



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY PIEDMONT REGIONAL OFFICE

4949A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
www.deq.virginia.gov

David K. Paylor
Director

Jeffery Steers
Regional Director

Molly Joseph Ward
Secretary of Natural Resources

September 22, 2017

Jason E. Williams
Manager, Generation Environmental Services
Chesterfield Power Station
Transmitted via email: Jason.E.Williams@dominionenergy.com

Re: FGD WWTP Pilot Study – Chesterfield Power Station
VPDES Permit VA0004146

Mr. Williams:

The DEQ received your Chemical Notification Letter dated August 8, 2017, regarding the proposed use of 22 chemicals in a pilot study to be conducted at the FGD WWTP. The notification letter included the pilot testing plan from Arcadis detailing the usage of these chemicals, including the expected chemical dosages, percent removal, discharge rate, and estimated concentrations of the effluent from the pilot test and of the effluent from Outfall 302. We are also in receipt of the SDS sheets and priority pollutant letters stating that none of the proposed chemicals or their constituents are on the EPA Priority Pollutants list.

The proposal indicates that effluent from the pilot testing will be comingled with the existing FGD WWTP effluent upstream of Outfall 302 which will then discharge to the Low Volume Wastewater Treatment System (LVWWTS). The LVWWTS is expected to be commissioned and discharging prior to this pilot study and will discharge to the thermal channel through Outfall 301 and subsequently through Outfall 003 to Farrar Gut.

We have no objection to the proposed use of these chemicals as described in the notification letter and concur that the effluent from the study can be directed through Outfall 302. Based on the information that you provided, it appears that the use of these proposed chemicals will not significantly alter the effluent characteristics at Outfall 302. Please be advised that effluent limitations and monitoring, including quarterly whole effluent toxicity testing at Outfall 003, will continue per the current VPDES permit requirements.

Nothing in this letter relieves Dominion Energy from the responsibility to comply with the requirements set forth in VPDES Permit No. VA0004146 or from adhering to the Virginia Water Quality Standards (9VAC25-260).

Please contact Joseph Bryan at (804) 527-5012 or via email at Joseph.Bryan@deg.virginia.gov if you have any questions.

Sincerely,

A handwritten signature in blue ink that reads 'Emilee C. Adamson'.

Emilee C. Adamson
Planning and Water Permit Manager

cc: Kenneth Roller, Dominion Energy
Heather Deihls, DEQ

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AUG 09 2017



Certified Mail
Return Receipt Requested

August 8, 2017

Mr. Joseph B. Bryan
DEQ – Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

RE: Dominion Energy - Chesterfield Power Station – Chemical Notification Letter
– VPDES Permit No. VA0004146

Dear Mr. Bryan:

This chemical notification submittal is for a pilot test to be conducted at the flue gas desulfurization (FGD) WWTP at the Chesterfield Power Station. The pilot study is necessary in order to optimize selenium treatment to reach VPDES permit requirements. The pilot study will be conducted by Arcadis, who provided the attached pilot study write-up which includes the list of proposed chemicals (see Table 2 of Pilot Study Narrative). The chemical dosage concentrations and the estimated pilot system effluent concentrations are provided in the FGD WWTP Pilot Chemical Discharge Estimates Table. In addition, the pilot study system layout, schedule, priority pollutants letters, and SDS sheets are attached. The pilot treated effluent and pre-filter backwash will be pumped to the existing FGD WWTP where it will be comingled with the WWTP effluent. From there, the effluent will be discharged to internal Outfall 302 and eventually through Outfall 301 which discharges to the thermal channel. In addition, the sludge generated during the pilot study will be dewatered and the filtrate will be pumped through the FGD WWTP master sump for retreatment in the WWTP prior to discharge through internal Outfall 302, and eventually through Outfall 301.

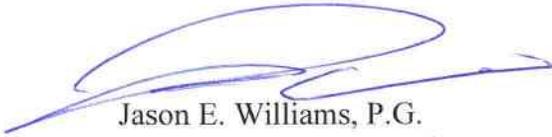
Based on the information provided herein, use of the proposed chemicals will not significantly alter the effluent characteristics of Outfall 301. In order to stay in compliance with some of the time constraints outlined in the station's VPDES Permit, personnel would like to start preparing for the pilot study in August 2017.

If you have any questions or desire additional information, please contact Ian Whitlock of Dominion Energy Environment and Sustainability at 804-273-2991.

Mr. Bryan
August 8, 2017
Page 2

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely



Jason E. Williams, P.G.
Manager, Environmental

Enclosures

Mr. Bryan
August 8, 2017
Page 4

Arcadis Pilot Study Plan, Chemical Information and
Safety Data Sheets

MEMO

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AUG 09 2017



To:
Kimberly Lanterman, Dominion
Beverly Wood, Dominion

Copies:
Dan O'Brien, Dominion
Mike Surface, Dominion
Michael Dreiling, Arcadis

Arcadis U.S., Inc.
9954 Mayland Drive
Suite 2400
Richmond
Virginia 23233
Tel 804 740 0181
Fax 804 217 8292

From:
Dave Riedel, Arcadis

Date:
July 21, 2017

Arcadis Project No.:
04314075.0006

Subject:
Dominion Chesterfield FGD WWTP Pilot Testing Plan

1. INTRODUCTION

The Dominion Chesterfield Power Station (hereafter referred to as "Chesterfield" and the "Station"), located at 500 Coxendale Road, Chester, Virginia in Chesterfield County, plans to pilot test multiple technologies to treat their flue gas desulfurization (FGD) wastewater to meet the limits of the Station's recently issued Virginia Pollution Discharge Elimination System (VPDES) permit for discharge to the James River (Chesapeake Bay watershed), which reflect the requirements of the new Steam Electric Power Effluent Limitations Guidelines (ELGs). Chesterfield currently utilizes a physical-chemical coagulation/flocculation/clarification treatment system (Infilco Degremont DensaDeg®) that treats the FGD wastewater stream and will treat the new ash landfill leachate stream, when construction is complete. Additional downstream treatment candidate technologies to remove selenium, nitrite, nitrate, and possibly arsenic and mercury, will be piloted. The effluent flow rate from the DensaDeg® system is approximately 300 gpm.

2. STATION BACKGROUND

Chesterfield has four active coal-burning units (Units 3 through 6) that began commercial operation in 1952, 1960, 1964 and 1969 (Natural gas Units 7 and 8 are not included in this study). Fly ash from Unit 6 is captured in a bag house; fly ash from Units 3 – 5 is captured by an electrostatic precipitator. Chesterfield has two wet flue gas desulfurization systems (FGD scrubbers) that serve the four coal units; the purge stream from the scrubbers is dewatered to recover gypsum, and the filtrate from dewatering is sent to a physical/chemical-based wastewater treatment system. The existing treatment system cannot achieve the level of treatment required by the Station's current VPDES permit.

3. REGULATORY DRIVERS

Chesterfield's wastewater streams are discharged to the James River under VPDES permit VA0004146. The current permit was made effective on October 1, 2016 and the limits below take effect on March 29, 2022.

The following table provides the discharge water quality requirements for the FGD Wastewater Treatment Plant outfall (Outfall 302) and thus the performance objectives of the pilot units:

Table 1 – FGD Wastewater Treatment Outfall Limits

Parameter	Monthly Average	Daily Maximum
pH ¹	Monitoring Only (Feeds External Outfall with Limitations of 6 – 9 SU)	Monitoring Only (Feeds External Outfall with Limitations of 6 – 9 SU)
Total Suspended Solids (TSS) ¹	30 mg/L	100 mg/L
	12 kg/d ² or 34 kg/d ³	42 kg/d ² or 114 kg/d ³
Oil and Grease (O&G) ¹	15 mg/L	20 mg/L
Arsenic, Total Recoverable (As)	8 ug/L (0.008 mg/L)	11 ug/L (0.0011 mg/L)
Mercury, Total Recoverable (Hg)	356 ng/L (0.000356 mg/L)	788 ng/L (0.000788 mg/L)
Selenium, Total Recoverable (Se)	12 ug/L (0.012 mg/L)	23 ug/L (0.023 mg/L)
Nitrogen as Nitrate (NO ₃ —N) and Nitrite (NO ₂ —N)	4.4 mg/L	17 g/L

Note:

(1) pH, TSS and O&G requirements were effective as of October 1, 2016

(2) Limitation expressed in three significant figures and is applicable if combustion residual leachate is separately treated and discharged to Outfall 301.

(3) Limitation expressed in three significant figures and is applicable if combustion residual leachate from the Fossil Fuel Combustion Product (FFCP) Management Facility is directed to the FGD WWTP for treatment and discharge through Outfall 302.

4. PROJECT OBJECTIVE

Dominion intends to evaluate treatment system candidates through pilot testing. Evaluation will assess system effectiveness at removing target constituents, operational and maintenance requirements, waste stream handling requirements, health and safety considerations, safety of chemicals used, and project capital costs. Dominion may select a Vendor's technology for eventual deployment onsite to comply with relevant VPDES permit limits.

5. PILOT TESTING OVERVIEW

Pilot testing of multiple vendors' systems will occur at the Station. These pilot systems will treat a portion of the effluent from the existing FGD WWTP; their effluent will be commingled with the existing FGD WWTP effluent upstream of Outfall 302 which will then discharge through the new Low Volume Wastewater Treatment System and out Outfall 301.

Dominion and Arcadis have evaluated multiple technology suppliers and ranked them for further study. Two biological-based treatment systems were selected for the first round of pilot testing at the Station; other physical-chemical-based systems were ranked as second tier solutions and may be pilot tested after the initial testing period. A zero valent iron (ZVI)-based physical-chemical system will likely be piloted as a polishing step for the biological systems assuming successful bench testing of the biological systems' effluent. A process flow diagram (PFD) and general arrangement have been prepared to illustrate the first round of piloting and is included as **Attachment A**.

Biological Pilots Influent

Effluent from the existing FGD WWTP system will be pumped from the DensaDeg effluent tank to 2 or more storage tanks ("frac" tanks) for feeding the pilot systems. The daily volume transferred will be 10,000 – 15,000 gallons per day (gpd). Pumps will feed the pilot systems from these storage tanks at 1 – 2 gallons per minute (gpm) (GE) and 5 – 8 gpm (Frontier). Further details of pilot flows are included in the PFD in **Attachment A**. The tie-in configuration is illustrated in **Attachment B**.

Biological Pilot Systems Operation

The biological systems selected for pilot testing are GE's ABMet and Frontier's SeHawk technologies. Both technologies utilize anoxic environments to reduce selenate (Se^{6+}) and selenite (Se^{4+}) to elemental selenium (Se^0) which precipitates and is removed with the biosludge generated. The two systems achieve this biological selenium reduction through slightly different approaches as illustrated in Figures 1 and 2.

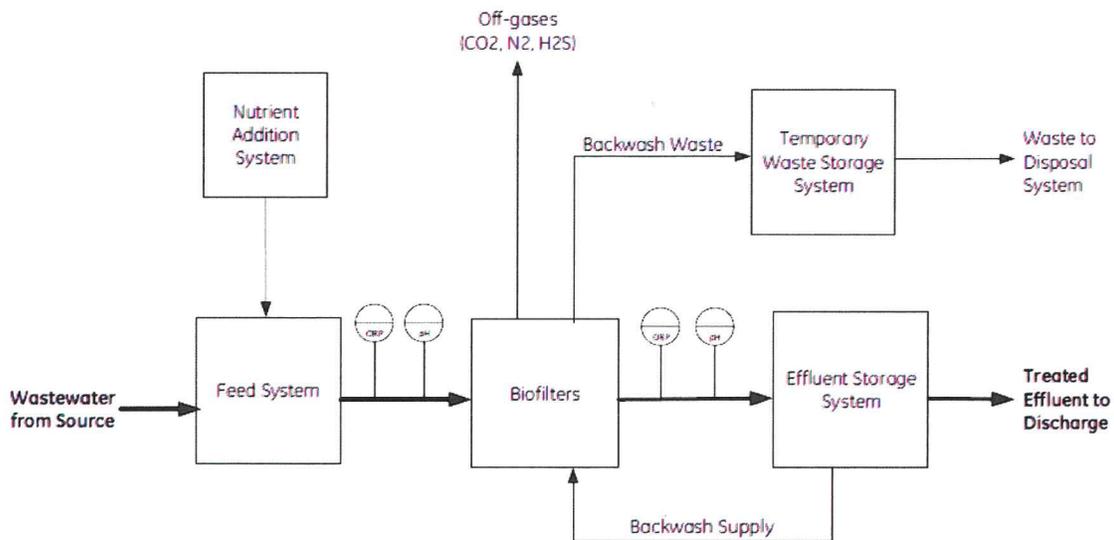


Figure 1 – GE ABMet General Process Flow Diagram (Source: GE Water and Power)

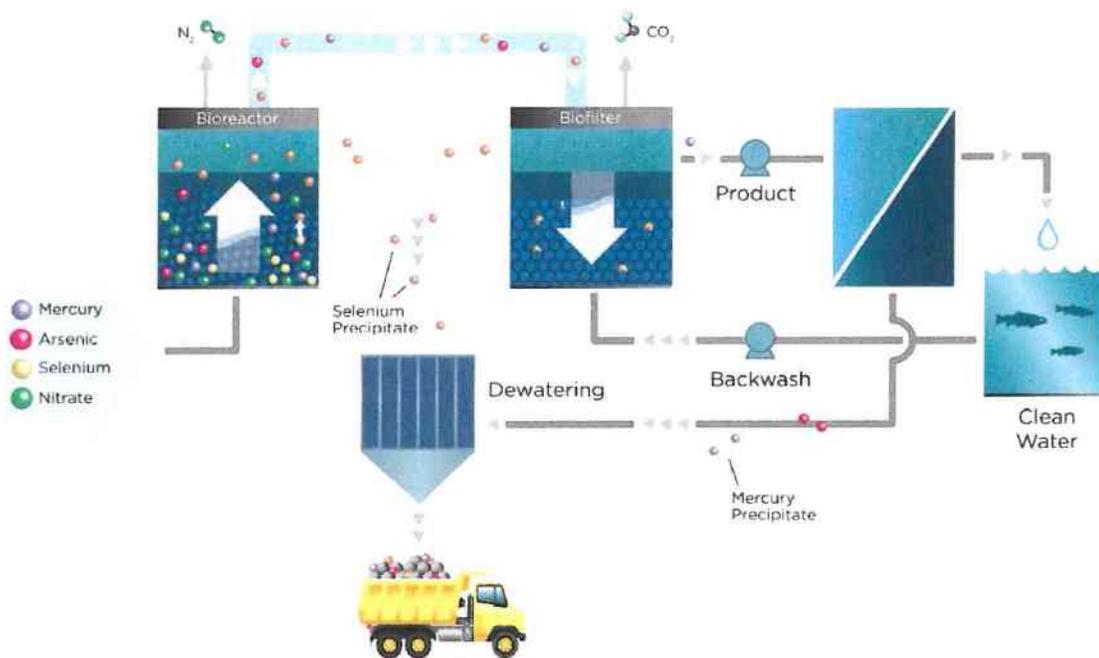


Figure 2 – Frontier SeHawk General Process Flow Diagram (Source: Frontier)

The most notable differences between the two systems are:

- Frontier includes an initial filter for suspended solids removal and some denitrification.
- Frontier includes an effluent ultrafiltration (UF) membrane for final suspended solids and colloidal mercury removal.
- Frontier utilizes an upflow granular bioreactor followed by a downflow biofilter. GE utilizes two downflow biofilters in series.

Biological Pilot Systems Effluents

The GE pilot will generate the following effluent streams. The flows for each are summarized in **Attachment A**.

- Treated effluent (continuous)
- Biofilter backwash (intermittent)

The Frontier pilot will generate the following effluent streams:

- Pre-filter backwash (continuous)
- Biofilter/reactor backwash (intermittent)
- UF clean in place (CIP) and backwash (intermittent)

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The treated effluents from each pilot will be collected in dedicated storage tanks for sampling and release to the FGD WWTP effluent pump suction. Additional filtration (bag or UF) will be supplied for the GE effluent to ensure that it meets the effluent TSS requirements for discharge.

The Frontier pre-filter backwash stream will be collected in a dedicated storage tank for solids settling prior to discharge to the FGD WWTP effluent pump suction. It will also be equipped with filtration to ensure TSS compliance. The other backwash and CIP waste streams will be commingled in a third storage tank for solids settling. The volumes are expected to be minimal over the course of the pilot test and the contents will not be discharged until the end of testing. Upon pilot completion, they will be discharged to the FGD WWTP master sump for treatment and solids removal in the existing FGD WWTP.

Acid and base will be provided for neutralizing the effluents returned to the FGD WWTP effluent pump suction; however, their usage is expected to be minimal.

ZVI Polishing Pilot

Pending successful bench testing of the Evoqua Pironox ZVI media on the effluents from the GE and Frontier systems, the Pironox media will be pilot tested as an effluent polishing process. This technology will only be necessary if the biological systems cannot achieve the treatment targets, specifically for selenium and nitrate/nitrite.

The Pironox media will be tested in three configurations: (1) to polish the GE effluent, (2) to polish the Frontier effluent, and (3) on the untreated DensaDeg effluent. These tests are anticipated to last 1 – 2 weeks each.

Figure 3 illustrates the process flow through the Pironox pilot. Influent to the Pironox system will be transferred from one of the biological pilot influent or effluent tanks, depending on the test period. The Pironox pilot will consist a trailer mounted system with reaction tanks, clarifiers, oxidation tank, multimedia filters and a standalone treated water tank and sludge disposal tank. Powdered ZVI media is added to the reactors which are configured in series with a clarifier after the second and fourth reactors. The first clarifier has ZVI recycle and waste capabilities, while the second clarifier only serves to waste exhausted ZVI media. Prior to clarification, the effluent from the fourth reactor passes through an oxidation tank where the pH is adjusted using caustic to facilitate the precipitation of soluble iron in the final clarifier. After final clarification, the effluent is passed through a pair of multimedia filters in series. The treated effluent will be handled in the same manner as the biological effluents: collection in a dedicated tank, sampling and release to the FGD WWTP effluent pump suction. Additional filtration (bag or UF) will be supplied to ensure that it meets the TSS requirements for discharge.

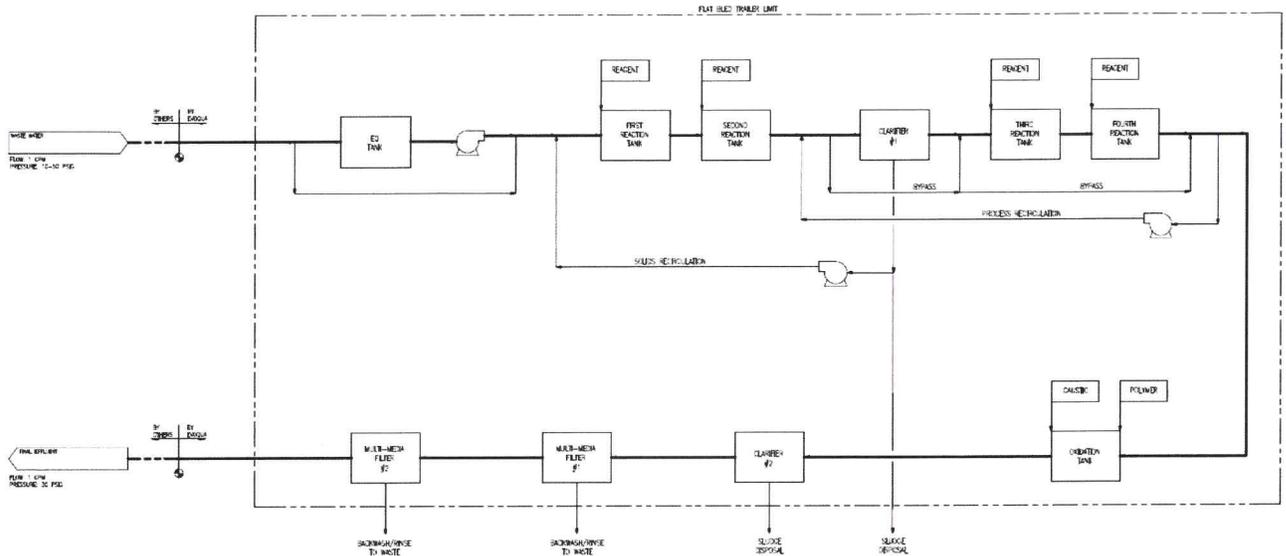


Figure 3 – Pironox Pilot System Process Flow Diagram

Second Tier Pilot Systems

Depending on the performance of the biological pilot systems, one or more second tier physical-chemical pilot systems may be tested either as polishing units or standalone systems. These supplemental systems will be deployed in the flow path after the biological pilots or in place of the biological pilots at the end of the initial test period. Details of these additional pilot systems will be provided at a later date.

6. PILOT TESTING SCHEDULE

The biological pilot units shall be fully operational and available for testing for twelve (12) consecutive weeks. Four (4) weeks are allowed in the schedule for pilot setup, biological acclimation, and pilot disassembly and removal from the site. The total pilot duration is sixteen (16) weeks. Anticipated pilot startup is November 2017. A schedule is included in **Attachment C**.

7. CHEMICALS

The following chemicals and associated storage volumes will be utilized during the pilot. Dosage rates, estimated discharge concentrations, and Safety Data Sheets (SDSs) are included in **Attachment D**. Several additional chemicals are included in Table 2 and Attachment D as alternates or to improve solids capture; they are indicated by the notes in Table 2.

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Table 2 – Summary of Chemicals for Pilot Test

Chemical	SDS ID No.	Purpose	Storage Volume
Glycerin (95%)	F001	Nutrient	275 gallon tote
Sodium Bisulfite (38%)	F002	Oxidant quenching	55 gallon drum
Citric Acid (50%)	F004	UF clean	1 gallon containers (max 20 gallons)
Sodium Hypochlorite (12.5%)	F005	UF clean	1 gallon containers (max 20 gallons)
Frontier Seed Culture	F006	Biomass Seed	1 lb bag
Molasses (100%)	GE001	Nutrient	275 gallon tote
Sodium Bicarbonate (5%)	GE003	Alkalinity	6 kg bags
Hypersperse MDC776 (100%)	GE006	Antiscalant	5 gallon containers
GE Seed Culture	GE007	Biomass Seed	1 lb bag
Acetic Acid ¹	GE008	Nutrient	275 gallon tote
Cortrol IS104 ¹	GE009	Oxidant quenching	55 gallon drum
Zero Valent Iron (100%)	E001	Media	2,000 lb supersack
Ferrous Chloride	E002	Media Conditioning	25 – 50 lb bags
Sodium Nitrate	E003	Media Conditioning	55 gallon drum
Sodium Percarbonate	E004	Media Conditioning	25 – 50 lb bags
Polyfloc AE1115 ²	E005	Polymer	55 gallon drum
Sodium Hydroxide (25%)	E006	pH control	55 gallon drum
Sodium Hydroxide (50%)	F003 or GE004	pH control	55 gallon drum
Hydrochloric acid (32%) or Sulfuric Acid (50%)	GE005 or A003	pH control	1000 gallon tote/55 gallon drum

Notes:

- (1) Alternate nutrient source and oxidant quenching chemicals provided in case molasses and sodium bisulfite do not perform to expectation.
- (2) If needed, this polymer could also be utilized in the effluent collection tanks to help with solids polishing.

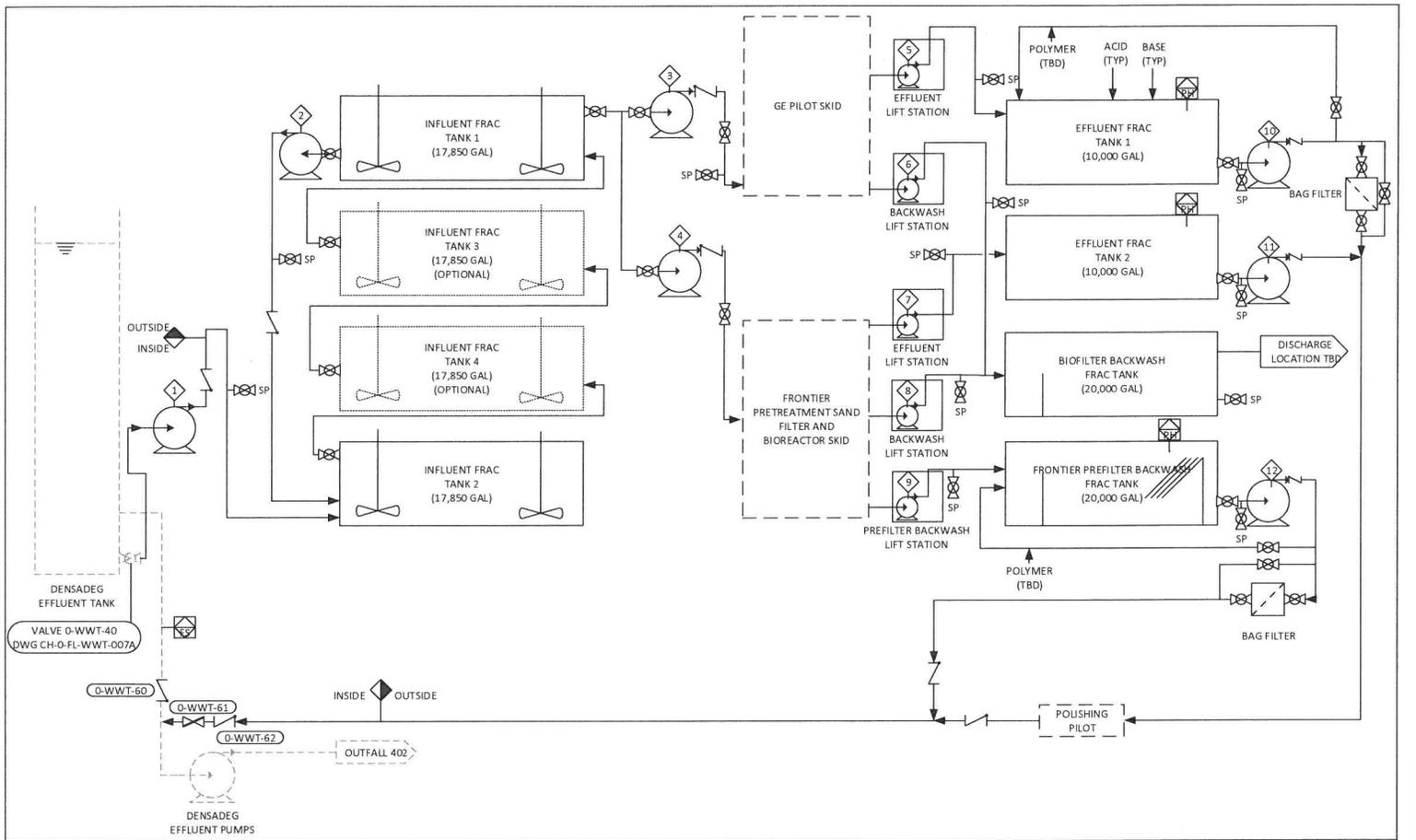
All chemicals will be stored on appropriate containment pallets with reactive chemicals isolated from one another.

