Contract No.: EP-W-09-002
WA #: 032-RICO-02KD

Region 2 RAC2
Remedial Action Contract

Health and Safety Plan

Matteo & Sons, Inc. Site

Remedial Investigation/ Feasibility Study

Thorofare, New Jersey

June 30, 2011

565358

CDM

HEALTH AND SAFETY PLAN
MATTEO & SONS, INC. SITE
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
THOROFARE, NEW JERSEY
Work Assignment No.: 032-RICO-02KD

Prepared for:
U.S. Environmental Protection Agency
290 Broadway
New York, New York 10007-1866

Prepared by:
CDM Federal Programs Corporation
14 Wall Street, Suite 1702
New York, New York 10005

EPA Work Assignment No.	: 032-RICO-02KD
EPA Region	: 2
Contract No.	: EP-W-09-002
CDM Federal Programs Corporation	
Document No.	: 3320-032-00751
Prepared by	: CDM
Project Manager	: Ms. Sharon Budney
Telephone Number	: (732) 590-4662
EPA Remedial Project Manager	: Mr. Larry Granite
Telephone Number	: (212) 637-4423
Date Prepared	: June 30, 2011

MATTEO & SONS, INC. SITE
HEALTH AND SAFETY PLAN
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APPENDICES

The CDM Health and Safety Program Manual will be kept on-site. It covers all the required Health and Safety Plan elements not detailed in this Health and Safety Plan Form.

ACRONYMS

APR	air purifying respirator
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
EPA	Environmental Protection Agency
eV	photoionization potential
EZ	exclusion zone
HAZWOPER	hazardous waste operations
HSM	corporate health and safety manager
HASP	health and safety plan
H&SP	health and safety plan
IDLH	immediately dangerous to life or health
LEL	lower explosive limit
mg/m^3	milligrams per cubic meter
MSDS	materials safety data sheet
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priority List
OSHA	Occupational Health and Safety Act
PCB	polychlorinated biphenyls
PEL	permissible exposure limit
PID	photoionization detector
POTW	publicly owned treatment sludge
PPE	personal protective equipment
ppm	parts per million
REZ	radiation exclusion zone
RI	remedial investigation
SCBA	self contained breathing apparatus
SHSC	site health and safety coordinator
SHSO	site health and safety officer
TLV	threshold limit value

HEALTH AND SAFETY PLAN FORM

CDM Health and Safety Program

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CDM Federal Programs Corporation
PROJECT DOCUMENT #: 3320-032-00751

PROJECT NAME	Matteo & Sons, Inc. Site	**PROJECT#**	032-RICO-02KD	**REGION**	2
SITE ADDRESS	1708 U.S Highway 130	**CLIENT ORGANIZATION**			U.S Environmental Protection Agency
	Thororfare	**CLIENT CONTACT**			Mr. Larry Granite
	West Deptford Township, NJ	**CLIENT CONTACT PHONE #**			212-637-4423

( ) AMENDMENT TO EXISTING APPROVED H&SP?

( ) H&SP AMENDMENT NUMBER? ____ ( ) DATE OF PREVIOUS H&SP APPROVAL ____

OBJECTIVES OF FIELD WORK:

(e.g. collect surface soil samples):

The objective of this work assignment is to evaluate the nature and extent of groundwater, soil, surface water, and sediment contamination. See page #6 of this Health and Safety Plan for specific task descriptions.

SITE TYPE: *Check as many as applicable*

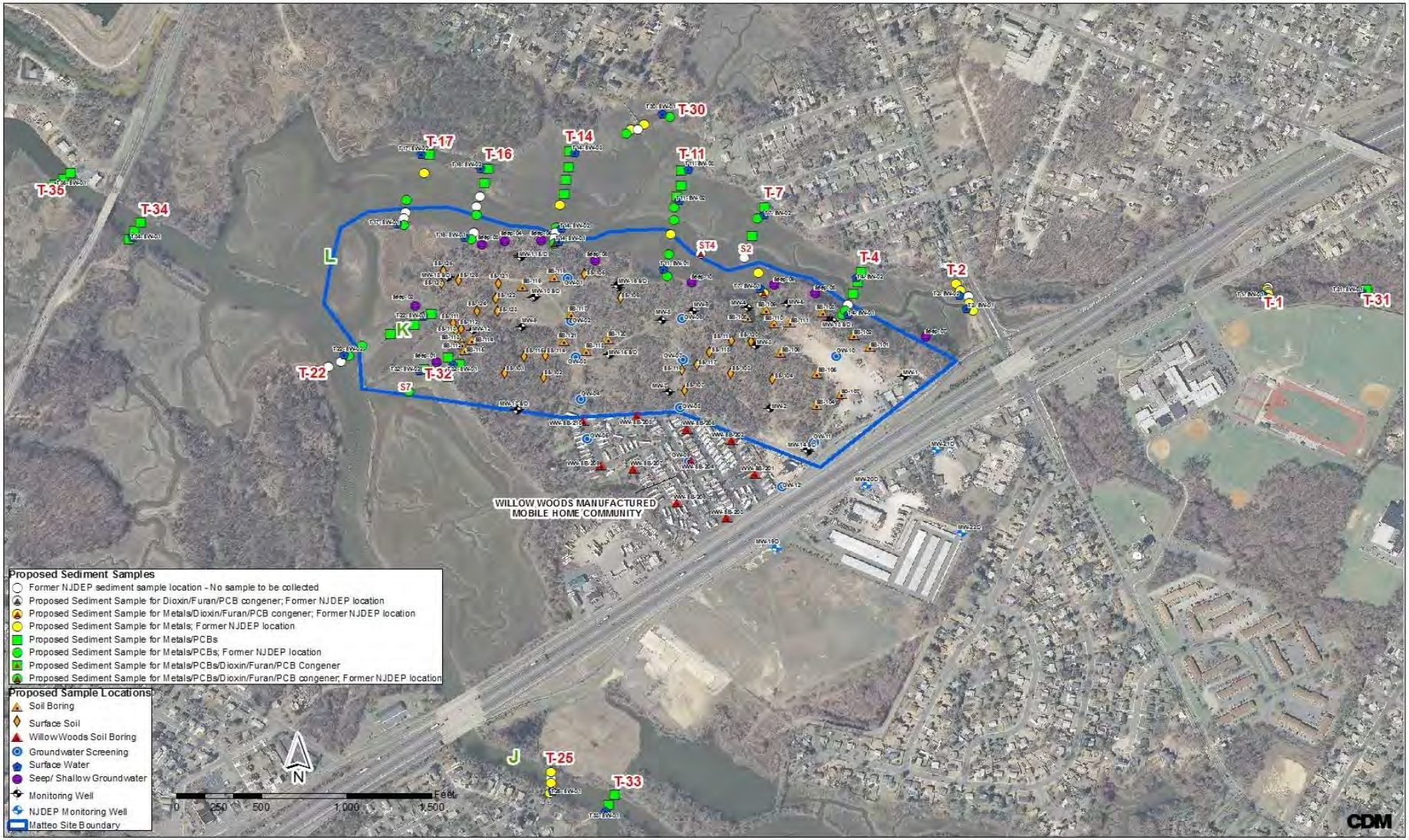
Active	**(X)**	**Landfill**	**(X)**	Unknown	( )
Inactive	( )	Uncontrolled	( )	Military	( )
Secure	**(X)**	Industrial	( )	**Other (specify)**	
Unsecure	( )	Recovery	( )	**Surface Water Body**	**X**
Enclosed space	( )	Well Field	( )		

All requirements described in the **CDM Health and Safety Manual** are incorporated in this health and safety plan by reference.

NAMES OF WORK CREW MEMBERS	Company / Division / Office	Current Training & Medical?	Project or Site Responsibilities	Tasks On Site?
Sharon Budney	CDM	Yes	Site Manager	1
Joseph Button	CDM	Yes	RI Task Leader	1,2,3,4,5
Jeffrey Rakowski	CDM	Yes	Field Team Leader	1,2,3,4,5
Mike Ehnot	CDM	Yes	Field Geologist	1,2,3,4,5
Dante Porzilli	CDM	Yes	Field Scientist	1,2,3,4,5
Ed Kulkusky	CDM	Yes	Field Technician	1,2,3,4,5
Pat Connelly	CDM	Yes	Field Geologist	1,2,3,4,5
George Molnar	CDM	Yes	Field Scientist	1,2,3,4,5
Alan Eisberg	CDM	Yes	Field Scientist	1,2,3,4,5

BACKGROUND REVIEW: **(X) Complete** ( ) Incomplete

SITE MAP:



Note: Exclusion Zones will only be setup for drilling as potentially contaminated soils will be disturbed. For such work, the exclusion zones will be setup in the immediate area of drills rigs

HISTORY:

According to available records, the Matteo family, under various names (James Matteo and Sons, Inc., Matteo Trucking Company, Thorofare Trucking and Trash Company, and Matteo Iron and Metal), has operated an unregistered landfill and junkyard and a metals recycling facility at the site since 1961. In 1968, NJDEP identified an inactive incinerator at the site. In 1971, NJDEP approved Matteo's request to operate the incinerator to burn copper wire and Matteo submitted a plan to operate a "sweating fire box" to melt lead battery terminals for lead reclamation. This lead smelting operation continued until 1985. In 1972, NJDEP observed landfilling of crushed battery casings in an area of wetlands adjacent to Hessian Run. This operation was apparently performed in conjunction with the lead melting operation, as there were several reports of battery casing incineration and subsequent onsite ash disposal. In addition to the incineration and landfilling operations, drums of waste were scattered throughout the property. In January 1984, NJDEP issued an Administrative Consent Order to Matteo Iron and Metal for solid waste violations and required Matteo to cease waste disposal at the site. Since 1986, a number of investigations were completed by NJDEP and EPA. In June 2005, NJDEP submitted the site for CERCLA removal action consideration. On September 27, 2006 the site was listed on the EPA NPL.

WASTE TYPES: **(X) Liquid** **(X) Solid** ( ) Sludge ( ) Gas ( ) Unknown ( ) Other, specify:

WASTE CHARACTERISTICS:

( ) Corrosive	( ) Flammable	( ) Radioactive
(X) Toxic	**(X) Volatile**	( ) Reactive
( ) Inert Gas	( ) Unknown	
(X) Other:	Metals	

WORK ZONES:

The exclusion zone (EZ) includes all active areas in which contaminants may affect personnel through exposure routes, and/or in which heavy equipment and other hazardous materials may be used. The EZ will be marked off with stakes and caution tape. Sufficient clearance will be provided around drill rigs (approx. 50 feet). The contamination reduction/decontamination zone (CRZ) is the transition area between the EZ and the support zone (SZ). These zones will be established such that the wind direction is from the SZ to the EZ. The Buddy System will be in effect at all times.

HAZARDS OF CONCERN: *Check as many as applicable.*

(X) Heat Stress*	**(X) Noise**
(X) Cold Stress*	**(X) Inorganic Chemicals**
( ) Explosive/Flammable	**(X) Organic Chemicals**
( ) Oxygen Deficient	**(X) Motorized Traffic**
( ) Radiological	**(X) Heavy Machinery**
(X) Biological (Ticks)	**(X) Slips & Falls**
(X) Other: Working Near or Over Water*	
( ) Other:	

* Select procedures included in Appendix B. Other procedures are included in the Corporate Health and Safety Plan.

FACILITY'S PAST AND PRESENT DISPOSAL METHODS AND PRACTICES:

The lead contamination observed at the site is believed to originate from automotive batteries brought to the site and stripped of their lead contents for smelting. The empty battery casings were crushed and deposited directly into Hessian Run, as well as into the wetlands along Hessian Run, altering the shoreline. The source of the PCB contamination is less clear. One possibility is widespread application of a PCB-containing agent for dust and weed control on the unpaved roadways and areas that supported the scrapyard and past waste disposal operations. Approximately 5 acres of the southeastern portion of the site is largely paved with asphalt, and contains several buildings which support the current used scrap metal recycling facility.

CDM's procedures can be found in the Corporate Health and Safety Manual (March 2011) which is kept onsite.

Housekeeping	Traffic and Work Zone Safety	Working Safely Around Geoprobes
Manual Material Handling	Working Around Heavy Equipment	Hazardous Waste Site Controls
Electrical Safety	Working Near or Over Water	Working Safely Around Drill Rigs
Tools and Power Equipment	Flammable and Combustible Liquids	Hazardous Waste Site Decontamination
Compressed Gases		

HEALTH AND SAFETY PLAN FORM	*This document is for the exclusive*	**CDM Federal Programs Corporation**
CDM Health and Safety Program	*use of CDM and its subcontractors*	**PROJECT DOCUMENT #: 3320-032-00751**

DESCRIPTION AND FEATURES:

The Matteo site is located at 1708 U.S. Highway 130 (Crown Point Road) in Thorofare, West Deptford Township, Gloucester County, New Jersey. The site occupies two tax parcels (Lot 2, Block 128 and Lot 2, Block 325) as identified on the West Deptford Township Tax Map. The property, which had historically been a farm, consists of 80 acres of land located between the confluence of Woodbury Creek and Hessian Run to the west, Belmont Avenue to the east, and U.S. Highway 130 to the south. The site is currently used as a scrap metal recycling facility. The southeastern portion of the site (approximately 5 acres) is largely paved with asphalt, and contains several buildings which support the scrap metal recycling business. The remainder of the site (approximately 75 acres) is comprised predominantly of heavily vegetated undeveloped land which borders Woodbury Creek to the west, Hessian Run to the north, and a residential mobile home community to the south. Additionally, two utility lines (Colonial Oil and Public Service Electric & Gas) are located on the northwestern portion of the property.

