. Use water to keep containers cool. Wear self-contained, positive pressure breathing apparatus and full fire-fighting protective clothing. See Section 8 (Exposure Controls/Personal Protection) for special protective clothing.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Cover spill with some inert absorbent material; sweep up and place in waste disposal container. Flush area thoroughly with water. Residual may be very slippery. If slipperiness remains, apply more dry-sweeping compound.

7. HANDLING AND STORAGE

Avoid contact with skin. Wash thoroughly after handling. To avoid product degradation and equipment corrosion, do not use iron, copper, or aluminum container or equipment. OSHA regulations (29 CFR 106.a.14), require that the flashpoint of materials of this type be determined by the Pensky-Martens Closed Tester method. The test for this product indicated it has flash point at >200^{0}F (93.3^{0}C); therefore, caution should be exercised in storage and handling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)
Engineering controls are not usually necessary if good hygiene practices are followed. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Avoid unnecessary skin contact. Impervious gloves are recommended to prevent prolonged skin contact. For operations where eye or face contact can occur, eye protection is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR	:	White, viscous, opaque liquid; slight hydrocarbon odor.
BOILING POINT	:	~ 347^{0}F; ~ 175^{0}C (value for oil phase)
MELTING POINT	:	0^{0}F; -18^{0}C
VAPOR PRESSURE	:	Not available
SPECIFIC GRAVITY	:	1.0
VAPOR DENSITY	:	Not available
% VOLATILE (BY WT)	:	~ 70
pH	:	Not available
SATURATED IN AIR (BY VOL)	:	Not available
EVAPORATION RATE	:	<1 (Butyl Acetate = 1)
SOLUBILITY IN WATER	:	Appreciable

10. STABILITY AND REACTIVITY

STABILITY	:	Stable
CONDITIONS TO AVOID	:	None known
POLYMERIZATION	:	Will not occur
CONDITIONS TO AVOID	:	None known
INCOMPATIBLE MATERIALS	:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS	:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, ammonia, and/or oxides or nitrogen.

11. TOXICOLOGICAL INFORMATION

Toxicological information on the OSHA regulated components of this product is as follows:
Acute overexposure to petroleum distillate vapors may cause eye and throat irritation. On direct skin contact, petroleum distillate may produce a severe skin irritation.

12. ECOLOGICAL INFORMATION

No aquatic LC50, BOD, or COD data available.
OCTANOL/H_2O PARTITION COEF: Not available

13. DISPOSAL CONSIDERATIONS

Disposal must be made in accordance with applicable governmental regulations.

14. TRANSPORT INFORMATION

		D.O.T SHIPPING INFORMATION	**IMO SHIPPING INFORMATION**
SHIPPING NAME	:	Not applicable/Not Regulated	Not applicable/Not Regulated
HAZARD CLASS/ PACKING GROUP	:	Not applicable	Not applicable
UN NUMBER	:	Not applicable	Not applicable
IMDG PAGE	:	Not applicable	Not applicable
D.O.T HAZARDOUS SUBSTANCES	:	(Product Reportable Quantity) Not applicable	Not applicable
TRANSPORT LABEL REQUIRED	:	None required	None required

		ICAO/IATA		**TRANSPORT CANADA**
SHIPPING NAME	:	Not applicable		Not applicable
HAZARD CLASS	:	Not applicable		Not applicable
SUBSIDIARY CLASS	:	Not applicable		Not applicable
UN / ID NUMBER	:	Not applicable		Not applicable
PACKING GROUP	:	Not applicable		Not applicable
TRANSPORT LABEL REQUIRED	:	None required		None required
PACKING INSTRUCTIONS	:	Passenger Cargo	Not applicable Not applicable	Not applicable
MAX NET QTY	:	Passenger Cargo	Not applicable Not applicable	Not applicable

ADDITIONAL TRASPORT INFORMATION

TECHNICAL NAME (N.O.S.) : Not applicable

15. REGULATORY INFORMATION

INVENTORY INFORMATION

US TSCA : This product is manufactured in compliance with all provisions of the Toxic Substances control Act, 15 U.S.C.

CANASA DSL : Components of this product have been reported to Environment Canada in accordance with subsection 25 of the Canadian Environmental Protection Act and are included on the Domestic Substances List.

EEC EINECS : All components of this product are included on the European Inventory of Existing Chemical Substances [EINECS] in compliance with Council Directive 67/548/EEC, Amended 79/831/EEC.

OTHER ENVIRONMENTAL INFORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

COMPONENT	CAS. NO.	%	TPQ(lbs)	RQ (lbs)	S313	RCRA	TSCA 12B

This product does not contain any components regulated under these sections of the EPA

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA
Not applicable under SARA TITLE III

16. OTHER INFORMATION

NFPA HAZARD RATING (National Fire Protection Association)

Fire		FIRE	: Materials that must be preheated before ignition can occur.
1		HEALTH	: Materials which on exposure under fire conditions would offer
Health 0	0 Reactivity	no hazard beyond that of ordinary combustible material.	
-		REACTIVTY	: Materials which in themselves are normally stable, even under
Special		fire exposure conditions, and which are not reactive with water.	

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.

Appendix C

Bioassay and Analytical Results

Shore PAC GCV

CETCO
DRILLING PRODUCTS GROUP
1500 West Shure Drive, 5th Floor
Arlington Heights, IL 60004-7803
847.392.5800/Fax 847.506.6150
www.cetco.com john.berry@cetco.com

October 26, 2001

RE: Benefits of Synthetic Slurry Vs Mineral Slurry

Dear Sir:

As requested a comparison has been prepared for drilling with synthetic drilling slurry Vs conventional mineral slurry. The advantages of using high performance polymer slurry over mineral slurry yield multiple benefits, which improve construction economics in many ways. Shore Pac GCV saves time and money while improving construction quality and reducing defects.

- Highly concentrated. Very small quantities required.
- Controls fluid loss in sands and gravels. Stabilizes excavations.
- Reduces chipping and cleaning of poured concrete.
- Improves productivity of machines and crews.
- Requires less mixing/processing equipment, reducing capital investment, jobsite congestion and fuel costs.
- Reduces are eliminates disposal costs. Product is environmentally safe.
- Reduces transport costs and storage space requirements.

Shore Pac GCV polymer slurry replaces mineral slurry at ratios ranging between 1 to 50 and 1 to 200 in typical application. When using salt water as the mix water only a special mineral called Attapulgite can be used, these ratios mean that 20 pounds of Shore Pac GCV can replace 4 tons of mineral slurry.

Shore Pac GCV slurry cohesively binds excavated soil solids together, facilitating their removal from the excavation and preventing them from dispersing into the slurry. Shore Pac GCV maximizes spoil loading on augers increasing excavation rates. Shore Pac GCV makes it possible to drill with augers, even in sand and gravel, eliminating the need to use a bucket. This feature can reduce drilling time, increase productivity and reduce slurry wastage. With mineral slurry a bucket must be used and half of the spoil is liquid slurry that dumps out over the job-site.

CETCO

PROVEN ADVANTAGES OVER MINERAL SLURRY

Shore Pac GCV polymer systems have been shown, in definitive laboratory research and in numerous full-scale load tests and construction projects, to provide the following advantages over mineral slurries:

- Greater frictional load testing capacity (skin Friction) in bored piles; higher success rate on load tests.
- Cleaner, harder top surfaces on concrete in bored piles and diaphragm walls; reduces or eliminates cleaning, chipping and dressing.
- Seawater tolerant.
- Improved recyclability and reusability.
- Cleaner more manageable sites.
- Drier, cleaner, firmer spoil which can be used for fill.
- Simplified disposal.

When all of Shore Pac's advantages are taken into consideration and their economic impact is understood, it becomes clear that Shore Pac GCV is the technology that is replacing mineral slurries because mineral slurries ultimately cannot remain competitive. Numerous foundation contractors, including some of the largest and most respected companies in the international industry, have adopted this new technology after trying it on critical, high profile jobs where efficient performance was required to meet schedules and make a profit. Polymer slurry has been tried only after repeated load test failures in problem soils with mineral slurry systems, and in every case has shown better results.

Removing uncertainty on load tests and keeping projects on schedule translates into large monetary savings and reduced liability.

Shore Pac™ GCV is a very high molecular weight synthetic polymer with negative charges on the backbone. Its high molecular weight gives viscosity to water at low concentrations.

When **Shore Pac™ GCV** is dissolved in aqueous solution, the very long polymer chains dissolve and orient randomly in the fluid in coils. In fresh water, the repulsion of the negative charges on the backbone of the polymer chains causes the coils to expand and to occupy a large volume in the fluid. When the fluid is sheared, the expanded polymer chains are located in different fluid layers in the shear field. The uncoiling of these expanded polymer chains dissipates mechanical energy and results in viscosity.

The high molecular weight polymer chains are so long that different parts of individual polymer chains bridge different solid particles. It is this adsorption on surfaces and bridging of solid surfaces that makes this polymer effective in keeping solids consolidated while drilling a foundation. In addition, the adsorbed layer of hydrophilic polymer on rock surfaces slows down the diffusion of water into the rock.

If you have any questions do not hesitate to contact me at 847.910.4334.

Sincerely,
John H. Berry, P.G./Hydrogeologist Product Manager/CETCO Drilling Product

Biomonitoring Report
Pimephales promelas

CETCO
SHORE PAC GCV SLURRY

October 1998

Pimephales promelas
ACUTE STATIC-RENEWAL 96-HOUR DEFINITIVE TEST
EPA 600 4-90 027F: SECTION 9

Prepared for

CETCO

by

ENVIRONMENTAL ENTERPRISES USA, INC.
58485 PEARL ACRES ROAD, SUITE D
SLIDELL, LOUISIANA 70461
--
(504) 646-2787

David S Daniel
DAVID L. DANIEL
Laboratory Director

10/22/98
DATE

Alicia Jewell
ALICIA JEWELL
QA/QC Officer

10-21-98
DATE

TEST OVERVIEW

A 96-hour static-renewal toxicity test was conducted by **Environmental Enterprises** to determine toxicity of a lab sample, SHORE PAC GCV SLURRY, to *Pimephales promelas* larvae. Test organisms were cultured at **Environmental Enterprises** and 2-days-old when this test was initiated. Reconstituted laboratory-prepared water was used as the diluent and a laboratory performance control was evaluated. Four replicates of the laboratory control and five lab sample concentrations were prepared initially and renewed daily. Lab sample concentrations tested were 1.0%, 1.8%, 3.2%, 5.6%, and 10.0%. With the exception of dilution to the concentrations listed previously, the lab sample was tested as received.