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ATTACHMENT A

Process Flow Diagram and General Arrangement





DOMINION CHESTERFIELD POWER STATION
FGD WWTP PILOT

DRAWN BY: D. RIEDEL, 6/14/2017
CHECKED BY: R. RACE 6/12/2017

PFD-1
PILOT FEED AND EFFLUENT PFD

NOTES:

1. GRAVITY FLOW FROM DENSADEG EFFLUENT TANK TO FRAC TANKS IS ACHIEVABLE DOWN TO ~9 FEET ABOVE GRADE IN DENSADEG EFFLUENT TANK PUMPING REQUIRED TO DRAWDOWN FURTHER.
2. INFLUENT FRAC TANKS WILL BE DAISY CHAINED WITH RECIRCULATION FROM TANKS 2 TO 1 TO ENCOURAGE MIXED CONDITIONS.
3. FEED PUMPS WILL PROVIDE SUFFICIENT PRESSURE TO THE PILOT BATTERY LIMITS.
4. PILOT EFFLUENT AND BACKWASH LIFT STATIONS WILL BE ASSEMBLED FROM IBCS AND SUBMERSIBLE PUMPS. ALTERNATIVELY, INLINE PUMPS CONTROLLED BY FLOW SWITCHES COULD BE UTILIZED. TBD BY PILOT PROGRAM MANAGER.
5. A CONTAINMENT BERM/CURB WILL BE INSTALLED AROUND ALL TANKS AND PILOT SKIDS. THE BERM HEIGHT WILL BE SUFFICIENT TO CONTAIN 110% OF THE TOTAL INFLUENT STORAGE VOLUME.
6. EXTERIOR PIPING WILL BE INSULATED.
7. PILOT PROGRAM MANAGER RESPONSIBLE FOR BALANCE OF PLANT OUTSIDE VENDOR PILOT BATTERY LIMITS, INCLUSIVE OF WEATHER PROTECTION OVER PILOT UNITS, IF REQUIRED.
8. EFFLUENT POLISHING PILOT TO BE DETERMINED.
9. ALL TANKS DISCHARGING TO OUTFALL 402 TO BE EQUIPPED WITH PH PROBES WITH ACID AND BASE FEEDS TO ENSURE DISCHARGE PH 6-9.
10. FRONTIER PREFILTER BACKWASH AND GE EFFLUENT FRAC TANK DISCHARGES WILL BE PASSED THROUGH DUPLEX BAG FILTER SKIDS. TSS MUST BE <10 MG/L FOR DISCHARGE TO OUTFALL 402. SAMPLES FOR TSS ANALYSIS WILL BE COLLECTED FROM THE FRAC TANKS PRIOR TO DISCHARGE. IF TSS EXCEEDS 30 MG/L, TANK EFFLUENT WILL BE RECYCLED TO THE TANK INFLUENT AND POLYMER WILL BE ADDED TO IMPROVE SETTLING. IF TSS <30 MG/L, WILL DISCHARGE THROUGH DUPLEX BAG FILTERS. FRONTIER SYSTEM EFFLUENT DOES NOT NEED ADDITIONAL TREATMENT BECAUSE OF UF INCLUDED IN PILOT SYSTEM.
11. EFFLUENT RETURN PUMPS WILL ONLY OPERATE WHEN DENSADEG EFFLUENT PUMPS OPERATE. CONTROLLED BY A FLOW SWITCH INSTALLED UPSTREAM OF THE NEW CHECK VALVE ON THE DENSADEG PUMP SUCTION.
12. PILOT PROGRAM MANAGER IS RESPONSIBLE FOR COORDINATION OF ALL OPERATIONS AND DISCHARGES.
13. ANTICIPATED CHEMICALS: HCl (36%), NaOH (50%), MOLASSES, GLYCERIN, CITRIC ACID (50%), BLEACH (12.5%), POLYMER, SODIUM BISULFITE (38%),
14. PILOT SYSTEM FLOWS:

		INFLUENT	EFFLUENT	PREFILTER BW	BIOFILTER BW	UF BW
GE	FLOW	GPM	1.0-1.5	0.5-1.5	N/A	0.5-1.5
	PRESSURE	PSI	5-15	ATM	N/A	ATM
	VOLUME	GPD	2160	2160	N/A	22.5
	FREQUENCY/DURATION		CONT.	CONT.	N/A	15 MIN, 1X/MONTH
FRONTIER	FLOW	GPM	5.0-8.0	2.0-3.0	2.0-3.0	12
	PRESSURE	PSI	TBC	2.6	2.6	TBC
	VOLUME	GPD	11500	4320	4320	72
	FREQUENCY/DURATION		CONT.	CONT.	CONT.	6MIN, 1-2X PILOT

15. PUMP FLOWS, LOSSES AND HP:

PUMP NO.	DESCRIPTION	TYPE	ESTIMATED (TBC BY PILOT PM)		
			MAX FLOW (GPM)	TDH (FT)	HP
1	INFLUENT EQ FEED	CENTRIFUGAL	100	20	1
2	INFLUENT EQ RECIRCULATION	CENTRIFUGAL	100	10	0.5
3	GE PILOT FEED	CENTRIFUGAL	2	20	0.5
4	FRONTIER PILOT FEED	CENTRIFUGAL	8	20	0.5
5	GE PILOT EFFLUENT	SUBMERSIBLE	10	10	0.5
6	GE PILOT BIOFILTER BACKWASH	SUBMERSIBLE	10	10	0.5
7	FRONTIER PILOT EFFLUENT	SUBMERSIBLE	10	10	0.5
8	FRONTIER PILOT BIOFILTER BACKWA	SUBMERSIBLE	10	10	0.5
9	FRONTIER PILOT PREFILTER BACKWA	SUBMERSIBLE	10	10	0.5
10	EFFLUENT PUMP 1	CENTRIFUGAL	5	30	0.5
11	EFFLUENT PUMP 2	CENTRIFUGAL	5	30	0.5
12	PREFILTER BACKWASH EFFLUENT	CENTRIFUGAL	5	30	0.5

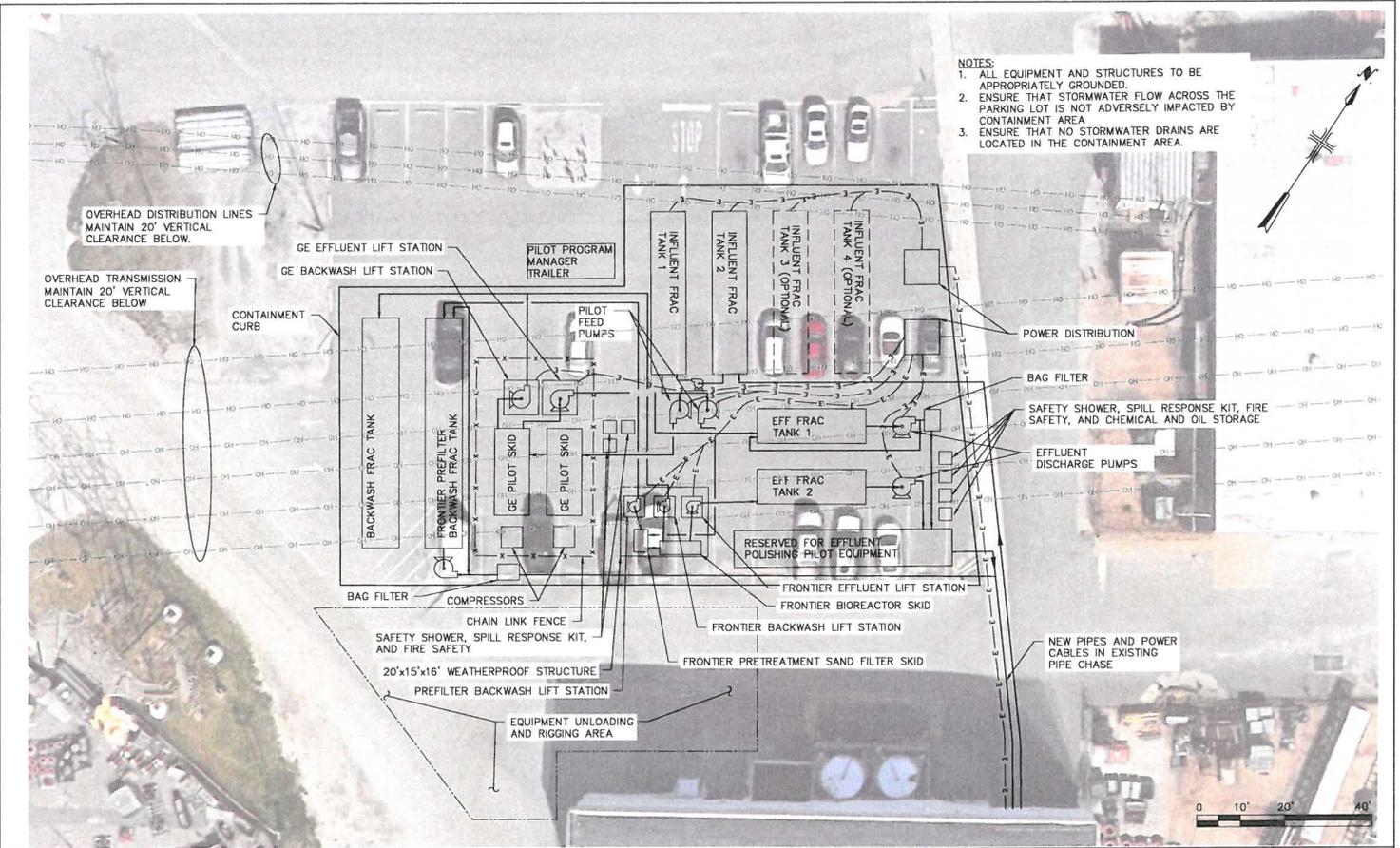


DOMINION CHESTERFIELD POWER STATION
FGD WWTP PILOT

DRAWN BY: D. RIEDEL, 6/8/2017
CHECKED BY: M. RAETZ, M. DREILING,
L. PONITZ, 6/8/2017

PFD-2
PILOT PFD NOTES

User: TOURTEL01 Spec: AUS-NCSMOD File: \\ARCAD\PROJ\4314 - DOMINION 075 - CHESTERFIELD LEACHATE TREATMENT\FIGURES\CHESTERFIELD POWER DISTRIBUTION PANEL.DWG
 Plot Date: Tourtel01_john; Scale: 1:1/2; Saved Date: 6/8/2017; Time: 09:05



- NOTES:**
1. ALL EQUIPMENT AND STRUCTURES TO BE APPROPRIATELY GROUNDED.
 2. ENSURE THAT STORMWATER FLOW ACROSS THE PARKING LOT IS NOT ADVERSELY IMPACTED BY CONTAINMENT AREA.
 3. ENSURE THAT NO STORMWATER DRAINS ARE LOCATED IN THE CONTAINMENT AREA.

ARCADIS Design & Consultancy for natural and built assets

DOMINION VIRGINIA POWER
CHESTERFIELD FGD WASTEWATER TREATMENT
 PROJECT NO. 04314075.0006

FGD WASTEWATER TREATMENT PILOT
SITE LAYOUT PLAN
 SCALE: 1" = 20'

JUNE 2017
FIG - 2

ATTACHMENT B

Pilot Tie-in Configuration



MEMO

To:

Dan Obrien
Mohamed Elmak

Copies:

Arcadis U.S., Inc.
9954 Mayland Drive
Suite 2400
Richmond
Virginia 23233
Tel 804 740 0181
Fax 804 217 8292

From:

Michael Dreiling, P.E.

Date:

June 7, 2017

Arcadis Project No.:

04314075.0006

Subject:

Pilot System Piping Modifications

This technical memorandum has been prepared to provide a high level overview of piping modifications that will be made to the existing FGD Wastewater Treatment (FGD WWT) system piping in order to accommodate water for the GE and Frontier pilot study systems.

The existing piping for the FGD WWT system is fiberglass reinforced plastic (FRP). A photograph of the existing piping arrangement is provided as Attachment 1. In order to minimize field work and system downtime, a new piping manifold will be made from 6" schedule (SCH) 80 polyvinyl chloride (PVC) piping off-site. This PVC manifold will then be brought to the site and bolted in place of the existing FRP manifold during a system shutdown.

A drawing of the new PVC manifold is provided as Attachment 2. Attachment 3 shows where modification to the FGD WWT effluent tank will be made.

Cutsheets for the fittings, check valves and ball valves shown in this sketch are provided as Attachment 4. The PVC manifold will include a new tee with 6" flanged connection for water coming from the discharge pilot systems. Wafer-style check valves will be installed on either side of this tee to eliminate flow from the pilot systems and FGD WWT system to mix.

The existing 1" PVC piping that is utilized for sampling purposes (this is the clear piping that can be seen in Attachment 1) will need to be rerouted to the 1" flanged connection on the new manifold. The routing and lengths for this piping are to be determined in the field. A 5'-0" length of 1" SCH 80 PVC piping and (2) 1" SCH 80 PVC 90 degree elbows will be sufficient to complete the reroute.



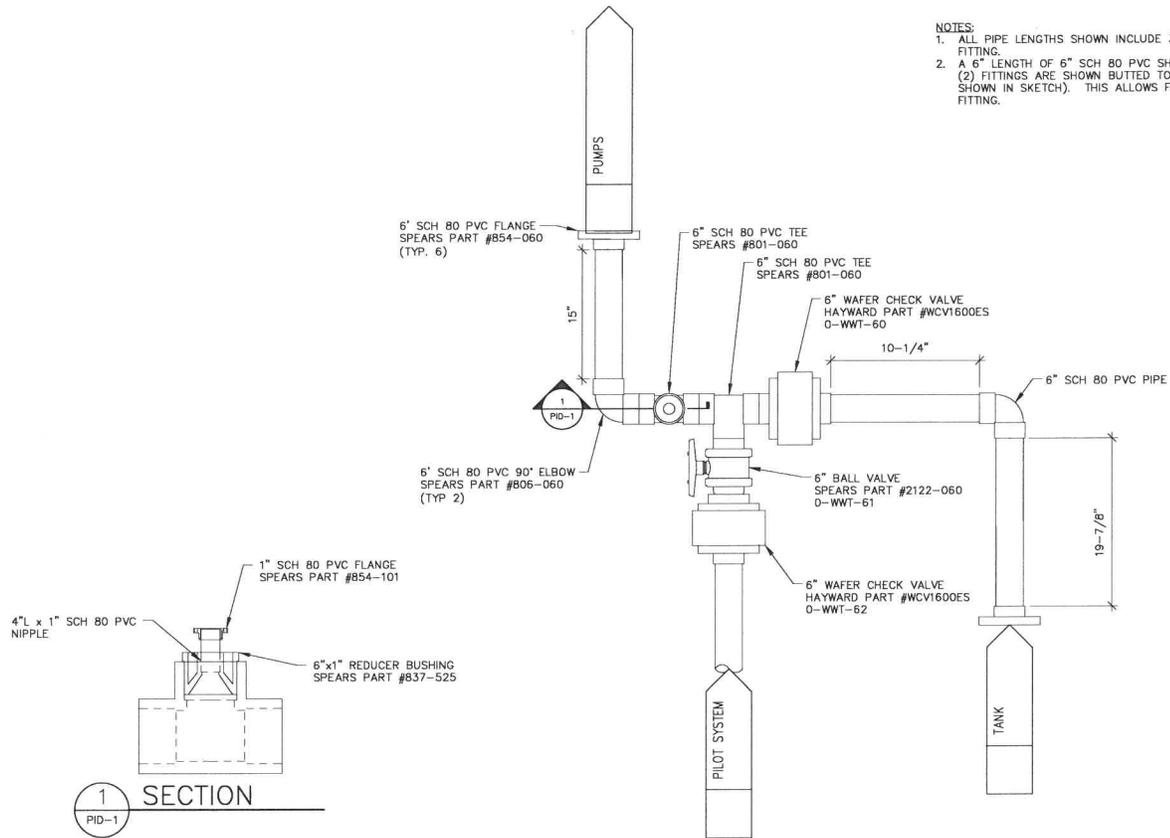
"Pumps" tie-in

"Pilot System" tie-in

"Tanks" tie-in

User: TOURTELDT Spec: AUS-NCSMOD File: \\ACAD\PROJ\4314 - DOMINION\075 - CHESTERFIELD LEACHATE TREATMENT\FIGURES\PILOT SYS PIPING MOD.DWG
 Plot Date: Tourtelot, John; Scale: 1:1; Saved Date: 6/6/2017 Time: 16:24

- NOTES:**
1. ALL PIPE LENGTHS SHOWN INCLUDE 3" FOR EMBEDMENT IN EACH FITTING.
 2. A 6" LENGTH OF 6" SCH 80 PVC SHOULD BE PLANNED FOR WHERE (2) FITTINGS ARE SHOWN BUTTED TOGETHER (I.E. NO RED LINES SHOWN IN SKETCH). THIS ALLOWS FOR 3" EMBEDMENT IN EACH FITTING.



DOMINION VIRGINIA POWER
 FGD WWTP PILOT
 PROJECT NO. 04314075.0006

PILOT SYSTEM PIPING MODIFICATIONS PLAN

SCALE: NOT TO SCALE

JUNE 2017

PID - 1

ATTACHMENT C

Pilot Testing Schedule



ID	Task Name	Duration	Start	Finish	Predecessor	2017												2018				2019																							
						Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1	"Green-Light" Pilot Procurement	303 days	Wed 3/15/17	Fri 5/11/18																																									
2	Dominion/Arcadis Finalize "Yellow-Light" to "Green-Light" List Based on Decision Matrix	0 days	Wed 3/15/17	Wed 3/15/17	◆	Dominion/Arcadis Finalize "Yellow-Light" to "Green-Light" List Based on Decision Matrix																																							
3	Dominion Issues RFP to GE, Frontier, and Other "Green-Lighted" Vendors, if applicable	0 days	Fri 3/17/17	Fri 3/17/17	◆	Dominion Issues RFP to GE, Frontier, and Other "Green-Lighted" Vendors, if applicable																																							
4	Vendors Prepare Proposal Packages	11 days	Fri 3/17/17	Fri 3/31/17	3	Vendors Prepare Proposal Packages																																							
5	Dominion/Arcadis Review Proposals	10 days	Mon 4/3/17	Fri 4/14/17	4	Dominion/Arcadis Review Proposals																																							
6	Vendors Finalize Proposals	5 days	Mon 4/17/17	Fri 4/21/17	5	Vendors Finalize Proposals																																							
7	Dominion SCM Issues P.O.	20 days	Mon 4/24/17	Fri 5/19/17	6	Dominion SCM Issues P.O.																																							
8	Prepare site for Pilot Unit	80 days	Mon 6/12/17	Fri 9/29/17	7FS	Prepare site for Pilot Unit																																							
9	Pilot Units Delivered to Site (6 month lead time)	20 days	Mon 11/6/17	Fri 12/1/17	8FS	Pilot Units Delivered to Site (6 month lead time)																																							
10	Pilot Preparation and Biological Acclimation	15 days	Mon 12/4/17	Fri 12/22/17	9	Pilot Preparation and Biological Acclimation																																							
11	Official Pilot Run Time (3 months)	70 days	Mon 12/25/17	Fri 3/30/18	10	Official Pilot Run Time (3 months)																																							
12	Develop and complete Pilot Reports	30 days	Mon 4/2/18	Fri 5/11/18	11	Develop and complete Pilot Reports																																							
13	"Yellow-Light" Pilot Procurement	681 days	Wed 3/15/17	Wed 10/23/18																																									
14	Dominion/Arcadis Finalize Bench Testing List	0 days	Wed 3/15/17	Wed 3/15/17	2	Dominion/Arcadis Finalize Bench Testing List																																							
15	Dominion Collect and Ship FGD WWTP Samples for Bench Testing (depends on unit utilization)	60 days	Wed 3/15/17	Tue 6/6/17	14	Dominion Collect and Ship FGD WWTP Samples for Bench Testing (depends on unit utilization)																																							
16	Vendors Finalize Bench Testing Results	30 days	Wed 6/7/17	Tue 7/18/17	15	Vendors Finalize Bench Testing Results																																							
17	Vendors Issue Final Bench Testing Reports	0 days	Tue 7/18/17	Tue 7/18/17	16	Vendors Issue Final Bench Testing Reports																																							
18	Dominion/Arcadis Determine Technologies to Advance to Pilot	10 days	Wed 7/19/17	Tue 8/1/17	17	Dominion/Arcadis Determine Technologies to Advance to Pilot																																							
19	Dominion Issues RFP to Vendors	0 days	Tue 8/8/17	Tue 8/8/17	18FS	Dominion Issues RFP to Vendors																																							
20	Vendors Prepare Proposal Packages	10 days	Wed 8/9/17	Tue 8/22/17	19	Vendors Prepare Proposal Packages																																							
21	Dominion/Arcadis Review Proposals	15 days	Wed 8/23/17	Fri 9/14/18	20	Dominion/Arcadis Review Proposals																																							
22	Vendors Finalize Proposals	5 days	Mon 9/17/18	Fri 9/21/18	21	Vendors Finalize Proposals																																							
23	Dominion SCM Issues P.O.	20 days	Mon 9/24/18	Fri 10/19/18	22	Dominion SCM Issues P.O.																																							
24	Pilot Units Delivered to Site for summer operation	20 days	Mon 3/11/19	Fri 4/5/19	22FS	Pilot Units Delivered to Site for summer operation																																							
25	Pilots Preparation	10 days	Mon 6/3/19	Fri 6/14/19	24FS	Pilots Preparation																																							
26	Official Pilot Run Time (3 months)	63 days	Mon 6/17/19	Wed 9/11/19	25	Official Pilot Run Time (3 months)																																							
27	Develop and complete Pilot Reports	30 days	Thu 9/12/19	Wed 10/23/19	26	Develop and complete Pilot Reports																																							
28	Review Pilot Reports and Select Technology	28 days	Thu 10/24/19	Mon 12/2/19	27	Review Pilot Reports and Select Technology																																							

Dominion Energy / Chesterfield FGD Wastewater Pilot Program Schedule

Rev 1: 3/9/17

ATTACHMENT D

Safety Data Sheets





**Dominion Chesterfield
FGD WWTP Pilot Chemical Discharge Estimates**

Prepared By: D. Riedel

Given

Outfall 302 Avg Daily Flow =	141,352	gpd
	98	gpm
Frontier Avg Pilot Effluent Flow =	2.0	gpm
Frontier Avg Prefilter Backwash Flow =	2.0	gpm
Frontier Avg UF Backwash Flow =	2.0	gpm
GE Avg Pilot Effluent Flow =	1.0	gpm
GE Avg Backwash Flow =	1.0	gpm

Assumptions

Avg Chemical Consumption in Pilots =	99%
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Frontier

Chemical	Alternative ID No.	Purpose	Dose Rate (gal/day)	Discharge (gal/day)	Density (lb/gal)	Mass Discharge (lb/day)	Pilot Effluent Conc (mg/L)	Conc at Outfall 302 (mg/L)
Glycerin (95%)	F001	Nutrient	2.90	0.0290	10.52	0.305	12.7	0.3
Sodium Bisulfite (38%)	F002	Oxidant quenching	1.90	0.0190	12.35	0.235	9.8	0.2
Sodium Hydroxide (50%)	F003	pH control	2.00	0.0200	17.78	0.356	14.8	0.3
Citric Acid (50%)	F004	UF clean	5 gal/month	0.05 gal/month	13.85	0.69 lb/month	N/A	N/A
Sodium Hypochlorite (12.5%)	F005	UF clean	5 gal/month	0.05 gal/month	9.26	0.69 lb/month	N/A	N/A
Frontier Seed Culture	F006	Biomass Seed	1.00	N/A	N/A	N/A	N/A	N/A

GE

Chemical	Alternative ID No.	Purpose	Dose Rate (gal/day)	Discharge (gal/day)	Density (lb/gal)	Mass Discharge (lb/day)	Pilot Effluent Conc (mg/L)	Conc at Outfall 302 (mg/L)
Molasses (100%)	GE001	Nutrient	0.476	0.005	11.7	0.056	4.6	0.05
Sodium Bisulfite (30%)	GE002	Oxidant quenching	0.754	0.008	12.4	0.093	7.8	0.08
Sodium Bicarbonate (5%)	GE003	Alkalinity	1.27	0.013	18.4	0.233	19.4	0.20
Sodium Hydroxide (50%)	GE004	pH control	0.5	0.005	17.8	0.089	7.4	0.08
Hydrochloric acid (32%)	GE005	pH control	0.5	0.005	12.5	0.063	5.2	0.05
Hypersperse MDC776 (100%)	GE006	Antiscalant	0.016	0.000	8.0	0.001	0.1	0.00
GE Seed Culture	GE007	Biomass Seed	1.00	N/A	N/A	N/A	N/A	N/A
Acetic Acid ¹	GE008	Nutrient	N/A	N/A	N/A	N/A	N/A	N/A
Control IS104 ¹	GE009	Oxidant quenching	N/A	N/A	N/A	N/A	N/A	N/A

Evoqua

Chemical	Alternative ID No.	Purpose	Dose Rate (gal/day)	Discharge (gal/day)	Density (lb/gal)	Mass Discharge (lb/day)	Pilot Effluent Conc (mg/L)	Conc at Outfall 302 (mg/L)
Zero Valent Iron (100%)	E001	Media	N/A	N/A	N/A	N/A	N/A	N/A
Ferrous Chloride	E002	Media Conditioning	1.91	0.019	26.4	0.504	42.0	0.43
Sodium Nitrate	E003	Media Conditioning	1.27	0.013	18.9	0.240	20.0	0.20
Hydrogen Peroxide	E004	Media Conditioning	1.88	0.020	12.1	0.240	20.0	0.20
Polyfloc AE1115 ²	E005	Polymer	0.003	0.000	8.0	0.000	0.0	0.00
Sodium Hydroxide (25%)	E006	pH control	0.5	0.005	17.8	0.089	7.4	0.08

Effluent Polishing

Chemical	Alternative ID No.	Purpose	Assumed Dose Rate (gal/day)	Discharge (gal/day)	Density (lb/gal)	Mass Discharge (lb/day)	Pilot Effluent Conc (mg/L)	Conc at Outfall 302 (mg/L)
Polyfloc AE1115 ²	E005	Solids Removal	0.5	0.005	8.9	0.045	3.7	0.04
Sodium Hydroxide (50%)	F003 or GE004	pH control	0.5	0.005	17.8	0.089	2.5	0.08
Hydrochloric acid (32%) or Sulfuric Acid (50%)	GE005 or A003	pH control	0.5	0.005	12.5	0.063	1.7	1.47

Notes

- Assumed Density
- Discharged to sludge holding tank which will be treated at end of pilot
- Consumed in pilot, no discharge

(1) Alternate nutrient source and oxidant quenching chemicals provided in case molasses and sodium bisulfite do not perform to expectation.
 (2) If needed, this polymer could also be utilized in the effluent collection tanks to help with solids polishing.

ATTACHMENT D

Safety Data Sheets



Frontier Safety Data Sheets





8 East Broadway, Suite 330
Salt Lake City, UT 84111

Mr. Dave Riedel PE
Project Engineer
Email: David.Riedel@arcadis.com
Arcadis
2101 L Street NW Suite 200
Washington, DC 20037

June 29, 2017

Dear Dave:

Per your request, Frontier Water Systems (FWS) has reviewed the chemicals listed on the 126 Priority Pollutants list. FWS will provide a pilot system to treat FGD wastewater at the Dominion Energy Chesterfield Plant. During this pilot study FWS will not be using any of the chemicals listed on the 126 Priority Pollutants.

If you have any further questions, please do not hesitate to contact me immediately.

Regards,

A handwritten signature in black ink that reads "Tim Pickett".

Tim Pickett
8 East Broadway, Suite 330
Salt Lake City, UT 84111
Email: timpickett@frontierwater.com
Phone: 858-822-9399

SAFETY DATA SHEET

Creation Date 07-Jan-2010

Revision Date 24-May-2017

Revision Number 7

1. Identification

Product Name Glycerol

Cat No. : G30-4; G30-20; G30-200; G31-1; G31-4; G31-20; G31-200; G31-500; G33-1; G33-4; G33-20; G33-200; G33-500; G37-4; G37-20; G153-1; G153-4: XXG153ET4LI

Synonyms Glycerin; 1,2,3-Propanetriol (USP/FCC/EP/BP/JP/Spectranalyzed/Certified ACS)

Recommended Use Laboratory chemicals.

Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) Identification

Classification

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Based on available data, the classification criteria are not met

Label Elements

None required

Hazards not otherwise classified (HNOC)

None identified

3. Composition / Information on Ingredients

Component	CAS-No	Weight %
Glycerin	56-81-5	>95

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention if irritation persists.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.
Inhalation	Move to fresh air. Get medical attention immediately if symptoms occur.
Ingestion	Do not induce vomiting. Drink plenty of water. Get medical attention if symptoms occur.
Most important symptoms/effects Notes to Physician	None reasonably foreseeable. Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable Extinguishing Media	No information available
Flash Point	160 °C / 320 °F
Method -	No information available
Autoignition Temperature	400 °C / 752 °F
Explosion Limits	
Upper	No data available
Lower	1.1 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Thermal decomposition can lead to release of irritating gases and vapors

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	1	1	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal.