SURROUNDING POPULATION: **(X) Residential** ( ) Industrial **(X) Commercial** **(X) Rural** ( ) Urban OTHER:

HAZARDOUS MATERIAL SUMMARY: ***Highlight or bold waste types and estimate amounts by category.***

CHEMICALS: *Amount/Units:*	**SOLIDS:** *Amount/Units:*	**SLUDGES:** *Amount/Units:*	**SOLVENTS:** *Amount/Units:*	**OILS:** *Amount/Units:*	**OTHER:** *Amount/Units:*
Acids	Flyash	Paints	Ketones	Oily Wastes	Laboratory
Pickling Liquors	Mill or Mine Tailings	Pigments	Aromatics	Gasoline	Pharmaceutical
Caustics	Asbestos	Metals Sludges	Hydrocarbons	Diesel Oil	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	Alcohols	Lubricants	Radiological
Dyes or Inks	Non-Ferrous Smelter	Distillation Bottoms	**Halogenated (chloro, bromo)**	Polynuclear Aromatics	Municipal
Cyanides	**Metals**	Aluminum	Esters	**PCBs**	Construction
Phenols	**Dioxins/ Furans**		Ethers	Heating Oil	Munitions
Halogens					
Other - *specify*	**Other - *specify***	Other - *specify*	**Other - *specify***	Other - *specify*	**Other - *specify***
			cis-1,2-dichloroethene		**Batteries**
			Vinyl Chloride		

KNOWN CONTAMINANTS		HIGHEST OBSERVED CONCENTRATION (ppm)	PEL/TLV *ppm or mg/m3 (specify)*	IDLH *ppm or mg/m3 (specify)*		SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL (eV)
Lead compounds	S/SD	31,300	50 µg/m3	100 mg/m3		Fatigue, pallor, colic, insomnia	Dust
Polychlorinated biphenyl (PCBs - skin)	SD	4.3	500 µg/m3	5 mg/m3		Irritated eyes, chloracne	Mist
Vinyl chloride	GW	0.02	1 ppm	Carc.		Weakness, stomach pain, cancer	10.00

Notes:
Verify your access to a material safety data sheet for each chemical at the site.

SD = Sediment
S = Soil
GW = Ground Water

IDLH = immediately dangerous to life or health
mg/m3 =milligrams per cubic meter
PEL = permissible exposure limit

TLV = threshold limit value
µg/m3 = micrograms per cubic meter

HEALTH AND SAFETY PLAN FORM **CDM Health and Safety Program**	*This document is for the exclusive use of CDM and its subcontractors*	**CDM Federal Programs Corporation** **PROJECT DOCUMENT #: 3320-032-00751**	
SPECIFIC TASK DESCRIPTIONS	**Disturbing the Waste?**	**TASK - SPECIFIC HAZARDS**	**HAZARD & SCHEDULE**
1 Site Visit, Mobilization/ Demobilization. Support zone activities - Sample management, laboratory communication, tailgate meetings. Vehicle and equipment set-up/breakdown	**Non-intrusive**	Slips, Trips, and Falls, Vehicular Traffic, Back Injuries, Noise, Contact with Preservatives (burning, irritant), Heat Stress, and Cold Stress	**Low Hazard** 2011
2 Ecological Characterization, Surveying Oversight - (Cultural Resources, Elevation - Location, Walkover Radiological Screening)	**Non-intrusive**	Slips, Trips, and Falls, Heat Stress, and Cold Stress.	**Low Hazard** 2011
3 Shallow Water Sampling, Monitoring and Potable Well Sampling, Synoptic Water Levels	**Non-intrusive**	Back Injuries, Slips, Trips, and Falls, Heat Stress, Cold Stress and Contact with Preservatives (burning, irritant).	**Low Hazard** 2011
4 Groundwater Screening, Well Installation, Soil Boring collection	**Intrusive**	Slips, Trips, and Falls, Back Injuries, Noise, Contact with Preservatives (burning, irritant), Heavy Machinery, Heat Sress, Cold Stress, underground and overhead utilities.	**Medium Hazard** 2011
5 Surface Water Sampling, Sediment Sampling, Bathymetry Survey Oversight - These activities will involve work around a arge mounted drill rig and on a boat.	**Intrusive**	These activities will involve work around a arge mounted drill rig and on a boat. Slips, Trips, and Falls, Back Injuries, Noise, Contact with Preservatives (burning, irritant), Heavy Machinery, Heat Sress, Cold Stress, underground and overhead utilities.	**Medium Hazard** 2011
SPECIALIZED TRAINING REQUIRED: **40 hour OSHA Training, 8 hour OSHA Training and boating license and safety training (as necessary under local laws)**		**SPECIAL MEDICAL SURVEILLANCE REQUIREMENTS:** **Annual Medical Surveillance**	
OVERALL HAZARD EVALUATION:	( ) High **(X) Medium** **(X) Low** ( ) Unknown		
JUSTIFICATION:	A risk up to medium was assigned due potentially dangerous drill rig and boat based activities.		
FIRE/EXPLOSION POTENTIAL:	( ) High ( ) Medium **(X) Low** ( ) Unknown		

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

TASKS: **1 - 2**
LEVEL: **D - Modified** ( ) Contingency
(X) Primary

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: (X) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: (X) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Flotation Device If Over Water
( ) Hearing Protection
(X) Sun Screen

BLOCK B

TASKS: **1 - 2**
LEVEL: **C** **(X) Contingency**
( ) Primary

Respiratory: ( ) Not needed
( ) SCBA, Airline:
(X) APR: North 7600
(X) Cartridge: North P100
( ) Escape Mask:
( ) Other:

Head and Eye: (X) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots: Latex

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
(X) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Float. Device If Over Water
( ) Hearing Protection
(X) Sun Screen

TASKS: **3**
LEVEL: **D - Modified** ( ) Contingency
(X) Primary

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
(X) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Flotation Device
( ) Hearing Protection
(X) Sun Screen

TASKS: **3**
LEVEL: **C** **(x) Contingency**
( ) Primary

Respiratory: ( ) Not needed
( ) SCBA, Airline:
(X) APR: North 7600
(X) Cartridge: North P100
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
(X) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Flotation Device
( ) Hearing Protection
(X) Sun Screen

This health and safety plan form constitutes hazard analysis per 29 CFR 1910.132 as certified by Sean Oliveira, CIH, the CDM Federal Programs Health and Safety Manager

HEALTH AND SAFETY PLAN FORM | *This document is for the exclusive* | **CDM Federal Programs Corporation**

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PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

TASKS: **4**
LEVEL: **D - Modified** ( ) Contingency
(X) Primary

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
(X) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Flotation Device If Over Water
(X) Hearing Protection
(X) Sun Screen

BLOCK B

TASKS: **4**
LEVEL: **C** **(X) Contingency**
( ) Primary

Respiratory: ( ) Not needed
( ) SCBA, Airline:
(X) APR: North 7600
(X) Cartridge: North P100
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots: Latex

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
( ) Float. Device If Over Water
(X) Hearing Protection
(X) Sun Screen

BLOCK C

TASKS: **5**
LEVEL: **D - Modified** ( ) Contingency
(X) Primary

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Other:

Gloves: ( ) Not needed
(X) Gloves:
( ) Overgloves:
Other: specify below
Other: specify below
(X) Tick Spray
(X) Flotation Device
(X) Hearing Protection
(X) Sun Screen

Note: If combined outdoor air and water temperature is less than 100 degree fahrenheit then workers on boats must wear United States Coastguard approved lifesuits.

BLOCK D

TASKS: **5**
LEVEL: **C** **(x) Contingency**
( ) Primary

Respiratory: ( ) Not needed
( ) SCBA, Airline:
(X) APR: North 7600
(X) Cartridge: North P100
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe **(X) Steel Shank**
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
(X) Gloves:
( ) Overgloves:

Other: specify below
(X) Tick Spray
(X) Flotation Device
(X) Hearing Protection
(X) Sun Screen

This health and safety plan form constitutes hazard analysis per 29 CFR 1910.132 as certified by Sean Oliveira, CIH, the CDM Federal Programs Health and Safety Manager

HEALTH AND SAFETY PLAN FORM		*This document is for the exclusive*		**CDM Federal Programs Corporation**
CDM Health and Safety Program		*use of CDM and its subcontractors*		**PROJECT DOCUMENT #: 3320-032-751**
MONITORING EQUIPMENT:		*Specify by task. Indicate type as necessary. Attach additional sheets if needed.*		
INSTRUMENT	**TASK**	**ACTION GUIDELINES**		**COMMENTS**
Combustible		0-10% LEL	*No explosion hazard*	
Gas Indicator	4-5	10-25% LEL	***Potential explosion hazard; stop work, notify SHS; implement engineering controlsprior to restarting work***	( ) Not Needed
		>25% LEL	***Explosion hazard; interrupt task/evacuate***	The combustible gas indicator will be used during all drilling activities. The borehole, boring, and breathing zone will be monitored
		21.0% O2	*Oxygen normal*	
		<21.0% O2	*Oxygen deficient; notify SHSC*	
		<19.5% O2	***Interrupt task/evacuate***	
Photoionization	*Specify:*	*Specify:*	*above background*	( ) Not Needed
Detector		*0-5 ppm:*	*Level D, proceed with caution*	PID should be used to monitor breathing zone during water sampling activities
Type Rae Systems MiniRae 2000		*5-10 ppm:*	*Level D, use vinyl chloride detector tubes*	
11.7 eV Lamp	3-4-5	*>5 ppm:*	*confirmed with detector tubes, Upgrade to Level C - (See pages 7(a) and 7(b))*	
		>10 ppm:	*Evacuate Site*	
Flame Ionization	*Specify:*			**(X) Not Needed**
Detector	1-2-3-4-5-6-7-8			
Type_____				
Single Gas	*Specify:*			**(X) Not Needed**
Type_____	1-2-3-4-5-6-7-8			
Type_____				
Respirable	*Specify:*	*Visible airborne dust*	*If visible dust is observed monitoring will be implemented*	( ) Not Needed
Dust Monitor		*0-.99 mg/m* ^{3}	*Proceed with caution*	
Type_____	4	*> 1mg/m* ^{3}	*Dust suppression techniques are required if this level is maintained for 5 minutes or dust is visually observed. Work will be stopped and re-evaluated if dust suppresion techniques are unsuccessful.*	
Type_____				
Other	*Specify:*			**(X) Not Needed**
Type_____	1-2-3-4-5-6-7-8			
Type_____				

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES AS PAGE TWO

Personnel Decontamination

Respirators will be selected, used, cleaned, and stored in accordance to the CDM Health & Safety Manual, based on OSHA 1910.134 guidelines. The personal decontamination station will move to each work location. Wash hands and face with soap and water, if necessary, upon doffing personal protective equipment. Wash well before hand-to-mouth contact is made. Workers will remove protective clothing in this order:

1) equipment drop
2) boot covers
3) outer gloves
4) hard hat
5) respirator (if used)
6) Tyvek
7) inner gloves
8) wash face and hands

Note: Wash hands and face prior to any ingestion of food or liquids!

Sampling Equipment Decontamination

The required decontamination procedure for all sampling equipment[1] is:

a[2]. wash and scrub with low phosphate detergent b. tap water rinse
c[3]. 10 percent nitric acid rinse (for metals analysis only), laboratory grade (one percent solution will be used when carbon steel equipments, such as split-spoons, are used)
d. demonstrated analyte-free water rinse
e[4]. isopropanol rinse (all solvents must be pesticide-grade or better)
f[5]. demonstrated analyte-free water rinse (amount of water must be at least five times that of the solvents used)
g. air dry
h. wrap in aluminum foil, shiny side out, for transport

Notes:
1. Groundwater sampling equipment will follow only steps a, b, d, g and h.
2. Tap water must be from a municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute.
3. Nitric acid rinse will only be used when samples are collected for inorganics
4. Solvent rinse required only when sampling for organics.
5. A sample of the demonstrated analyte-free water will be collected and submitted for chemical analysis. Analytical results will be kept on-site.

Heavy Equipment Decontamination

Heavy equipment contractors will be required to decontaminate their equipment at arrival and departure from site. All down-hole equipment will be decontaminated between each boring location.

Containment and Disposal Method

Disposable protective equipment will be containerized and disposed of off site.

Surface water, shallow water, groundwater, potable water, and rinsate will be containerized in a baker tank.

Containment and Disposal Method

Excess soil and sediments will be containerized in 55 gallon drums. Water produced from sampling and decontamination activities will be places in a baker tank.

HAZARDOUS MATERIALS TO BE BROUGHT ONSITE

Preservatives		*Decontamination*		*Calibration*	
(X) Hydrochloric Acid	( ) Zinc Acetate	( ) Alconox ™	( ) Hexane	**(X) 100 ppm isobutylene**	**(X) Hydrogen Sulfide**
(X) Nitric Acid	( ) Ascorbic Acid	**(X) Liquinox ™**	**(X) Isopropanol**	( ) Methane	**(X) Carbon Monoxide**
(X) Sulfuric Acid	( ) Acetic Acid	( ) Acetone	**(X) Nitric Acid**	( ) Pentane	**(X) pH Standards**
(X) Sodium Hydroxide	( ) Other:	( ) Methanol	( ) Other:	( ) Hydrogen	**(X) Conductivity Std**
		( ) Mineral Spirits		( ) Propane	( ) Other:

HEALTH AND SAFETY PLAN FORM

This document is for the exclusive use of CDM and its subcontractors

CDM Federal Programs Corporation

CDM Health and Safety Program

PROJECT DOCUMENT #: 3320-032-00751

EMERGENCY CONTACTS

Water Supply	TBD
EPA Release Report #:	800 / 424 - 8802
CDM 24-Hour Emergency #:	FSG 406 / 293 - 1547
Facility Management	
Other (specify)	
CHEMTREC Emergency #:	800 / 424 - 9300

SAFETY NARRATIVE:

Evacuate the Site if any unexpected hazards are encountered. If personnel observe hazards for which they have not been prepared then they will withdraw from the area and call the CDM Federal Health & Safety Manager (Shawn Oliveira). If CDM personnel experience nausea or dizziness, they will immediately leave the Site (or exclusion zone) and upgrade their level of PPE, regardless of monitoring instrument readings. When an evacuation is necessary, all field team members will go to the designated assembly point. This area will be located upwind at the site and will be dependent on the normal prevailing wind. The site safety coordinator will designate any other assembly points at the morning safety meeting, as appropriate.