Client:	CETCO
Location:	1350 West Shure Drive; Arlington Heights, IL 60004-1440
NPDES Permit No.:	n/a
Services Requested By:	Ms. Amy Suffecool
Test Requested:	Acute static-renewal 96-hour definitive test using *Pimephales promelas*. EPA 600 4-90 027F: SECTION 9.
Test Initiated:	October 2, 1998, at 1:15pm
Test Completed:	October 6, 1998, at 3:46pm
Sampling Location:	CETCO
Sample Type:	Product, Grab
Sample Collected:	
E.E. Project No.:	E-9545-98
Results:	96-hour LC50 = > 10.0% effluent.
	No Observable Effect Concentration (NOEC): 10.0% effluent.
	Lowest Observable Effect Concentration (LOEC): N/A
Principal Investigator:	Veronica McNew — Effluents Testing Supervisor
Report Date:	October 17, 1998 — Conclusion: Pass

Methods, materials, and results are presented in this document. The test was conducted from October 2 - 6, 1998, at the laboratory of **Environmental Enterprises**. Those involved in performing this test and in preparation of this report were Mark O'Neil, Alicia Jewell, Veronica McNew, and David L. Daniel.

MATERIALS AND METHODS

Materials and methods for the work performed are stated in EPA 600 4-90 027F: Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Actual materials and methods are detailed below. This test was performed with strict adherence to the requirements of EPA 600 4-90 027F, Section 9. Additionally, the recommendations and suggestions made elsewhere in EPA 600 4-90 027F were incorporated whenever applicable to optimize the experimental design.

P. promelas was cultured and maintained in reconstituted moderately hard water at 25±1°C. Several clutches from different females comprised the embryo pool from which the test organism population hatched. Test organisms were fed *Artemia* nauplii less than 24-hours old twice daily.

Sensitivity of test organisms to a known toxicant was determined by performing a chronic Standard Reference Toxicant (SRT) test, PP9810, with sodium dodecyl sulfate (Sigma Chemical, Lot 106H0112, 95% purity). The SRT test, was initiated on September 11, 1998, with less than 24-hour old *P. promelas* larvae.

	SURVIVAL	GROWTH
NOEC:	3.0 mg/l	3.0 mg/l
LOEC:	5.0 mg/l	N/A

On October 1, the SHORE PAC GCV SLURRY sample used in this test was delivered to **Environmental Enterprises** (Appendix B). Daily, a portion of the sample was warmed to 25°C and used to prepare the test solutions. Test chambers were labeled with concentration, replicate identification, and **Environmental Enterprises'** project number. Six treatments, five sample concentrations and a laboratory performance control, were prepared and pH was measured in the undiluted sample daily (Appendix A).

Each treatment was poured into a new acid-washed 1-gallon plastic container and placed in an environmental chamber to warm up to test temperature. After the test solutions reached test temperature, initial water quality parameters (temperature, conductivity, and dissolved oxygen (DO)) were measured. At the end of each 24-hour exposure period, prior to renewal, the ending DO, temperature, and pH in each treatment were recorded also (Appendix A, pages 4 - 5). Alkalinity, hardness, and conductivity were measured in the laboratory performance control and undiluted effluent sample October 2 (Appendix A, page 4).

On Day 0, the treatments were poured into their respective test chambers, ten *P. promelas* larvae were distributed randomly to each, and then this test was placed in the environmental chamber. On Days 1-3, the test was renewed: 90% of the treatment solution, excess food, and debris were poured or siphoned out of each replicate. Aliquots of freshly prepared treatments were poured gently into each replicate as appropriate. Surviving test organisms were disturbed as little as possible during renewal. Every 24 hours, survival was recorded (Appendix A, pages 2 - 3). After four days, the final survival data were recorded and this test was terminated.

APPENDIX A

EE# E-9545-98

10/2/98

CLIENT: CETCO
1350 WEST SHURE DRIVE
ARLINGTON HEIGHTS, IL 60004
AMY SUFFECOOL (847) 392-5800

SAMPLE #: SHORE PAC GCV
SLURRY

DILUTION CALCULATIONS

TEST CONCENTRATIONS, % EFFLUENT (EFF)

	Pimephales promelas	TOTAL VOLUME/ CONCENTRATION, ml	COLOR CODE	ml EFF	ml DH_2O
10.0%		2000.0	BLACK	200.0	1800.0
5.6%		"	BROWN	112.0	1888.0
3.2%		"	YELLOW	64.0	1936.0
1.8%		"	GREEN	36.0	1964.0
1.0%		"	BLUE	20.0	1980.0
LAB PERFORMANCE CONTROL 0%		"	WHITE	0.0	2000.0
TOTAL VOLUMES (ml) OF NEEDED =				432.0	

CALCULATIONS BY: Veronica McNew QA/QC OFFICER: Denise Braun

P. promelas = 4 REPS x 500 ml
= 2000 ml

DH_2O = DILUTION WATER = **SYNTHETIC MODERATELY HARD WATER**
ALKALINITY = 64
HARDNESS = 92

***** ***** ***** ***** ***** ***** ***** ***** ***** *****

PREP DATE	10/02	10/03	10/04	10/05
SAMPLE #	1	1	1	1
INITIAL	SJ	MAO	MAO	VM
pH	8.0	7.8	7.8	7.9

COMMENTS:

PAGE 1

EE: E-9545-98

EE# E-9545-98

SURVIVAL DATA CONT.

Pimephales promelas — to 2 days old

TIME	REP	TREATMENT: LPC WHT		1.0% BLUE	1.8% GREEN	3.2% YELLOW	5.6% BROWN	10.0% BLACK		INITIAL
0 HR 1:15pm	A	10	///	10	10	10	10	10		10/2
	B	10	///	10	10	10	10	10		
	C	10	///	10	10	10	10	10		
	D	10	///	10	10	10	10	10		
24 HR 1:10pm	A	10	///	10	10	10	10	10		af 10/3
	B	10	///	10	10	10	10	10		
	C	10	///	10	10	10	10	10		
	D	10	///	10	10	10	10	10		
48 HR 11:05am	A	10	///	10	10	10	10	10		MEO 10/4
	B	10	///	10	10	10	10	10		
	C	10	///	10	10	10	10	10		
	D	10	///	10	10	10	10	10		
72 HR 11:20 AM	A	10	///	10	10	10	10	10		sg 10/5
	B	10	///	10	10	10	10	10		
	C	10	///	10	10	10	10	10		
	D	10	///	10	10	10	10	10		

COUNTED/LOADED BY: Sharon [illegible] QC/QA BY: Veronica McNew

COMMENTS:

PAGE 2 PP

EE: E-9545-98

EE# E-9545-98

SURVIVAL DATA CONT.

TIME	REP	TREATMENT								INITIAL
		LPC WHT		1.0% BLUE	1.8% GREEN	3.2% YELLOW	5.6% BROWN	10.0% BLACK		
	A	10	///	10	10	10	10	10		GB
96 HR	B	10	///	10	10	10	10	10		
pm 3:46	C	10	///	10	10	10	10	10		10/6
	D	10	///	9	10	10	9	10		

LC50 >10.0 % EFF 95% CONFIDENCE LIMITS LOWER n/a % EFF UPPER n/a % EFF

STATISTICAL METHOD n/a

NOEC 10.0 % EFF LOEC n/a % EFF

STATISTICAL METHOD n/a

COMMENTS: _____

PAGE 3 PP

EE: E-9545-98

EE# E-9545-98

WATER QUALITY DATA

TIME	PARAMETER	TREATMENT							INI
		LPC W		1.0% BLUE	1.8% GREEN	3.2% YELLOW	5.6% BROWN	10.0% BLACK	
0 HR	DISSOLVED OXYGEN INITIAL	8.3	//	8.3	8.3	8.3	8.3	8.3	B
	P. promelas FINAL	7.5	//	7.4	7.4	7.3	7.4	7.4	MAC
	TEMPERATURE INITIAL	24.7	//	25.6	25.4	25.6	25.5	25.2	AJ
	P. promelas FINAL	25.0	//	25.1	25.0	25.0	24.9	25.0	
	FINAL pH *P.promelas*	7.7	//	7.7	7.7	7.7	7.7	7.7	
	CONDUCTIVITY	311	//	305	305	306	306	306	
	ALKALINITY		//	/	/	/	/	/	
	HARDNESS		//	/	/	/	/	/	
24 HR	DISSOLVED OXYGEN INITIAL	8.3	//	8.2	8.1	8.1	8.1	8.2	
	P. promelas FINAL	7.3	//	7.1	7.3	7.3	7.2	7.2	MAC
	TEMPERATURE INITIAL	24.3	//	24.9	25.1	25.1	24.9	25.1	
	P. promelas FINAL	25.4	//	25.4	25.4	25.4	25.4	25.5	
	FINAL pH *P.promelas*	7.6	//	7.5	7.5	7.5	7.5	7.5	
	CONDUCTIVITY	304	//						
	ALKALINITY	64	//	/	/	/	/	/	
	HARDNESS	92	//	/	/	/	/	/	

COMMENTS: 100.0% Eff : 8.0pH, 140alk, 120 hard, 315 cond, 0.28 TRC

PAGE 4 PP

EE: E-9545-98

EE# E-9545-98

WATER QUALITY DATA CONT.