7. Handling and storage

Handling	Wear personal protective equipment. Ensure adequate ventilation. Avoid contact with skin,
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eyes and clothing. Avoid ingestion and inhalation.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. To maintain product quality, do not store in heat or direct sunlight. Protect from moisture. Do not freeze.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Glycerin		(Vacated) TWA: 10 mg/m ³ (Vacated) TWA: 5 mg/m ³ TWA: 15 mg/m ³ TWA: 5 mg/m ³		TWA: 10 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment**Eye/face Protection**

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 and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

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.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Very viscous Liquid
Appearance	Clear
Odor	Slight
Odor Threshold	No information available
pH	5 - 100 g/L aq.sol
Melting Point/Range	18 °C / 64.4 °F
Boiling Point/Range	290 °C / 554 °F
Flash Point	160 °C / 320 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	1.1 vol %
Vapor Pressure	0.003 mbar @ 50 °C
Vapor Density	3.17
Specific Gravity	1.261
Solubility	Miscible with water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	400 °C / 752 °F
Decomposition Temperature	> 290°C
Viscosity	1069 mPa.s at 20 °C
Molecular Formula	C3 H8 O3

Molecular Weight 92.09

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Hygroscopic.
Conditions to Avoid	Incompatible products. Excess heat.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological Information

Acute Toxicity

Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Glycerin	LD50 = 12600 mg/kg (Rat)	LD50 > 10 g/kg (Rabbit)	LC50 > 570 mg/m ³ (Rat) 1 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Glycerin	56-81-5	Not listed				

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological Information

Ecotoxicity

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Glycerin	Not listed	LC50: 51 - 57 mL/L, 96h static (Oncorhynchus mykiss)	Not listed	EC50: > 500 mg/L, 24h (Daphnia magna)

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Glycerin	-1.76

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport Information

<u>DOT</u>	Not regulated
<u>TDG</u>	Not regulated
<u>IATA</u>	Not regulated
<u>IMDG/IMO</u>	Not regulated

15. Regulatory Information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Glycerin	X	X	-	200-289-5	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories

Acute Health Hazard	No
Chronic Health Hazard	No

Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals

**U.S. State Right-to-Know
Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Glycerin	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade Slight risk, Grade 1

16. Other Information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 07-Jan-2010
Revision Date 24-May-2017
Print Date 24-May-2017

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). SDS sections updated. 2. 7. 10.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

SODIUM BISULFITE SOLUTION 40% F.G.

Product ID: SO004000

Revised: 04-16-2014

Replaces: 06-06-2012

1. IDENTIFICATION

Product Name: SODIUM BISULFITE SOLUTION 40% F.G.
Synonyms: Sodium Acid Sulfit; Sodium hydrogen Sulfit
CAS Number: MIXTURE
Recommended Use: No data available.
Restrictions on Use: No data available.

Hydrite Chemical Co.
 300 N. Patrick Blvd.
 Brookfield, WI 53008-0948
 (262) 792-1450

EMERGENCY RESPONSE NUMBERS:
 24 Hour Emergency #: (414) 277-1311
 CHEMTREC Emergency #: (800) 424-9300

2. HAZARD(S) IDENTIFICATION



Signal Word: Danger

GHS Classification: Substance or mixture corrosive to metals Category 1
 Respiratory Sensitisation Category 1
 Skin Sensitisation Category 1
 Skin Corrosion/Irritation Category 2
 Serious Eye Damage/Eye Irritation Category 2A

Hazard Statements: May be corrosive to metals.
 Causes skin irritation.
 May cause an allergic skin reaction.
 Causes serious eye irritation.
 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary Statements:

Prevention: Keep only in original container.
 Avoid breathing dust, gas, mist, vapors or spray.
 Wash thoroughly after handling.
 Contaminated work clothing should not be allowed out of the workplace.
 Wear gloves, eye and face protection and protective clothing.
 In case of inadequate ventilation wear respiratory protection.

Response: IF ON SKIN: Wash with plenty of soap and water.
 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 Specific treatment (see First Aid on SDS or on this label).
 If skin irritation or rash occurs: Get medical advice or attention.
 If eye irritation persists: Get medical advice or attention.

SODIUM BISULFITE SOLUTION 40% F.G.

Product ID: SO004000

If experiencing respiratory symptoms: Call a POISON CENTER or doctor.
Take off contaminated clothing and wash before reuse.
Absorb spillage to prevent material damage.

Storage: Store in corrosive resistant container with a resistant inner liner.

Disposal: Dispose of in accordance with local, regional and international regulations.

Hazards Not Otherwise Classified: None known.

Percentage of Components with Unknown Acute Toxicity:

Dermal: 40.0 %

Inhalation Vapor: 40.0 %

Inhalation Dust/Mist: 40.0 %

3. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Component</u>	<u>CAS Number</u>	<u>% by Wt.</u>
Sodium Bisulfite	7631-90-5	40 %

4. FIRST-AID MEASURES

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids open. Tilt head to avoid contaminating unaffected eye. Get immediate medical attention.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Do not reuse clothing and shoes until cleaned. Wipe off excess. Discard footwear which cannot be decontaminated.

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. GET MEDICAL ATTENTION IMMEDIATELY.

Ingestion: If swallowed, call a physician immediately. DO NOT induce vomiting unless directed to do so by a physician. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Give water or milk to dilute. If vomiting occurs spontaneously, keep airway clear and give more water.

Note to Physicians:

The decision of whether to induce vomiting or not should be made by a physician.

Most Important Symptoms/Effects:

Eye Contact: May be corrosive to the eyes. Severe irritation and burns may result. Liquid or mist may cause: discomfort, tearing, redness, pain, blurred vision. If left untreated, may cause: burns, corneal damage, blindness.

Skin Contact: May be corrosive to the skin. Severe irritation and burns may result. Contact may cause: discomfort, rash, redness, swelling, scaling, blistering, allergic reaction in some individuals. Effects may be delayed.

Skin Absorption: No data available.

Inhalation: May be corrosive to the respiratory tract. Severe irritation and burns may result. May irritate or damage: nose, throat, mucous membranes, respiratory tract. May cause: coughing, shortness of breath, allergic reaction in some individuals. Effects may be delayed.

Ingestion: May be corrosive to the gastrointestinal tract. Severe irritation and burns may result. Large amounts may cause: nausea, stomach upset, vomiting, diarrhea, abdominal pain, central nervous system depression, violent colic, death. May cause an allergic reaction in some individuals. Effects may be delayed. Estimated fatal dose for Sodium Bisulfite is 10 grams.

5. FIRE-FIGHTING MEASURES

SODIUM BISULFITE SOLUTION 40% F.G.

Product ID: SO004000

Extinguishing Media: For fires in area use appropriate media. For example: Water spray. Dry chemical. Carbon dioxide. Foam.

Fire Fighting Methods: Evacuate area of unprotected personnel. Wear protective clothing including NIOSH-Approved self-contained breathing apparatus. Remain upwind of fire to avoid hazardous vapors and decomposition products. Cool containers that are exposed to flame with streams of water until fire is out. Do not use solid water streams near ruptured tanks or spills. Neutralize runoff with lime, soda ash or other suitable neutralizing agents. Run-off from fire control may cause pollution.

Fire and Explosion Hazards: Toxic fumes, gases or vapors may evolve on burning.

Hazardous Combustion Products: Toxic vapors. Sulfur oxides. Sulfur dioxide. Metal oxides. Sodium sulfide may be formed after dried solution residues are heated. This is an explosive hazard and strongly alkaline in contact with water.

6. ACCIDENTAL RELEASE MEASURES

Spill Clean-Up Procedures: CORROSIVE MATERIAL. Evacuate unprotected personnel from area. Maintain adequate ventilation. Follow personal protective equipment recommendations found in Section 8. Never exceed any occupational exposure limit. Eliminate all sources of ignition. Shut off source of leak if safe to do so. Contain spill, place into drums for proper disposal. Neutralize with an alkali (sodium carbonate, lime, etc.) Sulfur dioxide and carbon dioxide may be released during neutralization. Flush remaining area with water to remove trace residue and dispose of properly. Avoid direct discharge to sewers and surface waters. Notify authorities if entry occurs.

7. HANDLING AND STORAGE

Handling: Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Do not swallow. Avoid breathing vapors, mists, or dust. Do not eat, drink, or smoke in work area. Wash thoroughly after handling. Empty containers retain product residues; observe all warnings and precautions listed for the product. Do not handle near an open flame, heat, or other sources of ignition.

Storage: CORROSIVE MATERIAL. Store in a cool, well ventilated area, out of direct sunlight. Store in a dry location away from heat. Keep away from incompatible materials. Keep containers tightly closed. Do not store in unlabeled or mislabeled containers. Store away from all sources of heat and ignition to prevent decomposition and release of sulfur dioxide gas. Do not freeze. Store above 50 F to avoid crystallization. Protect containers against physical damage. Tanks should be vented into an alkaline fume recovery system or scrubber. Storage tanks should be protected from water ingress, and maintained structurally in a safe and reliable condition. Store in corrosion-resistant container. See Section 10 for incompatible materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OSHA Exposure Guidelines:

<u>Component</u>	<u>Limits</u>
No components found.	

ACGIH Exposure Guidelines:

<u>Component</u>	<u>Limits</u>
Sodium Bisulfite	5 mg/m ³ TWA

Note:

Sulfur Dioxide gas may be released. The Exposure Limits for Sulfur Dioxide are: 5 ppm-TWA (OSHA); 2 ppm-TWA, 5 ppm-STEL (ACGIH)(Vacated 1989 OSHA PELs).

Engineering Controls: Local exhaust ventilation, process enclosures, or other engineering controls are imperative when handling or using this product to avoid overexposure. Maintain adequate ventilation. Do not use in closed or confined spaces. Avoid creating dust or mist. Keep levels below exposure limits. To determine exposure levels, monitoring should be performed regularly.

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Product ID: SO004000

Eye/Face Protection: Wear chemical safety goggles and a full face shield while handling this product. Do not wear contact lenses.

Skin Protection: Prevent contact with this product. Wear gloves and protective clothing depending on condition of use. Protective gloves: Impervious. Neoprene. Rubber. Polyvinyl chloride.

Respiratory Protection: Respiratory protection must be worn when handling this product. If exposure limits are exceeded, wear: NIOSH-Approved respirator for dusts, mists, and/or SO₂ vapors as conditions indicate. NIOSH-Approved air-purifying respirator with: Acid gas cartridge. NIOSH-Approved self-contained breathing apparatus. NIOSH-Approved positive pressure supplied air respirator. DO NOT exceed limits established by the respirator manufacturer. All respiratory protection programs must comply with OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements and must be followed whenever workplace conditions require a respirator's use.

Other Protective Equipment: Eye-wash station. Safety shower. Rubber apron. Chemical safety shoes. Rubber boots. Full body suit. Protective clothing.

General Hygiene Conditions: Wash with soap and water before meal times and at the end of each work shift. Good manufacturing practices require gross amounts of any chemical be removed from skin as soon as practical, especially before eating or smoking.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid.

Color: Clear. Yellow.

Odor: Sulfur dioxide odor.

Odor Threshold: N.D.

pH: 4.00 (as is)

Freezing Point (deg. F): 45

Melting Point (deg. F): N.D.

Initial Boiling Point or Boiling Range: ~ 220 °F

Flash Point: NOT COMBUSTIBLE.

Flash Point Method: N.A.

Evaporation Rate (nBuAc = 1): N.D.

Flammability (solid, gas): N.D.

Lower Explosion Limit: N.A.

Upper Explosion Limit: N.A.

Vapor Pressure (mm Hg): ~9@20C (SO₂)

Vapor Density (air=1): N.D.

Specific Gravity or Relative Density: 1.33 @ 25C

Solubility in Water: Complete

Partition Coefficient (n-octanol/water): N.D.

Autoignition Temperature: No Data

Decomposition Temperature: N.D.

Viscosity: ~ 3 cP @ 30 C; ~ 4.5 cP @ 15.6 C

% Volatile (wt%): N.D.

VOC (wt%): N.D.

VOC (lbs/gal): N.D.

Fire Point: N.D.

10. STABILITY AND REACTIVITY

Reactivity: No data available.

Chemical Stability: Stable under normal conditions.

Possibility of Hazardous Reactions: Hazardous polymerization will not occur under normal conditions.

Oxidizing agents may cause exothermic reactions. Both acidification and heating accelerate the release of Sulfur dioxide fumes.

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Conditions to Avoid: Avoid contact with heat, sparks, electric arcs, other hot surfaces, and open flames. Avoid other ignition sources. Temperatures at or near boiling point causes evolution of Sulfur dioxide. Avoid excess exposure to air. On exposure to air, the product will lose some Sulfur dioxide and gradually oxidize to sulfate.

Incompatible Materials: Acids. Mineral acids. Oxidizing agents. Corrosive to some metals.

Hazardous Decomposition Products: Sulfur dioxide gas. Sulfur oxides. Toxic vapors.

11. TOXICOLOGICAL INFORMATION

<u>Component</u>	<u>Oral LD50</u>	<u>Dermal LD50</u>	<u>Inhalation LC50</u>
Sodium Bisulfite	Rat: 1420 mg/kg	No Data	No Data

Acute Toxicity Estimate (ATE):

Oral: 3,550 mg/kg

Routes of Exposure: Eyes. Skin. Inhalation. Ingestion.

Eye Contact: May be corrosive to the eyes. Severe irritation and burns may result. Liquid or mist may cause: discomfort. tearing. redness. pain. blurred vision. If left untreated, may cause: burns. corneal damage. blindness.

Skin Contact: May be corrosive to the skin. Severe irritation and burns may result. Contact may cause: discomfort. rash. redness. swelling. scaling. blistering. allergic reaction in some individuals. Effects may be delayed.

Skin Absorption: No data available.

Inhalation: May be corrosive to the respiratory tract. Severe irritation and burns may result. May irritate or damage: nose. throat. mucous membranes. respiratory tract. May cause: coughing. shortness of breath. allergic reaction in some individuals. Effects may be delayed.

Ingestion: May be corrosive to the gastrointestinal tract. Severe irritation and burns may result. Large amounts may cause: nausea. stomach upset. vomiting. diarrhea. abdominal pain. central nervous system depression. violent colic. death. May cause an allergic reaction in some individuals. Effects may be delayed. Estimated fatal dose for Sodium Bisulfite is 10 grams.

Medical Conditions Aggravated by Exposure to Product: Asthma. Lung disorders. Some individuals are said to be dangerously sensitive to minute amounts of sulfites in foods. Symptoms may include broncho constriction, shock, gastrointestinal disturbances, angio edema, flushing, and tingling sensations. Once allergy develops, future exposures can cause asthma attacks with shortness of breath, wheezing, and cough.

Other: May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals. The potential for exposure to sulfur dioxide must always be considered as well, particularly when the solution may become overheated. SULFUR DIOXIDE GIVEN OFF BY THIS PRODUCT HAS BEEN SHOWN TO CAUSE BREATHING DIFFICULTIES IN ASTHMATICS.

Cancer Information:

This product does not contain 0.1% or more of the known or potential carcinogens listed in NTP, IARC, or OSHA.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information: Sodium Bisulfite Solution: LC50 Mosquito Fish (96 hours): 240 ppm

Chemical Fate Information: Products of Biodegradation: Sulfur oxides (SO2, SO3). Some metallic oxides. The products of degradation are toxic.

13. DISPOSAL CONSIDERATIONS

Hazardous Waste Number: N.A.

Disposal Method: Dispose of in accordance with all local, state and federal regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. Since emptied containers retain product residue, follow label warnings even after container is

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Product ID: SO004000

emptied. The information offered here is for the product as shipped. Use and/or alteration to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

DOT (Department of Transportation):

Identification Number: UN2693
Proper Shipping Name: Bisulfites, Aqueous Solutions, N.O.S. (Contains Sodium Bisulfite)
Hazard Class: 8
Packing Group: III
Label Required: CORROSIVE
Reportable Quantity (RQ): 5000# (Sodium Bisulfite)

15. REGULATORY INFORMATION

TSCA Inventory Status: This product or all components of this product are listed on the EPA/TSCA Inventory of Chemical Substances.

SARA Title III Section 311/312 Category Hazards:

<u>Immediate (Acute)</u> Yes	<u>Delayed (Chronic)</u> No	<u>Fire Hazard</u> No	<u>Pressure Release</u> No	<u>Reactive</u> No			
<u>Regulated Components:</u>	<u>CAS</u>	<u>CERCLA</u>	<u>SARA</u>	<u>SARA</u>	<u>U.S.</u>	<u>WI</u>	<u>Prop</u>
<u>Component</u>	<u>Number</u>	<u>RQ</u>	<u>EHS</u>	<u>313</u>	<u>HAP</u>	<u>HAP</u>	<u>65</u>
Sodium Bisulfite	7631-90-5	Yes	No	No	No	Yes	No

***Prop 65 - May Contain the Following Trace Components:**

Sulfur Dioxide.

Clean Water Act:

This product contains one or more components designated as hazardous substances or toxic pollutants pursuant to the Federal Clean Water Act (40 CFR 116.4 Table A; 40 CFR 401.15). Any unpermitted introduction of this product into a facility stormwater or wastewater discharge may constitute a violation of the Clean Water Act. Facilities must notify the appropriate permitting agency prior to introducing this product into the aforementioned discharges.

16. OTHER INFORMATION

Hazard Rating System

Health: 2
Flammability: 0
Reactivity: 0
* = Chronic Health Hazard

NFPA Rating System

Health: 2
Flammability: 0
Reactivity: 0
Special Hazard: None

MSDS Abbreviations

N.A. = Not Applicable
N.D. = Not Determined
HAP = Hazardous Air Pollutant
VOC = Volatile Organic Compound
C = Ceiling Limit
N.E./Not Estab. = Not Established

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Product ID: SO004000

MSDS Prepared by: JB

Reason for Revision: New format. Changes made throughout the MSDS.

Revised: 04-16-2014

Replaces: 06-06-2012

The data in this Material Safety Data Sheet relates to the specific material designated and does not relate to its use in combination with any other material or process. The data contained is believed to be correct. However, since conditions of use are outside our control it should not be taken as warranty or representation for which HYDRITE CHEMICAL CO. assumes legal responsibility. This information is provided solely for your consideration, investigation, and verification.

Safety Data Sheet

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Date of issue: 10/16/2013

Revision date: 02/07/2017

Supersedes: 10/16/2013

Version: 1.1

SECTION 1: Identification

1.1. Identification

Product form : Mixtures
 Product name : Sodium Hydroxide, 50% w/w
 CAS No : 1310-73-2
 Product code : LC24150
 Formula : NaOH
 Synonyms : caustic soda 50% WW / soda lye, 50%, aqueous solution / white caustic, 50%, aqueous solution

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

Use of the substance/mixture : Industrial use
 Recommended use : Laboratory chemicals
 Restrictions on use : Not for food, drug or household use

1.3. Details of the supplier of the safety data sheet

LabChem Inc
 Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
 Zellenople, PA 16063 - USA
 T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin corrosion/irritation, Category 1B H314
 Serious eye damage/eye irritation, Category 1 H318
 Hazardous to the aquatic environment — Acute Hazard, Category 3 H402
 Full text of H statements : see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS05

Signal word (GHS-US) : Danger
 Hazard statements (GHS-US) : H314 - Causes severe skin burns and eye damage
 H402 - Harmful to aquatic life
 Precautionary statements (GHS-US) : P260 - Do not breathe mist, vapours, spray
 P264 - Wash exposed skin thoroughly after handling
 P273 - Avoid release to the environment
 P280 - Wear protective gloves, protective clothing, eye protection, face protection
 P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
 P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
 P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
 P310 - Immediately call a POISON CENTER or doctor/physician
 P363 - Wash contaminated clothing before reuse
 P405 - Store locked up
 P501 - Dispose of contents/container to comply with local, state and federal regulations
 If inhaled: Remove person to fresh air and keep comfortable for breathing

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2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	GHS-US classification
Sodium Hydroxide	(CAS No) 1310-73-2	50	Acute Tox. 4 (Dermal), H312 Skin Corr. 1A, H314 Eye Dam. 1, H318 Aquatic Acute 3, H402
Water	(CAS No) 7732-18-5	50	Not classified

Full text of hazard classes and H-statements : see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general

: Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital. Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid measures after inhalation

: Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.

First-aid measures after skin contact

: Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a POISON CENTER or doctor/physician.

First-aid measures after eye contact

: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.

First-aid measures after ingestion

: Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Do not induce vomiting. Do not give activated charcoal. Do not give chemical antidote. Immediately consult a doctor/medical service. Call Poison Information Centre (www.big.be/antigif.htm). Take the container/vomit to the doctor/hospital. Ingestion of large quantities: immediately to hospital. Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/physician.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries

: Causes severe skin burns and eye damage.

Symptoms/injuries after inhalation

: EXPOSURE TO HIGH CONCENTRATIONS: Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of lung oedema. Respiratory difficulties.

Symptoms/injuries after skin contact

: Caustic burns/corrosion of the skin. Slow-healing wounds.

Symptoms/injuries after eye contact

: Corrosion of the eye tissue. Permanent eye damage. Causes serious eye damage.

Symptoms/injuries after ingestion

: Vomiting. Diarrhoea. Burns to the gastric/intestinal mucosa. Possible esophageal perforation. Bleeding of the gastrointestinal tract. Shock. AFTER ABSORPTION OF HIGH QUANTITIES: Disturbances of consciousness.

Chronic symptoms

: ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Dry skin. Skin rash/inflammation. Possible inflammation of the respiratory tract.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

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SECTION 5: Fire-fighting measures

5.1. Extinguishing media

- Suitable extinguishing media : EXTINGUISHING MEDIA FOR SURROUNDING FIRES: Adapt extinguishing media to the environment. Foam. Dry powder. Carbon dioxide. Water spray. Sand.
- Unsuitable extinguishing media : Solid water jet ineffective as extinguishing medium.

5.2. Special hazards arising from the substance or mixture

- Fire hazard : DIRECT FIRE HAZARD. Non combustible. INDIRECT FIRE HAZARD. Reactions involving a fire hazard: see "Reactivity Hazard".
- Explosion hazard : INDIRECT EXPLOSION HAZARD. Reactions with explosion hazards: see "Reactivity Hazard".
- Reactivity : Violent exothermic reaction with water (moisture): (increased) risk of fire. On heating: release of corrosive gases/vapours. Absorbs the atmospheric CO₂. Violent exothermic reaction with (some) acids. May be corrosive to metals. Reacts with (some) metals: release of highly flammable gases/vapours (hydrogen).

5.3. Advice for firefighters

- Precautionary measures fire : Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to fire/heat: have neighbourhood close doors and windows.
- Firefighting instructions : Cool tanks/drums with water spray/remove them into safety. Dilute toxic gases with water spray. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.
- Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment : Gloves. Face-shield. Corrosion-proof suit. Large spills/in enclosed spaces: compressed air apparatus. Large spills/in enclosed spaces: gas-tight suit. See "Material-Handling" to select protective clothing.
- Emergency procedures : Mark the danger area. No naked flames. Wash contaminated clothes. Large spills/in confined spaces: consider evacuation. In case of hazardous reactions: keep upwind. In case of reactivity hazard: consider evacuation.

6.1.2. For emergency responders

- Protective equipment : Equip cleanup crew with proper protection.
- Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers. Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

- For containment : Contain released substance, pump into suitable containers. Consult "Material-handling" to select material of containers. Plug the leak, cut off the supply. Dam up the liquid spill. Hazardous reaction: measure explosive gas-air mixture. Reaction: dilute combustible gas/vapour with water curtain. Heat exposure: dilute toxic gas/vapour with water spray. Take account of toxic/corrosive precipitation water.
- Methods for cleaning up : Take up liquid spill into absorbent material, e.g.: sand, saw dust, kieselguhr. Scoop absorbed substance into closing containers. See "Material-handling" for suitable container materials. Carefully collect the spill/leftovers. Small quantities of liquid spill: neutralize with acid solution. Wash away neutralized product with plentiful water. Damaged/cooled tanks must be emptied. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

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SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle and open the container with care. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Keep away from naked flames/heat. Observe very strict hygiene - avoid contact. Keep container tightly closed. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.
- Hygiene measures : Wash exposed skin thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Comply with applicable regulations.
- Storage conditions : Keep only in the original container in a cool, well ventilated place away from : incompatible materials. Keep container closed when not in use.
- Incompatible products : Strong bases. Strong acids.
- Incompatible materials : Sources of ignition. Direct sunlight.
- Storage temperature : > 15 °C
- Heat and ignition sources : KEEP SUBSTANCE AWAY FROM: heat sources.
- Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: combustible materials. (strong) acids. metals.
- Storage area : Store in a dry area. Keep container in a well-ventilated place. Keep locked up. Protect against frost. Provide for a tub to collect spills. Unauthorized persons are not admitted. Meet the legal requirements.
- Special rules on packaging : SPECIAL REQUIREMENTS: hermetical. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.
- Packaging materials : SUITABLE MATERIAL: stainless steel. nickel. polyethylene. polypropylene. glass. stoneware/porcelain. MATERIAL TO AVOID: lead. aluminium. copper. tin. zinc. bronze.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sodium Hydroxide, 50% w/w (1310-73-2)		
OSHA	OSHA PEL (TWA) (mg/m ³)	2 mg/m ³
IDLH	US IDLH (mg/m ³)	10 mg/m ³
NIOSH	NIOSH REL (ceiling) (mg/m ³)	2 mg/m ³
Sodium Hydroxide (1310-73-2)		
ACGIH	ACGIH Ceiling (mg/m ³)	2 mg/m ³ (Sodium hydroxide; USA; Momentary value; TLV - Adopted Value)
OSHA	OSHA PEL (TWA) (mg/m ³)	2 mg/m ³
IDLH	US IDLH (mg/m ³)	10 mg/m ³
NIOSH	NIOSH REL (ceiling) (mg/m ³)	2 mg/m ³
Water (7732-18-5)		
Not applicable		

8.2. Exposure controls

- Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation.
- Personal protective equipment : Protective goggles. Gloves. Protective clothing. Face shield.



- Materials for protective clothing : GIVE EXCELLENT RESISTANCE: nitrile rubber. GIVE GOOD RESISTANCE: No data available. GIVE LESS RESISTANCE: chlorinated polyethylene. styrene-butadiene rubber. nitrile rubber/PVC. GIVE POOR RESISTANCE: PVA. natural fibres.
- Hand protection : Wear protective gloves.

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Eye protection	: Chemical goggles or face shield. Face shield.
Skin and body protection	: Corrosion-proof clothing.
Respiratory protection	: Wear gas mask with filter type B if conc. in air > exposure limit.
Other information	: Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Liquid.
Colour	: Colourless
Odour	: Odourless
Odour threshold	: No data available
pH	: 14 (8 %)
pH solution	: 8 %
Melting point	: 12 °C
Freezing point	: No data available
Boiling point	: 143 °C
Flash point	: Not applicable
Relative evaporation rate (butylacetate=1)	: No data available
Flammability (solid, gas)	: Non flammable.
Vapour pressure	: 1.2 hPa (20 °C)
Relative vapour density at 20 °C	: No data available
Relative density	: 1.5
Density	: 1525 kg/m ³
Molecular mass	: 40 g/mol
Solubility	: Exothermically soluble in water. Soluble in ethanol. Soluble in methanol. Soluble in glycerol. Water: Complete
Log Pow	: No data available
Auto-ignition temperature	: Not applicable
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: 79 mPa.s (20 °C)
Explosive limits	: No data available
Explosive properties	: Not applicable.
Oxidising properties	: None.

9.2. Other information

Minimum ignition energy	: Not applicable
VOC content	: Not applicable (inorganic)
Other properties	: Clear. Hygroscopic. Slightly volatile. Substance has basic reaction.

SECTION 10: Stability and reactivity

10.1. Reactivity

Violent exothermic reaction with water (moisture): (increased) risk of fire. On heating: release of corrosive gases/vapours. Absorbs the atmospheric CO₂. Violent exothermic reaction with (some) acids. May be corrosive to metals. Reacts with (some) metals: release of highly flammable gases/vapours (hydrogen).

10.2. Chemical stability

Stable under normal conditions. Absorbs the atmospheric CO₂. Hygroscopic. Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Strong acids. metals.

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10.6. Hazardous decomposition products

Sodium oxide. Thermal decomposition generates : Corrosive vapours.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure : Skin and eyes contact
 Acute toxicity : Not classified

Sodium Hydroxide (1310-73-2)	
ATE US (dermal)	1350.000 mg/kg bodyweight
Water (7732-18-5)	
LD50 oral rat	≥ 90000 mg/kg
ATE US (oral)	90000.000 mg/kg bodyweight

Skin corrosion/irritation : Causes severe skin burns and eye damage.
 pH: 14 (8 %)

Serious eye damage/irritation : Causes serious eye damage.
 pH: 14 (8 %)

Respiratory or skin sensitisation : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified
 Based on available data, the classification criteria are not met

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified

Potential adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of lung oedema. Respiratory difficulties.