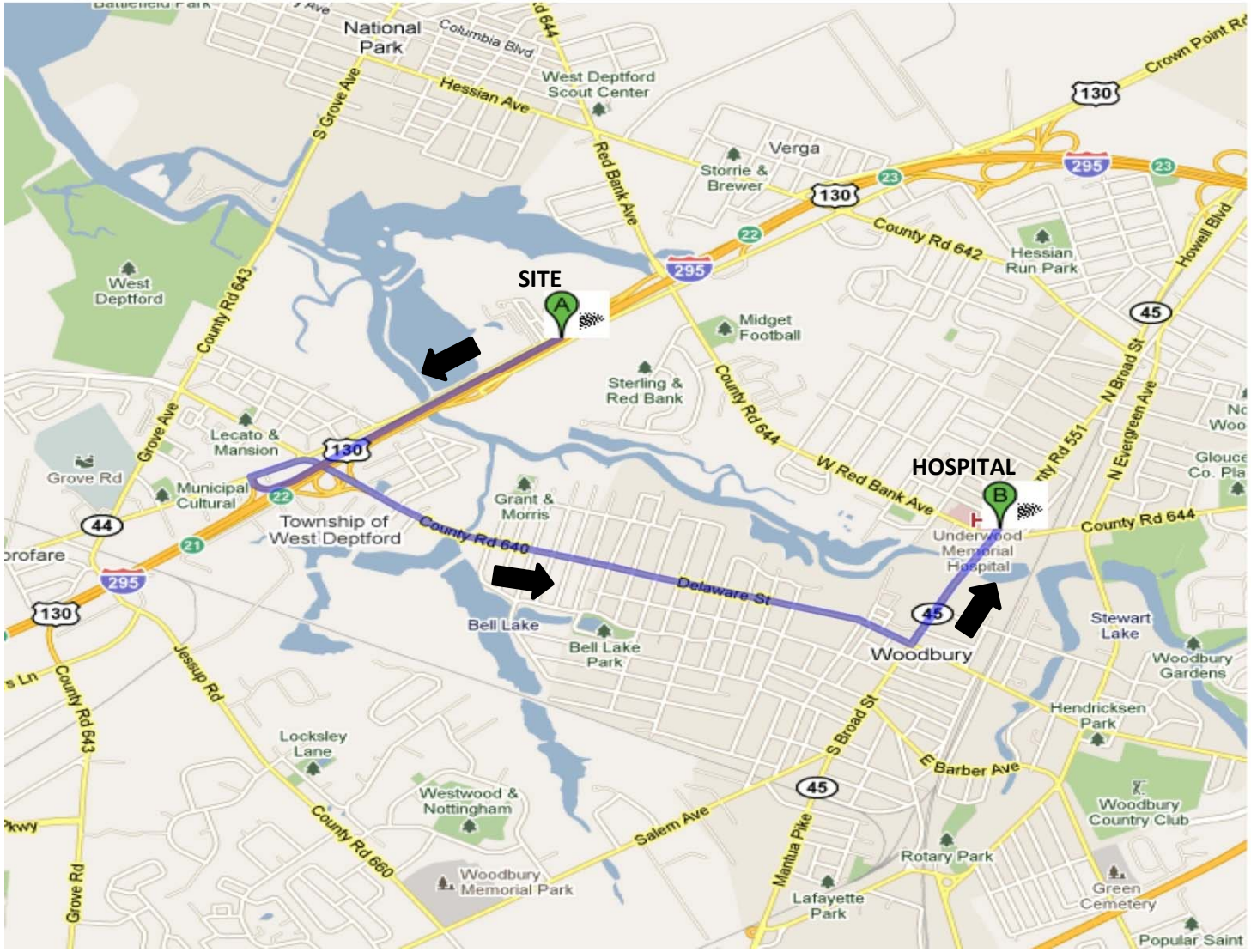
HEALTH AND SAFETY PLAN APPROVALS (H&S Mgr must sign each plan)

Prepared by	Jeffrey Rakowski	Date	6/22/2011
HSC Signature		Date	6/27/11
HSM Signature		Date	6/27/11

EMERGENCY CONTACTS	**NAME**	**PHONE**
Health and Safety Manager	Shawn Oliveira	720-264-1153
Site Safety Coordinator	Jeffrey Rakowski	732-675-0159
Client Contact	Mr. Larry Granite	212-637-4423
Other *(specify)*		
Environmental Agency	EPA	
State Spill Number	New Jersey	(877) Warn-DEP
Fire Department		911
Police Department		911
State Police		911
Health Department		1-800-367-6543
Poison Control Center	Nationwide	800 / 222 - 1222
Occupational Physician	Dr. Jerry Berke	800 / 350 - 4511

MEDICAL EMERGENCY		**PHONE**
Hospital Name:	Underwood Memorial	856-853-2000
Hospital Address	509 North Broad Street, Woodbury NJ, 08096	
Name of Contact at Hospital:		
Name of 24-Hour Ambulance:		
Route to Hospital:		
1. Head southwest on I-295 S toward Exit 21		0.8 miles
2. Take exit 21 for NJ-44 S toward Paulsboro/Woodbury		0.1 miles
3. Turn right at NJ-44 N/Crown Point Rd		0.1 miles
4. Turn right at County Rd 640/Delaware St		1.7 miles
5. Turn left at N Broad St/County Rd 551 N		0.5 miles
6. Turn left at Oak St		315 feet
Distance to Hospital	3.3 miles	

HOSPITAL ROUTE MAP



PRE-ENTRY BRIEFING AND DAILY SAFETY MEETING TOPICS

Site background, contaminant levels and exposure symptoms
PPE requirements for today
Buddy System and communication plan
Emergency Response
Daily tasks and associated risks; Hazard control
Engineering Controls to address site related activities
Injury and incident reporting
Heat Stress (weather forecast/conditions)
Cold Stress (weather forecast/conditions)
Water Safety
Underground and overhead utilities

TRAINING REQUIREMENTS

All staff shall review the HASP
HAZWOPER 40-hour - all on-site staff
8-hour refresher - all on-site staff
Supervisor HAZWOPER training (H&S Coordinator)
Fit testing
2 onsite personnel must have CPR/First Aid Training
Boating license/ safety training (when applicable)
Certificates will be kept on-site

MEDICAL MONITORING

Medical monitoring for field staff are as per OSHA standards 29 CFR 1910.120 (f) and 29 CFR 1926.65 (f). All on-site staff will be cleared by the WOHA physician (Dr. Berke) for

WOHA = Washington Occupational Health Associates, Inc.

HEAT STRESS MONITORING

If a field member shows signs of heat stress (dizziness severe sweating, chills, apnea), work should be stopped immediately and medical attention should be ensued for the field member. All field members should drink water periodically and take breaks in a shaded or air conditioned area when feeling initial signs of heat stress.

COLD STRESS MONITORING

If a field member shows signs of cold stress (hypothermia: shivering, teeth chattering, fumbling hands, slurred speech, and loss of coordination; frost bite: body parts becoming white, firm, cold to the touch, and may feel waxy) work should be stopped immediately and medical attention should be ensued for the field member. All field members should drink water periodically and take breaks in a heated area when feeling initial signs of cold stress.

EMERGENCY EQUIPMENT

Fire extinguisher (type ABC)
16- unit first aid kit
Eyewash

All equipment will be located either in the site vehicle or in the work zone.

ROLES AND RESPONSIBILITIES

SHSO: Mr. Jeffrey Rakowski, is responsible for ensuring that the protocols specified in the HASP are followed during the field activities. The SHSO will also ensure that current copies of certificates, the HASP, and the CDM Health and Safety Manual are maintained at the Site. He is responsible for upgrade of respiratory protection and performing daily safety inspections.

Site Manager: Sharon Bundey will inform Mr. Joe Button, the RI Task Leader, of coorespondance and requests from the EPA.

RI Task Leader: Joe Button will assist Mr. Jeffrey Rakowski, the field team leader, in implementing and coordinating the field investigation activities.

FTL: Ms. Jeffrey Rakowski, will be responsible for ensuring that all field tasks are conducted in strict compliance with the QAPP. All field personnel will report directly to the FTL on all matters relating to the field investigation. The FTL will also be responsible for sampling activities and reports to the RI Task Leader and Site Manager.

Project HSM: Mr. Shawn Oliveria, will be responsible for the review of the project-specific Health and Safety Plan (HASP) that governs the field activities outlined in this HASP.

Subcontractors: Will provide technical services and are responsible for inspecting and certifying the safety of their equipment on a daily basis.

Geologist: Mr. Mike Ehnot will be responsible for observing stratigraphy of drilling material; documentation of work performed and oversight of driller and drilling activities and air monitoring activities.

Scientists: Jeffrey Rakowski, Dante Porzilli and Field Technician: Ed Kulkusky will assist in the collection, preservation, and shipping of samples. They are responsible for generating the Forms II Lite or Scribe sampling paperwork and maintenance of chain of custody procedures. They will also be documenting sampling activities and communicating the chain of custodies to the laboratory, EPA Regional Sampling Control Coordinator (EPA RSCC) (Mr. Michael Adly) and Sample Management Office (SMO) contact and the CDM CLP Coordinator (Mr. Scott Kirchner or Ms. Vanessa Macwan).

HEALTH AND SAFETY PLAN SIGNATURE FORM

CDM Federal Corporation Health and Safety Plan

All site personnel must sign this form indicating receipt of the H&SP. Keep this original on site. It becomes part of the permanent project files. Send a copy to the Health and Safety Manager (HSM).

SITE NAME/NUMBER: Matteo & Sons, Inc. Site

DIVISION/LOCATION: FSG/Edison

CERTIFICATION:

I understand, and agree to comply with, the provisions of the above referenced H&SP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the site Health and Safety Coordinator (SHSC). I agree to inform the SHSC about any drugs (legal and illegal) that I take within three days of site work.

PRINTED NAME	SIGNATURE	DATE

APPENDIX A

ACTIVITY HAZARD ANALYSIS

- **BATHYMETRY SURVEY, SEDIMENT, SURFACE WATER SAMPLING**
- **(DRILL RIG ACTIVITIES) WELL INSTALLATION, GROUNDWATER SCREENING, SOIL BORINGS**
- **GROUNDWATER, SHALLOW WATER, POTABLE WELL SAMPLING, SYNOPTIC WATER LEVELS**

ACTIVITY HAZARDS ANALYSIS

Overall Risk Assessment Code (RAC) (Use highest code): M

Date: 1/31/11

Project: Matteo & Sons, Inc. Site

Activity: Bathymetry Survey, Sediment, and Surface Water Sampling

Activity Location: Thorofare, New Jersey

Prepared By: Jeffrey Rakowski

Risk Assessment Code Matrix

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
X	(If using boat) Prepare and launch boat	Slips, trips, falls; back injury; pinches; cuts; drowning; heat stress	Follow established plan from captain of boat; wear PFDs at all times; utilize proper lifting procedures; be aware of grade changes, holes, trip hazards.	L
X	Collect sediment and surface water samples from boat using Vibracore sampler	Drowning ; pinches; cuts; back injury; heat stress; sun exposure, contaminant exposure	Proceed with Vibracore according to manufacturer's instructions; use experienced subcontractors/personnel; remain in boat; wear PFD at all times; wear sunscreen; do not lift equipment when leaning or twisting body. Wear gloves when handling sample material.	M
X	Boat docking and demob of equipment	Slips, trips, falls; back injury; pinches; cuts; heavy lifting; drowning; heat stress	Follow established plan from captain of boat; wear PFDs at all times; utilize proper lifting procedures; be aware of grade changes, holes, trip hazards.	L
X	(If using a platform) Set up platform	Slips, trips, falls; back injury; pinches; cuts; drowning; heat stress; contaminant exposure	Follow platform manufacturer's instructions; wear PDFs if over or near water; utilize proper lifting procedures; be aware of grade changes, holes, trip hazards.	L
X	Collect sediment and surface water samples using vibracore sampler	Drowning ; pinches; cuts; back injury; heat stress; sun exposure, contaminant exposure	Proceed with vibracore according to manufacturer's instructions; use experienced subcontractors/personnel; wear PDF if over or near water ; wear sunscreen; do not lift equipment when leaning or twisting body. Wear gloves when handling sample material.	M
X	Demob of platform and equipment	Slips, trips, falls; back injury; pinches; cuts; heavy lifting; drowning; heat stress; contaminant exposure	Follow instructions of platform manufacturer; wear PDFs if over or near water; utilize proper lifting procedures; be aware of grade changes, holes, trip hazards. Wear gloves when handling soil material.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Vibracore sampler	Equipment manual, experienced subcontractors, applicable specific safety training and certification.	Before each use

ACTIVITY HAZARDS ANALYSIS

Involved Personnel:

CDM and associated subcontractors

Acceptance Authority (digital signature): _____

ACTIVITY HAZARDS ANALYSIS

Overall Risk Assessment Code (RAC) (Use highest code): M

Date: 1/31/11

Project: Matteo & Sons, Inc. Site

Activity: (Drill Rig Activities) Well Installation, GW Screening, Soil Borings

Activity Location: Matteo & Sons, Inc. Site

Prepared By: Jeffrey Rakowski

Risk Assessment Code Matrix

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
X	Drill Rig Setup	Environmental Release	Re-fueling will be conducted over plastics.	L
X	Drill Rig Setup	Electrical Shock	All electrical equipment inspected prior to each use. GFCI will be required for all wiring and/or extension cords.	L
X	Drill Rig Setup	Defective Equipment	All equipment will be inspected prior to being brought onsite. Prior to each use, personnel will perform pre-inspection to ensure it is safe to operate. SHSO will also perform routine audits and inspections.	L
X	Drill Rig Setup	Fire	Proper Fire extinguishers will be available on unit.	L
X	Drill Rig Activities	Emergency Notification	Cell phone will be available at all times. Personnel will be trained with respect to emergency numbers for assistance.	L
X	Drill Rig Activities	Work Zones	Drilling area will be marked off and set up as an exclusion zone. Signs identifying PPE requirements will be located outside of the zone.	L
X	Drill Rig Activities	Heat Stress	Personnel will be briefed on signs and symptoms of heat related illnesses. SHSO will oberve for heat related illnesses.	L
X	Drill Rig Activities	Untrained Personnel	Only trained and certified personnel will operate the drilling equipment.	L
X	Drill Rig Activities	Ultra-violet exposure	Sunscreen is recommended on all areas exposed to the sun.	L
X	Drill Rig Activities	Injury from Motorized Equipment or Moving Parts	Personnel will be aware of location of motorized equipment, especially those with limited visibility. Back-up alarms will be required on equipment. All extremities will be kept clear of moving parts and machinery.	M
X	Drill Rig Activities	Noise	Drilling equipment operator will be required to wear hearing protection when rig is in operation. Other personnel required to wear hearing protection when in work zone.	L

ACTIVITY HAZARDS ANALYSIS

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
X	Drill Rig Activities	Insects, snakes, and spiders	Be aware snakes may be in area. Anyone bitten by a snake should be transported immediately to nearest medical facility. Permanone can be used to control exposure to ticks and other insects. Personnel shall follow directions for use of permanone and ensure that it is not sprayed directly on skin. Be aware of spiders, do not pick up debris without carefully checking area, and wear gloves when moving debris to protect bare hands from exposure.	L
X	Drill Rig Activities	Slips, Trips, and Falls	Good housekeeping requirements will be applied to work areas.	L
X	Drill Rig Activities	Severe Weather	Operations will stop when weather interferes with safety or in event of severe weather. Personnel will move out of work zone and gather at assembly points.	L
X	Drill Rig Activities	Bodily Injury - hand, head, foot, eye, back	Leather gloves required for work with potential for cuts from sharp steel, push/drill steel, cutting sample sleeves, pinch points, etc. Hard hats, steel-toed boots, and safety glasses with side shields required for all activities in the work zone. Personnel instructed to lift with legs, not backs, and to ask for assistance with heavy, bulky items.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Direct Push Technology Drill Rig	Equipment manual, experienced subcontractors, applicable specific safety training and certification.	Before each use
X	Hollow Stem Auger Rig	Equipment manual, experienced subcontractors, applicable specific safety training and certification.	Before each use
X	Mud Rotary Rig	Equipment manual, experienced subcontractors, applicable specific safety training and certification.	Before each use
X	MineRae 2000	Manufacturer's instructions	Daily
X	Multi-Rae PGM-50	Manufacturer's instructions	Daily
X	YSI 650 MDS	Manufacturer's instructions	Daily
X	Lamotte 2020 Turbidimeter	Manufacturer's instructions	Daily

Involved Personnel:

CDM and associated subcontractors.