TIME	PARAMETER	TREATMENT							INI
		LPC W		1.0% BLUE	1.8% GREEN	3.2% YELLOW	5.6% BROWN	10.0% BLACK	
48 HR	DISSOLVED OXYGEN INITIAL	8.1	//	8.0	8.0	8.1	8.1	8.2	
	P. promelas FINAL	7.5	//	7.5	7.3	7.4	7.3	7.4	
	TEMPERATURE INITIAL	25.3	//	25.4	25.4	25.4	25.0	24.6	
	P. promelas FINAL	24.5	//	24.4	24.4	24.4	24.5	24.4	
	FINAL pH *P.promelas*	7.5	//	7.6	7.6	7.6	7.6	7.6	
	CONDUCTIVITY	305	//	311	306	306	305	305	
	ALKALINITY	64	//	/	/	/	/	/	
	HARDNESS	92	//	/	/	/	/	/	
72 HR	DISSOLVED OXYGEN INITIAL	7.8	//	7.8	7.8	7.9	7.9	8.0	
	P. promelas FINAL	6.3	//	6.3	6.4	6.3	6.3	6.2	
	TEMPERATURE INITIAL	24.8	//	24.8	24.9	24.6	24.6	23.9	
	P. promelas FINAL	25.5	//	25.4	25.4	25.3	25.4	25.5	
	FINAL pH *P.promelas*	7.3	//	7.5	7.5	7.8	7.3	7.8	
	CONDUCTIVITY	309	//	309	309	309	309	309	
	ALKALINITY	40	//	/	/	/	/	/	
	HARDNESS	108	//	/	/	/	/	/	

DO, DISSOLVED OXYGEN: mg/l
pH: SU
TEMPERATURE: °C

CONDUCTIVITY: µS/cm
ALKALINITY: mg/l as $CaCO_3$
HARDNESS: mg/l as $CaCO_3$

EE: E-9545-98

APPENDIX B

58485 Pearl Acres Road, Suite B
Slidell, Louisiana 70461
(504) 646-2787

POSTED 10/2/98

T#806338167325

CHAIN-OF-CUSTODY RECORD

Client: CETCO
Address:

Contact person: Amy Suffecool
Phone #:
P.O.#:
Project:

Special Handling Request
[ ] Rush
[ ] Verbal
[ ] Other

Sample Location	Date	Time	Grab	Comp	No. of Containers	Waste Type	Preservation	Analysis Request	EE Sample Number
									~~9553~~ MD E-~~9554~~ MD-98
									E-9545-98
5.6 °C 80 pH 140 alk 120 hard 315 cond. ~~hard~~									
0.28 trc sample #1 2 of 2									

Collected By:	Date	Time	Relinquished By: M. DeBach, FDEC	Date 10/1/99	Time 0930
Received By: Richard Rivas	Date 10/1/98	Time 0925	Relinquished By: Richard Rivas	Date 10/1/98	Time 0930
Received By: Sharon Jones	Date 10/2/98	Time 1:35PM	Relinquished By:	Date	Time
Received By:	Date	Time	Relinquished By:	Date	Time
Received for Laboratory By:	Date	Time	Comments (Precautions/Hazards)		
Final Disposition:			KIT # None		

Form EE-1004-JDM-1012-94

CETCO Drilling Products
Laboratory Request
Research and Development Department

Project: Submittal for analytical testing CETCO's **Shore Pac GCV** slurry mixed @ 1 lb per 500 gallons.

Purpose: Shore Pac GCV synthetic slurry must meet strict California Department of Health Services codes for toxic or hazardous waste disposal in California.

The California Code of Regulations Title 22 hazardous waste criteria has demanding regulations more stringent than the Federal EPA standards. Therefore test results certified from an independent laboratory confirming test results for Shore Pac GCV Title 22 non toxic status and documentation of EPA non-toxic conformance must be submitted to the California Department of Health Services for review. This must be completed as part of the approval process to have Shore Pac GCV used on construction projects approved by the State of California.

Laboratory Testing:

1.	Oil & Grease	EPA 413.1
2.	COD	EPA 410.4
3.	BOD	EPA 405.1
4.	PH	EPA 150.1
5.	Metals Discharge	
a.	Cadium	EPA 213.1
b.	Chromium	EPA 218.1
c.	Copper	EPA 220.1
d.	Lead	EPA 239.1
e.	Nickel	EPA 249.1
f.	Silver	EPA 272.1
g.	Zinc	EPA 289.1

6. **(Priority Pollutants)**
a. Base/Neutral Compounds
b. Purgeable Compounds (volatiles)
c. Acid Compounds
d. Heavy Metals

7. **Bioassay testing** utilizing flathead minnows (Pimephales promelas)

Please have a complete analytical report submitted for each procedure

CHAIN OF CUSTODY REPORT

L ANALYTICAL

BUFFALO GROVE, ILLINOIS 89-4505
(847) 808-7766 FAX (847) 8-7772

nt: CETCO DRILLING DIVISION	Bill To: SAME	TAT: (5 DAY) 4 DAY 3 DAY 2 DAY 1 DAY < 24 HRS.
ress: 1350 WEST SHURE DR.	Address:	DATE RESULTS NEEDED:
RLINGTON HEIGHTS, IL 60004-1440		TEMPERATURE UPON RECEIPT: YES 67°F
ort to: JOHN BERRY Phone #: (847) 392-5800 Fax #: (847) 506-6150	State & Program: CALTRANS APPROVAL Phone #: ( ) Fax #: ( )	AIR BILL NO.
ect: SHORE PAC GCV SLURRY		
npler: AMY SUFFECOOL		
Quote #:		

FIELD ID, LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	PRESERVATIVES	NO. CONTAINERS	TYPE CONTAINERS	OIL & GREASE 413.1	COD 410.4	BOD 405.1	PH 150.1	Priority Pollutants Biossay Tes	SAMPLE CONTROL: CRACKED/BROKEN	IMPROPERLY SEALED	GOOD CONDITION	LABORATORY ID NUMBER
SHORE PAC GCV SLURRY															
1 lb per 500 gal RATIO															

RELINQUISHED	DATE / TIME	RECEIVED	DATE / TIME	RELINQUISHED	DATE / TIME	RECEIVED	DATE / TIME
RELINQUISHED	DATE / TIME	RECEIVED	DATE / TIME	RELINQUISHED	DATE / TIME	RECEIVED	DATE / TIME

MENTS:

PAGE OF

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Date: October 13, 1998

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Project: Shore PAC GCV Sluury

Enclosed are the results from 1 water sample received at Great Lakes Analytical on September 30, 1998. The requested analyses are listed below:

SAMPLE#	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
8095574	Water: 1lb per 500 gal. sluury	9/30/98	COD, EPA 410.4
			BOD, EPA 405.1
			pH, EPA 150.1
			Oil & Grease, EPA 413.1
			Priority Pollutants
			Cyanide, EPA 9012
			PCB, EPA 8082
			VOC, EPA 8260
			SVOC, EPA 8270
			Organchlorine Pesticides, EPA 8081

The concentrations of Chloroform and Bromodichloromethane detected in this sample by EPA 8260 are charachteristic of those found in chlorinated drinking water.

This report may not be reproduced, except in full, without the written approval of the laboratory.

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Predident

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Date: October 8, 1998

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Project: Shore PAC GCV Sluury

Enclosed are the results from 1 water sample received at Great Lakes Analytical on September 30, 1998. The requested analyses are listed below:

SAMPLE#	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
8095574	Water: 1lb per 500 gal. sluury	9/30/98	COD, EPA 410.4 BOD, EPA 405.1 pH, EPA 150.1 Oil & Grease, EPA 413.1 Priority Pollutants Cyanide, EPA 9012 PCB, EPA 8082 VOC, EPA 8260 SVOC, EPA 8270 Organchlorine Pesticides, EPA 8081

This report may not be reproduced, except in full, without the written approval of the laboratory.

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <1>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. sluury

Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998

Analyzed: Oct 2, 1998
Reported: Oct 8, 1998

E.P.A. PRIORITY POLLUTANTS: METALS

Analyte	EPA Method	Detection Limit mg/L (ppm)	Sample Results mg/L (ppm)
Antimony	3015/6010	0.10	N.D.
Arsenic	3015/7060	0.050	N.D.
Beryllium	3015/6010	0.010	N.D.
Cadmium	3015/6010	0.010	N.D.
Chromium	3015/6010	0.010	N.D.
Copper	3015/6010	0.050	N.D.
Lead	3015/7421	0.0050	N.D.
Mercury	7470	0.0020	N.D.
Nickel	3015/6010	0.10	N.D.
Selenium	3015/7740	0.010	N.D.
Silver	3015/6010	0.050	N.D.
Thallium	3015/6010	0.50	N.D.
Zinc	3015/6010	0.50	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <1>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. slurry

Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998
Analyzed: Sep 30-Oct 5, 1998
Reported: Oct 8, 1998

LABORATORY ANALYSIS

Analyte	EPA Method	Detection Limit mg/L	Sample Results mg/L
BOD	405.1	0.60	N.D.
COD	410.4	100	N.D.
Cyanide	9012	0.010	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <2>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. slurry

Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998
Analyzed: Sep 30, 1998
Reported: Oct 8, 1998

LABORATORY ANALYSIS

Analyte	EPA Method	Temperature °C	Sample Result pH units
pH	150.1	19	7.3

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <3>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division	Client Project ID:	Shore PAC GCV Sluury	Sampled:	Sep 30, 1998
1350 W. Shure Dr.	Matrix Descript:	Water	Received:	Sep 30, 1998
Arlington Heights, IL 60004-1440	Analysis Method:	EPA 413.1 (Gravimetric)	Extracted:	Oct 5, 1998
Attention: John Berry	First Sample #:	809-5574	Analyzed:	Oct 6, 1998
			Reported:	Oct 8, 1998

TOTAL RECOVERABLE OIL & GREASE

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
809-5574	1lb per 500 gal. slurry	N.D.