Symptoms/injuries after skin contact : Caustic burns/corrosion of the skin. Slow-healing wounds.

Symptoms/injuries after eye contact : Corrosion of the eye tissue. Permanent eye damage. Causes serious eye damage.

Symptoms/injuries after ingestion : Vomiting. Diarrhoea. Burns to the gastric/intestinal mucosa. Possible esophageal perforation. Bleeding of the gastrointestinal tract. Shock. AFTER ABSORPTION OF HIGH QUANTITIES: Disturbances of consciousness.

Chronic symptoms : ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Dry skin. Skin rash/inflammation. Possible inflammation of the respiratory tract.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.

Ecology - air : Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009). None of the known components is included in the list of fluorinated greenhouse gases (Regulation (EC) No 842/2006).

Ecology - water : Ground water pollutant. Maximum concentration in drinking water: 200 mg/l (sodium) (Directive 98/83/EC). Harmful to fishes. Harmful to invertebrates (Daphnia). pH shift.

Sodium Hydroxide (1310-73-2)	
LC50 fish 1	45.4 mg/l (LC50; Other; 96 h; Salmo gairdneri; Static system; Fresh water; Experimental value)

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12.2. Persistence and degradability

Sodium Hydroxide, 50% w/w (1310-73-2)	
Persistence and degradability	Biodegradability: not applicable. No (test) data on mobility of the components available.
Sodium Hydroxide (1310-73-2)	
Persistence and degradability	Biodegradability: not applicable. No (test) data on mobility of the substance available.
Biochemical oxygen demand (BOD)	Not applicable
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
Water (7732-18-5)	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

Sodium Hydroxide, 50% w/w (1310-73-2)	
Bioaccumulative potential	Does not contain bioaccumulative component(s).
Sodium Hydroxide (1310-73-2)	
Bioaccumulative potential	No bioaccumulation data available.
Water (7732-18-5)	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on the global warming	: No known effects from this product.
GWPmix comment	: No known effects from this product.
Other information	: Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations	: Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove for physico-chemical/biological treatment. Do not discharge into drains or the environment.
Additional information	: LWCA (the Netherlands): KGA category 05. Hazardous waste according to Directive 2008/98/EC.
Ecology - waste materials	: Avoid release to the environment.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT	
Transport document description	: UN1824 Sodium hydroxide solution, 8, II
UN-No.(DOT)	: UN1824
Proper Shipping Name (DOT)	: Sodium hydroxide solution
Transport hazard class(es) (DOT)	: 8 - Class 8 - Corrosive material 49 CFR 173.136
Packing group (DOT)	: II - Medium Danger
Hazard labels (DOT)	: 8 - Corrosive



Sodium Hydroxide, 50% w/w

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

DOT Packaging Non Bulk (49 CFR 173.xxx)	: 202
DOT Packaging Bulk (49 CFR 173.xxx)	: 242
DOT Special Provisions (49 CFR 172.102)	: B2 - MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 and DOT 406 cargo tanks are not authorized. IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized. N34 - Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material. T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3) TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.
DOT Packaging Exceptions (49 CFR 173.xxx)	: 154
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: 1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: 30 L
DOT Vessel Stowage Location	: A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.
DOT Vessel Stowage Other	: 52 - Stow "separated from" acids
Other information	: No supplementary information available.

SECTION 15: Regulatory information

15.1. US Federal regulations

Sodium Hydroxide, 50% w/w (1310-73-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Not subject to reporting requirements of the United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Sodium Hydroxide (1310-73-2)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard

15.2. International regulations

CANADA

Sodium Hydroxide, 50% w/w (1310-73-2)	
WHMIS Classification	Class E - Corrosive Material
Sodium Hydroxide (1310-73-2)	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class E - Corrosive Material
Water (7732-18-5)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

EU-Regulations

No additional information available

Sodium Hydroxide, 50% w/w

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

National regulations

No additional information available

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

Revision date : 02/07/2017

Other information : None.

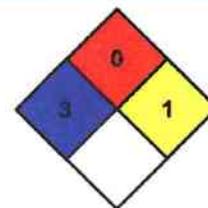
Full text of H-statements: see section 16:

H312	Harmful in contact with skin
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H402	Harmful to aquatic life

NFPA health hazard : 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA fire hazard : 0 - Materials that will not burn under typical dire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA reactivity : 1 - Materials that in themselves are normally stable but can become unstable at elevated temperatures and pressures.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Personal protection

: H
H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US LabChem

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

Alternate ID No.: F004



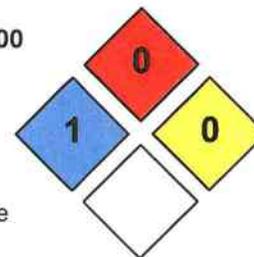
Colonial Chemical Solutions, Inc.

Material Safety Data Sheet – Citric Acid 50%

SECTION I · PRODUCT IDENTIFICATION

Manufacturers Address:
916 West Lathrop Avenue
Savannah, Georgia 31415

CHEMTREC – 24HR Emergency Telephone 1-800-424-9300
Information Phone: (912) 443-6702
Date Prepared: 25 Sept 08
Preparer: F.Spaeth



NFPA Rating

0- Minimal 1- Slight 2- Moderate
3- Serious 4- Extreme

Synonym: Citric Acid
Chemical Family: Organic Acid

SECTION II · HAZARDOUS INGREDIENTS

CHEMICAL NAME	CAS Number	%WT	TLV	PEL
Citric Acid	77-92-9	50	N/E	N/E

SECTION III · HAZARDOUS IDENTIFICATION

Potential Acute Health Effects: Causes irritation of the skin, digestive and respiratory tract.

Potential Chronic Health Effects: No chronic information available for solutions.

SECTION IV · PHYSICAL and CHEMICAL PROPERTIES

Boiling Point Range: Decomposes above 212 °F
pH: 2.2 (0.1N Sol'n)
Solubility In Water: Complete
Appearance/Odor: Clear light yellow liquid with citrus odor.
Melting Point/Freezing Point: 310 °F

Vapor Density (Air=1): >1
Vapor Pressure (mmHg): N/D
VOC %: 100
Specific Gravity (H₂O=1): 1.3

SECTION V · FIRE FIGHTING MEASURES

Flash Point: None

Auto Ignition: No available data.

Extinguishing Media: Water spray, dry chemical, carbon dioxide or ordinary foam are recommended.

Flammable Limits: Lower: N/A Upper: N/A

Fire Fighting Procedures: Cool fire-exposed containers with water spray to prevent container weakening and possible rupture. Use self-contained breathing apparatus with a full face piece operated in the positive pressure mode.

Unusual Fire and Explosion Hazards: None known.

SECTION VI · STABILITY AND REACTIVITY

Stability: Stable under normal use conditions.

Conditions to Avoid: This material should be stored away from potassium tartrate, alkali and alkaline earth carbonated and bicarbonates, acetates, sulfites and metal nitrates.

Incompatibility: Avoid contact with oxidizing agents, reducing agents.

Hazardous Decomposition Products: Oxides of Carbon.

Hazardous Polymerization: Will not occur.



Colonial Chemical Solutions, Inc.

SECTION VII · STORAGE AND HANDLING

Precautions To Be Taken In Handling and Storage: Always store in tightly sealed, properly labeled, original container. Store in a cool, dry well ventilated area.

Other Precautions: Avoid contamination.

SECTION VIII · HEALTH AND FIRST AID

Skin: Not likely to cause skin irritations.

Eyes: Causes eye irritation.

Inhalation: Causes mild respiratory tract irritation.

Ingestion: Causes mild irritation of the mouth, throat, and esophagus.

FIRST AID PROCEDURES:

Eyes: Flush with large amounts of cool running water for at least 15 minutes.

Skin: Wash skin with soap and water. Remove contaminated clothing.

Inhalation: For excessive inhalation remove to fresh air.

Ingestion: Drink large amounts of water. Seek medical advice.

SECTION IX · EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye Protection: Eye Protection when pouring.

Respiratory Protection: Where adequate ventilation is not available a certified OSHA respirator (organic vapor) must be worn.

Skin Protection: Wear gloves to avoid prolonged contact.

Ventilation: General Mechanical ventilation to prevent TLV from exceeding control limits.

Protective Clothing: Selection of protective clothing depends on potential exposure conditions and may include gloves, and other protective items.

Other Equipment: Eye wash station in close proximity is advised

SECTION X · ACCIDENTAL RELEASE MEASURES

Small Spill: Stop source of spill. Absorb on inert media and collect into suitable container.

Large Spill: Shut off or plug source of spill. Dike area to contain spill. Salvage as much liquid as possible into a suitable container. Absorb residual on inert media and collect into suitable container.

Personal Protection in Case of Large Spill: Splash goggles. Gloves.

SECTION XI · DISPOSAL CONSIDERATIONS

Waste Disposal Method: Avoid contaminating ground and surface water. Do not flush to drain. Follow local, state and federal regulations for disposal.



Colonial Chemical Solutions, Inc.

SECTION XII · TRANSPORTATION

Proper Shipping Name: Not Regulated by The U.S. DOT
Hazard Class:
UN Number:
Packaging Group:
Labels:

SECTION XIII · TOXICOLOGY

Carcinogenicity: Not listed by any agency
Mutagenicity: Not considered Mutagenic.
Reproductive: No available data.
Sensitization: May be sensitive to some individuals with rare allergic reaction.

SECTION XIV · REGULATORY

RMP/PSM: Not Listed.
CERCLA-RQ: None established.
EPCRA 311/312: This product does not contain any hazardous ingredients at or above regulated thresholds.
EPCRA 313: This product does not contain any hazardous ingredients at or above regulated thresholds.
FIFRA: No documented information available.
RCRA-CODE: No Hazardous Waste Identification.
TSCA: Listed on inventory

SECTION XV · OTHER INFORMATION

The information contained on this Material Safety Data Sheet is considered accurate as of the date of publication. It is not necessarily all inclusive nor fully adequate in every circumstance. The suggestions should not be confused with, nor followed in violation of applicable laws, regulations, rules or insurance requirements. No warranty, express or implied, of merchantability, fitness, accuracy of data, or the results to be obtained from the use thereof is made. The vendor assumes no responsibility for injury or damages resulting from the inappropriate use of this product.

SAFETY DATA SHEET

Alternate ID No.: F005



3141 Clifty Drive • Madison, IN 47250

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

NAME: **SODIUM HYPOCHLORITE 12.5%**

TYPE: Chlorine bleach
PRODUCT # 820501

FOR INDUSTRIAL USE ONLY – KEEP OUT OF THE REACH OF CHILDREN

EMERGENCY RESPONSE INFORMATION:

CHEMTREC	800-424-9300	24-Hour Service
Company Offices:	812-273-6000	Weekdays
Cara Cyrus:	812-599-3611	Evenings and Weekends
Bill Torline:	812-599-4976	Evenings and Weekends

PREPARED DATE: 04-01-15 **PREPARED BY:** Marjorie E. Hare

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification	Corrosive to Metals	Category 1	H290
	Acute Toxicity, Oral	Category 4	H302
	Skin Corrosion/Irritation	Category 1A	H314
	Serious Eye Damage/Eye Irritation	Category 1	H318
	Aquatic Toxicity (Acute)	Category 1	H400

Signal Word **DANGER**

Symbol



Hazard Statements

H290 May be corrosive to metals.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H400 Very toxic to aquatic life.

Precautionary Statements

P234 Keep only in original container.
P260 Do not breathe mist, vapors or spray.
P264 Wash hands, forearms, and exposed areas thoroughly after handling.
P273 Avoid release to the environment.
P280 Wear eye protection, face protection, protective clothing, protective gloves.
P301 + P330 + P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water / shower
P304 + P340 IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor / physician.
P321 Specific treatment (see Section 4).
P363 Wash contaminated clothing before reuse.

SAFETY DATA SHEET

Precautionary Statements (Cont'd)

P390	Absorb spillage to prevent material damage.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents / container according to local, regional, national and international regulations.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

<u>COMPONENT</u>	<u>SYNONYM</u>	<u>CAS NO.</u>	<u>% BY WEIGHT</u>
Sodium hypochlorite	None	7681-52-9	12 - 15

SECTION 4: FIRST AID MEASURES

DESCRIPTION OF FIRST AID MEASURES:

EYES:	Immediately flush with water for at least 15 minutes. Call a physician.
SKIN:	Immediately flush with large quantities of cool water continuously for at least 15 minutes. Call a physician. Remove contaminated clothing and shoes. Do not put contaminated clothing and shoes back on. Wash clothing and shoes thoroughly in soap and water; rinse repeatedly in clean water and dry before reuse.
INGESTION:	Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or a doctor. Do not give anything by mouth to an unconscious person.
INHALATION:	NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Move person to fresh air. If person is not breathing, call 911 or an ambulance. Call a poison control center or doctor for further treatment advice.
SIGNS AND SYMPTOMS OF EXPOSURE:	Contacted areas will exhibit severe irritation or burns. Burns may not be immediately apparent. Eye contact may cause permanent injury including blindness. If ingested, may cause nausea, vomiting and death. Effects may include circulatory collapse, delirium, coma and possible perforation of esophagus and stomach. May act as a sensitizer.
PRIMARY ROUTE(S) OF ENTRY:	Skin, eyes, mucous membranes, ingestion, inhalation
MOST IMPORTANT SYMPTOMS / EFFECTS, ACUTE AND DELAYED:	
EYE CONTACT:	Causes severe eye damage
SKIN CONTACT:	Causes severe irritation.
INGESTION:	Harmful if swallowed.
INHALATION:	May cause nasal and respiratory irritation.
CHRONIC SYMPTOMS:	None expected under normal conditions of use.

INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY:

If you experience any of the symptoms / effects listed above seek medical advice.

SECTION 5: FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA:

Use extinguishing media as appropriate for surrounding fire.

SPECIFIC HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE:

Not considered flammable or explosive. Use extinguishing agents suitable for the surrounding fire and not contraindicated for use with sodium hypochlorite. Sodium hypochlorite releases oxygen when heated, which may increase the severity of an existing fire. Use water spray to cool fire exposed surfaces and to protect personnel. Do not use a direct water stream.

ADVICE FOR FIRE FIGHTERS:

Wear self-contained breathing apparatus and full protective clothing. Use water spray to keep containers cool. Avoid inhalation of material or combustion by products. Firefighters should wear full protective clothing and NIOSH approved positive pressure self-contained breathing apparatus.

Hazardous Combustion Products: Chlorine gas.

Chlorine gas is an oxidizer and will support combustion.

SAFETY DATA SHEET

SECTION 6: ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES:

Contain liquid spills with sand and absorb on inert material such as Hazorb or clay. Avoid breathing vapors. Ventilate area. Remove sources of ignition and use non-sparking tools.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP:

Dispose with solid wastes. Avoid contact with acids. Do not discharge to sewers or waterways without proper treatment. Contact state and federal environment organizations if RQ is exceeded (See Section 15).

SECTION 7: HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING:

Wear proper safety equipment when handling this product. Handle in accordance with good industrial hygiene and safety procedures. DO NOT MIX SODIUM HYPOCHLORITE 12.5% WITH ACIDS! THIS WILL FORM TOXIC CHLORINE GAS.

CONDITIONS FOR SAFE STORAGE, INCLUDING INCOMPATIBILITIES:

Store in a cool dry area, away from direct sunlight and heat to avoid deterioration. Keep containers closed when not in use. Vent container frequently and more often in hot weather to relieve pressure. Do not reuse or refill this container.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES:

CHEMICAL IDENTITY

Sodium hypochlorite

CAS NO.

7681-52-9

OSHA PEL

N.E.*

ACGIH TLV

N.E.*

*Manufacturer recommends a ceiling limit of 0.5 ppm.

ENGINEERING CONTROLS:

Use good ventilation. Local exhaust is recommended if TLVs are exceeded.

INDIVIDUAL PROTECTION MEASURES:

Selection of personal protective equipment should be based upon the anticipated exposure and made in accordance with OSHA's Personal Protective Equipment Standard found in 29 CFR 1910 Subpart I. The following information may be used to assist in PPE selection.

RESPIRATORY PROTECTION:

In absence of proper environmental control, use a NIOSH / MSHA approved respirator for mists or where airborne exposure is excessive. If oxygen levels are below 19.5%, are unknown or decomposition products exist, use positive pressure supplied air respiration protection of self contained breathing apparatus for higher level of protection.

SKIN PROTECTION:

Impermeable type gloves. Rubber apron and rubber boots required. Other equipment as required to avoid contact.

EYE PROTECTION:

Goggles and faceshield necessary.

GENERAL HYGIENE CONSIDERATIONS:

Eyewash facility and emergency shower should be in close proximity. Always wash hands after handling any chemical.

SAFETY DATA SHEET

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Yellowish green liquid.
ODOR:	Mild chlorine
ODOR THRESHOLD:	0.3 ppm (detection), for Chlorine
pH (100%):	12.3 – 12.7
MELTING POINT/FREEZING POINT	-17°F (-27°C)
INITIAL BOILING POINT AND BOILING RANGE	284°F (140°C)
FLASH POINT (METHOD USED)	Not available.
EVAPORATION RATE	Not available.
FLAMMABILITY (SOLID, GAS)	Not available.
UPPER/LOWER FLAMMABLE OR EXPLOSIVE LIMIT	Not available.
VAPOR PRESSURE	12 (12.5% solution)
VAPOR DENSITY	0.670
SPECIFIC GRAVITY	1.24
SOLUBILITY IN WATER	Complete.
PARTITION COEFFICIENT: N-OCTANOL/WATER	Not available.
AUTO-IGNITION TEMPERATURE	Not available.
VISCOSITY, DYNAMIC	Not available.
DECOMPOSITION TEMPERATURE	Not available.
VISCOSITY	Not available.

SECTION 10: STABILITY AND REACTIVITY

REACTIVITY:	Will react with acids and ammonia to release toxic chlorine gas.
CHEMICAL STABILITY:	Stable under recommended handling and storage conditions (see Section 7).
POSSIBILITY OF HAZARDOUS REACTIONS:	Hazardous polymerization will not occur.
CONDITIONS TO AVOID:	Direct sunlight and high temperatures (above 100°F).
INCOMPATIBLE MATERIALS:	Acids, amines, ammonia compounds, oxidizing materials, peroxides, organic materials, reducing agents, cyanides, ethers, hydrocarbons, oxidizable materials and most metals. DO NOT MIX SODIUM HYPOCHLORITE 12.5% WITH ACIDS! THIS WILL FORM TOXIC CHLORINE GAS.
HAZARDOUS DECOMPOSITION PRODUCTS:	Chlorine gas, hypochlorous acid, hydrochloric acid, oxygen, hydrogen chloride gas.

SECTION 11: TOXOLOGICAL INFORMATION

ACUTE TOXICITY:	Not classified.
LD50 AND LC50 DATA:	LD50 Oral Rat: 8910 mg/kg LD50 Dermal Rabbit: >10,000 mg/m ³ LC50 Inhalation: No data.
ROUTES OF EXPOSURE / SYMPTOMS	
EYES:	DANGER! Causes severe eye damage.
SKIN:	DANGER! Causes severe irritation
INGESTION:	WARNING! Harmful if swallowed.
INHALATION:	WARNING! Causes burns to alimentary canal and mucous membranes.
GERM CELL MUTAGENICITY:	Not classified.
TERATOGENICITY:	Not available.
CHRONIC EFFECTS / CARCINOGENICITY:	This material contains no ingredient above de minimus concentrations known or suspected to cause cancer.
SPECIFIC TARGET ORGAN TOXICITY (Repeated exposure):	Not classified.
REPRODUCTIVE TOXICITY:	Not classified.
SPECIFIC TARGET ORGAN TOXICITY (Single exposure):	Not classified.
ASPIRATION HAZARD:	Not classified.

SAFETY DATA SHEET

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICITY The ecotoxicity of this product is not known

COMPONENT INFORMATION

Sodium hypochlorite	<p>Freshwater Fish Data: LC50 (Bluegill sunfish): 2.90 mg/L/96 hours LC50 (<i>Pimephales promelas</i>): 1.40 mg/L/96 hours LC50 (<i>Oncorhynchus mykiss</i>): 0.90 mg/L/0.5 hours</p> <p>Invertebrate Toxicity Data: No data</p>
---------------------	--

PERSISTENCE AND DEGRADABILITY: Material is inorganic and not subject to biodegradation.
BIOACCUMULATIVE POTENTIAL: Not available.
MOBILITY IN SOIL: Not available.
OTHER ADVERSE EFFECTS: This material contains no hazardous air pollutants (HAPS).

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD Normal for sodium hypochlorite containing wastes. Sodium metabisulfite may be used to neutralize chlorine. May require pH adjustment for neutralization. Dispose in accordance with local, state and federal regulations. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority.

SECTION 14: TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME: Hypochlorite solutions, 8, PG III, ERG# 154
HAZARD CLASS: 8
IDENTIFICATION NUMBER: UN1791
PACKING GROUP: III
EMERGENCY RESPONSE GUIDE: ERG #154

SECTION 15: REGULATORY INFORMATION

VOC: 0 pounds per gallon (0 grams per liter).
TSCA STATUS All ingredients are listed on the TSCA inventory.
CERCLA REPORTABLE QUANTITY 100 pounds for sodium hypochlorite (approximately 70 gallons)

SARA 311 / 312 HAZARD CLASSES

x	ACUTE HEALTH
	FIRE
	SUDDEN RELEASE OF PRESSURE
	CHRONIC HEALTH
	REACTIVE

SARA 312 INFORMATION

Storage of 10,000 pounds or more may require filing a Tier 2 form. Threshold planning quantity for reporting is 10,000 pounds. This material is not an extremely hazardous substance (EHS).

SARA 313 INFORMATION

This material contains the following substances subject to the reporting requirements of Section 313 of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372

CHEMICAL NAME	CATEGORY CODE	CAS NUMBER	% BY WEIGHT
None			

**STATE REGULATORY INFORMATION
 CALIFORNIA PROPOSITION 65**

California has not identified the ingredients listed in Section 3 as known to cause cancer or reproductive toxicity.

SAFETY DATA SHEET

SECTION 16: OTHER INFORMATION

MSDS STATUS: Revised to GHS Standards on 04-01-15.

HEALTH	3
FLAMMABILITY	0
PHYSICAL HAZARD	1

FOR INDUSTRIAL USE ONLY – KEEP OUT OF THE REACH OF CHILDREN

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

1 Identification

- **Product identifier**
- **Trade name: Frontier SeRx Seed Culture Series 2.3**
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**
 Frontier Water Systems
 3442 Sutherland St.
 San Diego, CA 92110
 619-326-9999
- **Emergency telephone number:** Chemtrec 1-800-424-9300 or outside USA 1-703-527-3887

2 Hazard(s) Identification

- **Classification of the substance or mixture**
 The product is not classified according to the Globally Harmonized System (GHS).
- **Label elements**
- **GHS label elements** Non-Regulated Material
- **Hazard pictograms** Non-Regulated Material
- **Signal word** Non-Regulated Material
- **Hazard statements** Non-Regulated Material
- **Classification system:**
- **NFPA ratings (scale 0 - 4)**



- **HMIS-ratings (scale 0 - 4)**



3 Composition/information on ingredients

7732-18-5 water, distilled, conductivity or of similar purity 90-99%

- **Chemical characterization: Mixtures**
- **Description:** Mixture of the substances listed below with nonhazardous additions.
- **Dangerous Components:** Non-Regulated Material

4 First-aid measures

- **Description of first aid measures**
- **General information:** No special measures required.
- **After inhalation:** Supply fresh air; consult doctor in case of complaints.
- **After skin contact:** If skin irritation continues, consult a doctor.
- **After eye contact:** Rinse opened eye for several minutes under running water.
- **After swallowing:** Rinse out mouth and then drink plenty of water.
- **Most important symptoms and effects, both acute and delayed** No further relevant information available.
- **Indication of any immediate medical attention and special treatment needed**
 No further relevant information available.

(Contd. on page 2)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

Trade name: Frontier SeRx Seed Culture Series 2.3

(Contd. of page 1)

5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
- **Protective equipment:**
As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures** Not required.
- **Environmental precautions:** No special measures required.
- **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (ie. sand, diatomite, acid binders, universal binders, sawdust).
Dispose of the collected material according to regulations.
- **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

- **Precautions for safe handling** No special measures required.
- **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
- **Storage:**
- **Requirements to be met by storerooms and receptacles:** No special requirements.
- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:** None.
- **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

- **Additional information about design of technical systems:** No further data; see section 7.
- **Control parameters**
- **Components with occupational exposure limits:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
- **Personal protective equipment:**
- **General protective and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.
- **Breathing equipment:** Not required.
- **Protection of hands:** Not required.
- **Material of gloves** Not required.
- **Penetration time of glove material** Not applicable.
- **Eye protection:** Not required.

(Contd. on page 3)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

Trade name: Frontier SeRx Seed Culture Series 2.3

(Contd. of page 2)

9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **General Information**

· **Appearance:**

Form:	Powder
Color:	Yellow/Brown
Odor:	Odorless
Odor threshold:	Not determined.

· **pH-value @ 20 °C (68 °F):** 7

· **Change in condition**

Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not applicable

· **Flash point:** Not applicable.

· **Flammability (solid, gaseous):** Not determined.

· **Ignition temperature:**

Decomposition temperature: Not determined.

· **Auto igniting:** Product is not selfigniting.

· **Danger of explosion:** Product does not present an explosion hazard.

· **Explosion limits:**

Lower:	0.0 Vol %
Upper:	0.0 Vol %

· **Vapor pressure @ 20 °C (68 °F):** 23 hPa (17 mm Hg)

· **Density:**

Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.

· **Solubility in / Miscibility with**

Water: Not miscible or difficult to mix.

· **Partition coefficient (n-octanol/water):** Not determined.

· **Viscosity:**

Dynamic:	Not determined.
Kinematic:	Not determined.

· **Solvent content:**

Organic solvents: 0.0 %

Solids content: 0.1 %

· **Other information** No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.

· **Chemical stability** Stable under normal conditions.

· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.

· **Possibility of hazardous reactions** No dangerous reactions known.

(Contd. on page 4)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

Trade name: Frontier SeRx Seed Culture Series 2.3

(Contd. of page 3)

- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** No further relevant information available.
- **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological Information

· Information on toxicological effects

· Acute toxicity:

· Primary irritant effect:

· **on the skin:** No irritating effect.

· **on the eye:** No irritating effect.

· Additional toxicological information:

The product is not subject to classification according to internally approved calculation methods for preparations:

When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

· Carcinogenic categories

· **IARC (International Agency for Research on Cancer)**

· **NTP (National Toxicology Program)**

None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients are listed.

* 12 Ecological information

· Toxicity

· **Aquatic toxicity:** No further relevant information available.

· **Persistence and degradability** No further relevant information available.

· **Bioaccumulative potential** No further relevant information available.

· **Mobility in soil** No further relevant information available.

· Additional ecological information:

· **General notes:** Generally not hazardous for water

· Results of PBT and vPvB assessment

· **PBT:** Not applicable.

· **vPvB:** Not applicable.

· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· Waste treatment methods

· **Recommendation:** Smaller quantities can be disposed of with household waste.

· Uncleaned packagings:

· **Recommendation:** Disposal must be made according to official regulations.