Acceptance Authority (digital signature): _____

ACTIVITY HAZARDS ANALYSIS

Overall Risk Assessment Code (RAC) (Use highest code): M

Date: 1/31/11 Project: Matteo & Sons, Inc. Site

Activity: GW Sampling, Seep and Shallow Water Sampling, Potable Well Sampling, and Synoptic Water Levels

Activity Location: Thorofare, New Jersey

Prepared By: Jeffrey Rakowski

Risk Assessment Code Matrix

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
X	Set up sampling equipment	Slips, trips, falls; heat stress; drowning; sun exposure; back injury	Utilize proper lifting procedures. Be aware of grade changes, holes, trip hazards - assess area prior to deploying equipment; wear sunscreen. Wear PDF if over or near water.	M
X	Collect samples	Slips, trips, falls; heat stress; drowning; sun exposure. chemical burns	Be aware of grade changes, holes, trip hazards - assess area prior to deploying equipment; wear sunscreen. Wear PDF if over or near water.	M
X	Demob from sampling location	Slips, trips, falls; heat stress; drowning; sun exposure; back injury	Utilize proper lifting procedures. Be aware of grade changes, holes, trip hazards - assess area prior to deploying equipment; wear sunscreen. Wear PDF if over or near water.	M

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Grundfos Rediflow	Manufacturer's instructions	daily
X	Water Level Meter	Manufacturer's instructions	daily
X	YSI 650 MDS	Manufacturer's instructions	daily
X	Lamotte 2020 Turbidimeter	Manufacturer's instructions	daily
X	MinRae 2000	Manufacturer's instructions	daily

ACTIVITY HAZARDS ANALYSIS

Involved Personnel:

CDM and associated subcontractors

Acceptance Authority (digital signature): _____

APPENDIX B

WORK PRACTICTES AND GUIDELINES

- **HEAT STRESS**
- **COLD STRESS**
- **WORKING NEAR OR OVER WATER**

16.13 Heat Stress

CDM employees may be exposed to hazards associated with hot work environments. Factors that contribute to heat exposure include temperature, humidity, PPE radiant heat, sunlight, access to drinking water, exposure duration, and work activity. Individuals vary widely in their susceptibility to heat stress. Factors that may influence individual susceptibility to heat stress include the following:

- Lack of physical fitness
- Lack of acclimatization
- Age
- Dehydration
- Obesity
- Alcohol and drug use
- Infection
- Sunburn
- Diarrhea
- Chronic disease

The following guidelines should be considered when CDM employees or subcontractors perform work:

- In ambient air temperatures above 80°F
- That involves heavy physical labor in temperatures above 70°F
- In chemical-protective clothing above 70°F

16.13.1 Hazards Associated with Heat Stress

Heat Stroke – Heat stroke is a serious medical emergency and can lead to death if left untreated. It is an acute and dangerous reaction caused by the failure of heat regulating mechanisms of the body. Persons who are elderly, obese, chronically ill, alcoholic, diabetic, or have circulatory system problems are at greater risk.

- Symptoms include red, hot, dry skin; nausea; headache; weakness; dizziness; elevated body temperature (BT); rapid respiration and pulse; coma; or loss of consciousness.

- Treatment for heat stroke:

  - Heat stroke is a serious medical emergency. Emergency medical services (911) should be contacted if heat stroke is suspected.
  - Move the victim to a cool place (shade, air conditioned building, vehicle).
  - Remove heavy clothing.
  - Cool the victim with ice packs, wet towels, or cloth.
  - Keep head and shoulders elevated.
  - Keep victim's airway open, check breathing and pulse.

Heat Exhaustion – A state of exhaustion or weakness caused by loss of fluids through perspiration and inadequate fluid replacement. Severe cases may result in loss of consciousness (fainting). This condition can progress to heat stroke if left untreated.

- Symptoms include:

  - Pale, clammy, moist skin; heavy sweating; and extreme weakness.
  - BT is normal, pulse is weak and rapid, breathing is shallow.
  - The person may have a headache, nausea, or feel dizzy.

- Treatment for heat exhaustion:

  - Remove the victim to a cool location (shade, air conditioned building, or vehicle).
  - Allow the victim to lie down and prop their legs up.
  - Cool the victim with wet towels, cloth, or cold packs.
  - If the victim in not nauseous, they should drink water slowly.
  - If the victim loses consciousness, transport to local medical facility.
  - Continue treatment until symptoms are gone. Consult with CDM medical consultant before returning to work.

Heat Cramps – Heat cramps are a condition that can progress to heat exhaustion or heat stroke. Symptoms include severe cramping of the arms, legs, and abdomen. Treatment includes:

- Removing the victim to a cool location; loosen clothing
- Having the victim slowly drink cool water
- Resting the cramping muscles

Heat Rash – Heat rash is a mild red skin rash in areas where the body is in contact with clothing or protective gear. The area is likely to itch and can be a source of irritation. Treatment includes decreasing the amount of time in protective gear and applying talcum powder to absorb moisture. When possible, wear breathable clothing to prevent a buildup of moisture within the clothing.

16.13.2 Heat Stress Monitoring

Since the susceptibility to heat stress hazards can vary greatly from one individual to another, often the best way to monitor for heat stress is through observing employees and individual physiological monitoring. When working in conditions that have the potential to create heat stress, either heart rate (HR) or BT should be monitored in accordance with the suggested frequency given in Table 16-1 below:

Table 16-1
Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[a]

Adjusted Temperature[b]	*Normal Work Ensemble[c]*	*Impermeable Ensemble*
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8° to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F (22.5° to 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour.

[b] Calculate the adjusted air temperature (T_a adj) by using this equation: T_a adj °F = T_a °F + (13 X % sunshine). Measure air temperature (T_a) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine - no cloud cover and a sharp, distinct shadow; 0 percent sunshine - no shadows).

[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

- Heart Rate – HR should be measured by the radial pulse for 30 seconds as early as possible in the initial rest period. On an individual basis, if the HR exceeds 110 beats per minute (BPM), that individual should not return to work until their HR drops below 110 BPM and they are fully recovered. If more than one worker has an HR that exceeds 110 BPM, a work rest regimen or other control measures should be implemented to maintain HRs below 110 BPM.

- Body Temperature – The BT may be measured using a clinical oral thermometer or a clinical ear thermometer. On an individual basis, if the BT exceeds 99.6°F, that individual should not return to work until their BT drops below 99.6°F and they are fully recovered. If more than one worker has a BT in excess of 99.6°F, a work rest regimen or other control measures should be implemented to maintain BTs below 99.6°F.

- Personnel should monitor themselves and each other for the development of symptoms such as sudden fatigue, nausea, dizziness, irritability, malaise, flu-like symptoms, and lightheadedness.

16.13.3 Heat Stress Controls and Prevention

- Develop work/rest regimen to maintain physiological parameters within limits described above and prevent development of initial symptoms of heat stress related conditions. If the physiological limits are exceeded or symptoms develop, the work period should be reduced and rest period increased. Rest areas should be cool (in areas such as shade, air conditioned buildings, or vehicles) and away from heat exposure.

- In extreme heat conditions, employees may wear heat-control clothing such as ice vests or cool suits. Physiological monitoring should still be conducted and work/rest regimens implemented to keep physiological parameters within recommended limits.

- Mobile showers or hoses can be used to cool down workers in waterproof protective clothing.

- Shield sources of radiant heat.

- Provide shaded work areas.

- Conduct activities in early morning and late evening to avoid the hottest parts of the day.

- Allow employees to become acclimatized to the heat by performing less strenuous activities for the first few days. Schedule more physically demanding work later.

- Provide adequate, cool drinking water for consumption during break periods.

- Avoid consumption of beverages such as coffee, tea, or colas that act as diuretics and dehydrate the body.

16.14 Cold Stress

Persons working outdoors in low temperatures, especially below freezing, or in wet or snowy weather are potentially subject to cold stress disorders. Factors that contribute to cold stress exposure include temperature, humidity, wind, sunlight, rain, snow, fog, exposure duration, clothing, and work activity. Individual susceptibility to cold stress disorders can vary widely. Individual physical factors that can affect a person's response to cold work environments include a person's general fitness and age.

The following guidelines should be considered when working in ambient air temperatures below 40°F, especially when other contributing weather conditions such as snow, rain, or wind are present.

16.14.1 Hazards Associated with Cold Stress

Hypothermia – Hypothermia results from a cooling of the body's core temperature and if left unattended can become a serious condition. Hypothermia can result in the loss of physical skills and impair judgment thereby contributing to the potential for other accidents. Severe hypothermia can result in death. Hypothermia can occur at temperatures above freezing as well as below.

- Symptoms include shivering, teeth chattering, fumbling hands, slurred speech, and loss of coordination. Eventually, the pulse and respiratory rate may slow. The victim may appear blue or lose color in the face.

- Treatment for hypothermia is to catch symptoms early and move the individual to a warm environment indoors or in a vehicle. If a warm location is not immediately available, the victim should be sheltered from the wind and provided extra clothing such as coats or blankets and observed to determine if their condition is improving. If the victim continues to deteriorate and becomes colder, they should be transported to a medical facility for assistance.

Frostbite – Frostbite is a condition in which the fluids around cells of body tissue freeze. The condition can lead to body tissue damage. The most vulnerable parts of the body are the nose, ears, cheeks, fingers, and toes.

- Symptoms of frostbite include body parts becoming white, firm, cold to the touch, and may feel waxy. The victim will not feel pain in the affected area.

- Treatment of frostbite requires that the victim be brought to a warm environment and the affected areas be allowed to thaw and warm. If frostbite has progressed beyond small patches of skin and affects whole body parts such as a hand, foot, or ear, the victim should be transported to a medical facility for treatment and observation.

16.14.2 Cold Stress Monitoring

Personnel should monitor themselves and each other for signs and symptoms of frostbite and/or hypothermia. If symptoms are observed in an employee or subcontractor, steps should be taken to treat the symptoms by having the individual go to a warm environment either in a nearby structure or vehicle.

16.14.3 Cold Stress Control and Prevention

Cold stress can easily be prevented with proper planning and prevention. Some basic controls and preventative measures are listed below:

- Forecasted conditions. Consider the effect of wind chill (Table 16-2 on next page).
- Dress in layers and stay dry. Avoid cotton clothing such as socks or T-shirts. Bring extra clothing.
- Wear hardhat liners and gloves. Wear rain gear in rain and snow.
- Curtail work if extreme weather conditions such as a blizzard, extreme wind chill (e.g., less than 0°F), torrential cold rains, or wind is expected.
- For long-term projects in cold environments, consider setting temporary structures with portable heaters.
- Take warming breaks as needed.
- Avoid beverages with caffeine, alcohol, or medications that restrict blood flow.
- Drink warm noncaffeine beverages such as hot chocolate or soups on breaks.

Table 16-2
Windchill Index

WINDCHILL INDEX	***Cooling Power of Wind on Exposed Flesh Expressed as an Equivalent Temperature (under calm conditions)***											
Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds greater than 40 mph have little additional effect	**LITTLE DANGER** in < hour with dry skin. Maximum danger of false sense of security.				**INCREASING DANGER** Danger from freezing of exposed flesh within 1 minute.			**GREAT DANGER** Flesh may freeze within 30 seconds.				
	From *Fundamentals of Industrial Hygiene,* Third Edition. Plog, B.A., Benjamin, G. S., Kerwin, M.A., National Safety Council, 1988.											

16.16 Working Near or Over Water

When working on, over, or near water, basic water safety precautions must be taken. Such areas include riverbanks, channels, dock areas, working from vessels of any kind, aeration basins, or other areas where a danger of drowning may exist. Depending on the circumstances, precautions needed may include any or all of the following:

- Employees should wear Coast Guard-approved personal floatation devices (PFDs) (either vests or jackets) where a potential danger of drowning exists. PFDs are required when working from any type of boat or floating platform.
- The PFDs should be inspected before and at the end of each use for wear, torn stitching or straps, inoperable buckles, or other defects.
- Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.
- At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water, unless the width of the water body is small enough to allow any potential rescue to occur from the bank (as would be the case with most aeration basins).

In some circumstances, these precautions may also be required by OSHA regulations. If you are planning to conduct work where water hazards may be present, be sure to take all appropriate precautions. If you will work in this situation, you should review the full text of the OSHA standard, OSHA Standard for Work Over or Near Water and consult your division HSM or designated HSC.

APPENDIX C

OSHA POSTERS

Job Safety and Health

It's the law!