Detection Limits:	5.0

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <4>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. slurry
Analysis Method: EPA 8081
Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998
Extracted: Oct 5, 1998
Analyzed: Oct 6, 1998
Reported: Oct 8, 1998

ORGANOCHLORINE PESTICIDES (EPA 8081)

Analyte	Detection Limit µg/L	Sample Results µg/L
Aldrin	0.025	N.D.
alpha-BHC	0.025	N.D.
beta-BHC	0.025	N.D.
delta-BHC	0.025	N.D.
gamma-BHC (Lindane)	0.025	N.D.
Chlordane	0.50	N.D.
4,4'-DDD	0.15	N.D.
4,4'-DDE	0.050	N.D.
4,4'-DDT	0.15	N.D.
Dieldrin	0.050	N.D.
Endosulfan I	0.050	N.D.
Endosulfan II	0.050	N.D.
Endosulfan sulfate	0.15	N.D.
Endrin	0.050	N.D.
Endrin aldehyde	0.15	N.D.
Heptachlor	0.025	N.D.
Heptachlor epoxide	0.025	N.D.
Methoxychlor	0.50	N.D.
Toxaphene	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <5>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Cetco, Drilling Division	Client Project ID:	Shore PAC GCV Sluury	Sampled:	Sep 30, 1998
1350 W. Shure Dr.	Sample Descript:	Water: 1lb per 500 gal. slurry	Received:	Sep 30, 1998
Arlington Heights, IL 60004-1440	Analysis Method:	EPA 8082	Extracted:	Oct 5, 1998
Attention: John Berry	Lab Number:	809-5574	Analyzed:	Oct 7, 1998
			Reported:	Oct 8, 1998

POLYCHLORINATED BIPHENYLS (EPA 8082)

Analyte	Detection Limit µg/L	Sample Results µg/L
PCB 1016	1.0	N.D.
PCB 1221	1.0	N.D.
PCB 1232	1.0	N.D.
PCB 1242	1.0	N.D.
PCB 1248	1.0	N.D.
PCB 1254	1.0	N.D.
PCB 1260	1.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <6>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Oetco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. slurry
Analysis Method: EPA 8260
Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998
Analyzed: Oct 7, 1998
Reported: Oct 8, 1998

VOLATILE ORGANICS by GC/MS (EPA 8260)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acetone	10	15A
Benzene	2.0	N.D.
Bromodichloromethane	2.0	4.4
Bromoform	2.0	N.D.
Bromomethane	2.0	N.D.
2-Butanone	10	N.D.
Carbon disulfide	2.0	N.D.
Carbon tetrachloride	2.0	N.D.
Chlorobenzene	2.0	N.D.
Chlorodibromomethane	2.0	N.D.
Chloroethane	2.0	N.D.
2-Chloroethyl vinyl ether	10	N.D.
Chloroform	2.0	7.6
Chloromethane	2.0	N.D.
-Dichloroethane	2.0	N.D.
,2-Dichloroethane	2.0	N.D.
1,1-Dichloroethene	2.0	N.D.
cis 1,2-Dichloroethene	2.0	N.D.
trans 1,2-Dichloroethene	2.0	N.D.
1,2-Dichloropropane	2.0	N.D.
cis 1,3-Dichloropropene	2.0	N.D.
trans 1,3-Dichloropropene	2.0	N.D.
Ethylbenzene	2.0	N.D.
2-Hexanone	10	N.D.
Methylene chloride	2.0	N.D.
4-Methyl-2-pentanone	10	N.D.
Styrene	2.0	N.D.
1,1,2,2-Tetrachloroethane	2.0	N.D.
Tetrachloroethene	2.0	N.D.
Toluene	2.0	N.D.
1,1,1-Trichloroethane	2.0	N.D.
1,1,2-Trichloroethane	2.0	N.D.
Trichloroethene	2.0	N.D.
Trichlorofluoromethane	2.0	N.D.
Vinyl acetate	2.0	N.D.
Vinyl chloride	2.0	N.D.
Total Xylenes	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

Please Note:
A = Laboratory artifact - concentrations found of this analyte are characteristic of laboratory artifact.

8095574.ccc <7>

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Petco, Drilling Division	Client Project ID:	Shore PAC GCV Sluury	Sampled:	Sep 30, 1998
1350 W. Shure Dr.	Sample Descript:	Water: 1lb per 500 gal. slurry	Received:	Sep 30, 1998
Arlington Heights, IL 60004-1440	Analysis Method:	EPA 8270	Extracted:	Oct 4, 1998
Attention: John Berry	Lab Number:	809-5574	Analyzed:	Oct 4, 1998
			Reported:	Oct 8, 1998

SEMI-VOLATILE ORGANICS by GC/MS (EPA 8270)

Analyte	Detection Limit µg/L	Sample Results µg/L
Acenaphthene	2.0	N.D.
Acenaphthylene	2.0	N.D.
Aniline	2.0	N.D.
Anthracene	2.0	N.D.
Benzoic Acid	10	N.D.
Benzo(a)anthracene	2.0	N.D.
Benzo(b)fluoranthene	2.0	N.D.
Benzo(k)fluoranthene	2.0	N.D.
Benzo(g,h,i)perylene	2.0	N.D.
Benzo(a)pyrene	2.0	N.D.
Benzyl alcohol	2.0	N.D.
Bis(2-chloroethoxy)methane	2.0	N.D.
Bis(2-chloroethyl)ether	2.0	N.D.
Bis(2-chloroisopropyl)ether	2.0	N.D.
s(2-ethylhexyl)phthalate	10	N.D.
Bromophenyl phenyl ether	2.0	N.D.
Butyl benzyl phthalate	2.0	N.D.
4-Chloroaniline	2.0	N.D.
2-Chloronaphthalene	2.0	N.D.
4-Chloro-3-methylphenol	2.0	N.D.
2-Chlorophenol	2.0	N.D.
4-Chlorophenyl phenyl ether	2.0	N.D.
Chrysene	2.0	N.D.
Dibenzo(a,h)anthracene	2.0	N.D.
Dibenzofuran	2.0	N.D.
Di-N-butyl phthalate	10	N.D.
Di-N-octyl phthalate	2.0	N.D.
1,3-Dichlorobenzene	2.0	N.D.
1,4-Dichlorobenzene	2.0	N.D.
1,2-Dichlorobenzene	2.0	N.D.
3,3-Dichlorobenzidine	10	N.D.
2,4-Dichlorophenol	2.0	N.D.
Diethyl phthalate	2.0	N.D.
2,4-Dimethylphenol	2.0	N.D.
Dimethyl phthalate	2.0	N.D.
4,6-Dinitro-2-methylphenol	10	N.D.
2,4-Dinitrophenol	10	N.D.

GREAT LAKES ANALYTICAL

1380 Busch Parkway
Buffalo Grove, Illinois 60089

Email: info@glalabs.com
(847) 808-7766 FAX (847) 808-7772

Delco, Drilling Division
1350 W. Shure Dr.
Arlington Heights, IL 60004-1440
Attention: John Berry

Client Project ID: Shore PAC GCV Sluury
Sample Descript: Water: 1lb per 500 gal. slurry
Analysis Method: EPA 8270
Lab Number: 809-5574

Sampled: Sep 30, 1998
Received: Sep 30, 1998
Extracted: Oct 4, 1998
Analyzed: Oct 4, 1998
Reported: Oct 8, 1998

SEMI-VOLATILE ORGANICS by GC/MS (EPA 8270)

Analyte	Detection Limit µg/L	Sample Results µg/L
2,4-Dinitrotoluene	2.0	N.D.
2,6-Dinitrotoluene	2.0	N.D.
Fluoranthene	2.0	N.D.
Fluorene	2.0	N.D.
Hexachlorobenzene	2.0	N.D.
Hexachlorobutadiene	2.0	N.D.
Hexachlorocyclopentadiene	2.0	N.D.
Hexachloroethane	2.0	N.D.
Indeno(1,2,3-cd)pyrene	2.0	N.D.
Isophorone	2.0	N.D.
2-Methylnaphthalene	2.0	N.D.
2-Methylphenol	2.0	N.D.
4-Methylphenol	2.0	N.D.
Naphthalene	2.0	N.D.
[illegible]itroaniline	10	N.D.
[illegible]Nitroaniline	10	N.D.
4-Nitroaniline	10	N.D.
Nitrobenzene	2.0	N.D.
2-Nitrophenol	2.0	N.D.
4-Nitrophenol	10	N.D.
N-Nitrosodiphenylamine	2.0	N.D.
N-Nitroso-di-N-propylamine	2.0	N.D.
Pentachlorophenol	10	N.D.
Phenanthrene	2.0	N.D.
Phenol	2.0	N.D.
Pyrene	2.0	N.D.
1,2,4-Trichlorobenzene	2.0	N.D.
2,4,5-Trichlorophenol	10	N.D.
2,4,6-Trichlorophenol	2.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

GREAT LAKES ANALYTICAL

Kevin W. Keeley
Laboratory Director

8095574.ccc <9>

Certifications: Delaware II-069; Illinois EPA-100261; New Jersey DEP-54001; New York DOH-11487

GREAT LAKES ANALYTICAL

CHAIN OF CUSTODY REPORT

1380 BUSSE PARKWAY
BUFFALO GROVE, ILLINOIS 60089-45
(847) 808-7766 FAX (847) 808-777

Client: CETCO DRILLING DIVISION	Bill To: SAME	TAT: (5 DAY) 4 DAY 3 DAY 2 DAY 1 DAY < 24 HR
Address: 1350 WEST SHURE DR.	Address:	DATE RESULTS NEEDED: 10-7-98
ARLINGTON HEIGHTS, IL 60004-1440		TEMPERATURE UPON RECEIPT: ONICE +3.6c YES 67°F
Report to: JOHN BERRY Phone #: (847) 392-5800 Fax #: (847) 506-6150	State & Program: CALTRANS APPROVAL Phone #: ( ) Fax #: ( )	AIR BILL NO. GCA 8/4
Project: SHORE PAC GCV SLURRY		
Sampler: AMY SUFFECOOL		
PO/Quote #: R98-Suffecool		

	FIELD ID, LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	PRESERVATIVES	NO. CONTAINERS	TYPE CONTAINERS	OIL & GREASE 413.1	COD 410.4	BOD 405.1	PH 150.1	PRIORITY POLLUTANTS	BIOASSAY TEST	SAMPLE CONTROL: CRACKED/BROKEN	SAMPLE CONTROL: IMPROPERLY SEALED	SAMPLE CONTROL: GOOD CONDITION	LABORATORY ID NUMBER
1	SHORE PAC GCV SLURRY 1 lb per 500 gal RATIO	9-30	10:00	water		3		X	X	X	X	X				✓	8095574
2												L					
3												P.P. Metals, CN, 8081, 8082, 8260, 8270					
4																	
5																	
6																	
7																	
8																	
9																	
10																	

RELINQUISHED	DATE 9-30-98 TIME 11:20	RECEIVED	DATE 9-30 TIME 16:0	RELINQUISHED	DATE 9-30 TIME	RECEIVED	DATE 9/30/98 TIME 1:20
RELINQUISHED	DATE TIME	RECEIVED	DATE TIME	RELINQUISHED	DATE TIME	RECEIVED	DATE TIME

COMMENTS:

PAGE

JG958198

SUPER MUD

PDSCo

POLYMER DRILLING SYSTEMS

Tel: (870) 863-5707 • (800) 243-7455
Fax: (870) 863-0603 • E-Mail: pdsco@pdscoinc.com

RE: Super Mud (synthetic polymer soil stabilizer) environmental issues.