* 14 Transport information

· UN-Number

· **DOT, ADR, ADN, IMDG, IATA**

Non-Regulated Material

· **UN proper shipping name**

· **DOT, ADR, ADN, IMDG, IATA**

Non-Regulated Material

(Contd. on page 5)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

Trade name: Frontier SeRx Seed Culture Series 2.3

(Contd. of page 4)

- **Transport hazard class(es)**
- **DOT, ADR, ADN, IMDG, IATA**
- **Class** Non-Regulated Material
- **Packing group**
- **DOT, ADR, IMDG, IATA** Non-Regulated Material
- **Environmental hazards:**
- **Marine pollutant:** No
- **Special precautions for user** Not applicable.
- **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.
- **UN "Model Regulation":** -

* 15 Regulatory information

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
- **Sara**
- **Section 355 (extremely hazardous substances):**
None of the ingredients are listed.
- **Section 313 (Specific toxic chemical listings):**
None of the ingredients are listed.
- **TSCA (Toxic Substances Control Act):**
All ingredients are listed.
- **Proposition 65**
- **Chemicals known to cause cancer:**
None of the ingredients are listed.
- **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients are listed.
- **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients are listed.
- **Chemicals known to cause developmental toxicity:**
None of the ingredients are listed.
- **Carcinogenic categories**
- **EPA (Environmental Protection Agency)**
None of the ingredients are listed.
- **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients are listed.
- **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients are listed.
- **GHS label elements** Non-Regulated Material
- **Hazard pictograms** Non-Regulated Material
- **Signal word** Non-Regulated Material
- **Hazard statements** Non-Regulated Material
- **National regulations:**
The product is subject to be labeled according with the prevailing version of the regulations on hazardous substances.

(Contd. on page 6)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g), Rev. 2012 and GHS Rev 03

Printing date 5/6/2015

Reviewed on 5/6/2015

Trade name: Frontier SeRx Seed Culture Series 2.3

(Contd. of page 5)

· **State Right to Know**

7722-76-1 Ammonium phosphate monobasic ≤ 2.5%

⚠ Skin Irrit. 2, H315; STOT SE 3, H335; Eye Irrit. 2B, H320

7631-99-4 Sodium Nitrate ≤ 2.5%

⚠ Ox. Sol. 2, H272; ⚠ Eye Irrit. 2A, H319

7732-18-5 water, distilled, conductivity or of similar purity 90-99%

All ingredients are listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

The information and recommendations in this safety data sheet are, to the best of our knowledge, accurate as of the date of issue. Nothing herein shall be deemed to create warranty, expressed or implied and shall not establish a legally valid contractual relationship. It is the responsibility of the user to determine applicability of this information and the suitability of the material or product for any particular purpose.

· **Date of preparation / last revision** 10/24/2014 / -

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

ADN: The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

ACGIH: American Conference of Governmental Industrial Hygienists

EINECS: European Inventory of Existing Commercial Chemical Substances

ELINCS: European List of Notified Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

· *** Data compared to the previous version altered.**

GE Safety Data Sheets





GE Water & Process Technologies

3239 Dundas Street West
Oakville, Ontario L6M 4B2
Canada

T +1 905 465 3030
F +1 905 465 3050

Thursday, July 13, 2017

Arcadis
2101 L NW, Suite 200
Washington DC 20037
USA

Attention: Mr. Dave Riedel, PE

Reference: GE Water & Process Technologies Pilot Study

Dear Dave,

In preparation for the GE Pilot Study using ABMet technology for Dominion Energy's Chesterfield Power Station, GE has submitted a list of chemicals to be used during the project.

This letter confirms that chemicals that will be requested or provided by GE for use as part of the Pilot Study contain none of the chemicals listed as part of the EPA Priority Pollutant list attached.

We look forward to working with Arcadis and Dominion on this exciting project. If you have any questions, please do not hesitate to contact either myself or your sales associate at GE Water.

Sincerely,

A handwritten signature in black ink that reads "Lee-Anne Doig".

Lee-Anne Doig
North American Pilot Group Supervisor
GE Water & Process Technologies
3239 Dundas Street West
Oakville, ON L6M 4B2 Canada

1.1 Chemical Requirements

The following table summarizes the typical chemical requirements for the ABMet study. Dose rates will be adjusted on an as needed basis as the study progresses. Not all chemicals may be required based on feed water quality.

Table 1: Chemical Requirements

Chemical	Stock Concentration	Estimated Dose (ppm)	Estimated Dose Rate	Stock Volume	Estimated Total Volume for 24-week project
Sodium Bisulfite	30%	200	119 mL/h	55-gal drum	126 gals
Sodium Bicarbonate	5%	50	200 mL/h	6 kg bags	40 - 60 kg
Caustic Soda	50%	pH=6.5	varies	55 gal drums	TBD
Hydrochloric acid	32%	pH=6.5	Varies	1000-gal tote	TBD
Hypersperse MDC776 (antiscalant)	100%	15	2.6 mL/h	5-gal pail	5-gal pail
Nutrient (molasses)	100%	150 COD	75 mL/h	275-gal tote	275-gal tote

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Chemical Name:	Chemical Formula	Molecular Weight
NA	Mixture of liquid Agricultural commodities	No Data

Trade Name - MOLASSES BASED CUSTOM BLENDS

Synonyms	DOT Identification No.
Molasses based nutrient	NA

Company Identification:
GE Water and Process Technologies
3239 Dundas St. West
Oakville, ON, L6M 4B2
(905) 465-3030

NFPA HAZARD CLASS: (0) Health, (0) Flammability, (0) and Reactivity

2. COMPOSITION, INFORMATION ON INGREDIENTS

Component(s), Chemical Name	CAS Registry No. %(Approx.)	ACGIH TLV-TWA
Proprietary	NA	No data

3. HAZARDS IDENTIFICATION

Emergency Overview

This material should be stored in a vented tank designed to contain a material with a specific gravity of 1.3 or greater. Material can ferment if excessive moisture contamination is allowed. Fermentation can yield carbon dioxide with possible traces of ethanol or volatile fatty acids (e.g. acetic, propionic, lactic, or butyric) and if exposed to a spark or flame may result in an explosion. These conditions should be avoided.

Potential Health Effects

Eyes: Mild irritant

Skin: None

Inhalation: Insufficient oxygen may be present in vessels containing the product due to the generation of carbon monoxide during fermentation

4. FIRST AID MEASURES

Eyes: Flush eyes for 15 minutes.

Skin: Wash with soap and water.

Ingestion: No data

5. FIRE FIGHTING MEASURES

Flashpoint (Method used) Flammable Limits in Air

Non-flammable Non-flammable
Non-combustible Non-combustible

Extinguishing Agents - NA

Unusual Fire and Explosion Hazards - Fermentation occurs when diluted with water and is accelerated by heat. During fermentation carbon monoxide with possible traces of ethanol or volatile fatty acids (e.g., acetic, propionic, lactic, or butyric) is given off, which produces inhalation hazards and possible explosion hazards.

6. ACCIDENTAL RELEASE MEASURES

Small Spills: Stop the source of the spill. Recover as much product as possible for reuse. Absorb remaining spill and dispose solids in waste container.

Large Spill: Stop the source of the spill. Create diversionary structures to minimize the extent of the release. Prevent the release from entering a waterway or sewer. Recover useable product. Absorb remaining spill and dispose of at an approved facility such as a municipal landfill land application site.

7. HANDLING AND STORAGE

This material should be stored in a vented tank designed to contain a material with a specific gravity of 1.3 or greater. Store away from sparks or open flames. Material can ferment if excessive moisture contamination is allowed, which can yield carbon dioxide with possible traces of ethanol or volatile fatty acids (e.g. acetic, propionic, lactic, or butyric) and if exposed to a spark or flame may result in an explosion.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Respiratory Protection - None
Ventilation - Provide adequate ventilation to prevent accumulation of vapors.
Skin Protection - Rubber gloves
Eye Protection - Safety glasses
Hygiene - Wash any exposed area promptly with soap and water. Launder contaminated clothing
Other Control Measures - None

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Odor
Dark brown syrupy liquid Sweet

Physical State Specific Gravity
Liquid 1.3

Boiling Point Freezing/Melting Point
Very high Varies

Vapor Pressure Low	% Volatile, by Volume No data
Evaporation Rate No data	Vapor Density in Air Water vapor only
Solubility in Water Soluble	pH 3.5 to 6.0

10. STABILITY AND REACTIVITY

Chemical Stability - Stable
Conditions to Avoid - Excess moisture or heat. Unventilated containers.

Incompatibility with Other Materials -
Reacts with concentrated nitric acid or concentrated sulfuric acid. Ferments when diluted with water.

Hazard Decomposition Products - Carbon monoxide, alcohol or fatty acid vapors

Hazardous Polymerization - NA

11. TOXICOLOGICAL INFORMATION

Exposure Limits - No Data

Acute Toxicity
Primary routes of exposure: Inhalation, Skin Absorption, Ingestion

No Data

Chronic Toxicity - No Data

12. ECOLOGICAL INFORMATION

Prevent releases to land or water. Results in high Biological Oxygen Demand (BOD) and potential oxygen depletion of aquatic systems.

13. DISPOSAL CONSIDERATIONS

Dispose of waste material at an approved landfill or land application site.

14. TRANSPORT INFORMATION

Hazardous Materials Description/ Proper Shipping Name - NA
DOT Hazard Class - NA
DOT Identification Number - NA
This product is not a DOT hazardous material.

15. REGULATORY INFORMATION

Discharges to surface waters of the U.S. are regulated by the Environmental Protection Agency.

Date of Preparation: 3/15/13

Prepared by: _____



SAFETY DATA SHEET

BETZ*DEARBORN DCL30

1. Identification

Product identifier	BETZDEARBORN DCL30
Other means of identification	None.
Recommended use	Dechlorination agent
Recommended restrictions	None known.

Company/undertaking identification

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355 3300, F 215 953 5524

Emergency telephone

(800) 877 1940

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Serious eye damage/eye irritation	Category 2B
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements



Signal word	Warning
Hazard statement	Causes eye irritation. May cause respiratory irritation.

Precautionary statement

Prevention	Avoid breathing mist or vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area.
Response	If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor// if you feel unwell. If eye irritation persists: Get medical advice/attention.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations. Dispose of contents/container to .

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Components	CAS #	Percent
Sodium bisulphite	7631-90-5	20 - 40

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

Composition comments Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this SDS for our assessment of the potential hazards of this formulation.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	Rinse skin with water/shower.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
Most important symptoms/effects, acute and delayed	Exposed individuals may experience eye tearing, redness, and discomfort. Irritation of eyes and mucous membranes. May cause respiratory irritation. Skin irritation.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO ₂).
Unsuitable extinguishing media	Water. Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Cool containers / tanks with water spray.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of vapors or mists. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground. Water contaminated with this product may be sent to a sanitary sewer treatment facility, or a permitted waste treatment facility, in accordance with any local agreements.

7. Handling and storage

Precautions for safe handling	Vent carefully before opening. Sulfur dioxide can be formed during the normal use and handling of this product. Avoid breathing mist or vapor. Avoid contact with eyes. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Use care in handling/storage.
--------------------------------------	--

Conditions for safe storage, including any incompatibilities

Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation. Avoid freezing. If frozen, thaw completely and mix thoroughly prior to use.

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium bisulphite (CAS 7631-90-5)	TWA	5 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Sodium bisulphite (CAS 7631-90-5)	TWA	5 mg/m3

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station.

Individual protection measures, such as personal protective equipment

Eye/face protection

Chemical goggles are recommended.

Skin protection

Hand protection

Chemical resistant gloves. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Glove selection must take into account any solvents and other hazards present.

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

Chemical respirator with organic vapor cartridge and full facepiece. A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Color Colorless to light yellow

Physical state Liquid

Odor Strong

Odor threshold Not available.

pH (concentrated product) 4.5

pH in aqueous solution 4.9 (5% SOL)

Melting point/freezing point 18 °F (-8 °C)

Initial boiling point and boiling range 220 °F (104 °C)

Flash point Not applicable.

Evaporation rate < 1 (Ether = 1)

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure 18 mm Hg

Vapor pressure temp.	70 °F (21 °C)
Vapor density	< 1 (Air = 1)
Relative density	1.27
Relative density temperature	70 °F (21 °C)
Solubility(ies)	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	6 cps
Viscosity temperature	70 °F (21 °C)
Other information	
Percent volatile	0 (Calculated)
Pour point	23 °F (-5 °C)
Specific gravity	1.27

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials. None under normal conditions.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Oxides of sulphur evolved in fire.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	No adverse effects due to skin contact are expected.
Eye contact	Causes eye irritation.
Ingestion	Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics Irritation of eyes and mucous membranes. Exposed individuals may experience eye tearing, redness, and discomfort. May cause respiratory irritation. Skin irritation.

Information on toxicological effects

Acute toxicity May cause respiratory irritation.

Product	Species	Test Results
BETZDEARBORN DCL30 (CAS Mixture)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 5000 mg/kg, (Calculated according to GHS additivity formula)
<i>Inhalation</i>		
LC50	Rat	> 5 mg/l, 4 hours, (Calculated according to GHS additivity formula)
<i>Oral</i>		
LD50	Rat	3320 mg/kg, (Calculated according to GHS additivity formula)

Components	Species	Test Results
Sodium bisulphite (CAS 7631-90-5)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 2000 mg/kg
<i>Inhalation</i>		
LC50	Rat	> 5.5 mg/l, 4 Hour
<i>Oral</i>		
LD50	Rat	1420 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes eye irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not available.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
IARC Monographs. Overall Evaluation of Carcinogenicity	
Sodium bisulphite (CAS 7631-90-5)	3 Not classifiable as to carcinogenicity to humans.
OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)	
Not listed.	
US. National Toxicology Program (NTP) Report on Carcinogens	
Not available.	
Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure	Not available.
Aspiration hazard	Not available.
Chronic effects	Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity

Product	Species	Test Results	
BETZDEARBORN DCL30 (CAS Mixture)			
LC50	Fathead Minnow	225 mg/L, Static Renewal Bioassay, 96 hour	
	Menidia beryllina (Silversides)	930 mg/L, Static Acute Bioassay, 96 hour, (pH adjusted)	
	Mysid Shrimp	370 mg/L, Static Acute Bioassay, 48 hour, (pH adjusted)	
	NOEL	Fathead Minnow	160 mg/L, Static Renewal Bioassay, 96 hour
		Menidia beryllina (Silversides)	156 mg/L, Static Acute Bioassay, 96 hour, (pH adjusted)
		Mysid Shrimp	156 mg/L, Static Acute Bioassay, 48 hour, (pH adjusted)
Aquatic			
Crustacea	LC50	Daphnia magna	225 mg/L, Static Renewal Bioassay, 48 hour
	NOEL	Daphnia magna	160 mg/L, Static Renewal Bioassay, 48 hour

Product	Species	Test Results
Fish	0% Mortality Rainbow Trout	100 mg/L, Static Screen, 48 hour
	100% Mortality Rainbow Trout	500 mg/L, Static Screen, 48 hour

* Estimates for product may be based on additional component data not shown.

Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	Not available.
Persistence and degradability	
- COD (mgO ₂ /g)	49 (calculated data)

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (SODIUM BISULFITE SOLUTION), RQ
Transport hazard class(es)	
Class	9
Subsidiary risk	-
Packing group	III
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
ERG number	171

Some containers may be exempt from Dangerous Goods/Hazmat Transport Regulations, please check BOL for exact container classification.

IATA

Not regulated as dangerous goods.

IMDG

UN number	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (SODIUM BISULFITE SOLUTION), RQ
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	No.
EmS	Not available.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

DOT



IMDG



15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium bisulphite (CAS 7631-90-5) Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical

No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)

Not regulated.

Inventory status

Country(s) or region

Canada

Canada

Inventory name

Domestic Substances List (DSL)

Non-Domestic Substances List (NDSL)

On inventory (yes/no)*

Yes

No

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**NSF Registered and/or meets
USDA (according to 1998
guidelines):**

Registration No. – 147820
Category Code(s):
G5 Cooling and retort water treatment products
G6 Boiler treatment products, steam line products – food contact

US state regulations

US - Massachusetts RTK - Substance List

Sodium bisulphite (CAS 7631-90-5)

US - Pennsylvania RTK - Hazardous Substances

Sodium bisulphite (CAS 7631-90-5)

US - Rhode Island RTK

Sodium bisulphite (CAS 7631-90-5)

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. New Jersey Worker and Community Right-to-Know Act

Sodium bisulphite (CAS 7631-90-5)

US. Pennsylvania Worker and Community Right-to-Know Law

Sodium bisulphite (CAS 7631-90-5)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Developmental toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Female reproductive toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

No ingredient listed.

16. Other information, including date of preparation or last revision

Issue date	Oct-16-2014
Revision date	Aug-03-2015
Version #	1.0

List of abbreviations

CAS: Chemical Abstract Service Registration Number
TWA: Time Weighted Average
STEL: Short Term Exposure Limit
LD50: Lethal Dose, 50%
LC50: Lethal Concentration, 50%
EC50: Effect Concentration, 50%
NOEL: No Observed Effect Level
COD: Chemical Oxygen Demand
BOD: Biochemical Oxygen Demand
TOC: Total Organic Carbon
CEN: European Committee for Standardisation
IATA: International Air Transport Association
IMDG: International Maritime Dangerous Goods Code
NFPA: National Fire Protection Association
ACGIH: American Conference of Governmental Industrial Hygienists
TSRN indicates a Trade Secret Registry Number is used in place of the CAS number.

References: No data available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Information

Hazard(s) identification: Hazard statement
Hazard(s) identification: Prevention
Composition/information on ingredients: Composition comments
First-aid measures: Skin contact
First-aid measures: Most important symptoms/effects, acute and delayed
Handling and storage: Precautions for safe handling
Physical & Chemical Properties: Multiple Properties
Toxicological Information: Toxicological Data
Toxicological information: Reproductive toxicity
Toxicological information: Inhalation
Toxicological information: Symptoms related to the physical, chemical and toxicological characteristics
Other information, including date of preparation or last revision: Prepared by
GHS: Classification

Prepared by

This SDS has been prepared by GE Water & Process Technologies Regulatory Department (1-215-355-3300).

* Trademark of General Electric Company. May be registered in one or more countries.



Alternate ID No.:
GE003

GE
Water & Process Technologies

Material Safety Data Sheet

Issue Date: 04-APR-2002
Supersedes: 04-APR-2002

SODIUM BICARBONATE CMD

1 Identification of Product and Company

Identification of substance or preparation
SODIUM BICARBONATE CMD

Product Application Area
Commodity chemical

Company/Undertaking Identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355-3300, F 215 953 5524

Emergency Telephone
(800) 877-1940

Prepared by Product Stewardship Group: 215 355-3300

2 Composition / Information On Ingredients

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

This product is not hazardous as defined by OSHA regulations.

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 Hazards Identification

EMERGENCY OVERVIEW

CAUTION

Non-hazardous to skin. Potential eye irritant due to mechanical action only. Dusts may cause irritation to the upper respiratory tract.

DOT hazard is not applicable
Odor: None; Appearance: White, Crystals

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Non-hazardous to skin.

ACUTE EYE EFFECTS:

Potential eye irritant due to mechanical action only.

ACUTE RESPIRATORY EFFECTS:

Primary route of exposure; Dusts may cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

May cause slight gastrointestinal irritation.

TARGET ORGANS:

No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

Inhalation of dust and/or vapors may cause eye, nose, throat and respiratory tract irritation.

4 First Aid Measures

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get medical attention if irritation persists after flushing.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

No special instructions

5 Fire Fighting Measures

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

elemental oxides

FLASH POINT:

> 200F > 93C P-M(CC)

6 Accidental Release Measures

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 Handling & Storage

HANDLING:

Normal chemical handling.

STORAGE:

Keep containers closed when not in use. Keep dry.

8 Exposure Controls / Personal Protection

EXPOSURE LIMITS

This product is not hazardous as defined by OSHA regulations.

ENGINEERING CONTROLS:

Adequate ventilation to maintain dust concentrations below the exposure limit of 10 mg/m³ (PEL/TLV) for nuisance dusts.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.

If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

neoprene gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

safety glasses

9 Physical & Chemical Properties

Density	60.000 lb/cu.	Vapor Pressure (mmHG)	< 0.1
Freeze Point (F)	NA	Vapor Density (air=1)	< 1.00
Freeze Point (C)	NA		
Viscosity(cps 70F,21C)	NA	% Solubility (water)	~ 10.0

Odor	None
Appearance	White
Physical State	Crystals
Flash Point	P-M(CC) > 200F > 93C
pH 1% Sol. (approx.)	8.6
Evaporation Rate (Ether=1)	< 1.00

Percent VOC: 0.0

NA = not applicable ND = not determined

10 Stability & Reactivity

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxides.

DECOMPOSITION PRODUCTS:

elemental oxides

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"A"

11 Toxicological Information

Oral LD50 RAT: 4,220 mg/kg
NOTE - Mouse oral LD50: 3,360 mg/kg
Dermal LD50 RABBIT: >2,000 mg/kg
NOTE - Estimated value

12 Ecological Information

AQUATIC TOXICOLOGY

Ceriodaphnia 48 Hour Static Renewal Bioassay
LC50= 2650; No Effect Level= 1870 mg/L
Daphnia magna 48 Hour Static Renewal Bioassay
LC50= 5120; No Effect Level= 3750 mg/L
Fathead Minnow 96 Hour Static Renewal Bioassay
LC50= 9890; No Effect Level= 3750 mg/L

BIODEGRADATION

No Data Available.

13 Disposal Considerations

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 Transport Information

DOT HAZARD: Not Applicable
PROPER SHIPPING NAME:

DOT EMERGENCY RESPONSE GUIDE #: Not applicable
Note: Some containers may be DOT exempt, please check BOL for exact container classification

15 Regulatory Information

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

No regulated constituent present at OSHA thresholds

SARA SECTION 312 HAZARD CLASS:

Product is non-hazardous under Section 311/312

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65):

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 Other Information

NFPA/HMIS		CODE TRANSLATION
Health	0	Minimal Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	A	Safety Glasses

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
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MSDS status: 04-APR-2002		** NEW **



GE Power & Water
Water & Process Technologies

SAFETY DATA SHEET

ELITE CAUSTIC SODA 50%

Alternate ID No.:
GE004

1. Identification

Product identifier	ELITE CAUSTIC SODA 50%
Other means of identification	Not available.
Recommended use	Not available.
Recommended restrictions	None known.

Company/undertaking identification

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355 3300, F 215 953 5524

Emergency telephone

(800) 877 1940

2. Hazard(s) identification

Physical hazards	Corrosive to metals	Category 1
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1A
	Serious eye damage/eye irritation	Category 1
OSHA defined hazards	Not classified.	

Label elements



Signal word	Danger
Hazard statement	May be corrosive to metals. Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage.
Precautionary statement	
Prevention	Keep only in original container. Do not breathe mist or vapor. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wear eye/face protection.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Continue rinsing for at least 30 minutes. Immediately call a poison center/doctor/. Specific treatment (see on this label). Wash contaminated clothing before reuse. Absorb spillage to prevent material damage.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed. Store in corrosive resistant/ container with a resistant inner liner.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Sodium hydroxide		1310-73-2	40 - 60

Composition comments Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this SDS for our assessment of the potential hazards of this formulation.

4. First-aid measures

Inhalation	Move to fresh air. For breathing difficulties, oxygen may be necessary. If breathing stops, provide artificial respiration. Get medical attention immediately.
Skin contact	Remove contaminated clothing. Wash clothing separately before reuse. Get medical attention immediately.
Eye contact	Immediately flush eyes with plenty of low-pressure water for at least 30 minutes while removing contact lenses. Keep eyelids apart. Get medical attention immediately.
Ingestion	Do not feed anything by mouth to an unconscious or convulsive victim. Do NOT induce vomiting! Immediately contact a physician. Dilute contents of stomach using 2-8 fluid ounces (60-240ml) of milk or water.
Most important symptoms/effects, acute and delayed	Corrosive effects. Refer to item "symptoms" at section 11.
Indication of immediate medical attention and special treatment needed	Corrosive material It may not be advisable to induce vomiting. Possible mucosal damage may contraindicate the use of gastric lavage. No specific antidotes are recommended.
General information	Appropriate protective clothing.

5. Fire-fighting measures

Suitable extinguishing media	Dry chemical, CO ₂ , water spray or regular foam.
Unsuitable extinguishing media	None.
Specific hazards arising from the chemical	None known.
Special protective equipment and precautions for firefighters	Not available.
Fire-fighting equipment/instructions	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Specific methods	Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).
General fire hazards	Non flammable liquid

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Wear appropriate protective equipment and clothing during clean-up. Please refer also to section no. 8 'Exposure controls' for further information.
Methods and materials for containment and cleaning up	Ventilate the area. Soak up with inert absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground. Prevent from entering sewers or the immediate environment.

7. Handling and storage

Precautions for safe handling	Alkaline. Do not mix with acidic material. corrosive to skin corrosive to the eyes
--------------------------------------	---

Conditions for safe storage,
including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	PEL	2 mg/m ³

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m ³

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m ³

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Provide adequate ventilation.

Individual protection measures, such as personal protective equipment

Eye/face protection Splash proof chemical goggles.
Face shield.

Skin protection

Hand protection Rubber, butyl, viton or neoprene glove.
Wash off after each use. Replace as necessary.

Other Wear suitable protective clothing.

Respiratory protection

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

If air-purifying respirator use is appropriate, use organic vapor cartridges and any of the following particulate respirators: R95, R99, R100, P95, P99 or P100.

Thermal hazards Not applicable.

General hygiene considerations Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance

Color Colorless

Physical state Liquid

Odor Mild

Odor threshold Not available.

pH in aqueous solution 13.4 (5% SOL.)

Melting point/freezing point 50 °F (10 °C)

Initial boiling point and boiling range Not available.

Flash point > 212 °F (> 100 °C) SETA(CC)

Evaporation rate < 1 (Ether = 1)

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure 18 mm Hg

Vapor pressure temp. 70 °F (21 °C)

Vapor density < 1 (Air = 1)

Material name: ELITE CAUSTIC SODA 50%

Version number: 2.0

Relative density	1.53
Relative density temperature	70 °F (21 °C)
Solubility(ies)	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	60 cps
Viscosity temperature	70 °F (21 °C)
Other information	
Percent volatile	0 (Estimated)
Pour point	55 °F (13 °C)
Specific gravity	1.53

10. Stability and reactivity

Reactivity	Not available.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	None known. Friction, heat or other sources of ignition may cause a violent reaction releasing heat and toxic fumes. Avoid contact with strong acids.
Incompatible materials	Contact with strong acids may cause a violent reaction releasing heat. Strong oxidizing substances.
Hazardous decomposition products	None known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Ingestion may cause severe irritation of the mouth, the esophagus and the gastrointestinal tract.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Permanent eye damage including blindness could result. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation.

Information on toxicological effects

Acute toxicity	Harmful if swallowed. Harmful in contact with skin.
----------------	---

Product	Species	Test Results
ELITE CAUSTIC SODA 50% (CAS Mixture)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	2700 mg/kg, (Calculated according to GHS additivity formula)
<i>Oral</i>		
LD50	Rat	1000 mg/kg, (Calculated according to GHS additivity formula)
Components	Species	Test Results
Sodium hydroxide (CAS 1310-73-2)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	1350 mg/kg
<i>Oral</i>		
LD50	Rabbit	> 500 mg/kg

Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Causes severe burns.
Respiratory or skin sensitization	
Respiratory sensitization	Not classified.
Skin sensitization	Causes severe burns.
Germ cell mutagenicity	Not classified.
Carcinogenicity	
OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)	
Not listed.	
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.
Chronic effects	Prolonged or repeated contact may cause tissue necrosis, dermatitis and/or skin sensitisation.

12. Ecological information

Ecotoxicity

Product	Species	Test Results	
ELITE CAUSTIC SODA 50% (CAS Mixture)	0% Mortality	Fathead Minnow 5000 mg/L, Static Bioassay with 48-Hour Renewal, 96 hour, (pH adjusted) 50 mg/L, Static Bioassay with 48-Hour Renewal, 96 hour	
	10% Mortality	Ceriodaphnia 1785 mg/L, Static Acute Bioassay, 48 hour, (pH adjusted)	
	100% Mortality	Fathead Minnow 200 mg/L, Static Bioassay with 48-Hour Renewal, 96 hour	
	45% Mortality	Fathead Minnow 10000 mg/L, Static Bioassay with 48-Hour Renewal, 96 hour, (pH adjusted)	
	LC50	Ceriodaphnia 2480 mg/L, Static Acute Bioassay, 48 hour, (pH adjusted)	
	Crustacea	100% Mortality	Daphnia magna 500 mg/L, Static Screen, 48 hour
		5% Mortality	Daphnia magna 5000 mg/L, Static Screen, 48 hour, (pH adjusted) 100 mg/L, Static Screen, 48 hour
	Other	0% Mortality	Rainbow Trout 10000 mg/L, Static Bioassay with 48-Hour Renewal, 96 hour, (pH adjusted)

Bioaccumulative potential Not available.