OSHA

Occupational Safety and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

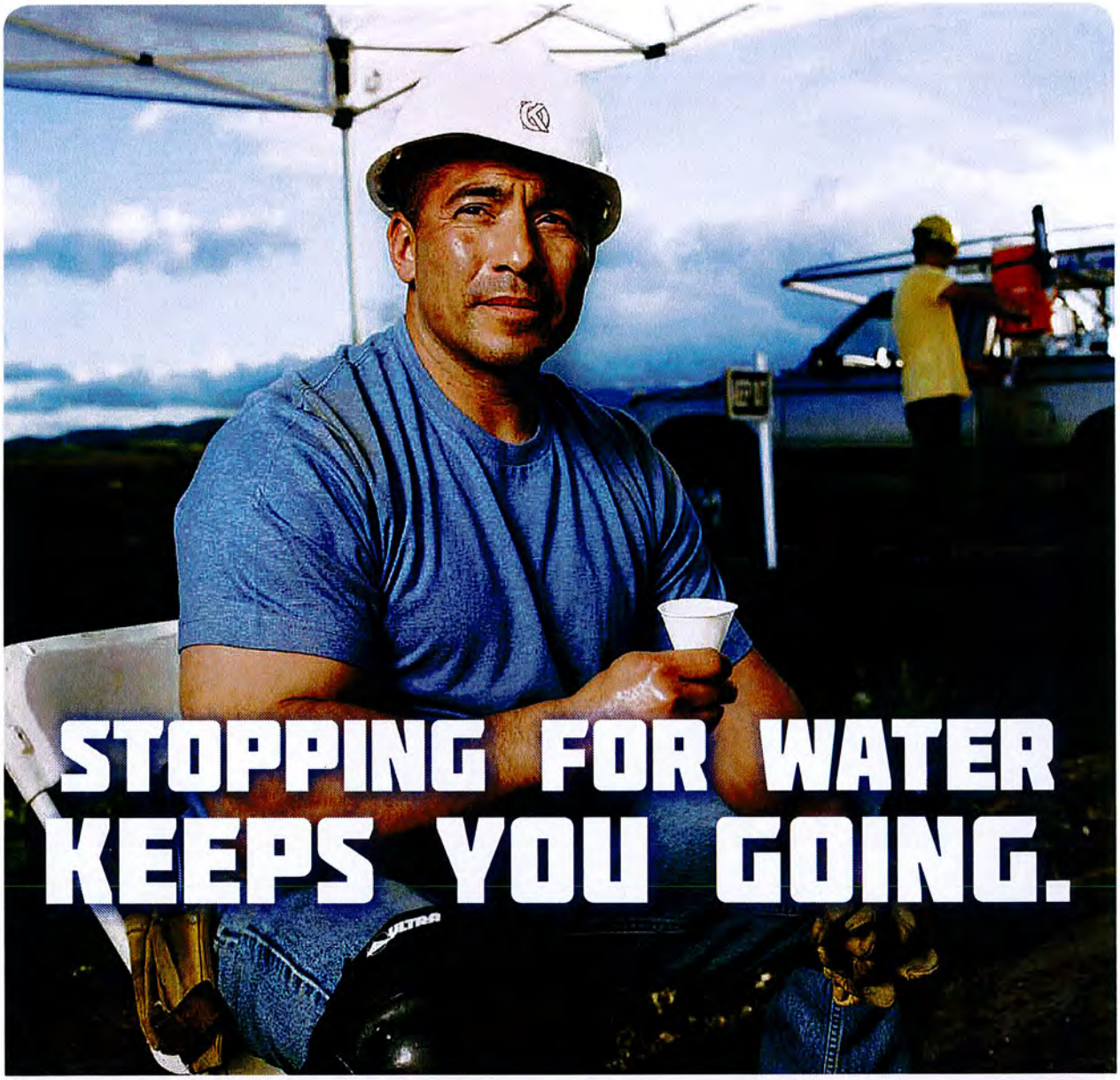
- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA
www.osha.gov

OSHA 3165-12-06R



STOPPING FOR WATER KEEPS YOU GOING.

WATER.
REST.
SHADE.

OSHA® Occupational Safety and Health Administration
U.S. Department of Labor

1-800-321-OSHA (6742)
TTY 1-877-889-5627
www.osha.gov

The work can't get done without them.

HEAT ILLNESS CAN BE DEADLY.

Remember to:

- Drink water often, even if you aren't thirsty.
- Rest in the shade to cool down.
- Report heat symptoms early.
- Know what to do in an emergency.

Let's make heat safety part of the job. If you have questions, call OSHA. It's confidential. We can help!

OSHA 3435-04N 2011

Developed by Cal OSHA

U.S. Department of Labor
Hilda L. Solis, Secretary of Labor

WATER. REST. SHADE.

The work can't get done without them.

A Guide for Employers to Carry Out Heat Safety Training for Workers

U.S. Department of Labor
Hilda L. Solis, Secretary of Labor

OSHA® Occupational Safety and Health Administration
U.S. Department of Labor

Developed by CAL OSHA

Heat Illness Prevention Training Guide:
A Lesson Plan for Employers

OSHA 3437-04N 2011

Health effects of heat

Two types of heat illness:

Heat Exhaustion

Heat Stroke

Watch out for early symptoms. You may need medical help.
People react differently — you may have just a few of these symptoms, or most of them.

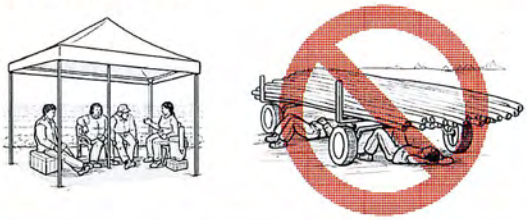
1

Stay safe and healthy!

WATER. REST. SHADE. The work can't get done without them.

Drink water even if you aren't thirsty — every 15 minutes.

Rest in the shade.



Watch out for each other.

Wear hats and light-colored clothing.

"Easy does it" on your first days of work in the heat. You need to get used to it.
Rest in the shade – at least 5 minutes as needed to cool down.

2

Be prepared for an emergency

Heat kills -- get help right away!

If someone in your crew has symptoms:

1) Tell the person who has a radio/phone and can call the supervisor – you need medical help.

2) Start providing first aid while you wait for the ambulance to arrive.

3) Move the person to cool off in the shade.

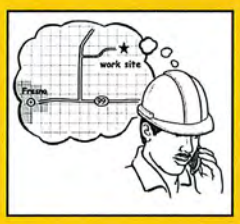
4) Little by little, give him water (as long as he is not vomiting).

5) Loosen his clothing.

6) Help cool him: fan him, put ice packs in groin and underarms, or soak his clothing with cool water.

When you call for help, you need to:

- Be prepared to describe the symptoms.
- Give specific and clear directions to your work site.

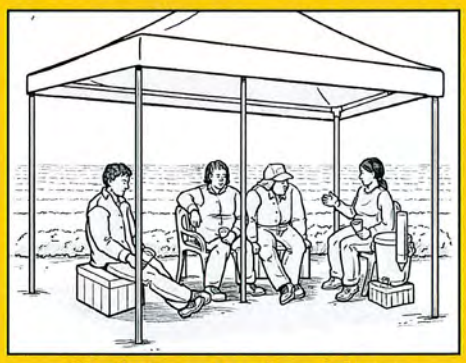


3

Heat illness can be prevented!

At our work site, we have:

Water



Shade to rest and cool down

We are extra careful when there is a heat wave or temperature goes up. Then we may change our work hours, and we all need more water and rest.

Training and emergency plan

OSHA Occupational Safety and Health Administration U.S. Department of Labor

CAL OSHA

U.S. Department of Labor
Hilda L. Solis, Secretary of Labor

Developed by CAL/OSHA

For more information:
1-800-321-OSHA (6742) • TTY 1-877-889-5627 • www.osha.gov

4

OSHA 3431-04N 2011

APPENDIX D

INJURY ILLNESS REPORT FORM

CDM

Injury-Illness Report

All Sections should be complete by Employee, Direct Manager or Group Leader

Section 1-Information about the involved Employee:		
First Name:	Last Name:	Office:
Employee Number:	Division CED	
Employment Status: Click to Select	*Name/Address of Subcontractor Firm:	
Employment Category: Click to Select	Length of Employment at CDM: Click to Select	Time in Occupation: Click to Select

Section 2-Information about the injury/Illness:		
Date of Injury/Illness:	Time:	
Project and Location Employee was Working at Time of Injury/Illness:	Client Service Group: Click to Select	Client:
Project Manager:	Client Service Manager:	
Direct Manager or Group Leader:		
Witness(es):		
Employees' Usual Occupation:	Activities at Time of Injury/Illness:	
Property Damage? Click to Select Brief Description (Add additional pages if necessary):	Vehicle Involved? Click to Select Damage?Click to Select Vehicle Type?Click to Select Vehicle Incident Report Required Click to Select	
Employee's Workday at Time of Injury: Status: Click to Select Work Period: Click to Select Employee was Working: Click to Select Supervision at Time of Accident: Click to Select	**General Type of Task Being Performed at Time of Injury/Ilness:**	
Specific Activity Being Performed at Time of Injury/Illness:		
Description of Event and Injury/Illness:		

Section 3- Root Cause Analysis- Select each Contributing Factor that applies to the incident:	
A. Equipment-Was a Hazardous Condition a Contributing Factor?	A1. Select Item
	A2. Select Item
B. Environment-Was the Location/Position of Equipment, Materials, or Employee a Contributing Factor?	B1. Select Item
	B2. Select Item
C. People-Was the Job Procedure(s) a Contributing Factor?	C1. Select Item
	C2. Select Item
D. Personal Protective Equipment-Was PPE a contributing factor?	D1. Select Item
	D2. Select Item
E. Management-Was a Management Defect a Contributing Factor?	E1. Select Item
	E2. Select Item
F. Occupational Health-Was a Chemical or Physical Agent a Contributing Factor?	
F1. Physical Agent: Select Item : Select Item	
F2. Chemical Agent: Select Item : Select Item	Agent Name:
F3. Biological Agent: Select Item : Select Item	Agent Name:
Additional Contributing Factors not listed above:	
Section 4- Corrective Action(s) Should Address Contributing Factor(s) form Section 3:	
Interim Controls:	
Recommended Corrective Action(s)-What action will be taken to prevent recurrence of this type of injury/illness at this site and other sites:	
Corrective Action(s) Required (Completed by the H&S Manager):	
Person Assigned to:	Date Completed:
Section 5-Signatures/Acknowledgements:	
Project Manager:	Date:
Direct Manager or Group Leader:	Date:
H&S Manager/Coordinator:	Date:
Corp. Human Resources/Benefits:	Date:

Section 6- Evaluation of Injury/Illness:			
Body Part Affected (Check all that are applicable)			
Head: Select Item Select Item	Limbs: Select Item Select Item	Trunk: Select Item Select Item	Other:
Injury Type(Check all that are applicable)			
Chemical: Select Item Select Item	Physical: Select Item Select Item	Biological: Select Item Select Item	Other:
Injury Source (Check all that are applicable)			
A through G: Select Item	H through P: Select Item	Q through Z: Select Item	Other:
Accident Type Code	**Hazardous Condition**	**Accident Part Code**	
Select Item	Select Item	Select Item	Other:

Section 7- Medical Treatment Information	
Hospital: **Name:** **Address:** **Phone Number:**	**Attending Physicians:** **Name:** **Address:** **Phone Number:**

Section 8 – Injury/Illness Classification **To be Completed by H&S Manager,**	
Injury/Illness Severity: **Select Item** **Total Number of Lost Days:**	**OSHA illness Code:** **Select Item**

Photographs:

Additional Information:

Witness Statement-To be completed by witnesses to the Injury/Illness:	
Name:	**Employer:**
Address:	**Position/Craft:**
Date of Accident:	**Phone:**
This statement is in reference to:	
Site of accident (Job name, location):	
Describe what you know about the accident, what you saw or heard, what you were doing before the accident, what you did after the accident (Use additional pages as necessary): **This statement is true to the best of my knowledge and memory.**	
Signature:	**Date:**

APPENDIX E

EMPLOYEE MEETING RECORD

CDM Federal
EMPLOYEE MEETING RECORD

Date:_____ Project # or office location:_____

Time:_____ Instructor:_____

Duration of training:_____

Topics discussed:_____

_____

_____

_____

Printed Name	Employee Number	Signature

APPENDIX F

MATERIALS SAFETY DATA SHEETS

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

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

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

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

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Neoprene or rubber gloves.

Respiratory / Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye / Type:

Safety glasses with side-shields.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

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

Ventilation requirements: Local exhaust at points of emission.

MATERIAL SAFETY DATA SHEET
MASTER NON HAZARDOUS

Revision Number A96002D,
3/30/06

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product name	3161 Conductivivty Calibrator 1,000 micromho/cm
Synonyms	None
Chemical characterization	Liquid.
Manufacturer, importer, supplier	YSI, Inc. 1700/1725 Brannum Lane Yellow Springs, OH 45387 USA
EMERGENCY TELEPHONE NUMBER	CHEMTREC: 1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS	Chemical Name	% Weight	ACGIH TWA	Acute toxicity	IARC*	NTP*	OSHA*
7447-40-7	Potassium chloride	0-1	None	NA	N/A	N/A	N/A
7732-18-5	Water	99-100	None	NA	N/A	N/A	N/A

* IARC - Group 1 (Carcinogenic to humans)
* NTP - Report on Carcinogens - Known Carcinogens
* OSHA - Regulated Carcinogens

3. HAZARDS IDENTIFICATION

Emergency Overview:

- The product contains no substances which at their given concentration, are considered to be hazardous to health

Eye contact	Can cause severe irritation.
Skin contact	Exposure can cause skin irritation.
Inhalation:	Inhalation of dust may cause irritation of respiratory tissue.
Ingestion:	May be harmful if swallowed.
General advice	No information available.
Properties affecting health	No information available
Principle Routes of Exposure	eyes, absorption, ingestion

4. FIRST AID MEASURES

General advice	• If exposure symptoms persist, seek medical attention.
Skin contact	• Wash exposed areas with soap and water for 15 minutes. • If skin irritation persists, seek medical attention.
Eye contact	• Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes • If eye irritation persists, seek medical attention
Inhalation:	• Move to fresh air • If exposure symptoms persist, seek medical attention.
Ingestion:	• Do not swallow. Rinse mouth with water and afterwards drink plenty of water. • If effects persist, seek medical attention.
Notes to physician	• Treat symptomatically
Protection of first-aiders	• Use necessary personal protective equipment
Aggravated Medical Conditions	• Users with skin conditions (eczema, psoriasis, etc.,) respiratory conditions (asthma, bronchitis, emphysema, etc.,) or with chemical sensitivities should take protective precautions.