In response to questions on the environmental impacts of Super Mud we submit the following:

1: Common disposal practice.
In general we recommend oxidation of the slurry prior to disposal to break the polymers and other ingredients in this product into inert products such as CO_2, H_2, and minute traces of Nitrogen. Super Mud degradation can be accelerated by oxidation with oxidizers such as hydrogen peroxide (H_2O_2) or 5.25% sodium hypochlorite (household bleach).

The procedure for usage of household bleach to degrade the polymer is simple. A 1:1 ratio of bleach to Super Mud is added to the slurry. For example 1 gallon of household bleach is added to 800 gallons of slurry when the recommended dosage of 800:1 (water:Super Mud) is used. This is then mixed well by methods such as recirculating pumps attached to the slurry tank or by auger rotation until the viscous nature of the slurry is gone.

Hydrogen peroxide may be the preferred oxidant in many applications due to the H_2O_2 degrading to oxygen and inert water . Unlike bleach, no extra chemicals are added to the water such as sodium chloride or chlorine. The procedure for usage of hydrogen peroxide is the same with the exception of dosage. One gallon of household grade H_2O_2 (3% H_2O_2) should be added to the slurry for every 5 gallons of Super Mud.

2: Super Mud is environmentally friendly.
Super Mud is inert and presents no harm to the environment. The volume of pure Super Mud is approximately:
- 40% H_2O & emulsifier
- 35% polymer (an inert polyacrylamide polymer similar to polymers used in water and wastewater as flocculents).
- 25% base oil (light hydrocarbon, contains the identical petroleum distillate which is approved by the FDA for the production of food contact papers and for the clarification of beet, cane sugar juice, liquor, and by the EPA for the treatment of potable water).

The CAS number of the petroleum distillate in Super Mud is 064742-47-8. Please note that the

P.O. BOX 507, El Dorado, Arkansas 71731-0507 USA

used slurry is diluted with water 800:1 (water:Super Mud). Super Mud slurry is non-toxic and non-hazardous and disposal should not present a problem. Enclosed is a copy of the official laboratory analysis report on pure Super Mud and a copy of the priority pollutant list content (United States Environmental Protection Agency, EPA). This priority pollutant list indicates that the pure product contains some cyanide and copper however please note the following:

A. The priority pollutant list testing was performed on pure product. In usage the product is diluted, 800 part water to one part Super Mud. During usage the product may undergo further dilution. Regardless, if the product is used at normal dosage or even at a higher dose the resulting slurry would meet the very strict EPA drinking water criteria (criteria for treatment of water for use as a drinking water source).

B. If Super Mud is disposed as pure product, the waste would be classified as non-hazardous per EPA regulations.

C. There are no TCLP (Toxic Characteristics Leaching Procedure) limits for the small quantity of Cyanide and Copper found in the pure product. This is a very intensive testing procedure, required by the EPA, using an acid to determine the potential of a waste or its contaminating constituents to enter into groundwater. Also enclosed is testing performed on Super Mud slurry in regards to the toxicity of this product. From this information it can be observed that this product is non-toxic.

3: Collection and storage.
When a drilled shaft is constructed, the slurry stabilizes the shaft. Once the shaft has been drilled to the desired depth and size, concrete is usually placed in the shaft beginning at the bottom. As the concrete is placed the slurry is displace and pumped to a storage tank for reuse on the next shaft. Following completion of the project, the slurry is mixed in the tank with the oxidants, (if forced degradation is specified), and disposed of per site requirements.

4. Super Mud is biodegradable.
Enclosed is a copy of a letter from our analytical laboratory stating the biodegradability potential for Super Mud. It is felt that this product will biodegrade over time to yield inorganic nitrogen. This product will also photodegrade if left in sunlight.

If you have any questions or if we can be of assistance please let us know.

Best regards,

Rob Newsom

POLYMER DRILLING SYSTEMS
Tel: (870) 863-5707 • (800) 243-7455
Fax: (870) 863-0603 • E-Mail: pdsco@pdscoinc.com

RE: Super Mud Dry (synthetic polymer soil stabilizer) environmental issues.

In response to questions on the environmental impacts of Super Mud Dry we submit the following:

1: Common disposal practice.
In general we recommend oxidation of the slurry prior to disposal to break the polymers and other ingredients in this product into inert products such as CO_2, H_2, and minute traces of Nitrogen. Super Mud Dry degradation can be accelerated by oxidation with oxidizers such as hydrogen peroxide (H_2O_2) or 5.25% sodium hypochlorite (household bleach).

The procedure for usage of household bleach to degrade the polymer is simple. A 1:1 ratio of bleach to Super Mud Dry is added to the slurry. For example 1 gallon of household bleach is added to 800 gallons of slurry when the recommended dosage of 1 lbs Super Mud Dry to 300 gallons of water is used. This is then mixed well by methods such as recirculating pumps attached to the slurry tank or by auger rotation until the viscous nature of the slurry is gone.

Hydrogen peroxide may be the preferred oxidant in many applications due to the H_2O_2 degrading to oxygen and inert water . Unlike bleach, no extra chemicals are added to the water such as sodium chloride or chlorine. The procedure for usage of hydrogen peroxide is the same with the exception of dosage. One gallon of household grade H_2O_2 (3% H_2O_2) should be added to the slurry for every 5 gallons of Super Mud.

2: Super Mud Dry is environmentally friendly.
Super Mud Dry is inert and presents no harm to the environment. The volume of pure Super Mud Dry is approximately:
- 99% polymer (an inert polyacrylamide polymer similar to polymers used in water and wastewater as flocculents).
- less than 1% water or inert matter

Enclosed is a copy of the official laboratory analysis report on pure Super Mud and a copy of the priority pollutant list content (United States Environmental Protection Agency, EPA). This

P.O. BOX 5

priority pollutant list indicates that the pure product contains some cyanide and copper however please note the following:

A. The priority pollutant list testing was performed on pure product. In usage the product is diluted, 300 gallons of water to one lbs Super Mud Dry. During usage the product may undergo further dilution. Regardless, if the product is used at normal dosage or even at a higher dose the resulting slurry would meet the very strict EPA drinking water criteria (criteria for treatment of water for use as a drinking water source).

B. If Super Mud Dry is disposed as pure product, the waste would be classified as non-hazardous per EPA regulations.

C. There are no TCLP (Toxic Characteristics Leaching Procedure) limits for the small quantity of Cyanide and Copper found in the pure product. This is a very intensive testing procedure, required by the EPA, using an acid to determine the potential of a waste or its contaminating constituents to enter into groundwater. Also enclosed is testing performed on Super Mud slurry in regards to the toxicity of this product. From this information it can be observed that this product is non-toxic.

3: Collection and storage.
When a drilled shaft is constructed, the slurry stabilizes the shaft. Once the shaft has been drilled to the desired depth and size, concrete is usually placed in the shaft beginning at the bottom. As the concrete is placed the slurry is displace and pumped to a storage tank for reuse on the next shaft. Following completion of the project, the slurry is mixed in the tank with the oxidants, (if forced degradation is specified), and disposed of per site requirements.

4. Super Mud is biodegradable.
Enclosed is a copy of a letter from our analytical laboratory stating the biodegradability potential for Super Mud Dry. It is felt that this product will biodegrade over time to yield inorganic nitrogen. This product will also photodegrade if left in sunlight.

If you have any questions or if we can be of assistance please let us know.

Best regards,

Rob Newsom

APPENDIX A: Super Mud Priority Pollutant test report

Please note that where the value(s) is/are shown as "<" (less than), this should be interpreted as "non-detectable."

As you can see from the data below, there are low levels of certain metals in the product samples tested. The Priority Pollutant constituents which are present in pure Super Mud are summarized below:

Volatile Organic Compounds	None Detected
Base Neutral Compounds	None Detected
Acid Extractable Organics	None Detected
Pesticides	None Detected
PCB's	None Detected
Metals/Miscellaneous	
Cyanide	4.8 mg/kg
Copper	3.9 mg/kg

In an effort to put these low levels in prospective, the tables below compare the results observed to potentially applicable regulatory criteria:

Super Mud Comparison With California Standards

Chemical Observed	Concentration Detected in Priority Pollutant Scan (mg/L)	California Title 22 Toxicity Regulatory level (section 66261.2)(mg/l)	California Title 22 Drinking Water Standards (section 64435)(mg/l)
Copper	3.9	25	Not listed
Cyanide	4.8	Not listed	0.05

Super Mud Comparison With Federal Standards

Chemical Observed	Concentration Detected in Priority Pollutant Scan (mg/L)	Federal RCRA Hazardous Waste Standard (40 CFR 261)	Federal Drinking Water Standard (40 CFR 141, 143)	Federal Water Quality Criteria (40 CFR 131)
Copper	3.9	Not Regulated	1.0	0.18
Cyanide	4.8	250	0.2	0.02

This priority pollutant list indicates that the pure product contains some cyanide and copper however please note the following:

A. The priority pollutant list testing was performed on PURE PRODUCT. In usage the product is diluted to 800 parts water to one part Super Mud. During usage the product may

undergo further dilution. Regardless, if the product was used in the normal dosage or even at a higher dose the resulting slurry would meet the very strict drinking water criteria.

B. If Super Mud is disposed of as a pure product, the waste would be classified as non-hazardous.

C. There are no TCLP (Toxic Characteristics Leaching Procedure) limits for the small quantity of Cyanide and Copper found in the PURE product. This is a very intensive testing procedure, required by the US EPA, using an acid to determine the potential of a waste or its contaminating constituents to enter into groundwater.