Mobility in soil Not available.

Other adverse effects Not available.

Persistence and degradability

This product, being inorganic and in its highest oxidation state, has no COD, BOD or TOC.

13. Disposal considerations

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

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Via an authorized waste disposal contractor to an approved waste disposal site, observing all local and national regulations.

14. Transport information

DOT

UN number	UN1824
UN proper shipping name	SODIUM HYDROXIDE SOLUTION, RQ
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Special precautions for user	Not available.
ERG number	154

Some containers may be DOT exempt, please check BOL for exact container classification.

IATA

UN number	UN1824
UN proper shipping name	SODIUM HYDROXIDE SOLUTION
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	No.
ERG Code	154
Special precautions for user	Not available.

IMDG

UN number	UN1824
UN proper shipping name	SODIUM HYDROXIDE SOLUTION
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	Not available.
Special precautions for user	Not available.

DOT



IATA; IMDG



15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium hydroxide (CAS 1310-73-2) Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

US state regulations

US - Massachusetts RTK - Substance List

Sodium hydroxide (CAS 1310-73-2)

US - Pennsylvania RTK - Hazardous Substances

Sodium hydroxide (CAS 1310-73-2)

US - Rhode Island RTK

Sodium hydroxide (CAS 1310-73-2)

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. California Proposition 65

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Developmental toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Female reproductive toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

No ingredient listed.

16. Other information, including date of preparation or last revision

Issue date	Jun-30-2014
Revision date	Dec-01-2014
Version #	2.0
List of abbreviations	CAS: Chemical Abstract Service Registration Number NFPA: National Fire Protection Association ACGIH: American Conference of Governmental Industrial Hygienists TWA: Time Weighted Average STEL: Short Term Exposure Limit LD50: Lethal Dose, 50% LC50: Lethal Concentration, 50% NOEL: No Observed Effect Level COD: Chemical Oxygen Demand BOD: Biochemical Oxygen Demand TOC: Total Organic Carbon IATA: International Air Transport Association IMDG: International Maritime Dangerous Goods Code EC50: Effect Concentration, 50% CEN: European Committee for Standardisation TSRN indicates a Trade Secret Registry Number is used in place of the CAS number. TLV: Threshold Limit Value
References:	No data available
Disclaimer	The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
Revision Information	Product and Company Identification: Physical States First-aid measures: Eye contact First-aid measures: Ingestion First-aid measures: Skin contact Fire-fighting measures: Fire-fighting equipment/instructions Accidental release measures: Personal precautions, protective equipment and emergency procedures Accidental release measures: Methods and materials for containment and cleaning up Handling and storage: Precautions for safe handling Physical & Chemical Properties: Multiple Properties Toxicological Information: Toxicological Data Other information, including date of preparation or last revision: Disclaimer GHS: Classification
Prepared by	This SDS has been prepared by GE Water & Process Technologies Regulatory Department (1-215-355-3300).



Alternate ID No.:
GE005

GE
Water & Process Technologies

Material Safety Data Sheet

Issue Date: 05-MAY-2010
Supercedes: 06-JUN-2006

HCL 33% CMD

1 Identification

Identification of substance or preparation
HCL 33% CMD

Product Application Area
Commodity chemical

Company/Undertaking Identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355-3300, F 215 953 5524

Emergency Telephone
(800) 877-1940

Prepared by Product Stewardship Group: T 215-355-3300 Prepared on: 05-MAY-2010

2 Hazard(s) identification

EMERGENCY OVERVIEW

DANGER

Corrosive to skin. Corrosive to the eyes. Vapors, gases, mists and/or aerosols cause irritation to the upper respiratory tract.

DOT hazard: Corrosive to skin/steel
Odor: Acid; Appearance: Colorless To Light Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:
Primary route of exposure; Corrosive to skin.

ACUTE EYE EFFECTS:
Corrosive to the eyes.

ACUTE RESPIRATORY EFFECTS:
Primary route of exposure; Vapors, gases, mists and/or aerosols cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

May cause severe irritation or burning of mouth, throat, and gastrointestinal tract with severe chest and abdominal pain, nausea, vomiting, diarrhea, lethargy and collapse. Possible death when ingested in very large doses.

TARGET ORGANS:

Prolonged or repeated exposures may cause tissue necrosis.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

Inhalation may cause irritation of mucous membranes and respiratory tract. Skin contact causes severe irritation or burns.

3 Composition / information on ingredients

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

Cas#	Chemical Name	Range (w/w%)
7647-01-0	HYDROCHLORIC ACID Corrosive; IARC=3 (carcinogen status not classifiable)	30-60

4 First-aid measures

SKIN CONTACT:

URGENT! Wash thoroughly with soap and water. Remove contaminated clothing. Get immediate medical attention. Thoroughly wash clothing before reuse.

EYE CONTACT:

URGENT! Immediately flush eyes with plenty of low-pressure water for at least 20 minutes while removing contact lenses. Hold eyelids apart. Get immediate medical attention.

INHALATION:

Remove to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get immediate medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Rinse mouth with plenty of water. Dilute contents of stomach using 4-10 fluid ounces (120-300 mL) of milk or water.

NOTES TO PHYSICIANS:

Material is corrosive. It may not be advisable to induce vomiting. Possible mucosal damage may contraindicate the use of gastric lavage.

5 Fire-fighting measures

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

none identified

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Corrosive to skin/steel

UN 1789;Emergency Response Guide #157

6 Accidental release measures

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 Handling and storage

HANDLING:

Acidic. Corrosive(Skin/eyes). Do not mix with alkaline material.

STORAGE:

Keep containers closed when not in use. Use approved containers only. Store in cool, well-vented area. Contact with metals may release flammable hydrogen gas. Store away from bases.

8 Exposure controls / personal protection

EXPOSURE LIMITS**CHEMICAL NAME****HYDROCHLORIC ACID**

PEL (OSHA): 5 PPM(CEILING)

TLV (ACGIH): 2 PPM(CEILING)-A4

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.

If air-purifying respirator use is appropriate, use a respirator with acid gas cartridges.

SKIN PROTECTION:

gauntlet-type rubber or neoprene gloves, chemical resistant apron -- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles, face shield

9 Physical and chemical properties

Spec. Grav. (70F, 21C)	1.196	Vapor Pressure (mmHG)	80.0
Freeze Point (F)	-89	Vapor Density (air=1)	< 1.00
Freeze Point (C)	-67		
Viscosity(cps 70F, 21C)	6	% Solubility (water)	100.0

Odor	Acid
Appearance	Colorless To Light Yellow
Physical State	Liquid
Flash Point	P-M(CC) > 200F > 93C
pH As Is (approx.)	< 1.0
Evaporation Rate (Ether=1)	< 1.00
Percent VOC:	0.0

NA = not applicable ND = not determined

10 Stability and reactivity

CHEMICAL STABILITY:

Stable under normal storage conditions.

POSSIBILITY OF HAZARDOUS REACTIONS:

Contact with strong bases may cause a violent reaction releasing heat.

INCOMPATIBILITIES:

May react with bases or strong oxidizers.

DECOMPOSITION PRODUCTS:

none identified

11 Toxicological information

Oral LD50 RAT:	>2,000 mg/kg
NOTE - Estimated value; 100% neat material rat oral LD50:	900 mg/kg
Dermal LD50 RABBIT:	>2,000 mg/kg
NOTE - Estimated value	
Inhalation LC50 RAT:	2,810 ppm/hr
NOTE - 31.5% HCL	

12 Ecological information

AQUATIC TOXICOLOGY

No Data Available.

BIODEGRADATION

No Data Available.

13 Disposal considerations

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
D002=Corrosive(pH, steel).

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 Transport information

Transportation Hazard: Corrosive to skin/steel
DOT: HYDROCHLORIC ACID SOLUTION
8, UN 1789, PG II, RQ
DOT EMERGENCY RESPONSE GUIDE #: 157
Note: Some containers may be DOT exempt, please check BOL for exact container classification
IATA: HYDROCHLORIC ACID SOLUTION
8, UN 1789, PG II
IMDG: HYDROCHLORIC ACID SOLUTION
8, UN 1789, PG II

15 Regulatory information

TSCA:

All components of this product are included on or are in compliance with the U.S. TSCA regulations.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

1,394 gallons due to HYDROCHLORIC ACID;

NSF Registered and/or meets USDA (according to 1998 Guidelines):

Registration number: Not Registered

SARA SECTION 312 HAZARD CLASS:

Immediate(acute);Delayed(Chronic)

SARA SECTION 302 CHEMICALS:

CAS#	CHEMICAL NAME
7647-01-0	HYDROCHLORIC ACID

SARA SECTION 313 CHEMICALS:

CAS#	CHEMICAL NAME	RANGE
7647-01-0	HYDROCHLORIC ACID	31.0-40.0%

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 Other information

HMIS vII		CODE TRANSLATION
Health	3	Serious Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	CORR	DOT corrosive
(1) Protective Equipment	D	Goggles, Face Shield, Gloves, Apron

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	12-MAY-2005		** NEW **
	06-JUN-2006	2, 8, 15	12-MAY-2005
	05-MAY-2010	4, 5, 7, 8, 10, 14	06-JUN-2006



SAFETY DATA SHEET

HYPERSPERSE* MDC776

1. Identification

Product identifier HYPERSPERSE MDC776
Other means of identification Not available.
Recommended use Membrane Deposit Control Agent
Recommended restrictions None known.

Company/undertaking identification

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355 3300, F 215 953 5524

Emergency telephone

(800) 877 1940

2. Hazard(s) identification

Physical hazards Not classified.
Health hazards Skin corrosion/irritation Category 2
 Serious eye damage/eye irritation Category 2B
 Specific target organ toxicity, single exposure Category 3 respiratory tract irritation
OSHA defined hazards Not classified.

Label elements



Signal word Warning
Hazard statement Causes skin irritation. Causes eye irritation. May cause respiratory irritation.
Precautionary statement
Prevention Avoid breathing mist or vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves.
Response If on skin: Wash with plenty of water/. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor// if you feel unwell. Specific treatment (see on this label). If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC) None known.
Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
[Hexane-1,6-diylbis(nitrilobis(methyle ne))]tetrakisphosphonic acid, potassium salt		38820-59-6	20 - 40
Dipotassium phosphonate		13492-26-7	2.5 - 10
Potassium chloride		7447-40-7	1 - 2.5

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

Composition comments Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this SDS for our assessment of the potential hazards of this formulation.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.
Eye contact	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
Most important symptoms/effects, acute and delayed	Exposed individuals may experience eye tearing, redness, and discomfort. May cause respiratory irritation. May cause redness and pain.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Fire-fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials. Move containers from fire area if you can do so without risk. Cool containers / tanks with water spray.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of vapors or mists. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid discharge into drains, water courses or onto the ground. Water contaminated with this product may be sent to a sanitary sewer treatment facility, or a permitted waste treatment facility, in accordance with any local agreements.

7. Handling and storage

Precautions for safe handling Avoid breathing mist or vapor. Avoid contact with skin. Avoid contact with eyes. Avoid contact with clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Use care in handling/storage.

Conditions for safe storage, including any incompatibilities Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation. Protect from freezing. If frozen, thaw and mix completely prior to use.

8. Exposure controls/personal protection

Occupational exposure limits No exposure limits noted for ingredient(s).

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Splash proof chemical goggles.

Skin protection

Hand protection

Chemical resistant gloves. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Glove selection must take into account any solvents and other hazards present.

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

Chemical respirator with organic vapor cartridge and full facepiece. A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Color Yellow

Physical state Liquid

Odor None

Odor threshold Not available.

pH (concentrated product) 6.5

Melting point/freezing point 10 °F (-12 °C)

Initial boiling point and boiling range Not available.

Flash point > 212 °F (> 100 °C) SETA(CC)

Evaporation rate < 1 (Ether = 1)

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure 18 mm Hg

Vapor pressure temp. 70 °F (21 °C)

Vapor density	< 1 (Air = 1)
Relative density	1.29
Relative density temperature	70 °F (21 °C)
Solubility(ies)	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	13 cps
Viscosity temperature	70 °F (21 °C)
Other information	
Percent volatile	4 (ASTM 3960-93)
Pour point	15 °F (-9 °C)
Specific gravity	1.29

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials. None under normal conditions.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Oxides of carbon, nitrogen and phosphorus evolved in fire.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Expected to be a low ingestion hazard.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes skin irritation.
Eye contact	Causes eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics May cause redness and pain. May cause respiratory irritation. Exposed individuals may experience eye tearing, redness, and discomfort.

Information on toxicological effects

Acute toxicity May cause respiratory irritation.

Product	Species	Test Results
HYPERSPERSE MDC776		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 5000 mg/kg, (Calculated according to GHS additivity formula)
<i>Oral</i>		
LD50	Rat	> 5000 mg/kg, (Calculated according to GHS additivity formula)
Components	Species	Test Results
[Hexane-1,6-diylbis[nitrilobis(methylene)]tetrakisphosphonic acid, potassium salt (CAS 38820-59-6)]		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 3250 mg/kg

Components	Species	Test Results
Oral LD50 Potassium chloride (CAS 7447-40-7)	Rat	> 4875 mg/kg
Acute Oral LD50	Rat	2600 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes eye irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not available.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)	
	Not listed.
Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure	Not available.
Aspiration hazard	Not available.

12. Ecological information

Ecotoxicity This product is not classified as marine pollutant.

Product	Species	Test Results
HYPERSPERSE MDC776	LC50	Fathead Minnow 2143 mg/L, Static Renewal Bioassay, 96 hour
	NOEL	Fathead Minnow 1000 mg/L, Static Renewal Bioassay, 96 hour
Crustacea	LC50	Daphnia magna 1071 mg/L, Static Renewal Bioassay, 48 hour
	NOEL	Daphnia magna 500 mg/L, Static Renewal Bioassay, 48 hour
Other	LC50	Rainbow Trout 3482 mg/L, Static Renewal Bioassay, 96 hour
	NOEL	Rainbow Trout 2000 mg/L, Static Renewal Bioassay, 96 hour

* Estimates for product may be based on additional component data not shown.

Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.
Environmental fate	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data available

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Material name: HYPERSPERSE* MDC776

Version number: 1.0

Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.
Some containers may be DOT exempt, please check BOL for exact container classification.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

US state regulations

US - Massachusetts RTK - Substance List

Not regulated.

US - Pennsylvania RTK - Hazardous Substances

Not regulated.

US - Rhode Island RTK

Not regulated.

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Developmental toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Female reproductive toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

No ingredient listed.

16. Other information, including date of preparation or last revision

Issue date Nov-02-2014

Revision date Nov-02-2014

Version # 1.0

List of abbreviations CAS: Chemical Abstract Service Registration Number
TWA: Time Weighted Average
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value
LD50: Lethal Dose, 50%
LC50: Lethal Concentration, 50%
NOEL: No Observed Effect Level
COD: Chemical Oxygen Demand
BOD: Biochemical Oxygen Demand
TOC: Total Organic Carbon
IATA: International Air Transport Association
IMDG: International Maritime Dangerous Goods Code
NFPA: National Fire Protection Association
ACGIH: American Conference of Governmental Industrial Hygienists
TSRN indicates a Trade Secret Registry Number is used in place of the CAS number.

References: No data available

Disclaimer The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Information Product and Company Identification: Product and Company Identification
Composition / Information on Ingredients: Ingredients
Physical & Chemical Properties: Multiple Properties
Toxicological Information: Toxicological Data
Ecological Information: Ecotoxicity
Transport Information: Material Transportation Information
Regulatory Information: Hazard Symbol - Labeling
HazReg Data: Europe - EU
GHS: Classification

Prepared by This SDS has been prepared by GE Water & Process Technologies Regulatory Department (1-215-355-3300).

* Trademark of General Electric Company. May be registered in one or more countries.

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

1 Identification

- **Product identifier**
- **Trade name:** ABMET Olympus Culture
- **Relevant identified uses of the substance or mixture and uses advised against**
- **Product description** Treatment for common wastewater organics
- **Application of the substance / the mixture** Biological, industrial and municipal wastewater treatment.
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**
Osprey Biotechnics, Inc.
1833A 57th Street
Sarasota, FL 34243
941-351-2700
- **Emergency telephone number:** Chemtrec 1-800-424-9300 or outside USA 1-703-527-3887

2 Hazard(s) identification

- **Classification of the substance or mixture**
The substance is not classified according to the Globally Harmonized System (GHS).
- **Label elements**
- **GHS label elements** Non-Regulated Material
- **Hazard pictograms** Non-Regulated Material
- **Signal word** Non-Regulated Material
- **Hazard statements** Non-Regulated Material
- **Unknown acute toxicity:**
100 percent of the mixture consists of ingredient(s) of unknown toxicity.
- **Classification system:**
- **NFPA ratings (scale 0 - 4)**



- **HMIS-ratings (scale 0 - 4)**



- **Hazard(s) not otherwise classified (HNOC):** None known

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**
- **Description:** Mixture of substances listed below with nonhazardous additions.
- **Dangerous Components:**
144-55-8 Sodium Hydrogencarbonate 90-99%

4 Exposure controls

- **Description of first aid measures**
- **General information:** No special measures required.
- **After inhalation:** Supply fresh air; consult doctor in case of complaints.
- **After skin contact:** Generally the product does not irritate the skin.
- **After eye contact:** Rinse opened eye for several minutes under running water.

(Contd. on page 2)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

- **After swallowing:** If swallowed and symptoms occur, consult a doctor.
- **Information for doctor:**
- **Most important symptoms and effects, both acute and delayed:** No further relevant information available.
- **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

* 8 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture**
If incinerated, product will release the following: Carbon Oxides and Sodium Oxides.
- **Advice for firefighters**
- **Protective equipment:**
As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

* 9 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
Avoid breathing dust.
Avoid formation of dust.
Wear dust mask
- **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
- **Methods and material for containment and cleaning up:**
Dispose of the collected material according to regulations.
- **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

- **Handling:**
- **Precautions for safe handling** No special measures required.
- **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
Store away from strong acids, strong oxidizing agents and moisture (water).
- **Storage:**
- **Requirements to be met by storerooms and receptacles:** No special requirements.
- **Information about storage in one common storage facility:** Not required.
- **Further information about storage conditions:** None.
- **Specific end use(s)** No further relevant information available.

- **Additional information about design of technical systems:** No further data; see section 7.

- **Control parameters**
All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use local exhaust at filling zones and where leakage and dust formation is probable. Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure Limits in Air below TLV & PEL limits.

(Contd. on page 3)

Safety Data Sheet (SDS)

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- **Components with occupational exposure limits:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
- **Additional information:** The lists that were valid during the creation of this SDS were used as basis.
- **Exposure controls**
- **Personal protective equipment:**
- **General protective and hygienic measures:** No special measures required.
- **Breathing equipment:**



Dust mask

- **Protection of hands:** Not required.
- **Material of gloves:** Not required.
- **Penetration time of glove material:** Not applicable.
- **Eye protection:**
Not required.
If working in conditions where dust may form, safety glasses/goggles are recommended.

Physical and Chemical properties

- **Information on basic physical and chemical properties**
- **General Information**
- **Appearance:**

Form:	Powder
Color:	Light brown
Odor:	Sweet
Odor threshold:	Not determined.
pH-value @ 20 °C (68 °F):	8.1
- **Change in condition**

Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
- **Flash point:** Not applicable.
- **Flammability (solid, gaseous):** Not determined.
- **Ignition temperature:**

Decomposition temperature:	Not determined.
----------------------------	-----------------
- **Auto igniting:** Product is not self-igniting.
- **Danger of explosion:** Product does not present an explosion hazard.
- **Explosion limits:**

Lower:	Not determined.
Upper:	Not determined.
- **Vapor pressure:** Not applicable.
- **Density @ 20 °C (68 °F):** 2.2 g/cm³ (18.359 lbs/gal)
- **Bulk density @ 20 °C (68 °F):** 700-1.15 kg/m³
- **Relative density:** Not determined.
- **Vapor density:** Not applicable.

(Contd. on page 4)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

- **Evaporation rate** Not applicable.
- **Solubility in / Miscibility with Water @ 20 °C (68 °F):** 95 g/l
- **Partition coefficient (n-octanol/water):** Not determined.
- **Viscosity:**
 - Dynamic:** Not applicable.
 - Kinematic:** Not applicable.
- **Solvent content:**
 - Organic solvents:** 0.0 %
 - Solids content:** 100.0 %
- **Other information** No further relevant information available.

9 Stability and reactivity

- **Reactivity** No further relevant information available.
- **Chemical stability** Stable under normal conditions.
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** Strong acids and strong oxidizing agents.
- **Hazardous decomposition products:** Carbon Oxides and Sodium Oxides.

10 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**
- **LD/LC50 values that are relevant for classification:**
 - 144-55-8 Sodium Hydrogencarbonate**
 - Oral LD50 4220 mg/kg (rat)
- **Primary irritant effect:**
 - on the skin:** No irritating effect.
 - on the eye:** No irritating effect.
- **Additional toxicological information:**

The product is not subject to classification according to internally approved calculation methods for preparations:
When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.
- **Carcinogenic categories**
- **IARC (International Agency for Research on Cancer)**

Substance is not listed.
None of the ingredients are listed.
- **NTP (National Toxicology Program)**

None of the ingredients are listed.
- **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients are listed.

(Contd. on page 5)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

* **11. Other information**

- **Toxicity** The hazards for the aquatic environment are unknown.
- **Aquatic toxicity:** No further relevant information available.
- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
- **Bioaccumulative potential** No further relevant information available.
- **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
- **General notes:** Not known to be hazardous to water.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

* **12. Disposal considerations**

- **Waste treatment methods**
- **Recommendation:**
Small quantities can be disposed of with household waste.
Recycle or dispose with household trash.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

* **13. Transport information**

- **UN-Number**
- **DOT, ADR, ADN, IMDG, IATA** Non-Regulated Material
- **UN proper shipping name**
- **DOT, ADR, ADN, IMDG, IATA** Non-Regulated Material
- **Transport hazard class(es)**
- **DOT, ADR, ADN, IMDG, IATA**
- **Class** Non-Regulated Material
- **Packing group**
- **DOT, ADR, IMDG, IATA** Non-Regulated Material
- **Environmental hazards:** Not applicable.
- **Special precautions for user** Not applicable.
- **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.
- **UN "Model Regulation":** -

* **14. Regulatory information**

- **Safety, health and environmental regulations/legislation specific for the substance or mixture**
- **Sara**
- **Section 355 (extremely hazardous substances):**
None of the ingredients are listed.
- **Section 313 (Specific toxic chemical listings):**
None of the ingredients are listed.

(Contd. on page 6)

Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

- **TSCA (Toxic Substances Control Act):**
 - 144-55-8 Sodium Hydrogencarbonate
- **California Proposition 65**
- **Chemicals known to cause cancer:**
None of the ingredients are listed.
- **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients are listed.
- **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients are listed.
- **Chemicals known to cause developmental toxicity:**
None of the ingredients are listed.
- **Carcinogenic categories**
- **EPA (Environmental Protection Agency)**
None of the ingredients are listed.
- **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients are listed.
- **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients are listed.
- **GHS label elements** Non-Regulated Material
- **Hazard pictograms** Non-Regulated Material
- **Signal word** Non-Regulated Material
- **Hazard statements** Non-Regulated Material
- **National regulations:**
The product is subject to be classified according with the latest version of the regulations on hazardous substances.
- **State Right to Know**
 - 144-55-8 Sodium Hydrogencarbonate 90-99%
 - Trade Secret ≤ 2.5%All ingredients are listed.
- **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

The information and recommendations in this safety data sheet are, to the best of our knowledge, accurate as of the date of issue. Nothing herein shall be deemed to create warranty, expressed or implied and shall not establish a legally valid contractual relationship. It is the responsibility of the user to determine applicability of this information and the suitability of the material or product for any particular purpose.

· **Date of preparation / last revision** 05/06/2015 / -

· **Abbreviations and acronyms:**

ADR: The European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN: The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)

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Safety Data Sheet (SDS)

OSHA HazCom Standard 29 CFR 1910.1200(g) and GHS Rev 03.

Reviewed on 05/06/2015

NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

** Data compared to the previous version altered.*



Alternate ID No.:
GE008

GE
Water & Process Technologies

Material Safety Data Sheet

Issue Date: 01-JUN-2006
Supercedes: 01-JUN-2006

ACETIC ACID CMD

1 Identification of Product and Company

Identification of substance or preparation
ACETIC ACID CMD

Product Application Area
Commodity chemical

Company/Undertaking Identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355-3300, F 215 953 5524

Emergency Telephone
(800) 877-1940

Prepared by Product Stewardship Group: 215 355-3300

2 Composition / Information On Ingredients

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

Cas#	Chemical Name	Range (w/w%)
64-19-7	ACETIC ACID Combustible; corrosive	60-100

3 Hazards Identification

EMERGENCY OVERVIEW

DANGER

Corrosive to skin. Corrosive to the eyes. Vapors, gases, mists and/or aerosols cause irritation to the upper respiratory tract.

DOT hazard: Corrosive to skin/steel
Odor: Pungent; Appearance: Colorless, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; Corrosive to skin.

ACUTE EYE EFFECTS:

Corrosive to the eyes.

ACUTE RESPIRATORY EFFECTS:

Primary route of exposure; Vapors, gases, mists and/or aerosols cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

May cause severe irritation or burning of mouth, throat, and gastrointestinal tract with severe chest and abdominal pain, nausea, vomiting, diarrhea, lethargy and collapse. Possible death when ingested in very large doses.

TARGET ORGANS:

Prolonged or repeated exposures may cause tissue necrosis.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

Inhalation may cause irritation of mucous membranes and respiratory tract. Skin contact causes severe irritation or burns.

4 First Aid Measures

SKIN CONTACT:

URGENT! Wash thoroughly with soap and water. Remove contaminated clothing. Get immediate medical attention. Thoroughly wash clothing before reuse.

EYE CONTACT:

URGENT! Immediately flush eyes with plenty of low-pressure water for at least 20 minutes while removing contact lenses. Hold eyelids apart. Get immediate medical attention.

INHALATION:

Remove to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get immediate medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

Material is corrosive. It may not be advisable to induce vomiting. Possible mucosal damage may contraindicate the use of gastric lavage.

5 Fire Fighting Measures

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

elemental oxides

FLASH POINT:

131F 55C P-M(CC)

MISCELLANEOUS:

Corrosive to skin/steel

UN 2790;Emergency Response Guide #153

6 Accidental Release Measures

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 Handling & Storage

HANDLING:

Corrosive to skin. Corrosive to eyes.

STORAGE:

Keep containers closed when not in use. Keep away from flames or sparks. Bond containers during filling or discharge when performed at temperatures at or above the product flash point.

8 Exposure Controls / Personal Protection

EXPOSURE LIMITS

CHEMICAL NAME

ACETIC ACID

PEL (OSHA): 10 PPM

TLV (ACGIH): 10 PPM(15PPM-STEL)

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE. USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS. If air-purifying respirator use is appropriate, use a respirator with organic vapor cartridges.

SKIN PROTECTION:

gauntlet-type neoprene gloves, chemical resistant apron--

Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles, face shield

9 Physical & Chemical Properties

Specific Grav.(70F,21C)	1.073	Vapor Pressure (mmHG)	12.0
Freeze Point (F)	19	Vapor Density (air=1)	> 1.00
Freeze Point (C)	-7		
Viscosity(cps 70F,21C)	5	% Solubility (water)	100.0

Odor	Pungent
Appearance	Colorless
Physical State	Liquid
Flash Point	P-M(CC) 131F 55C
pH As Is (approx.)	1.0
Evaporation Rate (Ether=1)	< 1.00
Percent VOC:	80.0

NA = not applicable ND = not determined

10 Stability & Reactivity

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with bases or strong oxidizers.

DECOMPOSITION PRODUCTS:

elemental oxides

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"C"

11 Toxicological Information

Oral LD50 RAT:	3,310 mg/kg
NOTE - Value is for 100% active.	
Dermal LD50 RABBIT:	1,060 mg/kg
NOTE - Value is for 100% active.	
Inhalation LC50 MOUSE:	5,620 ppm/hr
NOTE - Value is for 100% active. Rat inhalation LC50 100% active:	
16,000 ppm/hr.	
Skin Irritation Score RABBIT:	8
NOTE - Value is for 100% active.	
Eye Irritation Score RABBIT:	110
NOTE - Value is for 100% active.	
Skin Sensitization UNKNOWN:	POSITIVE

12 Ecological Information

AQUATIC TOXICOLOGY

No Data Available.