5. FIRE-FIGHTING MEASURES

Flash point	NA
Suitable extinguishing media	• Not applicable to this product
Extinguishing media which must not be used for safety reasons	• None
Specific hazabrds	• None
Special exposure hazards arising from the substance or preparation itself, its combustion products, or released gases	• None
Special protective equipment for firefighters	• None • As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear
Specific methods	• No special protective measures against fire required
NFPA (National Fire Protection Association)	Health=1 (slight); Reactivity=0, fire=0, & Special = 0 (none)
HMIS (Hazardous Material Information System)	Health=1(slight); Reactivity=0, fire=0, & Special = 0 (none)

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	• Ensure adequate ventilation
Environmental precautions	• No information available
Methods for cleaning up	• Soak up with inert absorbent material • After cleaning, flush away traces with water

7. HANDLING AND STORAGE

Handling

Technical measures/Precautions	• As a rule, at least 10 air changes per hour are recommended at the workplace
Safe handling advice	• Avoid contact with eyes. Wash hands immediately after contact to avoid hand-eye transfer.

Storage

Technical measures/Precautions	• Keep in properly labelled containers • Keep containers tightly closed; discard any material that may be contaminated or, which may have changed composition. • The product is not flammable
Incompatible products	• Avoid strong acids, oxidizing agents.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures	• Ensure eyewash station is readily available • Ensure adequate ventilation, especially in confined areas
Personal protective equipment	
Hand protection	• Wear appropriate protective gloves
Eye protection	• Avoid contact with eyes • Safety glasses with side-shields or full face shield.
Respiratory protection	• No information available
Skin and body protection	• lightweight protective clothing • boots • apron
Hygiene measures	• Handle in accordance with good industrial hygiene and safety practice • Keep away from food, drink and animal feeding stuffs

Environmental exposure controls	• No information available

9. PHYSICAL AND CHEMICAL PROPERTIES

General Information

Form	Liquid.
Appearance	Clear colorless liquid.
Odour	None.

Important Health Safety and Environmental Information

pH	6.50 to 7.50
Boiling point/range	100°C
Flash point	Not applicable
Vapour pressure	equivalent to water.
Vapour density	equivalent to water vapor.
Water solubility	Infinitely soluable.
Specific Gravity	1.00.

10. STABILITY AND REACTIVITY

Stability	Stable under normal conditions.
Materials to avoid	None. Incompatible with strong acids and oxidizing agents.
Hazardous decomposition products	None.
Polymerization	Polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Component Information

Product Information

Local effects	
Skin irritation	May cause skin irritation in susceptible persons.
Eye irritation	Dust may cause eye irritation.
Inhalation:	Inhalation of dust may cause irritation of respiratory tissue.
Ingestion:	No effects expected from normal use and minor amounts ingested. Ingestion of large amounts (over 1 tablespoon) may cause digestive system upset.
Sensitization	Not a sensitizer.
Chronic toxicity	No information available.
Specific effects	
carcinogenic effects	No information available.
mutagenic effects	No information available.
Reproductive toxicity	No information available.
Target Organ Effects	No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Component Information

CAS	Chemical Name	% Weight	ACGIH*
7447-40-7	Potassium chloride	0-1	N/A

7732-18-5	Water	99-100	N/A

* ACGIH - Occupational Exposure Limits - TWA's

Product Information

Aquatic toxicity No information available.

Other information:

Ozone depletion potential; ODP; (R-11 = 1)	No information available.
Global warming potential (GWP)	No information available.
Additional ecological information	No information available.
Mobility	No information available
Bioaccumulative potential	No information available
Ecotoxicity effects	No information available
Aquatic toxicity	No information available

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products	In accordance with local and national regulations.
Contaminated packaging	Empty containers should be rinsed and disposed of as appropriate for glass and plastic containers. .

14. TRANSPORT INFORMATION

DOT Not regulated.
UN-No
Proper shipping name
Packing group
Subsidiary Risk
Description

15. REGULATORY INFORMATION

U.S. Inventories

CAS	Chemical Name	% Weight	ACGIH*
7447-40-7	Potassium chloride	0-1	N/A
7732-18-5	Water	99-100	N/A

* ACGIH - Occupational Exposure Limits - TWA's

International Inventories

CAS	Chemical Name	% Weight	EUOED*
7447-40-7	Potassium chloride	0-1	N/A
7732-18-5	Water	99-100	N/A

* EUOED - EU Occupational Exposure Directive (98/24/EC) Indicative Occupational Exposure Limit Values (IOELV)

16. OTHER INFORMATION

Literary reference None.
Prepared By YSI, Inc. .

End of Safety Data Sheet

Material Safety Data Sheet

Hydrochloric Acid, Reagent ACS

ACC# 95547

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrochloric Acid, Reagent ACS
Catalog Numbers: AC423790025, AC423790250, AC423795000, NC9619320
Synonyms: Muriatic acid; Chlorohydric acid; Hydrogen chloride; Spirits of salt
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7647-01-0	Hydrochloric acid	36.5	231-595-7
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: C
Risk Phrases: 34 37

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless to slight yellow clear liquid. **Danger!** Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May be harmful if swallowed.
Target Organs: Respiratory system, teeth, eyes, skin, circulatory system.

Potential Health Effects

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Contact with liquid is corrosive and causes severe burns and ulceration.
Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Give milk of magnesia.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Do NOT use sodium bicarbonate in an attempt to neutralize the acid.
Antidote: Do NOT use oils or ointments in eye.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
Extinguishing Media: For large fires, use water spray, fog, or alcohol-resistant foam. Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Large spills may be neutralized with dilute alkaline solutions of soda ash (sodium carbonate, Na2CO3), or lime (calcium oxide, CaO). Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not breathe

dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.
Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Store protected from moisture. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrochloric acid	2 ppm Ceiling	50 ppm IDLH	5 ppm Ceiling; 7 mg/m3 Ceiling
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrochloric acid: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear neoprene or polyvinyl chloride gloves to prevent exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: colorless to slight yellow
Odor: strong, pungent
pH: 0.01
Vapor Pressure: 5.7 mm Hg @ 0 deg C
Vapor Density: 1.26
Evaporation Rate:> 1.00 (N-butyl acetate)
Viscosity: Not available.
Boiling Point: 81.5-110 deg C @ 760 mmHg
Freezing/Melting Point:-74 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:1.0-1.2
Molecular Formula:HCl.H2O
Molecular Weight:36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Mechanical shock, incompatible materials, metals, excess heat, exposure to moist air or water, bases.

Incompatibilities with Other Materials: Acetates, acetic anhydride, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, calcium phosphide, cesium acetylene carbide, cesium carbide, chlorosulfonic acid, 1,1-difluoroethylene, ethylene diamine, ethyleneimine, fluorine, lithium silicides, magnesium boride, mercuric sulfate, oleum, perchloric acid, potassium permanganate, beta-propiolactone, propylene oxide, rubidium acetylene carbide, rubidium carbide, silver perchlorate + carbon tetrachloride, sodium, sodium hydroxide, sulfuric acid, uranium phosphide, vinyl acetate, zinc, metal oxides, aluminum, amines, carbonates, iron, steel, copper alloys, copper, alkali metals, bases, moisture.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7647-01-0: MW4025000; MW4031000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
Carcinogenicity:
CAS# 7647-01-0:
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: Experimental reproductive effects have been reported.
Teratogenicity: Embryo or Fetus: Stunted fetus, Inhalation, rat TCL0=450 mg/m3/1H Specific Developmental Abnormalities: homeostatis, Inhalation, rat TCL0=450 mg/m3/1H (female 1 days pre-mating).
Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: Cytogenetic analysis: Hamster, lung = 30 mmol/L.; Cytogenetic analysis: Hamster, ovary = 8 mmol/L.
Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified) Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5 No data available.
Environmental: Rapidly hydrolyzes when exposed to water. Will exhibit extensive evaporation from soil surfaces. Upon transport through the soil, hydrochloric acid will dissolve some of the soil materials (especially those with carbonate bases) and the acid will neutralize to some degree.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	HYDROCHLORIC ACID				No information available.
Hazard Class:	8				
UN Number:	UN1789				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7647-01-0: 500 lb TPQ
SARA Codes
CAS # 7647-01-0: acute.
Section 313
This material contains Hydrochloric acid (CAS# 7647-01-0, 36 5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

C

Risk Phrases:

R 34 Causes burns.
R 37 Irritating to respiratory system.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)

CAS# 7647-01-0: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, E.

Canadian Ingredient Disclosure List

CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3) OEL-AUSTRIA:TWA 5 ppm (7 mg/m3) OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3) OEL-DENMARK:STEL 5 ppm (7 mg/m3) OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin OEL-FRANCE:STEL 5 ppm (7.5 mg/m3) OEL-GERMANY:TWA 5 ppm (7 mg/m3) OEL-HUNGARY:STEL 5 mg/m3 OEL-JAPAN:STEL 5 ppm (7.5 mg/m3) OEL-THE NETHERLANDS:TWA 5 p pm (7 mg/m3) OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3) OEL-POLAND:TWA 5 mg/m3 OEL-RUSSIA:STEL 5 ppm (5 mg/m3) OEL-SWEDEN:STEL 5 ppm (8 mg/ m3) OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3) OEL -THAILAND:TWA 5 ppm (7 mg/m3) OEL-TURKEY:TWA 5 ppm (7 mg/m3) OEL-UNI TED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPOR E, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 7/06/1999
Revision #4 Date: 8/14/2003

Material Safety Data Sheet

Nitric acid, reagent ACS

ACC# 96317

Section 1 - Chemical Product and Company Identification

MSDS Name: Nitric acid, reagent ACS
Catalog Numbers: AC424000000, AC424000025, AC424000250, AC424005000
Synonyms: Azotic Acid; Engravers Nitrate; Hydrogen Nitrate.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7697-37-2	Nitric acid	69	231-714-2
7732-18-5	Water	31	231-791-2

Hazard Symbols: O C
Risk Phrases: 35 8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear to yellow liquid. **Danger!** Corrosive. Strong oxidizer. Contact with other material may cause a fire. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Check internal container upon receipt. Bottles should be vented periodically to relieve pressure.
Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes severe eye burns. May cause irreversible eye injury. May cause chemical conjunctivitis and corneal damage.
Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.
Inhalation: Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema.
Chronic: Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. Effects may be delayed.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Contact professional fire-fighters immediately.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 1; Special Hazard: OX

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Neutralize spill with sodium bicarbonate. Remove all sources of ignition. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not get on skin or in eyes. Avoid ingestion and inhalation. Discard contaminated shoes.
Storage: Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Bottles should be vented periodically in order to overcome pressure buildup.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Nitric acid	2 ppm TWA; 4 ppm STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs: Nitric acid: 2 ppm TWA; 5 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear a chemical apron. Wear appropriate clothing to prevent skin exposure.

Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear to yellow
Odor: strong odor - acrid odor
pH: 1.0
Vapor Pressure: 6.8 mm Hg
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 122 deg C
Freezing/Melting Point:-42 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density:1.41
Molecular Formula:HNO3
Molecular Weight:63.01

Section 10 - Stability and Reactivity

Chemical Stability: Stable. Decomposes when in contact with air, light, or organic matter.

Conditions to Avoid: High temperatures, incompatible materials, ignition sources, dust generation, moisture, combustible materials, reducing agents.

Incompatibilities with Other Materials: Reducing agents, acids (organic, e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), alcohols and glycols (e.g. butyl alcohol, ethanol, methanol, ethylene glycol), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, formaldehyde), amides (e.g. butyramide, diethyltoluamide, dimethyl formamide), amines (aliphatic and aromatic, e.g. dimethyl amine, propylamine, pyridine, triethylamine), azo, diazo, and hydrazines (e.g. dimethyl hydrazine, hydrazine, methyl hydrazine), carbamates (e.g. carbanolate, carbofuran), caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), cyanides (e.g. potassium cyanide, sodium cyanide), dithiocarbamates (e.g. ferbam, maneb, metham, thiram), esters (e.g. butyl acetate, ethyl acetate, propyl formate), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), fluorides (inorganic, e.g. ammonium fluoride, calcium fluoride, cesium fluoride), hydrocarbons (aromatic, e.g. benzene, chrysene, cumen.

Hazardous Decomposition Products: Nitrogen oxides.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7697-37-2: QU5775000; QU5900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7697-37-2:
Inhalation, rat: LC50 = 260 mg/m3/30M;
Inhalation, rat: LC50 = 130 mg/m3/4H;
Inhalation, rat: LC50 = 67 ppm(NO2)/4H;
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
Carcinogenicity:
CAS# 7697-37-2: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA. CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: No information found.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Neurotoxicity: No information found.
Mutagenicity: No information found.
Other Studies: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestial: During transport through the soil, nitric acid will dissolve some of the soil material, in particular, the carbonate based materials. The acid will be neutralized to some degree with adsorption of the proton also occurring on clay materials. However, significant amounts of acid are expected to remain for transport down toward the ground water table. Upon reaching the ground water table, the acid will continue to move, now in the direction of the ground water flow.
Physical: Not expected to biodegrade or bioconcentrate.
Other: For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	NITRIC ACID				No information available.
Hazard Class:	8				
UN Number:	UN2031				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1,000 lb TPQ
SARA Codes
CAS # 7697-37-2: acute, chronic, flammable.
Section 313
This material contains Nitric acid (CAS# 7697-37-2, 69%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
O C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S23B Do not breathe fumes.

WGK (Water Danger / Protection)

CAS# 7697-37-2: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of C, D1A, E.