PARAMETERS

Volatile Organic Compounds (624)	Report of Results
Acrolein, ug/kg	<5000
Acrylonitrile, ug/kg	<5000
Benzene, ug/kg	<250
Bromoform, ug/kg	<250
Carbon Tetrachloride, ug/kg	<250
Chlorobenzene, ug/kg	<250
Dibromochloromethane, ug/kg	<250
Chloroethane, ug/kg	<500
2-Chloroethylvinyl Ether, ug/kg	<500
Chloroform, ug/kg	<250
Dichlorobromomethane, ug/kg	<250
Dichlorodifluoromethane, ug/kg	<250
1,1- Dichloroethane, ug/kg	<250
1,2- Dichloroethane,ug/kg	<250
1,1- Dichloroethene, ug/kg	<250
1,2- Dichloropropane, ug/kg	<250
1,3- Dichloropropylene, ug/kg	<250
Ethylbenzene, ug/kg	<250
Bromomethane, ug/kg	<500
Chloromethane, ug/kg	<500
Methylene Chloride, ug/kg	<250
1, 1, 2, 2- Tetrachloroethane, ug/kg	<250
Tetrachloroethene, ug/kg	<250
Toluene, ug/kg	<250
Trans-1, 2- Dichloroethene, ug/kg	<250
1, 1, 1- Trichloroethane, ug/kg	<250
1, 1, 2- Trichloroethane, ug/kg	<250
Trichloroethylene, ug/kg	<250
Trichlorofluoromethane, ug/kg	<250
Vinyl Chloride, ug/kg	<500
Xylenes, ug/kg	<250
Dilution factor	50

Base Neutral Compounds (625)

Acenaphthene, ug/kg	<20000 * F68
Acenaphthylene, ug/kg	<20000 * F68
Anthracene, ug/kg	<20000 * F68
Benzidine, ug/kg	<160000 * F68
Benzo (a) Anthracene, ug/kg	<20000 * F68
Benzo (a) pyrene, ug/kg	<20000 * F68
3, 4-Benzofluoranthene, ug/kg	<20000 * F68
Benzo (g,h,i) perylene, ug/kg	<20000 * F68
Benzo (k) fluoranthene, ug/kg	<20000 * F68
bis (2- Chloroethoxy) methane, ug/kg	<20000 * F68
bis (2- Chloroethyl) ether, ug/kg	<20000 * F68
Bis (2- chloroisopropyl) ether, ug/kg	<20000 * F68
bis (2- Ethylhexyl) phthalate, ug/kg	<20000 * F68
4- Bromophenyl - phenyl - ether, ug/kg	<20000 * F68
Butylbenzylphthalate, ug/kg	<20000 * F68
2- Chloronaphthalene, ug/kg	<20000 * F68
4- Chlorophenyl - phenyl ether, ug/kg	<20000 * F68
Chrysene, ug/kg	<20000 * F68
Dibenz (a, h) anthracene, ug/kg	<20000 * F68
1, 2- Dichlorobenzene, ug/kg	<20000 * F68
1, 3- Dichlorobenzene, ug/kg	<20000 * F68
1, 4- Dichlorobenzene, ug/kg	<20000 * F68
3, 3'- Dichlorobenzidine, ug/kg	<40000 * F68
Diethylphthalate, ug/kg	<20000 * F68
Dimethylphthalate, ug/kg	<20000 * F68
Di-n-butylphthalate, ug/kg	<20000 * F68
2, 4- Dinitrotoluene, ug/kg	<20000 * F68
2, 6- Dinitrotoluene, ug/kg	<20000 * F68
Di-n-octylphthalate, ug/kg	<20000 * F68
1, 2- Diphenylhydrazine, ug/kg	<20000 * F68
Fluoranthene, ug/kg	<20000 * F68
Fluorene, ug/kg	<20000 * F68
Hexachlorobenzene, ug/kg	<20000 * F68
Hexachlorobutadiene, ug/kg	<20000 * F68
Hexachloroethane, ug/kg	<20000 * F68
Indeno (1, 2, 3 - cd) pyrene, ug/kg	<20000 * F68
Isophorone, ug/kg	<20000 * F68
Naphthalene, ug/kg	<20000 * F68
Nitrobenzene, ug/kg	<20000 * F68
N - Nitrosodimethylamine, ug/kg	<20000 * F68
N - Nitrosodi-N-Propylamine, ug/kg	<20000 * F68

N - Nitrosodiphenylamine/Diphenylamine, ug/kg	<20000 * F68
Phenanthrene, ug/kg	<20000 * F68
Pyrene, ug/kg	<20000 * F68
1, 2, 4- Trichlorobenzene, ug/kg	<20000 * F68
Dilution factor	50

Acid Extractable Organics (625)

2- Chlorophenol, ug/kg	<20000 * F68
2, 4- Dichlorophenlol, ug/kg	<20000 * F68
2, 4- Dimethylphenol, ug/kg	<20000 * F68
4, 6- Dinitro - 2 - methylphenol, ug/kg	<100000 * F68
2, 4- Dinitrophenol, ug/kg	<100000 * F68
2- Nitrophenol, ug/kg	<20000 * F68
4- Nitrophenol, ug/kg	<100000 * F68
p-Chloro-m-cresol, ug/kg	<20000 * F68
Pentachlorophenol, ug/kg	<100000 * F68
Phenol, ug/kg	<20000 * F68
2, 4, 6- Trichlorophenol, ug/kg	<20000 * F68

Pesticides/PCB's (608)	
Aldrin, ug/kg	< 0.50
alpha-BHC, ug/kg	< 0.50
beta-BHC, ug/kg	< 0.50
gamma-BHC, ug/kg	< 0.50
delta-BHC, ug/kg	< 0.50
Chlordane, ug/kg	< 5.0
4, 4' - DDT, ug/kg	< 1.0
4, 4' - DDE, ug/kg	< 1.0
4, 4' - DDD, ug/kg	< 1.0
Dieldrin, ug/kg	< 1.0
Alpha - Endosulfan, ug/kg	< 0.50
Beta - Endosulfan, ug/kg	< 1.0
Endosulfan sulfate, ug/kg	< 1.0
Endrin, ug/kg	< 1.0
Endrin Aldehyde, ug/kg	< 1.0
Heptachlor, ug/kg	< 0.50
Heptachlor epoxide, ug/kg	< 0.50
Aroclor-1242, ug/kg	<10
Aroclor-1254, ug/kg	<10
Aroclor-1221, ug/kg	<20
Aroclor-1232, ug/kg	<10
Aroclor-1248, ug/kg	<10
Aroclor-1260, ug/kg	<10
Aroclor-1016, ug/kg	<10
Toxaphene, ug/kg	<50
Cyanide (EPA 335.2), mg/kg	4.8
Antimony, mg/kg	< 5.0
Arsenic, mg/kg	< 0.050
Beryllium, mg/kg	< 0.50
Cadmium, mg/kg	< 0.50
Chromium, mg/kg	< 0.50
Copper, mg/kg	3.9
Lead, mg/kg	< 0.50
Mercury, mg/kg	< 0.0050
Nickel, mg/kg	< 0.50
Selenium, mg/kg	< 0.050
Silver, mg/kg	< 0.50
Thallium, mg/kg	< 0.50
Zinc, mg/kg	< 0.50
Phenolics, Total Recoverable (420.1), mg/kg	< 0.40

REFERENCE: EPA 40 CFR Part 136

*F68 - Due to matrix interference, reported value is estimated.

April 8, 1992

Mr. Robert Ryan
POLYMER DRILLING SERVICES
P.O. Box 507
El Dorado, AR 71731

Dear Mr. Ryan:

Re: Your Product--PDS Supermud

In response to your request, we have reviewed the probable fate of the subject product in the soil. Based on our knowledge of the primary constituent--the ammonium salt of a copolymer of acrylamide and acrylic acid--we would anticipate that this polymer would slowly biodegrade in soil to yield inorganic nitrogen.

Very truly yours,

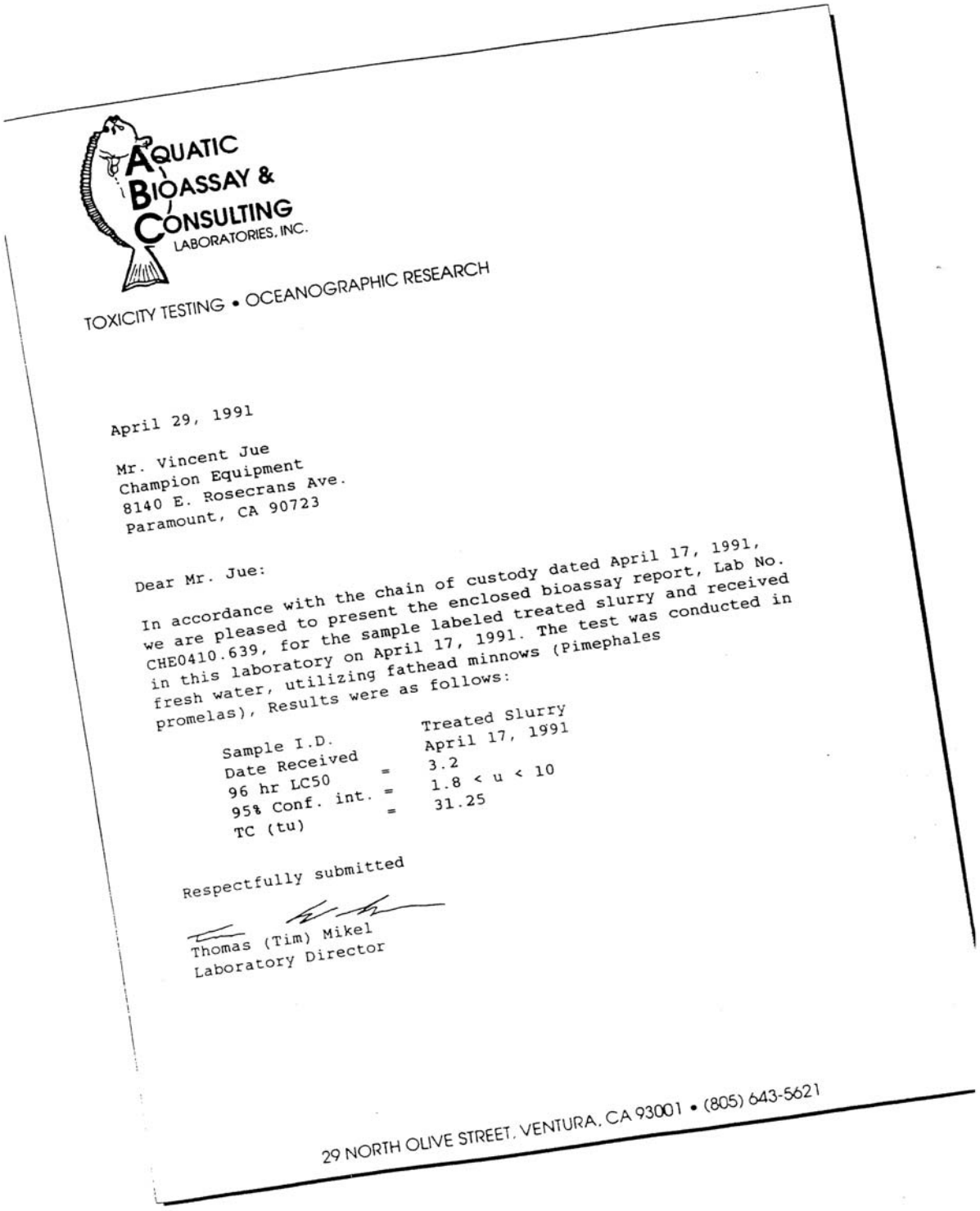
T. Harris
Environmental Specialist

TH:cc
THPDSSUP.LET
Enc.

cc: B. Coopersmith - M2
R. A. Dennis - W3
R. A. Deskin - W3
E. Miller - MO

Information or assistance is provided for your consideration without any legal responsibility. Users are expected to perform adequate verification and testing to satisfy themselves that it suits their purposes.