BIODEGRADATION

No Data Available.

13 Disposal Considerations

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
D001=Ignitable;D002=Corrosive(pH, steel).

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 Transport Information

DOT HAZARD: Corrosive to skin/steel
PROPER SHIPPING NAME: ACETIC ACID SOLUTION
8, UN 2790, PG II

DOT EMERGENCY RESPONSE GUIDE #: 153

Note: Some containers may be DOT exempt, please check BOL for exact container classification

15 Regulatory Information

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

699 gallons due to ACETIC ACID;

SARA SECTION 312 HAZARD CLASS:

Immediate (acute); Delayed (Chronic); Fire

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 Other Information

NFPA/HMIS		CODE TRANSLATION
Health	3	Serious Hazard
Fire	2	Moderate Hazard
Reactivity	0	Minimal Hazard
Special	CORR	DOT corrosive
(1) Protective Equipment	D	Goggles, Face Shield, Gloves, Apron

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
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MSDS status: 28-FEB-2001
01-JUN-2006 8

** NEW **
28-FEB-2001



SAFETY DATA SHEET

CORTROL* IS104

1. Identification

Product identifier CORTROL IS104
Other means of identification Not available.
Recommended use Oxygen scavenger
Recommended restrictions None known.

Company/undertaking identification

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355 3300, F 215 953 5524

Emergency telephone

(800) 877 1940

2. Hazard(s) identification

Physical hazards Not classified.
Health hazards Serious eye damage/eye irritation Category 2B
Specific target organ toxicity, single exposure Category 3 respiratory tract irritation
OSHA defined hazards Not classified.

Label elements



Signal word Warning
Hazard statement Causes eye irritation. May cause respiratory irritation.

Precautionary statement

Prevention Avoid breathing mist or vapor. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area.
Response If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor// if you feel unwell. If eye irritation persists: Get medical advice/attention.
Storage Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Potassium sulfite		10117-38-1	40 - 60

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

Composition comments Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this SDS for our assessment of the potential hazards of this formulation.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
Most important symptoms/effects, acute and delayed	Exposed individuals may experience eye tearing, redness, and discomfort. May cause respiratory irritation.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire-fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of vapors or mists. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid breathing mist or vapor. Avoid contact with eyes. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Use care in handling/storage.
Conditions for safe storage, including any incompatibilities	Protect from freezing. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS). Store in accordance with local/regional/national/international regulation.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
-------------------------------------	---

Material name: CORTROL* IS104

Version number: 1.0

Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Splash proof chemical goggles.
Skin protection	
Hand protection	Chemical resistant gloves. The choice of an appropriate glove does not only depend on its material but also on other quality features and is different from one producer to the other. Glove selection must take into account any solvents and other hazards present.
Other	Wear suitable protective clothing. Use of an impervious apron is recommended.
Respiratory protection	Chemical respirator with organic vapor cartridge and full facepiece. A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Color	Colorless to light yellow
Physical state	Liquid
Odor	Slight
Odor threshold	Not available.
pH (concentrated product)	9.7
pH in aqueous solution	9 (5% SOL.)
Melting point/freezing point	< -30 °F (< -34 °C)
Initial boiling point and boiling range	226 °F (108 °C)
Flash point	> 200 °F (> 93 °C) P-M(CC)
Evaporation rate	< 1 (Ether = 1)
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	18 mm Hg
Vapor pressure temp.	70 °F (21 °C)
Vapor density	< 1 (Air = 1)
Relative density	1.46
Relative density temperature	70 °F (21 °C)
Solubility(ies)	
Solubility (water)	100 %
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	7 cps
Viscosity temperature	70 °F (21 °C)

Other information	
Percent volatile	0 (SUPPLIER DATA)
Pour point	< -30 °F (< -34 °C)
Specific gravity	1.46

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Contact with water reactive compounds may cause fire or explosion.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials. None under normal conditions.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	Oxides of sulfur.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Expected to be a low ingestion hazard.
Inhalation	May cause irritation to the respiratory system.
Skin contact	May cause irritation.
Eye contact	Causes eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	May cause respiratory irritation. Exposed individuals may experience eye tearing, redness, and discomfort.

Information on toxicological effects

Acute toxicity	May cause respiratory irritation.
-----------------------	-----------------------------------

Product	Species	Test Results
CORTROL IS104 (CAS Mixture)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 2000 mg/kg, (Estimated value)
<i>Oral</i>		
LD50	Rat	> 1000 mg/kg, (Estimated value)
Components	Species	Test Results

Potassium sulfite (CAS 10117-38-1)

Acute

Dermal

LD50

Rat

> 2000 mg/kg

Inhalation

LC50

Rat

> 5.5 mg/l, 4 Hour

Oral

LD50

Rat

> 2000 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Prolonged skin contact may cause temporary irritation.
Serious eye damage/eye irritation	Causes eye irritation.
Respiratory or skin sensitization	
Respiratory sensitization	Not available.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Product		Species	Test Results
CORTROL IS104 (CAS Mixture)	LC50	Fathead Minnow	1760 mg/L, Static Renewal Bioassay, 96 hour
	NOEL	Fathead Minnow	1250 mg/L, Static Renewal Bioassay, 96 hour
Crustacea	0% Mortality	Daphnia magna	1000 mg/L, Static Screen, 48 hour
	50% Mortality	Daphnia magna	2000 mg/L, Static Screen, 48 hour

* Estimates for product may be based on additional component data not shown.

Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.
Environmental fate	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT	Not regulated as dangerous goods. Some containers may be DOT exempt, please check BOL for exact container classification.
IATA	Not regulated as dangerous goods.
IMDG	Not regulated as dangerous goods.

15. Regulatory information

US federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.
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TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

Food and drug administration ALL ingredients in this product are authorized in 21CFR173.310 for use as boiler water additives where the steam may contact food.

NSF Registered and/or meets USDA (according to 1998 guidelines): Registration No. - 141466
Category Code(s): G5 Cooling and retort water treatment products
G6 Boiler treatment products, steam line products - food contact

US state regulations California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - Massachusetts RTK - Substance List

Not regulated.

US - Pennsylvania RTK - Hazardous Substances

Not regulated.

US - Rhode Island RTK

Not regulated.

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Developmental toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Female reproductive toxin

No ingredient listed.

US - California Proposition 65 - CRT: Listed date/Male reproductive toxin

No ingredient listed.

16. Other information, including date of preparation or last revision

Issue date Oct-22-2014

Revision date Oct-22-2014

Version # 1.0

List of abbreviations CAS: Chemical Abstract Service Registration Number
TSRN indicates a Trade Secret Registry Number is used in place of the CAS number.
ACGIH: American Conference of Governmental Industrial Hygienists
NOEL: No Observed Effect Level
STEL: Short Term Exposure Limit
LC50: Lethal Concentration, 50%
TWA: Time Weighted Average
BOD: Biochemical Oxygen Demand
COD: Chemical Oxygen Demand
TOC: Total Organic Carbon
IATA: International Air Transport Association
IMDG: International Maritime Dangerous Goods Code
TLV: Threshold Limit Value
LD50: Lethal Dose, 50%
NFPA: National Fire Protection Association

References: No data available

Disclaimer The information in the sheet was written based on the best knowledge and experience currently available. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Information Product and Company Identification: Product and Company Identification
Transport Information: Material Transportation Information
Regulatory Information: Risk Phrases - Labeling
GHS: Classification

Prepared by This SDS has been prepared by GE Water & Process Technologies Regulatory Department (1-215-355-3300).

* Trademark of General Electric Company. May be registered in one or more countries.

Evoqua Safety Data Sheets



- Chemicals:
 - Zero valent iron (ZVI): is the reactant media that is used for removal of selenium, arsenic, mercury, and other heavy metals and oxyanions.
 - Conditioning agent (ferrous chloride): used to condition the ZVI.
 - Conditioning agent (sodium nitrate or peroxide): used during start-up.
 - Polymer: used to flocculate the ferric hydroxide solids that are generated in the oxidation tank.
 - pH adjust (sodium hydroxide): is used to adjust pH in the oxidation tank to allow for the precipitation of soluble iron generated by the Pironox reactors.

Please note that the chemicals above are not part of EPA's 126 priority pollutant list.

<https://www.epa.gov/sites/production/files/2015-09/documents/priority-pollutant-list-epa.pdf>

- One (1) safety shower. This station is located near the chemical handling areas and includes a flow switch which alarms upon activation, an eyewash function, and a shower deluge function.



DATE ISSUED: 6/13

MSDS: Ferox Target ZVI Reactive Iron Powder

1. PRODUCT DATA

Chemical Name:	Iron
Chemical Data	Melting Point 1536 C
Bulk Density:	2.4 g/cm ³
Appearance:	Gray color
Synonym:	Cast Iron Powder
Chemical Formula:	Fe

2. CAS NUMBER

Iron Powder fall under	
CAS Number as:	7439-89-6+

3. FIRE/EXPLOSION HAZARDS

Iron is not a flammable product under most conditions. Avoid airborne dispersion of any fine powder in an enclosed area to reduce potential dust ignition.

4. EXTINGUISH MEDIA

Dry chemical, sand, graphite to smother fire. Use water only in mist/fog application to avoid spreading powder/acclimated dust in surrounding area.

5. HAZARDS IDENTIFICATION

Irritating to the skin and eyes on contact. Inhalation will cause irritation to lungs and mucus membrane. Irritation to eyes will cause watering and redness. Reddening, scaling and itching are characteristics of skin inflammation. Follow safe industrial hygiene practices.

6. CHRONIC HEALTH EFFECTS

This product has no known chronic effects.

7. CARCINOGENICITY

This product is not carcinogen.

8. FIRST AID FOR EYES

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

9. FIRST AID FOR SKIN

In case of contact, flush skin with water. Wash clothes before reuse. Call a physician if irritation occurs.

10. FIRST AID FOR INHALATION

If inhaled, move to fresh air. If not breathing, give artificial respiratory. If breathing is difficult, give oxygen. Call a physician.

11. FIRST AID IN INGESTION

If swallowed, call a physician immediately.

12. FIRE AND EXPLOSION DATA

Flammability:	Non-flammable
Flash Point:	Not applicable
Extinguishing Media:	Water spray or choose extinguishing agent most suitable for type of surrounding fire.

13. FIRE FIGHTING PROCEDURE

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

14. FIRE/EXPLOSION HAZARDS

Fire and explosion hazards are moderate when the material is in the form of a dust and exposed to heat, flames, and chemical reaction or contact with powerful oxidizer.

15. HANDLING AND STORAGE

Special Sensitivity:	None
Storage Temperature:	Ambient temperature

16. DISPOSAL CONSIDERATIONS

Waste disposal should be in accordance with existing federal, state and local environmental regulations.

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. State and local disposal regulations may differ from federal disposal regulations.

- Unused (virgin) iron should be disposed of as a non-hazardous waste. Dispose of container and unused contents in accordance with federal, state and local requirements.
- Used or contaminated iron may change the waste management options. Test used/contaminated iron to determine proper waste characterization and disposal requirements.

17. TRANSPORTATION INFORMATION

Proper Shipping Name:	Cast Iron Powder
H.S. Code :	72052910
UN Number:	Not Applicable
Class:	Not Applicable
P.G.:	Not Applicable
Label:	Not Applicable

18. INFORMATION

The product contains no chemicals. Even though reasonable care has been taken during the preparation of the document, we also extend no warranties and make no representations as to the completeness of the information contained and assume no responsibility regarding the suitability of this information. Each person should determine the suitability of this information for their specific needs.

Hepure Technologies, Inc.
63 Main Street, Suite 203B
Flemington, NJ 08822

MATERIAL SAFETY DATA SHEET

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

Product identifier: FERROUS CHLORIDE- Solution

Typical product use: Water and wastewater treatment, treatment of industrial waste water, chrome reduction.

Supplier name and address:

California Water Technologies

8851 Dice Rd.
Santa Fe Springs, CA 90670 USA
866-337-7427

Manufacturer's name and address:

Refer to supplier

Distributed By: PVS NOLWOOD CHEMICALS, INC. 10900 Harper Avenue Detroit, MI, 48213 (313) 925-0300	
PVS ITEM #	PVS MSDS #
10248	0237

CONTROLLED DOCUMENT
IF STAMPED IN RED

24 Hour Transportation Emergency Telephone #: (800) 424-9300 (Chemtrec)

SECTION 2 — HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Greenish yellow liquid, slight iron / acid odor.

Danger! Corrosive material. Causes burns. Reacts with metals to release flammable hydrogen gas.
May be harmful or fatal if swallowed in large amounts. Effects may be delayed.

POTENTIAL HEALTH EFFECTS

Target organs: Eyes, skin, respiratory system, digestive system.

Signs and symptoms of short-term (acute) exposure:

- Inhalation:** Vapors and mists may be corrosive or irritating to the nose, throat and respiratory tract. Symptoms may include burning sensation, coughing, shortness of breath, lung inflammation and pulmonary edema (fluid accumulation).
- Skin contact:** Vapors, mists and liquids may cause severe irritation and/or corrosive burns to the skin. Symptoms may include dryness, discomfort or rash, deep burns and tissue damage.
- Eye contact:** Direct eye contact may cause severe irritation, tearing, blurred vision, corrosive burns, severe damage, eye injury and permanent blindness.
- Ingestion:** Vapors, mists and liquids are corrosive to the mouth, throat and digestive system. Ingestion may result in abnormal liver and kidney function. Symptoms may include nausea, vomiting, pain, diarrhea, coma and death. Effects may be delayed by up to three days.

Effects of long-term (chronic) exposure: Chronic skin contact with low concentrations may cause dermatitis.

Other important hazards: Eye contact may cause eye tissue discoloration. For further information on other important hazards, see TOXICOLOGICAL INFORMATION, Section 11.

SECTION 3 — COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients	CAS #	% (weight)	LC ₅₀ (rat, inh) (mg/m ³ / 4hr)	LD ₅₀ (mg/kg)	
				rat, oral	dermal, rabbit
Ferrous chloride	7758-94-3	16 – 37	not available	900	>2000
Hydrochloric Acid	7647-01-0	< 6	not available	-----not available-----	
Water	7732-18-5	63 – 84	not available	90 ml/Kg	not available

SECTION 4 — FIRST AID MEASURES

- Inhalation:** Immediately remove person to fresh air. If breathing stops, provide rescue breathing. If breathing is difficult, administer oxygen by qualified medical personnel only. Obtain medical attention.
- Skin contact:** Flush immediately with water for at least 30 minutes, while removing contaminated clothing under running water. Obtain immediate medical attention. Wash clothing before reuse.
- Eye contact:** Immediately flush with water for at least 30 minutes. Obtain immediate medical attention.
- Ingestion:** If swallowed, DO NOT induce vomiting. Have victim rinse mouth with water, then give victim one to two glasses of water to drink. Never give anything by mouth to an unconscious person. Obtain immediate medical attention.

SECTION 5 — FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability: This material is not considered to be flammable. Product may release small amounts of flammable Hydrogen gas on contact with metals. Closed containers may rupture if exposed to excess heat or flame, due to a build-up of internal pressure.

Flash point (Method): Not Applicable

Auto-ignition temperature: Not Applicable

Lower flammable limit (% by volume): Not Applicable

Upper flammable limit (% by volume): Not Applicable

Explosion data: *Sensitivity to mechanical impact / static discharge:* Not Applicable

Oxidizing properties: Data not available

Suitable extinguishing media: Use water spray, water fog, alcohol resistant foam, dry chemicals, CO₂ or other agents as appropriate for surrounding fires.

Special fire-fighting procedures/equipment: Firefighters should wear proper protective equipment and a self-contained breathing apparatus. Move containers from fire area if it can be done without risk. Water spray may be useful in cooling equipment and containers exposed to heat and flame.

Hazardous combustion products: May release toxic fumes of Hydrogen Chloride gas in a fire.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions: Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate protective equipment including self-contained breathing apparatus and boots. Keep all other personnel upwind and away from the spill/release.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. Dike far ahead of the spill for later recovery or disposal.

Spill response/Cleanup: Ventilate area of release. Stop leak if you can do so without risk. Neutralize spill with lime or soda ash. Absorb neutralized spill with inert absorbent material, then place absorbent material into a suitable, labeled container for later disposal (see Section 13). Flush spill area with water, in accordance with applicable regulations, to waste treatment system. Notify the appropriate authorities as required.

Reportable Quantity: Spills over 100 dry pounds (45.4Kg) must be reported to National Response Center (800) 424-8802.

SECTION 7 — HANDLING AND STORAGE

Safe handling procedures: This material is corrosive. Wear appropriate chemically protective equipment. Use in a well ventilated area with proper engineering controls. Avoid inhalation of vapors. Avoid contact with skin, eyes and clothing. Keep away from heat and flame. Keep away from metals and other incompatible materials. Protect container from physical damage. Do not strike containers or fittings with tools or hard objects. Keep container closed and dry. Wash thoroughly after handling. Emptied container may retain vapor and product residue.

Storage requirements: Store in a cool, dry, well-ventilated area away from all sources of heat and incompatible materials. Storage area should be clearly identified, clear of obstruction, and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks.

Incompatible materials: Oxidizing agents, metals, strong bases, reducing agents, alcohols, sulfides, monomers (e.g. Styrene).

Special packaging materials: Always keep in containers made of the same materials as the supply container.

SECTION 8 — EXPOSURE CONTROLS / PERSONAL PROTECTION

Permissible exposure levels:

Ingredient name:	OSHA PEL	ACGIH TLV
Ferrous chloride	*1 mg/m ³ (final rule / vacated limit)	*1 mg/m ³

*Note: The OSHA PEL's and ACGIH TLV's listed above for Ferric chloride are for "Iron salts, soluble, as Fe".

Ventilation and engineering controls: Provide good general room ventilation to minimize exposure to vapors or mists. Local exhaust ventilation may be required in order to meet TLV requirements.

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SECTION 8 — EXPOSURE CONTROLS / PERSONAL PROTECTION- Continued

Respiratory protection: Respiratory protection is required if the airborne concentration exceeds the TLV. NIOSH-approved full face respirators are recommended depending on the airborne concentration levels. Advice should be sought from respiratory protection specialists.

Protective gloves: Gloves impervious to the material must be worn. Confirmation of what type of material is most suitable for the intended application, should be obtained from glove suppliers.

Eye protection: Chemical splash goggles to prevent direct contact or injury. Do not wear contact lenses.

Other protective equipment: Wear protective clothing to minimize skin contact. Full-face shield, rubber footwear, acid-resistant hood and full-body suit recommended as appropriate. An eyewash station and safety shower should be made available in the immediate working area. Other equipment may be required depending on workplace standards.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical form, color and odor: Greenish yellow liquid, slight iron/acid odor

Odor threshold: Not Available

Boiling point: >212 °F (>100 °C)

Specific gravity (water=1): 1.200 @ 17.5°C (20% solution).

Coefficient of oil/water distribution: Not Available

Solubility in water (%): Complete

Volatile organic compounds (VOC's): Not Applicable

pH: < 2.0.

Evaporation rate (nBuAC=1): <1

Melting/freezing point: -58°F (20% solution)

Vapour pressure: Negligible.

Vapour density (Air=1): Not Applicable

Percent Volatile by Weight: Not Available

SECTION 10 — STABILITY AND REACTIVITY

Stability and reactivity: Stable under the recommended storage and handling conditions prescribed. Product may release small amounts of flammable Hydrogen gas on contact with metals. Hazardous polymerization will not occur.

Conditions to avoid: Avoid contact with incompatible materials, heat and flame. Material is acidic and corrodes most metals.

Materials to avoid: Incompatible materials (see Section 7).

Hazardous decomposition products: . Product may release small amounts of flammable Hydrogen gas on contact with metals

SECTION 11 — TOXICOLOGICAL INFORMATION

Routes of exposure: Skin contact, eye contact, inhalation and ingestion.

Toxicological data: There is no available data for the product itself, only for the ingredients. See Section 2 for ingredient LD₅₀ and LC₅₀ data.

Carcinogenicity: None of the listed ingredients are classified as carcinogenic by IARC or ACGIH.

Teratogenicity, mutagenicity, other reproductive effects: None known.

Sensitization to material: No skin or respiratory sensitization effects are known.

Synergistic materials: Not Available.

Conditions aggravated by exposure: None known.

SECTION 12 — ECOLOGICAL INFORMATION

Environmental effects: The product should not be allowed to enter drains or water courses or be deposited where it can affect ground or surface waters.

Important environmental characteristics: Not Available

Aquatic toxicity: Chronic Toxicity Daphnia Magna 130 ppm.

SECTION 13 — DISPOSAL CONSIDERATIONS

Handling for disposal: Handle waste according to recommendations in Section 7. Do not allow waste product or container to contaminate waterways.

Methods of disposal: Containers should be disposed of in accordance with all applicable federal, state, and local regulations

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SECTION 14 — TRANSPORT INFORMATION

Department of Transportation (DOT) Information:

Proper Shipping Name: FERROUS CHLORIDE, SOLUTION
UN No.: UN1760
Primary Class(es): 8
Subsidiary Class(es): None
Packing Group: II
Label: Corrosive

Other Shipping Information: Emergency Guidebook Number 154.

SECTION 15 — REGULATORY INFORMATION

U.S. Federal Regulations:

OSHA: This product is hazardous by definition of Hazard Communication Standard (29CFR1910.1200).

SARA TITLE III (Superfund Amendments and Reauthorization Act of 1986)

Section 311/312 Hazard and Physical Hazards:

Immediate	yes
Delayed	yes
Fire:	no
Pressure:	no
Reactivity:	no

CERCLA/SUPERFUND (40 CFR 117, 302)

<u>Ingredient</u>	<u>RQ (Reportable Quantity)</u>
ferrous chloride, solution	100 pounds, anhydrous basis

RCRA: If discarded in its purchased form, this product would be a hazardous waste by characteristic. Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. This product contains no Class I or Class II Ozone Depleting Chemicals

TSCA: All compounds contained in this product are in the TSCA inventory

DOT: Please see Section 14.

SECTION 16 — OTHER INFORMATION

The following label hazard ratings are recommended for containers of Ferrous Chloride, Solution:
(Hazard Index Key: 4 = severe; 3 = serious; 2 = moderate; 1 = slight; 0 = minimal)

<u>NFPA</u>		<u>HMIS</u>	
Health	3	Health	3
Flammability	0	Flammability	0
Reactivity	0	Reactivity	0

Prepared by: California Water Technologies

Telephone No. 866-337-7427

Preparation date: November 07, 2011.

Revision information: - Formatting changes. No content changes.

END OF DOCUMENT

Document Number.: CW016	Page 4 of 4	Revision No.: 3	Revision Date: 11/07/2011
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SQM North America Corp. – Sodium Nitrate

Material Safety Data Sheet

SECTION I

IDENTIFICATION

CHEMICAL NAME Sodium Nitrate	CHEMICAL SYNONYMS Soda Niter Chile Saltpeter	CAS. NO. 7631-99-4
CHEMICAL FAMILY Nitrates	DESCRIPTION White Solid Prills (Pellets)	PERCENT (MIN.) 98.0 (Ind); 99.0 (Tech); 99.4 (Refined)
CHEMICAL FORMULA NaNO ₃	GRADE Industrial/Technical/Refined - NITEROX	MOL. WT. 85.01

SECTION II

MANUFACTURERS INFORMATION

MANUFACTURERS NAME Sociedad Quimica y Minera de Chile, S.A., Santiago, Chile	EMERGENCY TELEPHONE NUMBERS Chemtrec 1-800-424-9300; SQM North America 770-916-9400	
ADDRESS SQM North America Corp. 3101 Towercreek Parkway, Suite 450 Atlanta, GA 30339	FOR INFORMATION Phone: 770-916-9400 Fax: 770-916-9401	
	DATA PREPARED May 4, 1989	REVISED September 10, 1999

SECTION III

INGREDIENTS INFORMATION

COMPONENT Sodium Nitrate	OSHA PEL No Information Available	ACGIH TLV None Established	OTHER LIMITS RECOMMENDED No information Available	SIGNIFICANT EFFECTS None Established
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SECTION IV

FIRE AND EXPLOSION DATA

FLASH POINT (METHOD USED) Not Applicable	FLAMMALBE LIMITS No Information available	OSHA CLASSIFICATION Class 1 Oxidizer
FLAMMABLE EXPLOSIVE LIMITS Upper Limits: Not Applicable Lower Limits: Not Applicable	EXTINGUISHING MEDIA Small Fires: Dry chemical, CO ₂ , water spray or foam Large Fires: Water spray, fog or foam	
SPECIAL FIRE FIGHTING PROCEDURES Remove containers from fire if possible without risk. Cool containers exposed to flames with water. Use NIOSH/MSHA approved self-contained breathing apparatus where this material is involved in a fire.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Oxidizer. Keep away from reducing agents, will explode if heated to 1,000°F in presence of reducing agents, organic materials or mixed with cyanides. Yields gaseous oxides when heated above melting point (306.8°C).		

SECTION V

HEALTH HAZARD DATA

HEALTH HAZARDS ACUTE EXPOSURE Toxic by ingestion, content in cured meats, fish and other food products restricted.	CHRONIC EXPOSURE Not Applicable
CARCINOGENICITY Sodium Nitrate has not been directly implicated as a carcinogen. A constant oral intake of nitrate containing foods or water could lead to formation of carcinogenic N-Nitroso compounds.	SYMPTOMS OF OVEREXPOSURE Not Applicable
EMERGENCY FIRST AID PROCEDURES	
SKIN Not Applicable	EYES Flush with water.
INGESTION Drink water, induce vomiting by sticking finger down throat, and call a physician.	INHALATION Not Applicable

SQM North America Corp. – Sodium Nitrate

SECTION VI

TOXICOLOGY

ACUTE ORAL LD 50 4.3 g/kg (Rats)	CARCINOGENIC Not known to be carcinogenic	PRINCIPLE ROUTES OF ABSORPTION Not Applicable
ACUTE DERMAL LD 50 Not Determined	MUTAGENIC Not known to be mutagenic	EFFECTS OF ACUTE EXPOSURE Not Applicable
ACUTE INHALATION LC 50 Not Determined	EYE/SKIN IRRITATION May be an irritant	EFFECTS OF CHRONIC EXPOSURE None expected at industrial use levels

SECTION VII

REACTIVITY DATA

STABILITY (UNDER NORMAL CONDITIONS) Stable <input checked="" type="checkbox"/> Unstable <input type="checkbox"/>	HAZARDOUS DECOMPOSITION Produces oxides of nitrogen.
HAZARDOUS POLNERIZATION May Occur <input type="checkbox"/> Will Not Occur <input checked="" type="checkbox"/>	INCOMPATIBILITY (MATERIALS TO AVOID) Avoid contact with reducing agents and flammable or combustible materials.

SECTION VIII

PHYSICAL DATA

BOILING POINT 380°C (Decomposes)	MELTING POINT 306.8 °C	VAPOR PRESSURE Not Applicable (MM/Hg)	APPEARANCE White Prills (Pellets)
SOLUBILITY IN WATER 92 g/100ml at 25°C	SPECIFIC GRAVITY 2.26 (H ₂ O =1)	VAPOR DENSITY Not Applicable (Air = 1)	EVAPORATION RATE No Information Available

SECTION IX

SAFE HANDLING & USE PRECAUTIONS

WASTE DISPOSAL METHOD Sanitary landfill in accordance with federal, state and local regulations.	OTHER PRECAUTIONS Wood and empty paper bags used to hold this product should be removed from the premises.
IN CASE MATERIAL IS RELEASED OR SPILLED Sweep or shovel up spilled material.	HANDLING AND STORING PRECAUTIONS Store away from reducing agents and liquids of low flash points.

SECTION IX

CONTROL MEASURES

RESPIRATORY PROTECTION NIOSH/MSHA-Approved dust type respirator.	VENTILATION Mechanical (General)
PROTECTIVE GLOVES No special gloves needed.	EYE PROTECTION Goggles
OTHER PROTECTIVE CLOTHING OR EQUIPMENT None	WORK/HYGENIC PRACTICES Follow recommendations in Section IX .