Canadian Ingredient Disclosure List

CAS# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

CAS# 7697-37-2: OEL-ARAB Republic of Egypt:TWA 2 ppm (5 mg/m3) OEL-AUSTRALIA:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3) OEL-BELGIUM:TWA 2 ppm (5.2 mg/m3);STEL 4 ppm (10 mg/m3) OEL-CZECHOSLOVAKIA:TWA 2.5 mg/m3;STEL 5 mg/m3 OEL-DENMARK:TWA 2 ppm (5 mg/m3) OEL-FINLAND:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3);Skin OEL-FRANCE:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3) OEL-GERMANY:TWA 10 ppm (25 mg/m3) OEL-HUNGARY:STEL 5 mg/m3 OEL-JAPAN:TWA 2 ppm (5.2 mg/m3) OEL-THE PHILIPPINES:TWA 2 ppm (5 mg/m3) OEL-POLAND:TWA 10 mg/m3 OEL-RUSSIA:TWA 2 ppm;STEL 2 mg/m3;Skin OEL-SWEDEN:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3) OEL-SWITZERLAND:TWA 2 ppm (5 mg/m3);STEL 4 ppm (1 mg/m3) OEL-THAILAND:TWA 2 ppm (5 mg/m3) OEL-TURKEY:TWA 2 ppm (5 mg/m3) OEL-UNITED KINGDOM:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 12/16/1997
Revision #5 Date: 12/06/2001

HNU SYSTEMS INC -- ISOBUTYLENE SPAN GAS, SEE SUPP DATA -- 6665-01-214-8247

========== Product Identification ==========

Product ID:ISOBUTYLENE SPAN GAS, SEE SUPP DATA
MSDS Date:12/08/1987
FSC:6665
NIIN:01-214-8247
MSDS Number: BJDVR
=== Responsible Party ===
Company Name:HNU SYSTEMS INC
Address:160 CHARLEMONT ST
City:NEWTON HIGHLANDS
State:MA
ZIP:02161
Country:US
Info Phone Num:617/964-6690
Emergency Phone Num:800/841-4357
CAGE:57631
=== Contractor Identification ===
Company Name:HNU SYSTEMS INC
Address:160 CHARLEMONT ST
Box:City:NEWTON HIGHLANDS
State:MA
ZIP:02161
Country:US
Phone:617/964-6690
CAGE:57631

========== Composition/Information on Ingredients ==========

Ingred Name:ISOBUTYLENE
CAS:115-11-7
RTECS #:UD0890000
Fraction by Wt: 0.01%

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ISOBUTYLENE IS A SIMPLE ASPHYXIANT;
MODERATE CONCENTRATION IN AIR CAUSE UNCONSCIOUSNESS. CONTACT
W/LIQUID CAUSES FROSTBITE.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:IF BREATHED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS
DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED, GIVE
ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET; GET MEDICAL
ATTENTION.

========== Fire Fighting Measures ==========

Flash Point Method:CC
Flash Point:-76 C OR -105 F
Lower Limits:1.8%
Upper Limits:9.6%
Extinguishing Media:CO2 OR DRY CHEMICAL
Fire Fighting Procedures:STOP FLOW OF ISOBUTYLENE IF POSSIBLE. USE
WATER SPRAY TO COOL SURROUNDING CONTAINERS.
Unusual Fire/Explosion Hazard:ISOBUTYLENE IS HEAVIER THAN AIR MAY
TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION. SHOULD FLAME BE

EXTINGUISHED AND FLOW OF GAS CONTINUE SEE SUPP DATA.

========== Accidental Release Measures ==========

Spill Release Procedures:NONE SPECIFIED BY MANUFACTURER.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE AWAY FROM HEAT AND PROTECT CYLINDERS FROM PHYSICAL DAMAGE.
Other Precautions:DO NOT PUNCTURE CYLINDER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:POSITIVE PRESSURE AIR LINE OR SCBA FOR EMERGENCY USE.
Ventilation:HOOD W/FORCED VENTILATION TO PREVENT ACCUMULATION ABOVE LEL.
Protective Gloves:PLASTIC OR RUBBER.
Eye Protection:SAFETY GOGGLES OR GLASSES.
Other Protective Equipment:SAFETY SHOES, SAFETY SHOWER, EYEWASH FOUNTAIN.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
MFR PART NO, TRADE NAME:CALIBRATION GAS 101- 350-N, DC102573.EXPLO HAZ:INCREASE VENTILATION TO PREVENT FORMATION OF FLAMMABLE MIXTURE IN LOW AREAS/POCKETS. NOTE:DATA GIVEN FOR PURE ISOBUTLENE. CYLINDER OF HNU SPAN GAS/ISOBUTYLENE CALIBRATION GAS CONTAINS 100 PPM IN ZERO AIR OR 0.01% ISOBUTYLENE IN AIR.

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:19.6F,-6.9C
Melt/Freeze Pt:M.P/F.P Text:-221F,-140C
Vapor Pres:@20C 24SIG
Vapor Density:1.95
Spec Gravity:0.59
Solubility in Water:UNAVAILABLE
Appearance and Odor:CLEAR UNPLEASANT ODOR SIMILAR TO COAL GAS

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
OXIDIZERS.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:NONE

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSAL MUST BE I/A/W FED, STATE AND LOCAL REGULATIONS.

Material Safety Data Sheet

Isopropanol, Reagent ACS, Spectro Grade

ACC# 95535

Section 1 - Chemical Product and Company Identification

MSDS Name: Isopropanol, Reagent ACS, Spectro Grade
Catalog Numbers: AC412790000, AC412795000
Synonyms: Isopropanol; Dimethylcarbinol; sec-Propyl alcohol; Rubbing alcohol; Petrohol; 1-Methylethanol; 1-Methylethyl alcohol; 2-Hydroxypropane; 2-Propyl alcohol; Isopropyl alcohol; Propan-2-ol; IPA; 2-Propanol.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
67-63-0	2-Propanol	>= 99.5	200-661-7

Hazard Symbols: XI F
Risk Phrases: 11 36

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: 12 deg C. **Warning!** May cause central nervous system depression. May form explosive peroxides. **Flammable liquid and vapor.** Hygroscopic (absorbs moisture from the air). Causes respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. Causes eye irritation. Breathing vapors may cause drowsiness and dizziness. Prolonged or repeated contact causes defatting of the skin with irritation, dryness, and cracking.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. May cause transient corneal injury. In the eyes of a rabbit, 0.1 ml of 70% isopropyl alcohol caused conjun ctivitis, iritis, and corneal opacity.
Skin: May cause irritation with pain and stinging, especially if the skin is abraded. Isopropanol has a low potential to cause allergic skin reactions; however, rare cases of allergic contact dermatitis have been reported. May be absorbed through intact skin. Dermal absorption has been considered toxicologically insignificant. T he cases of deep coma associated with skin contact are thought to be a consequence of gross isopropanol vapor inhalation in rooms with inade quate ventilation, rather than being attributable to percutaneous abso rption of isopropanol per se.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. The probable oral lethal dose in humans is 240 ml (2696

mg/kg), but in gestion of only 20 ml (224 mg/kg) has caused poisoning.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause narcotic effects in high concentration. Causes upper respiratory tract irritation. Inhalation of vapors may cause drowsiness and dizziness.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Urine acetone test may be helpful in diagnosis. Hemodialysis should be considered in severe intoxication. Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. May form explosive peroxides. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Water may be ineffective. Do NOT use straight streams of water. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: 12 deg C (53.60 deg F)
Autoignition Temperature: 399 deg C (750.20 deg F)
Explosion Limits, Lower:2.0 vol %
Upper: 12.7 @ 200°F
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Use water spray to dilute spill to a non-flammable mixture. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep

container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist. Do not allow to evaporate to near dryness.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Do not store in direct sunlight. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. After opening, purge container with nitrogen before reclosing. Periodically test for peroxide formation on long-term storage. Addition of water or appropriate reducing materials will lessen peroxide formation. Store protected from moisture. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-Propanol	200 ppm TWA; 400 ppm STEL	400 ppm TWA; 980 mg/m3 TWA 2000 ppm IDLH	400 ppm TWA; 980 mg/m3 TWA

OSHA Vacated PELs: 2-Propanol: 400 ppm TWA; 980 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: alcohol-like
pH: Not available.
Vapor Pressure: 33 mm Hg @ 20 deg C
Vapor Density: 2.1 (Air=1)
Evaporation Rate:1.7 (n-butyl acetate=1)
Viscosity: 2.27 mPas @ 20C
Boiling Point: 82 deg C @ 760 mmHg
Freezing/Melting Point:-88 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:0.7850 (water=1)
Molecular Formula:C3H8O
Molecular Weight:60.09

Section 10 - Stability and Reactivity

Chemical Stability: Under normal storage conditions, peroxidizable compounds can form and

accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation. Isopropanol is susceptible to autoxidation and therefore should be classified as peroxidizable.
Conditions to Avoid: Light, ignition sources, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Attacks some forms of plastics, rubbers, and coatings., chlorine, carbony dichloride(phosgene), acetaldehyde, ethylene oxide, isocyanates, amines, aluminum at high temperatures, strong oxidizing agents, strong acids, ammonia, strong bases.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 67-63-0: NT8050000
LD50/LC50:
CAS# 67-63-0:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 10 mg Moderate;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 500 mg Mild;
Inhalation, mouse: LC50 = 53000 mg/m3;
Inhalation, rat: LC50 = 16000 ppm/8H;
Inhalation, rat: LC50 = 72600 mg/m3;
Oral, mouse: LD50 = 3600 mg/kg;
Oral, mouse: LD50 = 3600 mg/kg;
Oral, rabbit: LD50 = 6410 mg/kg;
Oral, rat: LD50 = 5045 mg/kg;
Oral, rat: LD50 = 5000 mg/kg;
Skin, rabbit: LD50 = 12800 mg/kg;
Carcinogenicity:
CAS# 67-63-0: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: Experimental teratogenic and reproductive effects have been reported for isopropanol. Early epidemiological studies hav e suggested an association between the strong acid man ufacture of isopropyl alcohol and paranasal sinus cancer in workers.
Teratogenicity: A rat & rabbit developmental toxicity study showed no teratogenic effects at doses that were clearly maternally toxic. In a separate rat study, no evidence of developmental neurotoxicity was associated with gestational exposures to IPA up to 1200 mg/kg/d.
Reproductive Effects: See actual entry in RTECS for complete information.
Neurotoxicity: No information available.
Mutagenicity: See actual entry in RTECS for complete information.
Other Studies: Standard Draize Test: Administration onto the skin (rabbit) = 500 mg (Mild). Standard Draize Test: Administration into the eye (rabbit) = 100 mg (Moderate). Standard Draize Test : Administration into the eye = 10 mg (Moderate). Standard D raize test: Administration into the eye (rabbit) = 100 mg/24 H (Moderate).

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: >1000 ppm; 96h; LC50Daphnia: >1000 ppm; 96h; LC50Fish: Gold orfe: 8970-9280 ppm; 48h; LC50 IPA has a high biochemical oxygen demand and a potential to cause oxygen depletion in aqueous systems, a low potential to affect aquatic organisms, a low potential to affect secondary waste treatment microbial metabolism, a low potential to affect the germination of some plants, a high potential to biodegrade (low persistence) with unacclimated microorganisms from activated sludge.
Environmental: No information available.
Physical: THOD: 2.40 g oxygen/gCOD: 2.23 g oxygen/gBOD-5: 1.19-1.72 g oxygen/g
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	ISOPROPANOL				No information available.
Hazard Class:	3				
UN Number:	UN1219				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 67-63-0 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 67-63-0: Effective 12/15/86; Sunset 12/15/96
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 67-63-0: acute, chronic, flammable.
Section 313
This material contains 2-Propanol (CAS# 67-63-0, 99 5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 67-63-0 can be found on the following state right to know lists: California, New Jersey,

Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
XI F

Risk Phrases:
R 11 Highly flammable.
R 36 Irritating to eyes.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 24/25 Avoid contact with skin and eyes.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 7 Keep container tightly closed.

WGK (Water Danger/Protection)
CAS# 67-63-0: 1

Canada - DSL/NDSL
CAS# 67-63-0 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of B2, D2B.

Canadian Ingredient Disclosure List
CAS# 67-63-0 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits
CAS# 67-63-0: OEL-AUSTRALIA:TWA 400 ppm (980 mg/m3);STEL 500 ppm (12 25 mg/m3) OEL-BELGIUM:TWA 400 ppm (985 mg/m3);STEL 500 ppm (1230 mg/m 3) OEL-DENMARK:TWA 200 ppm (490 mg/m3);Skin OEL-FRANCE:STEL 400 ppm (980 mg/m3) OEL-GERMANY:TWA 400 ppm (980 mg/m3) OEL-JAPAN:STEL 400 p pm (980 mg/m3) OEL-THE NETHERLANDS:TWA 400 ppm (980 mg/m3);Skin OEL-THE PHILIPPINES:TWA 400 ppm (980 mg/m3) OEL-RUSSIA:STEL 400 ppm (10 m g/m3) OEL-SWEDEN:TWA 150 ppm (350 mg/m3);STEL 250 ppm (600 mg/m3) OE L-SWITZERLAND:TWA 400 ppm (980 mg/m3);STEL 800 ppm OEL-TURKEY:TWA 200 ppm (500 mg/m3) OEL-UNITED KINGDOM:TWA 400 ppm (980 mg/m3);STEL 500 ppm;Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OE L IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 7/27/1999
Revision #9 Date: 10/12/2001

LIQUINOX MSDS

Section 1 : MANUFACTURER INFORMATION

Supplier: Same as manufacturer.

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

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

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

Supplier MSDS date: 2005/02/24

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

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

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

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

Volatiles (%)

By volume: Not available.

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

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

Section 4 : FIRE AND EXPLOSION HAZARD DATA

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

Not available.

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

Section 5 : REACTIVITY DATA

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

Section 6 : HEALTH HAZARD DATA

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

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

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

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

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

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Wear appropriate gloves.

Respiratory / Type: None required under normal use.

Eye / Type:

Safety glasses recommended.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

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

Ventilation requirements: Local exhaust at points of emission.

Material Safety Data Sheet

NCL of Wisconsin, Inc.
PO Box 8
Birnamwood, WI 54414
Emergency Telephone No: 800-424-9300 (Chemtrec)

Date of this revision: 11-02-2004

Product Identification

Product Name: YSI 3821 Buffer Solution, PH = 4.0
Synonyms: None. Molecular Weight: NA
Chemical Name: NA Chemical Family: NA
Product CAS#: NA Formula: NA

Ingredients

1. Potassium Acid Phthalate CAS# 877-24-7
   Percent: <2 SARA: Not Listed.
   TLV: Not established. PEL: Not Established
   Hazard: May cause eye and respiratory tract irritation.