TOTAL P.01



AQUATIC BIOASSAY & CONSULTING LABORATORIES, INC.

TOXICITY TESTING • OCEANOGRAPHIC RESEARCH

April 29, 1991

Mr. Vincent Jue
Champion Equipment
8140 E. Rosecrans Ave.
Paramount, CA 90723

Dear Mr. Jue:

In accordance with the chain of custody dated April 17, 1991, we are pleased to present the enclosed bioassay report, Lab No. CHE0410.639, for the sample labeled treated slurry and received in this laboratory on April 17, 1991. The test was conducted in fresh water, utilizing fathead minnows (Pimephales promelas), Results were as follows:

Sample I.D.		Treated Slurry
Date Received		April 17, 1991
96 hr LC50	=	3.2
95% Conf. int.	=	1.8 < u < 10
TC (tu)	=	31.25

Respectfully submitted

Thomas (Tim) Mikel
Laboratory Director

29 NORTH OLIVE STREET, VENTURA, CA 93001 • (805) 643-5621

12

ABC Laboratories
29 North Olive Street
Ventura, CA 93001
(805) ~~648-2735~~
643-5621

CLIENT NAME: Champion Equipment DATE: 04/17/91

SAMPLE ID: Treated Slurry LAB. NO: CHE0410.639

TEST TYPE: Screening FLOW: Static TANK VOLUME: 10 Liters

DILUTION WATER: Reconstituted Fresh HARDNESS: 25 mg/l ALKALINITY: 28 mg/l

END: 35 END: 38

AERATION: Single bubble aeration in all tanks ACCL. TEMP: 20.0 deg. C

ORGANISM: Fathead Minnow SPECIES: Pimephales promelas SOURCE: Thomas Fish Co.

CARRIER: Greyhound Bus Co. DATE REC'D: 03/26/91 AVG. LNGTH: 38 mm AVG.WT: .6g

NUMBER ORGANISMS PER TANK: 10

	Intitial	24 Hour	48 Hour	72 Hour	96 Hour
Date:	04/22/91	04/23/91	04/24/91	04/25/91	04/26/91
Time:	1315	1315	1300	1300	1300

Conc. mg/l	DO	Dg.C	ph	DO	Dg.C	ph	#m	DO	Dg.C	ph	#m	DO	Dg.C	ph	#m	DO	Dg.C	ph	#m	Tot. #m
0(Con.)	8.0	18.5	7.5	8.2	21.2	7.5	0	7.4	20.8	7.2	0	76	20.8	7.2	0	7.8	20.8	7.2	0	0
10%	9.0	20.4	7.6	8.2	20.8	7.8	10	–	–	–	–	–	–	–	–	–	–	–	–	10
5.6%	8.4	20.3	8.0	8.5	21.2	7.1	7	8.8	21.1	7.5	0	8.4	21.3	7.5	1	8.0	21.7	6.6	0	8
3.2%	7.8	19.6	8.1	8.6	21.1	7.1	2	8.6	21.2	7.5	2	8.4	21.3	7.5	1	7.2	21.5	6.8	0	5
1.8%	8.0	18.3	8.1	8.5	21.1	7.0	0	8.6	21.2	7.4	0	8.2	21.4	7.4	0	7.8	21.6	6.8	0	0
1.0%	8.2	19.4	8.2	8.5	21.0	7.0	0	8.8	21.2	7.4	0	8.3	21.4	7.4	0	7.4	21.7	7.0	0	0

96 Hour LC50 = 3.2 95% CONFIDENCE INTERVAL = 1.8 <u < 10

TC (tu) = 7.46

CALCULATION METHOD: Binomial Test ANALYST: Martha Meyer DATE: 04/29/91

Martha Meyer / Chief Biologist

REMARKS: Beginning Sample Hardness: 55 mg/L (CACO3) Alkalinity: 37 mg/L
Ending Sample Hardness: 65 mg/L (CACO3) Alkalinity: 55 mg/L

13

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
10	10	10	100	9.765625E-02
5.6	10	8	80	5.46875
3.2	10	5	50	62.30469
1.8	10	0	0	9.765625E-02
1	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 1.8 AND 10 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 99.80469 PERCENT
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 3.2

>>>>>>>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS
4	.1208808	3.722142	2.86017 5.056305

>>>>>>>>>>>>>>RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	.2570987	1	.6907188

SLOPE = 5.835559
95 PERCENT CONFIDENCE LIMITS = 2.876644 AND 8.794474
LC50 = 3.617213
95 PERCENT CONFIDENCE LIMITS = 2.805555 AND 4.657007
LC1 = 1.444268
95 PERCENT CONFIDENCE LIMITS = .5336195 AND 2.067589

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE: (501) 682-0744
FAX: (501) 682-0707

April 2, 1996

Mr. Pat Bailey
PDSCo., Inc.
P.O. Box 507
El Dorado, AR 71731-0507

RE: Land application of drilling fluids

Dear Mr. Bailey:

This is in response to your request dated March 15, 1996, to land apply drilling fluids generated in drilling shafts for the Hwy. 31 railroad overpass near Pine Bluff in Jefferson County. By this letter the Department grants approval to your request with the following conditions:

1. The material must be applied evenly to the site.
2. Land application shall not occur when soils are saturated or when significant precipitation is anticipated within the next 24 hours.

Please contact me at 682-0655 if you have any questions.

Sincerely,

Bruce Kirkpatrick

Bruce Kirkpatrick, P.E.
Assistant Chief
Water Division

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

October 6, 1995

Mr. Rob Newsom, Marketing Director
PDSCo
PO Box 507
El Dorado, Arkansas 71731-0507]

Dear Mr. Newsom:

It is my pleasure to inform you that the Department of Environmental Protection has found the requested use of PDSCo Super Mud acceptable for the FDOT applications, assuming compliance with the best management practices proposed in your August 1995 report.

Your company's regard for Florida's environment is greatly appreciated. If I can be of further assistance, please contact me at 904/488-3601.

Sincerely,

Mary E. Williams, Chief
Bureau of Drinking Water and Ground Water Resources

MW/cd

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Printed on recycled paper.

MATERIAL SAFETY DATA

1. CHEMICAL PRODUCT AND COMPANY INDENTIFICATION

PRODUCT NAME	:	**Super Mud**
SYNONYMS	:	Anionic polyacrylamide in water-in-oil emulsion
CHEMICAL FAMILY	:	Anionic polyacrylamide copolymer
MOLECULAR FORMULA	:	Mixture
MOLECULAR WEIGHT	:	Mixture

PDSCo, P.O. BOX 507, WEST SHARP STREET, EL DORADO, AR 71730 USA
EMERGENCY PHONE: For emergency call PDSCo: 1 (800) 243-7455

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Petroleum distillate Hydrotreated light	064742-47-8	24	400 ppm	OSHA

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR	:	White, viscous, opaque liquid; slight hydrocarbon odor
STATEMENTS OF HAZARD	:	WARNING! MAY CAUSE SKIN IRRITATION IMPORTANT! SPILLS OF THIS PRODUCT ARE VERY SLIPPERY WHEN WET

POTENTIAL HEALTH EFFECTS

EFFECTS OF OVEREXPOSURE:
Acute oral (rat) LD50 and acute dermal (rabbit) LD50 of > 10 ml/kg. Direct contact with this material may cause minimal eye and moderate skin irritation.
Refer to Section 11 for toxicology information on the OSHA regulated components of this product.

4. FIRST AID MEASURES

In case of skin contact, wash affected areas of skin with soap and water. Do not reuse clothing without laundering.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT	:	>200^{0}F (>93.3^{0}C)	METHOD	:	Pensky-Martens Closed Cup
FLAMMABLE LIMITS (% BY VOL)	:	Not applicable			
AUTOIGNITION TEMP	:	Not available			
DECOMPOSITION TEMP	:	Not available			

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTIONS

Use water spray, carbon dioxide or dry chemical to extinguish fires. Use water to keep containers cool. Wear self-contained, positive pressure breathing apparatus and full fire-fighting protective clothing. See Section 8 (Exposure Controls/Personal Protection) for special protective clothing.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Cover spill with some inert absorbent material; sweep up and place in waste disposal container. Flush area thoroughly with water. Residual may be very slippery. If slipperiness remains, apply more dry-sweeping compound.

7. HANDLING AND STORAGE

Avoid contact with skin. Wash thoroughly after handling. To avoid product degradation and equipment corrosion, do not use iron, copper, or aluminum container or equipment. OSHA regulations (29 CFR 106.a.14), require that the flashpoint of materials of this type be determined by the Pensky-Martens Closed Tester method. The test for this product indicated it has flash point at >200^{0}F (93.3^{0}C); therefore, caution should be exercised in storage and handling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)
Engineering controls are not usually necessary if good hygiene practices are followed. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Avoid unnecessary skin contact. Impervious gloves are recommended to prevent prolonged skin contact. For operations where eye or face contact can occur, eye protection is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR	:	White, viscous, opaque liquid; slight hydrocarbon odor.
BOILING POINT	:	~ 347^{0}F; ~ 175^{0}C (value for oil phase)
MELTING POINT	:	0^{0}F; -18^{0}C
VAPOR PRESSURE	:	Not available
SPECIFIC GRAVITY	:	1.0
VAPOR DENSITY	:	Not available
% VOLATILE (BY WT)	:	~ 70
pH	:	Not available
SATURATED IN AIR (BY VOL)	:	Not available
EVAPORATION RATE	:	<1 (Butyl Acetate = 1)
SOLUBILITY IN WATER	:	Appreciable

10. STABILITY AND REACTIVITY

STABILITY	:	Stable
CONDITIONS TO AVOID	:	None known
POLYMERIZATION	:	Will not occur
CONDITIONS TO AVOID	:	None known
INCOMPATIBLE MATERIALS	:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS	:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, ammonia, and/or oxides or nitrogen.

11. TOXICOLOGICAL INFORMATION

Toxicological information on the OSHA regulated components of this product is as follows:
Acute overexposure to petroleum distillate vapors may cause eye and throat irritation. On direct skin contact, petroleum distillate may produce a severe skin irritation.

12. ECOLOGICAL INFORMATION

No aquatic LC50, BOD, or COD data available.
OCTANOL/H_2O PARTITION COEF: Not available

13. DISPOSAL CONSIDERATIONS

Disposal must be made in accordance with applicable governmental regulations.

14. TRANSPORT INFORMATION

		D.O.T SHIPPING INFORMATION	IMO SHIPPING INFORMATION
SHIPPING NAME	:	Not applicable/Not Regulated	Not applicable/Not Regulated
HAZARD CLASS/ PACKING GROUP	:	Not applicable	Not applicable
UN NUMBER	:	Not applicable	Not applicable
IMDG PAGE	:	Not applicable	Not applicable
D.O.T HAZARDOUS SUBSTANCES	:	(Product Reportable Quantity) Not applicable	Not applicable
TRANSPORT LABEL REQUIRED	:	None required	None required

		ICAO/IATA		TRANSPORT CANADA
SHIPPING NAME	:	Not applicable		Not applicable
HAZARD CLASS	:	Not applicable		Not applicable
SUBSIDIARY CLASS	:	Not applicable		Not applicable
UN / ID NUMBER	:	Not applicable		Not applicable
PACKING GROUP	:	Not applicable		Not applicable
TRANSPORT LABEL REQUIRED	:	None required		None required
PACKING INSTRUCTIONS	:	Passenger Cargo	Not applicable Not applicable	Not applicable
MAX NET QTY	:	Passenger Cargo	Not applicable Not applicable	Not applicable

ADDITIONAL TRASPORT INFORMATION

TECHNICAL NAME (N.O.S.) : Not applicable

MATERIAL SAFETY DATA

1. CHEMICAL PRODUCT AND COMPANY INDENTIFICATION

PRODUCT NAME	:	**Super Mud *Dry***
SYNONYMS	:	None
CHEMICAL FAMILY	:	Anionic polyacrylamide copolymer
MOLECULAR FORMULA	:	Polymer
MOLECULAR WEIGHT	:	Polymer

PDSCo, P.O. BOX 507, 105 WEST SHARP STREET, EL DORADO, AR 71730 USA
EMERGENCY PHONE: For emergency call PDSCo: 1 (800) 243-7455

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE

No permissible Exposure Limits (PEL/TLV) have been established by OSHA or ACGIH

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR	:	Off-white granular solid
STATEMENTS OF HAZARD	:	IMPORTANT! SPILLS OF THIS PRODUCT ARE VERY SLIPPERY WHEN WET

POTENTIAL HEALTH EFFECTS

EFFECTS OF OVEREXPOSURE:
This product has an acute oral (rat) LD50 and acute dermal (rabbit) LD50 of > 2.5 g/kg and >10.0 g/kg respectively. This product produced no eye irritation and no dermal irritation during primary irritation tests in rabbits. The inhalation of the vapors is not likely to cause adverse health effects.

4. FIRST AID MEASURES

In case of skin contact, wash affected areas of skin with soap and water.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES		
FLASH POINT	:	Not applicable
FLAMMABLE LIMITS (% BY VOL)	:	Not applicable
AUTOIGNITION TEMP	:	Not available
DECOMPOSITION TEMP	:	Not available

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTIONS
As with many solids, any dust that is generated may be explosive if mixed with air in critical proportions and in the presence of a source of ignition. Use water, carbon dioxide or dry chemical to extinguish fires. Wear self-contained, positive pressure breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Spilled material becomes very slippery when wet. Sweep up spills and place in a waste disposal container. Flush the area thoroughly with water and scrub to remove residual. If slipperiness remains, apply more dry-sweeping compound. Do not flush large quantity of the material to sewer.

7. HANDLING AND STORAGE

Spills should be scooped up or wiped up immediately, and spill area flushed with water.
Maintained good housekeeping to control dust accumulations.
To avoid product degradation and equipment corrosion, do not use iron, copper or aluminum container or equipment.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

Engineering controls are not usually necessary if good hygiene practices are followed. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Avoid unnecessary skin contact. Impervious gloves are recommended to prevent prolonged skin contact. For operations where eye or face contact can occur, eye protection is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR	:	Off-white granular solid
BOILING POINT	:	Not applicable
MELTING POINT	:	Not available
VAPOR PRESSURE	:	Not applicable
SPECIFIC GRAVITY	:	48 - 55; lb/ft^3
VAPOR DENSITY	:	Not applicable
% VOLATILE (BY WT)	:	8 - 12; (water)
pH	:	7 - 9; (aqueous solution)
SATURATED IN AIR (BY VOL)	:	Not applicable
EVAPORATION RATE	:	Not applicable
SOLUBILITY IN WATER	:	Limited by viscosity

10. STABILITY AND REACTIVITY

STABILITY	:	Stable
CONDITIONS TO AVOID	:	None known
POLYMERIZATION	:	Will not occur
CONDITIONS TO AVOID	:	None known
INCOMPATIBLE MATERIALS	:	Strong oxidizing agents
HAZARDOUS DECOMPOSITION PRODUCTS	:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, ammonia, and/or oxides or nitrogen.

11. TOXICOLOGICAL INFORMATION

Toxicological information on the OSHA regulated components of this product is as follows:
Not Applicable

12. ECOLOGICAL INFORMATION

LC50

BLUEGILL, 96 HOUR: 180 mg/L
TROUT, 96 HOUR: 130 mg/L
DAPHNIA, 48 HOUR: > 1000 mg/L

OCTANOL/H_2O PARTITION COEF.: Not available

13. DISPOSAL CONSIDERATIONS

Disposal must be made in accordance with applicable governmental regulations.

14. TRANSPORT INFORMATION

		D.O.T SHIPPING INFORMATION	IMO SHIPPING INFORMATION
SHIPPING NAME	:	Not applicable/Not Regulated	Not applicable/Not Regulated
HAZARD CLASS/ PACKING GROUP	:	Not applicable	Not applicable
UN NUMBER	:	Not applicable	Not applicable
IMDG PAGE	:	Not applicable	Not applicable
D.O.T HAZARDOUS SUBSTANCES	:	(Product Reportable Quantity) Not applicable	Not applicable
TRANSPORT LABEL REQUIRED	:	None required	None required

		ICAO/IATA		TRANSPORT CANADA
SHIPPING NAME	:	Not applicable/Not Regulated		Not applicable/Not Regulated
HAZARD CLASS	:	Not applicable		Not applicable
SUBSIDIARY CLASS	:	Not applicable		Not applicable
UN / ID NUMBER	:	Not applicable		Not applicable
PACKING GROUP	:	Not applicable		Not applicable
TRANSPORT LABEL REQUIRED	:	None required		None required
PACKING INSTRUCTIONS	:	Passenger Cargo	Not applicable Not applicable	Not applicable
MAX NET QTY	:	Passenger Cargo	Not applicable Not applicable	Not applicable

ADDITIONAL TRASPORT INFORMATION

TECHNICAL NAME (N.O.S.) : Not applicable

15. REGULATORY INFORMATION

INVENTORY INFORMATION

US TSCA : This product is manufactured in compliance with all provisions of the Toxic Substances control Act, 15 U.S.C.

CANASA DSL : Components of this product have been reported to Environment Canada in accordance with subsection 25 of the Canadian Environmental Protection Act and are included on the Domestic Substances List.

EEC EINECS : All components of this product are included on the European Inventory of Existing Chemical Substances [EINECS] in compliance with Council Directive 67/548/EEC, Amended 79/831/EEC.

OTHER ENVIRONMENTAL INFORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

COMPONENT	CAS. NO.	%	TPQ(lbs)	RQ (lbs)	S313	RCRA	TSCA 12B

This product does not contain any components regulated under these sections of the EPA

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA
Not applicable under SARA TITLE III

16. OTHER INFORMATION

NFPA HAZARD RATING (National Fire Protection Association)

	Fire	FIRE	: Materials that must be preheated before ignition can occur.
	1	HEALTH	: Materials which on exposure under fire conditions would offer
Health 0	0 Reactivity	no hazard beyond that of ordinary combustible material.	
	-	REACTIVTY	: Materials which in themselves are normally stable, even under
	Special	fire exposure conditions, and which are not reactive with water.	

REASON FOR ISSUE:

Revised Section 3

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.

15. REGULATORY INFORMATION

INVENTORY INFORMATION

US TSCA : This product is manufactured in compliance with all provisions of the Toxic Substances control Act, 15 U.S.C.

CANASA DSL : Components of this product have been reported to Environment Canada in accordance with subsection 25 of the Canadian Environmental Protection Act and are included on the Domestic Substances List.

EEC EINECS : Product was not required to be included in the European Inventory of Existing Chemical Substances [EINECS] since the product (or its components) was regarded to be a polymer by the EEC-Commission. This product fulfils the requirements of Council Directive 67/548/EEC, Amended 79/831/EEC.

OTHER ENVIRONMENTAL INFORMATION

The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

COMPONENT	CAS. NO.	%	TPQ(lbs)	RQ (lbs)	S313	RCRA	TSCA 12B
Ammonium Sulfate	007783-20-2	~2.00	None	None	Yes	None	No

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA				
Acute (Y)	Chronic (N)	Fire (N)	Reactive (N)	Pressure (N)

16. OTHER INFORMATION

NFPA HAZARD RATING (National Fire Protection Association)

Fire 1 Health 2 0 Reactivity - Special

FIRE : Materials that must be preheated before ignition can occur.
HEALTH : Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.
REACTIVTY : Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

Reason for Issue: New Format

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.