2. Red Food Coloring CAS# Not listed.
   Percent: <0.02 SARA: Not listed
   TLV: Not established. PEL: Not established
   Hazard: None known.

3. Deionized Water CAS# 7732-18-5
   Percent: >98 SARA: Not listed.
   TLV: Not applicable PEL: Not applicable
   Hazard: None.

Precautionary Measures

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Minimal contact, as with all chemicals, is a good policy to follow.

Emergency/First Aid

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, give two glasses of water or milk to dilute. Call a physician.

DOT Hazard Class: Not Regulated

Physical Data Section One

Appearance: Clear Pink solution
Odor: Odorless
Solubility: Infinitely soluble in water.
Boiling Point: 100° C (212° F)
Melting Point: 0° C (32° F)
Specific Gravity: 1.0
Vapor Density (Air=1): Essentially the same as water.
Vapor Pressure (mm Hg): Essentially the same as water.
Evaporation Rate: Essentially the same as water.

Fire and Explosion Information — Section Two

Fire: Not considered to be a fire hazard.
Explosion: Not considered to be and explosion hazard
Fire Extinguishing Media: Use any suitable means for extinguishing surrounding fire.

Reactivity Data — Section Three

Stability: Stable under ordinary conditions of use and storage
Hazardous Decomposition Products: May emit toxic fumes of carbon monoxide, carbon dioxide, and potassium oxide if involved in a fire.
Hazardous Polymerization: This substance does not polymerize.
Incompatibilities: Strong solutions of nitric acid.

Leak/Spill/Disposal Information — Section Four

Flush to sewer with large amounts of water.
Ensure compliance with Federal, State, and local regulations
Reportable Quantity: 5000 lbs.

Health Hazard Information — Section Five

A. Exposure/Health Effects

Inhalation: May cause irritation to mucous membranes due to slight acidity.
Ingestion: Large doses may cause nausea, vomiting and abnormal sensations in hands and feet. Because of slight acidity, may cause irritation to mucous membranes.
Skin Contact: May cause irritation, redness, and pain.
Eye Contact: May cause irritation and damage.
Chronic Exposure: No information found.
Cancer information: No information found for any ingredient
Aggravation of Pre-existing Conditions: No information found

B. First Aid

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion: If swallowed, give two glasses of water to dilute. Give medical attention immediately.
Skin Exposure: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Get medical attention if irritation develops or persists.
Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attentions immediately.

Occupational Control Measures — Section Six

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this material. However, if conditions of use create discomfort to a worker, a local exhaust should be considered.

Personal Respirators (NIOSH Approved): For conditions of use where exposure to mist exists, a dust/mist respirator may be worn. For emergencies, a self-contained breathing apparatus may be necessary.

Skin Protection: Rubber gloves and lab coat, apron or overalls.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material.

Maintain eye-wash fountain and quick-drench facilities in work areas.

Storage and Special Information — Section Seven

Keep in a tightly closed container. Protect container from physical damage.

END OF MATERIAL SAFETY DATA SHEET

Material Safety Data Sheet

NCL of Wisconsin, Inc.
PO Box 8
Birnamwood, WI 54414
Emergency Telephone No: 800-424-9300 (Chemtrec)

Date of this revision: 11-02-2004

Product Identification

Product Name: YSI 3822 Buffer Solution, pH = 7.00
Synonyms: None. Molecular Weight: NA
Chemical Name: NA Chemical Family: NA
Product CAS#: NA Formula: NA

Ingredients

1. Potassium Phosphate Monobasic CAS# 7778-77-0
   Percent: <1 SARA: Not Listed.
   TLV: Not established. PEL: Not Established
   Hazard: Moderately toxic - May cause Irritation.

2. Sodium Hydroxide CAS# 1310-73-2.
   Percent: <1 SARA: Not listed
   TLV: 2 mg/m³ PEL: 2 mg/m³

3. Yellow Food Coloring CAS# Not listed.
   Percent: <0.02 SARA: Not listed.
   TLV: Not established. PEL: Not established.
   Hazard: None Known.

4. Deionized Water CAS# 7732-18-5
   Percent: >98 SARA: Not listed.
   TLV: Not applicable PEL: Not applicable
   Hazard: None.

Precautionary Measures

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Minimal contact, as with all chemicals, is a good policy to follow.

Emergency/First Aid

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, give two glasses of water or milk to dilute. Call a physician.

DOT Hazard Class: Not Regulated

Physical Data Section One

Appearance: Clear yellow solution
Odor: Odorless
Solubility: Infinitely soluble in water.
Boiling Point: 100° C (212° F)
Melting Point: 0° C (32° F)
Specific Gravity: 1.0

Vapor Density (Air=1): Essentially the same as water.
Vapor Pressure (mm Hg): Essentially the same as water.
Evaporation Rate: Essentially the same as water.

Fire and Explosion Information — Section Two

Fire: Not considered to be a fire hazard.
Explosion: Not considered to be and explosion hazard
Fire Extinguishing Media: Use any suitable means for extinguishing surrounding fire.

Reactivity Data — Section Three

Stability: Stable under ordinary conditions of use and storage
Hazardous Decomposition Products: None known.
Hazardous Polymerization: This substance does not polymerize.
Incompatibilities: None known.

Leak/Spill/Disposal Information — Section Four

Flush to sewer with large amounts of water.
Ensure compliance with Federal, State, and local regulations
Reportable Quantity: 5000 lbs.

Health Hazard Information — Section Five

A. Exposure/Health Effects

Inhalation: No information found.
Ingestion: Large doses may cause diarrhea.
Skin Contact: Prolonged contact may cause irritation.
Eye Contact: May cause irritation and damage.
Chronic Exposure: Potassium phosphate, one of the ingredients, may sequester calcium and cause calcium phosphate deposits in the kidneys.
Cancer information: No information found for any ingredient
Aggravation of Pre-existing Conditions: No information found

B. First Aid

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion: If swallowed, give two glasses of water to dilute. Give medical attention immediately.
Skin Exposure: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Get medical attention if irritation develops or persists.
Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attentions immediately.

Occupational Control Measures — Section Six

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this material. However, if conditions of use create discomfort to a worker, a local exhaust should be considered.

Personal Respirators (NIOSH Approved): For conditions of use where exposure to mist exists, a dust/mist respirator may be worn. For emergencies, a self-contained breathing apparatus may be necessary.

Skin Protection: Rubber gloves and lab coat, apron or overalls.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material.

Maintain eye-wash fountain and quick-drench facilities in work areas.

Storage and Special Information — Section Seven

Keep in a tightly closed container. Protect container from physical damage.

END OF MATERIAL SAFETY DATA SHEET

Material Safety Data Sheet

Sulfuric acid 90-98%

ACC# 22350

Section 1 - Chemical Product and Company Identification

MSDS Name: Sulfuric acid 90-98%
Catalog Numbers: AC124640000, AC124640010, AC124640011, AC124640025, AC124640026, AC124645000, AC124645001, AC133610000, AC133610010, AC133610011, AC133610025, AC133610026, AC133610051, AC302070000, AC302070010, AC302070011, AC302070025, AC302070026, AC388270000, AC424520000, AC424520025, AC424520026, AC424525000, AC424525001, S71211, S71211MF, S71211SC, S71826, S79200, S79200MF, S79200SCMF, S80213, S80213-1, S93391, A298-212, A300-212, A300-225LB, A300-500, A300-500LC, A300-612GAL, A300-700LB, A300C-212, A300C-212002, A300C-212003, A300C-212LC, A300C212004, A300C212005, A300C212006, A300C212007, A300C212008, A300C212009, A300C212010, A300J-500, A300P-500, A300S-212, A300S-212LC, A300S-500, A300SI-212, A468-1, A468-2, A468-250, A468-500, A484-212, A510-212, A510-500, A510SK-212, NC9008405, NC9825433, S71211SCMF, SA174-212, SA174-4, SA176-4, SA196-500
Synonyms: Hydrogen sulfate; Oil of vitriol; Vitriol brown oil; Mattling acid; Battery acid; Sulphuric acid; Electrolyte acid; Dihydrogen sulfate; Spirit of sulfur; Chamber acid.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7664-93-9	Sulfuric acid	90-98	231-639-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless to yellow liquid.
Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if mist inhaled. Strong inorganic acid mists containing sulfuric acid may cause cancer. Concentrated sulfuric acid reacts violently with water and many other substances under certain conditions. May cause lung damage. Hygroscopic (absorbs moisture from the air). Corrosive to metal.
Target Organs: Lungs, teeth, eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes severe eye burns. May cause irreversible eye injury. May cause blindness. May cause permanent corneal opacification. The severity of injury depends on the concentration of the solution and the duration of exposure.
Skin: Causes skin burns. The severity of injury depends on the concentration of the solution and the duration of exposure.
Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns.

Inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Because its vapor pressure is negligible, it exists in the air only as a mist or spray. Exposure may impair lung function and cause mucostasis (reduced mucous clearance).
Chronic: Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Effects may be delayed. Workers chronically exposed to sulfuric acid mists may show various lesions of the skin, tracheobronchitis, stomatitis, conjunctivitis, or gastritis. Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid immediately.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Contact with water can cause violent liberation of heat and splattering of the material. Contact with metals may evolve flammable hydrogen gas. Runoff from fire control or dilution water may cause pollution. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Strong dehydrating agent, which may cause ignition of finely divided materials on contact. Oxides of sulfur may be produced in fire.
Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire. Do NOT get water inside containers. If water is used, care should be taken, since it can generate heat and cause spattering if applied directly to sulfuric acid.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Carefully scoop up and place into appropriate disposal container. Provide ventilation. Do not get water inside containers. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and

contact with water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not allow water to get into the container because of violent reaction. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use only with adequate ventilation. Do not breathe spray or mist. Do not use with metal spatula or other metal items. Inform laundry personnel of contaminant's hazards.
Storage: Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near alkaline substances. Store protected from moisture. Ideally, sulfuric acid should be stored in isolation from all other chemicals in an approved acid or corrosives safety cabinet.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sulfuric acid	0.2 mg/m3 TWA (thoracic fraction)	1 mg/m3 TWA 15 mg/m3 IDLH	1 mg/m3 TWA

OSHA Vacated PELs: Sulfuric acid: 1 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles and face shield.
Skin: Wear neoprene gloves, apron, and/or clothing. Viton gloves are recommended.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: oily - clear colorless to yellow
Odor: odorless
pH: 0.3 (1N solution)
Vapor Pressure: < 0.001 mm Hg @ 20 deg C
Vapor Density: 3.38 (air=1)
Evaporation Rate: Slower than ether.
Viscosity: 21 mPas @ 25 C
Boiling Point: 290 - 338 deg C
Freezing/Melting Point:10 deg C
Decomposition Temperature:340 deg C
Solubility: Soluble with much heat
Specific Gravity/Density:1.84
Molecular Formula:H2SO4
Molecular Weight:98.07

Section 10 - Stability and Reactivity

Chemical Stability: Sulfuric acid reacts vigorously, violently or explosively with many organic and inorganic chemicals and with water.
Conditions to Avoid: Excess heat, exposure to moist air or water, Note: Use great caution in mixing with water due to heat evolution that causes explosive spattering. Always add the acid to water, never the reverse..
Incompatibilities with Other Materials: Metals, oxidizing agents, reducing agents, bases, acrylonitrile, chlorates, finely powdered metals, nitrates, perchlorates, permanganates, epichlorohydrin, aniline, carbides, fulminates, picrates, organic materials, flammable liquids.
Hazardous Decomposition Products: Oxides of sulfur.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7664-93-9: WS5600000
LD50/LC50:
CAS# 7664-93-9:
Draize test, rabbit, eye: 250 ug Severe;
Inhalation, mouse: LC50 = 320 mg/m3/2H;
Inhalation, mouse: LC50 = 320 mg/m3;
Inhalation, rat: LC50 = 510 mg/m3/2H;
Inhalation, rat: LC50 = 510 mg/m3;
Oral, rat: LD50 = 2140 mg/kg;
.

Carcinogenicity:
CAS# 7664-93-9:

- **ACGIH:** A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)
- **California:** carcinogen, initial date 3/14/03 (listed as Strong inorganic acid mists containing sulfuric acid).
- **NTP:** Known carcinogen (listed as Strong inorganic acid mists containing s).
- **IARC:** Group 1 carcinogen

Epidemiology: Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This suggests a possible relationship between carcinogenesis and inhalation of sulfuric acid mist.
Teratogenicity: Sulfuric acid was not teratogenic in mice and rabbits, but was slightly embryotoxic in rabbits (a minor, rare skeletal variation). The animals were exposed to 5 and 20 mg/m3 for 7 hr/day throughout pregnancy. Slight maternal toxicity was present at the highest dose in both species.
Reproductive Effects: No information found
Mutagenicity: There are no mutagenicity studies specifically of sulfuric acid. However, there are established effects of reduced pH in mutagenicity testing, as would be caused by sulfuric acid. These effects are an artifact of low pH and are not necessarily due to biological effects of sulfuric acid itself.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 49 mg/L; 48Hr; TLm (tap water @ 20C)
Fish: Bluegill/Sunfish: 24.5 ppm; 48Hr; TLm (fresh water)

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	SULFURIC ACID	SULFURIC ACID
Hazard Class:	8	8
UN Number:	UN1830	UN1830
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7664-93-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7664-93-9: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7664-93-9: 1000 lb TPQ
SARA Codes
CAS # 7664-93-9: immediate, delayed, reactive.
Section 313
This material contains Sulfuric acid (CAS# 7664-93-9, 90-98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 7664-93-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
The following statement(s) is(are) made in order to comply with the California Safe Drinking

Water Act:
WARNING: This product contains Sulfuric acid, listed as `Strong inorganic acid mists contain', a chemical known to the state of California to cause cancer.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

C

Risk Phrases:

R 35 Causes severe burns.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 30 Never add water to this product.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger / Protection)

CAS# 7664-93-9: 2

Canada - DSL / NDSL

CAS# 7664-93-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A, D1A, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7664-93-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/22/1999
Revision #14 Date: 6/07/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.