Material contained herein complies with OSHA communications standard, 29 CFR 1910. 1200. Standard must be consulted for specific requirements. The information contained herein is, to best of our knowledge and belief, accurate. However, SQM Sodium Nitrate is sold without representations or warranties, express or implied, of fitness for use or purpose or of merchantability beyond the description of said material on the face hereof, and is sold on the condition that seller shall not be liable for accident, injury, or damage occasioned during or resulting from the transportation, handling, storage, sale or use of the material. In the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemical call Chemtrec: 800-424-9300.

SAFETY DATA SHEET

HYDROGEN PEROXIDE 35%

SDS # : 7722-84-1-35
 Revision date: 2015-03-18
 Format: NA
 Version 1



1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name HYDROGEN PEROXIDE 35%

Other means of identification

CAS-No 7722-84-1

Recommended use of the chemical and restrictions on use

Recommended Use:

Restrictions on Use: Use as recommended by the label.

Manufacturer/Supplier

PeroxyChem LLC
 2005 Market Street
 Suite 3200
 Philadelphia, PA 19103
 Phone: +1 267/ 422-2400 (General Information)
 E-Mail: sdsinfo@peroxychem.com

PeroxyChem Canada
 PG Pulp Mill Road
 Prince George, BC V2N2S6
 1+ 250/ 561-4200 (General Information)

Emergency telephone number

For leak, fire, spill or accident emergencies, call:
 1 800 / 424 9300 (CHEMTREC - U.S.A.)
 1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
 1 613/ 996-6666 (CANUTEC - Canada)
 1 303/ 389-1409 (Medical - U.S. - Call Collect)

1 281 / 474-8750 (Bayport, Texas Plant)
 1 250 / 561-4221 (Prince George, BC, Canada Plant)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Acute toxicity - Oral	Category 4
Acute toxicity - Inhalation (Vapors)	Category 4
Skin corrosion/irritation	Category 2 Sub-category B
Serious eye damage/eye irritation	Category 1

HYDROGEN PEROXIDE 35%

SDS #: 7722-84-1--35
Revision date: 2015-03-18
Version 1

Specific target organ toxicity (single exposure)	Category 3
Oxidizing Liquids	Category 2

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Danger

Hazard Statements

H318 - Causes serious eye damage
H302 - Harmful if swallowed
H332 - Harmful if inhaled
H335 - May cause respiratory irritation
H315 - Causes skin irritation
H270 - May cause or intensify fire; oxidizer



Precautionary Statements - Prevention

P271 - Use only outdoors or in a well-ventilated area
P261 - Avoid breathing mist/vapors/spray
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P221 - Take any precaution to avoid mixing with combustibles/flammables
P220 - Keep/Store away from clothing/flammable materials/combustibles

Precautionary Statements - Response

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor
P302 + P352 - IF ON SKIN: Wash with plenty of water and soap
P332 + P313 - If skin irritation occurs: Get medical advice/ attention
P362 + P364 - Take off all contaminated clothing and wash it before reuse
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P312 - Call a POISON CENTER or doctor if you feel unwell
P301 + P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell
P330 - Rinse mouth
P370 + P378 - In case of fire: Use water for extinction

Hazards not otherwise classified (HNOC)

No hazards not otherwise classified were identified.

Other Information

Keep container in a cool place out of direct sunlight. Store only in vented containers. Do not store on wooden pallets. Do not return unused material to its original container. Avoid contamination - Contamination could cause decomposition and generation of oxygen which may result in high pressure and possible container rupture. Empty drums should be triple rinsed with water before discarding.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula HO - OH

Chemical name	CAS-No	Weight %
Hydrogen peroxide	7722-84-1	35
Water	7732-18-5	65

Occupational exposure limits, if available, are listed in section 8

4. FIRST AID MEASURES

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Seek immediate medical attention/advice.
Skin Contact	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for further treatment advice.
Inhalation	Move to fresh air. If person is not breathing, contact emergency medical services, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.
Ingestion	Rinse mouth. Do not induce vomiting. If conscious, give 2 glasses of water. Get immediate medical attention. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed	In case of accidental ingestion, necrosis may result from mucous membrane burns (mouth, esophagus and stomach). Oxygen rapid release may cause stomach swelling and hemorrhaging, which may product major, or even fatal, injury to organs if a large amount has been ingested. In case of skin contact, may cause burns, erythema, blisters or even necrosis. Hydrogen Peroxide irritates respiratory system and, if inhaled, may cause inflammation and pulmonary edema. The effects may not be immediate.
Indication of immediate medical attention and special treatment needed, if necessary	Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Water. Do not use any other substance.
Specific Hazards Arising from the Chemical	In closed unventilated containers, risk of rupture due to the increased pressure from decomposition. Contact with combustible material may cause fire
Hazardous Combustion Products	On decomposition product releases oxygen which may intensify fire.
Explosion data	
Sensitivity to Mechanical Impact	Not sensitive.
Sensitivity to Static Discharge	Not sensitive.
Protective equipment and precautions for firefighters	Use water spray to cool fire exposed surfaces and protect personnel. Move containers from fire area if you can do it without risk. As in any fire, wear self-contained breathing apparatus and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Isolate and post spill area. Keep people away from and upwind of spill/leak. Eliminate all sources of ignition and remove combustible materials.
Other	Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in fire.
Environmental Precautions	Do not flush into surface water or sanitary sewer system; if discharged into sewers or watercourses, dilute with plenty of water. See Section 12 for additional Ecological Information.
Methods for Containment	Dike to collect large liquid spills. Stop leak and contain spill if this can be done safely. Small spillage: Dilute with large quantities of water.
Methods for cleaning up	Flush area with flooding quantities of water. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%.

7. HANDLING AND STORAGE

Handling	Keep/Store away from clothing/ combustible materials. Wear personal protective equipment. Reference to other sections. Never return unused hydrogen peroxide to original container. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic. Pipes and equipment should be passivated before first use. Use only in well-ventilated areas. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner.
Storage	Keep containers in cool areas out of direct sunlight and away from combustibles. Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into work environment. Containers must be vented. Keep/store only in original container. Store rooms or warehouses should be made of non-combustible materials with impermeable floors. In case of release, spillage should flow to safe area. Containers should be visually inspected on a regular basis to detect any abnormalities (swollen drums, increases in temperature, etc.).
Incompatible products	Combustible materials. Copper alloys, galvanized iron. Strong reducing agents. Heavy metals. Iron. Copper alloys. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines Ingredients with workplace control parameters.

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Hydrogen peroxide 7722-84-1	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m ³	IDLH: 75 ppm TWA: 1 ppm TWA: 1.4 mg/m ³	Mexico: TWA 1 ppm Mexico: TWA 1.5 mg/m ³ Mexico: STEL 2 ppm Mexico: STEL 3 mg/m ³
Chemical name	British Columbia	Quebec	Ontario TWA EV	Alberta
Hydrogen peroxide 7722-84-1	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m ³	TWA: 1 ppm	TWA: 1 ppm TWA: 1.4 mg/m ³

Appropriate engineering controls

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Engineering measures Ensure that eyewash stations and safety showers are close to the workstation location.
Ensure adequate ventilation.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

Skin and Body Protection For body protection wear impervious clothing such as an approved splash protective suit made of SBR rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboot made of nylon or nylon blends. DO NOT USE cotton, wool or leather as these materials react rapidly with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles, can cause the material to ignite and result in a fire.

Hand Protection For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

Respiratory Protection If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA) or other approved air-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (dust mask), especially those containing oxidizable sorbants such as activated carbon.

Hygiene measures Avoid breathing vapors, mist or gas. Clean water should be available for washing in case of eye or skin contamination.

General information Protective engineering solutions should be implemented and in use before personal protective equipment is considered.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Clear, colorless liquid
Physical State	Liquid
Color	Colorless
Odor	odorless
Odor threshold	Not applicable
pH	<= 3.7
Melting point/freezing point	-33 °C
Boiling Point/Range	108 °C
Flash point	Not flammable
Evaporation Rate	> 1 (n-butyl acetate=1)
Flammability (solid, gas)	Not flammable
Flammability Limit in Air	Not applicable
Upper flammability limit:	
Lower flammability limit:	
Vapor pressure	23 mm Hg @ 30 °C
Vapor density	No information available
Density	1.13 g/cm ³ @ 20°C
Specific gravity	1.13
Water solubility	completely soluble
Solubility in other solvents	No information available
Partition coefficient	log Kow = -1.5 @ 20 °C
Autoignition temperature	Not combustible
Decomposition temperature	100 °C (adiabatic)

Viscosity, kinematic	1.10 cP @ 20 °C
Viscosity, dynamic	No information available
Explosive properties	No information available
Oxidizing properties	Strong oxidizer
Molecular weight	34
Bulk density	Not applicable

10. STABILITY AND REACTIVITY

Reactivity	Reactive and oxidizing agent.
Chemical Stability	Stable under normal conditions. Decomposes on heating. Stable under recommended storage conditions.
Possibility of Hazardous Reactions	Contact with organic substances may cause fire or explosion. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.
Hazardous polymerization	Hazardous polymerization does not occur.
Conditions to avoid	Excessive heat; Contamination; Exposure to UV-rays; pH variations.
Incompatible materials	Combustible materials. Copper alloys, galvanized iron. Strong reducing agents. Heavy metals. Iron. Copper alloys. Contact with metals, metallic ions, alkalis, reducing agents and organic matter (such as alcohols or terpenes) may produce self-accelerated thermal decomposition.
Hazardous Decomposition Products	Oxygen which supports combustion. Liable to produce overpressure in container.

11. TOXICOLOGICAL INFORMATION

Product Information

LD50 Oral	50% solution: LD50 > 225 mg/kg bw (rat) 35 % solution: LD50 1193 mg/kg bw (rat) 70 % solution: LD50 1026 mg/kg bw (rat)
LD50 Dermal	35% solution: LD50 > 2000 mg/kg bw (rabbit) 70 % solution: LD50 9200 mg/kg bw (rabbit)
LC50 Inhalation	50% solution: LC50 > 170 mg/m ³ (rat) (4-hr) Hydrogen Peroxide vapors: LC0 9400 mg/m ³ (mouse) (5 - 15 minutes) Hydrogen Peroxide vapors: LC50 > 2160 mg/m ³ (mouse)
Serious eye damage/eye irritation	Corrosive. Risk of serious damage to eyes.
Skin corrosion/irritation	Moderately irritating (rabbit).
Sensitization	Did not cause sensitization on laboratory animals.

Information on toxicological effects

Symptoms	Vapors, mists, or aerosols of hydrogen peroxide can cause upper airway irritation, inflammation of the nose, hoarseness, shortness of breath, and a sensation of burning or tightness in the chest. Prolonged exposure to concentrated vapor or to dilute solutions can cause irritation and temporary bleaching of skin and hair. Exposure to vapor, mist, or aerosol can cause stinging pain and tearing of eyes.
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Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity	This product contains hydrogen peroxide. The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a
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'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

Chemical name	ACGIH	IARC	NTP	OSHA
Hydrogen peroxide 7722-84-1	A3	3		

Mutagenicity This product is not recognized as mutagenic by Research Agencies
 In vivo tests did not show mutagenic effects

Reproductive toxicity No toxicity to reproduction in animal studies.

STOT - single exposure May cause respiratory irritation.
STOT - repeated exposure Not classified.

Target organ effects Eyes, Respiratory System, Skin.

Aspiration hazard Aspiration risk: may cause lung damage if swallowed.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Hydrogen peroxide is naturally produced by sunlight (between 0.1 and 4 ppb in air and 0.001 to 0.1 mg/L in water). Not expected to have significant environmental effects.

Hydrogen peroxide (7722-84-1)				
Active Ingredient(s)	Duration	Species	Value	Units
Hydrogen peroxide	96 h LC50	Fish Pimephales promelas	16.4	mg/L
Hydrogen peroxide	72 h LC50	Fish Leuciscus idus	35	mg/L
Hydrogen peroxide	48 h EC50	Daphnia pulex	2.4	mg/L
Hydrogen peroxide	24 h EC50	Daphnia magna	7.7	mg/L
Hydrogen peroxide	72 h EC50	Algae Skeletonema costatum	1.38	mg/L
Hydrogen peroxide	21 d NOEC	Daphnia magna	0.63	mg/L

Persistence and degradability Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10 - 20 hours, and in soils from minutes to hours depending upon microbiological activity and metal contamination.

Bioaccumulation Material may have some potential to bioaccumulate but will likely degrade in most environments before accumulation can occur.

Mobility Will likely be mobile in the environment due to its water solubility but will likely degrade over time.

Other Adverse Effects Decomposes into oxygen and water. No adverse effects.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods Dispose of in accordance with local regulations. Can be disposed as waste water, when in compliance with local regulations.

US EPA Waste Number D001

Contaminated Packaging Dispose of in accordance with local regulations.
 Drums - Empty as thoroughly as possible. Triple rinse drums before disposal. Avoid contamination; impurities accelerate decomposition. Never return product to original

container.

14. TRANSPORT INFORMATION

DOT

UN/ID no 2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard class 5.1
 Subsidiary class 8
 Packing Group II

TDG

UN/ID no UN 2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard class 5.1
 Subsidiary class 8
 Packing Group II

ICAO/IATA

Air regulation permit shipment of Hydrogen Peroxide (<=40%) in non-vented containers for Air Cargo Only aircraft, as well as for Passenger and Cargo aircraft. HOWEVER, all PeroxyChem Hydrogen Peroxide containers are vented and therefore, air shipments of PeroxyChem H2O2 are not permitted. IATA air regulations state that venting of packages containing oxidizing substances is not permitted for air transport.

IMDG/IMO

UN/ID no UN 2014
 Proper Shipping Name HYDROGEN PEROXIDE, AQUEOUS SOLUTION
 Hazard class 5.1
 Subsidiary Hazard Class 8
 Packing Group II

OTHER INFORMATION

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drums on wooden pallets.

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard Yes
 Chronic health hazard No
 Fire hazard Yes
 Sudden release of pressure hazard No
 Reactive Hazard No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

Chemical name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	SARA RQ
Hydrogen peroxide 7722-84-1		1000 lb	

HYDROGEN PEROXIDE 35%

SDS #: 7722-84-1-35
 Revision date: 2015-03-18
 Version 1

Hydrogen Peroxide RQ is for concentrations of > 52% only

International Inventories

Component	TSCA (United States)	DSL (Canada)	EINECS/EL INCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Hydrogen peroxide 7722-84-1 (35)	X	X	X	X	X	X	X	X	X

Mexico - Grade Serious risk, Grade 3

CANADA

WHMIS Hazard Class C - Oxidizing materials
 D1B - Toxic materials
 E - Corrosive material
 F - Dangerously reactive material



16. OTHER INFORMATION

NFPA	Health Hazards 3	Flammability 0	Stability 1	Special Hazards OX
HMIS	Health Hazards 3	Flammability 0	Physical hazard 1	Special precautions H

NFPA/HMIS Ratings Legend Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0
 Special Hazards: OX = Oxidizer
 Protection = H (Safety goggles, gloves, apron, the use of supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

Uniform Fire Code Oxidizer: Class 2--Liquid

Revision date: 2015-03-18
Revision note Initial Release

Disclaimer

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Prepared By:

PeroxyChem
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End of Safety Data Sheet



Material Safety Data Sheet

Issue Date: 06-OCT-2011
Supercedes: 29-NOV-2010

POLYFLOC AE1115

1 Identification

Identification of substance or preparation
POLYFLOC AE1115

Product Application Area
Flocculant.

Company/Undertaking Identification
GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
T 215 355-3300, F 215 953 5524

Emergency Telephone
(800) 877-1940

Prepared by Product Stewardship Group: T 215-355-3300 Prepared on: 06-OCT-2011

2 Hazard(s) identification

EMERGENCY OVERVIEW

WARNING

May cause moderate irritation to the skin. Severe irritant to the eyes. Vapors, gases, mists or aerosols may cause irritation to the upper respiratory tract. Prolonged exposure may cause dizziness and headache.

DOT hazard is not applicable
Odor: Mild; Appearance: White, Emulsion

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: dry chemical/CO2/foam or water--slippery condition; use sand/grit.

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause moderate irritation to the skin.

ACUTE EYE EFFECTS:

Severe irritant to the eyes.

ACUTE RESPIRATORY EFFECTS:

Primary route of exposure; Vapors, gases, mists or aerosols may cause irritation to the upper respiratory tract. Prolonged exposure may cause dizziness and headache.

INGESTION EFFECTS:

May cause severe gastrointestinal irritation with possible nausea, vomiting, diarrhea, salivation, blurred vision, weakness, paralysis and injury to kidneys, heart and respiratory system. Aspiration may cause lung injury or death.

TARGET ORGANS:

Prolonged or repeated exposures may cause CNS depression.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

Excessive skin contact may cause defatting or drying of skin. Excessive inhalation of vapors may cause dizziness, headache and nausea.

3 Composition / information on ingredients

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation. This product is subject to the Pennsylvania and New Jersey Worker and Community Right to Know Law.

HAZARDOUS INGREDIENTS:

Cas#	Chemical Name	Range (w/w%)
79-06-1	ACRYLAMIDE Toxic (by ingestion); irritant; probable human carcinogen (IARC=2A; NTP=anticipated); neurotoxin	0.1-1.0
64742-47-8	ISOPARAFFINIC PETROLEUM DISTILLATE Combustible liquid; irritant; CNS depressant; IARC=3 (carcinogen status not classifiable)	15-40
68002-97-1	ALCOHOLS, C10-C16, ETHOXYLATED Slight Irritant (eyes and skin)	1-5
68551-12-2	ALCOHOLS, C12-16, ETHOXYLATED Severe irritant (eyes); moderate irritant (skin)	1-5
68439-50-9	ALCOHOLS, C12-14, ETHOXYLATED Irritant (eyes and skin)	1-5

NON-HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
7732-18-5	WATER
25085-02-3	ACRYLAMIDE/SODIUM ACRYLATE COPOLYMER

4 First-aid measures

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Get medical attention if irritation develops or persists.

EYE CONTACT:

URGENT! Immediately flush eyes with plenty of low-pressure water for at least 20 minutes while removing contact lenses. Hold eyelids apart. Get immediate medical attention.

INHALATION:

Remove to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get immediate medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 2-8 fluid ounces (60-240 mL) of milk or water.

NOTES TO PHYSICIANS:

This product contains a hydrocarbon solvent. Aspiration into the lungs will result in chemical pneumonia and may be fatal.

5 Fire-fighting measures

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical/CO2/foam or water--slippery condition; use sand/grit.

HAZARDOUS DECOMPOSITION PRODUCTS:

oxides of carbon, nitrogen and sulfur

FLASH POINT:

> 200F > 93C P-M(CC)

6 Accidental release measures

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 Handling and storage

HANDLING:

Normal chemical handling.

STORAGE:

Shelf life = 240 days. Keep containers closed when not in use. Reasonable and safe chemical storage. Protect from freezing. If frozen, thaw completely and mix thoroughly prior to use.

8 Exposure controls / personal protection

EXPOSURE LIMITS

CHEMICAL NAME

ACRYLAMIDE

PEL (OSHA): 0.3 MG/M3 (SKIN)
TLV (ACGIH): TWA (SKIN) = 0.03 MG/M3; A3
MISC: NIOSH REL = 0.03 MG/M3; NIOSH IDLH = 60 MG/M3

ISOPARAFFINIC PETROLEUM DISTILLATE

PEL (OSHA): LIMITS HAVE NOT BEEN ESTABLISHED BY US OSHA.
TLV (ACGIH): TWA (Skin): 200 MG/M3; A3 (for Kerosene)

ALCOHOLS, C10-C16, ETHOXYLATED

PEL (OSHA): LIMITS HAVE NOT BEEN ESTABLISHED BY US OSHA.
TLV (ACGIH): LIMITS HAVE NOT BEEN ESTABLISHED BY ACGIH.

ALCOHOLS, C12-16, ETHOXYLATED

PEL (OSHA): LIMITS HAVE NOT BEEN ESTABLISHED BY US OSHA.
TLV (ACGIH): LIMITS HAVE NOT BEEN ESTABLISHED BY ACGIH.

ALCOHOLS, C12-14, ETHOXYLATED

PEL (OSHA): LIMITS HAVE NOT BEEN ESTABLISHED BY US OSHA.
TLV (ACGIH): LIMITS HAVE NOT BEEN ESTABLISHED BY ACGIH.

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.
If air-purifying respirator use is appropriate, use a respirator with organic vapor cartridges.

SKIN PROTECTION:

Wear gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 Physical and chemical properties

Spec. Grav. (70F, 21C)	1.019	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	~ 23	Vapor Density (air=1)	> 1.00
Freeze Point (C)	~ -5		
Viscosity (cps 70F, 21C)	1000	% Solubility (water)	ND
Odor		Mild	
Appearance		White	
Physical State		Emulsion	
Flash Point	P-M(CC)	> 200F > 93C	
pH 1% Sol. (approx.)		7.0	
Evaporation Rate (Ether=1)		< 1.00	
Percent VOC:		22.4	

NA = not applicable ND = not determined

10 Stability and reactivity

CHEMICAL STABILITY:

Stable under normal storage conditions.

POSSIBILITY OF HAZARDOUS REACTIONS:

Contact with oxidizers may cause fire. Contact with water reactive compounds may cause fire or explosion.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

oxides of carbon, nitrogen and sulfur

11 Toxicological information

Oral LD50 RAT: >5000 mg/kg

NOTE - Calculated value according to GHS additivity formula

Dermal LD50 RABBIT: >5000 mg/kg

NOTE - Calculated value according to GHS additivity formula

12 Ecological information

AQUATIC TOXICOLOGY

Bluegill Sunfish 96 Hour Static Acute Bioassay

LC50= 89; No Effect Level= 18 mg/L

Ceriodaphnia 48 Hour Static Acute Bioassay

LC50= 2.8; No Effect Level= 2.06 mg/L

Daphnia magna 48 Hour Static Renewal Bioassay

LC50= 3.9; 5% Mortality= 1.6 mg/L

Fathead Minnow 96 Hour Static Renewal Bioassay

LC50= 25; 25% Mortality= 15 mg/L

Rainbow Trout 96 Hour Static Acute Bioassay

LC50= 75; No Effect Level= 10 mg/L

BIODEGRADATION

COD (mg/g): 1270

TOC (mg/g): 510

13 Disposal considerations

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 Transport information

Transportation Hazard: Not Applicable
DOT: Not Regulated

DOT EMERGENCY RESPONSE GUIDE #: Not applicable
Note: Some containers may be DOT exempt, please check BOL for exact container classification
IATA: Not Regulated

IMDG: Not Regulated

15 Regulatory information

TSCA:

All components of this product are included on or are in compliance with the U.S. TSCA regulations.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

Treat as oil spill

FOOD AND DRUG ADMINISTRATION:

21 CFR 176.110 (acrylamide - acrylic acid resins)
All ingredients comprising this product are authorized by FDA for the manufacture of paper and paperboard that may contact aqueous and fatty foods as per 21 CFR 176.170(a) (4).

NSF Registered and/or meets USDA (according to 1998 Guidelines):

Registration number: Not Registered
This product contains ingredients that have been determined as safe for use in sewage and/or drain lines. (L1)

SARA SECTION 312 HAZARD CLASS:

Immediate (acute); Delayed (Chronic)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65):

This product contains one or more ingredients known to the state of California to cause cancer and reproductive toxicity.

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 Other information

HMIS vII		CODE TRANSLATION
Health	2	Moderate Hazard
Fire	1	Slight Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles, Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	23-JUN-2000	12	** NEW **
	01-JUN-2001	15	23-JUN-2000
	11-DEC-2001	2, 3, 4, 5, 7, 8, 15, 16	01-JUN-2001
	19-NOV-2009	4, 5, 7, 8, 10, 12, 14	11-DEC-2001
	29-NOV-2010	3, 7, 10	19-NOV-2009
	06-OCT-2011	11	29-NOV-2010



25% SODIUM HYDROXIDE SOLUTION

Safety Data Sheet

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product/Chemical Name: Sodium Hydroxide Solution

Chemical Family: Inorganic alkalis

General Use: Drinking water treatment, papermaking and other manufacturing applications

Company Information:

GAC Chemical Corporation

34 Kidder Point Road

Searsport, Maine 04974 U.S.A.

Phone: 207-548-2525 FAX: 207-548-2891 Toll Free: 800-266-5155

Emergency Phone:

1-800-424-9300 Chemtrec (USA)

SECTION 2. HAZARDS IDENTIFICATION



Signal Word: DANGER

Hazard Statements: Causes severe skin burns and eye damage.
Harmful if swallowed or inhaled.
May be corrosive to metals

Precautionary Statements: Do not get in eyes, on skin or on clothing.
Wear gloves, eye and face protection and protective clothing.
Do not breathe mist, vapors, or spray.
Avoid release to the environment
IF SWALLOWED: Rinse mouth. Do not induce vomiting
IF ON SKIN: Remove immediately all contaminated clothing. Rinse skin with shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Get immediate medical attention.
Collect spillage.

Store in a closed container.

Dispose of container in accordance with local, state, province and federal regulations.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance Sodium Hydroxide Solution

Chemical Name:	Sodium Hydroxide	CAS#: 1310-73-2	(24 - 26%)
	Sodium Chloride	CAS#: 7647-14-5	(<1%)
	Water	CAS#: 7732-18-5	(74 - 76%)

Synonyms: Caustic Soda, Caustic Alkali, Lye, Caustic Soda Liquid 25%, Soda Lye, Liquid Caustic, Sodium Hydrate

Impurities: NA. No impurities or additives which are themselves classified and which contribute to the classification of the substance.

SECTION 4. FIRST AID MEASURES

Inhalation of mist or liquid:

Remove person from source of exposure to fresh air. If breathing is difficult, administer oxygen. If not breathing, start CPR. Get medical attention immediately.

Skin contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Get medical attention immediately.

Eye contact:

Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids open. Get medical attention immediately.

Ingestion:

If fully conscious, drink as much water as can be tolerated. DO NOT induce vomiting. DO NOT neutralize with acidic juices. Get medical attention immediately.

Most Important Symptoms/Effects:

Inhalation:

Mists may severely irritate nose, throat, lungs, mucous membranes, respiratory tract. Mists may cause sore throat, coughing, sneezing, labored breathing, burning sensation.

Skin contact:

Severely corrosive to the skin. Causes severe burns.

Eye contact:

Severely corrosive to the eyes. Causes eye burns. Direct contact with the eyes can cause irreversible damage, including blindness.

Ingestion:

Can cause chemical burns of the mouth, throat, gastrointestinal tract. May cause pain, nausea, vomiting.

SECTION 5. FIRE FIGHTING MEASURES

Flammability:

Product is not flammable and will not burn.

Suitable Extinguishing Media:

For fires in area, use appropriate extinguishing media.

Specific Hazards Arising from the Chemical:

In a fire, dried product can decompose at elevated temperatures and may release toxic fumes/vapors. Exposure to products of decomposition during a fire may be hazardous. Spilled sodium hydroxide solution can cause slippery footing.

Special Protective Equipment and Precautions for Firefighters:

Wear full protective fire fighting clothing including NIOSH approved self contained breathing apparatus. Remain upwind of fire to avoid hazardous vapors and decomposition products.

SECTION 6. ACCIDENTAL RELEASE MEASURES

General:

Site specific procedures to address accidental spills are necessary as dictated by facility design, location, staffing, containment structures, and regulatory requirements. Consult engineers if needed.

Personal Precautions, Protective Equipment and Emergency Procedures:

In the event of a spill, clear unnecessary personnel from spill area. If direct contact with spilled material is likely, use personal protective equipment recommended in Section 8. Maintain adequate ventilation. Spilled material will be slippery.

Methods and Materials for Containment and Cleaning Up:

Shut off source of leak if safe to do so. Manage spill using containment structures or inert materials and collect for reuse. Product not reused can be neutralized using dry citric acid or weak sulfuric acid. Neutralized residue can be swept up or rinsed down with water and captured using absorbent materials for disposal in accordance with local, state, province, and federal regulations. Avoid direct discharge to sewers and surface waters. Notify authorities if entry occurs.

SECTION 7. HANDLING AND STORAGE

Incompatible Chemicals:

Avoid contact with acids and acidic (low pH) materials.

Containment:

To minimize the possibility of a release into the environment and contact with other incompatible chemicals, storage tanks and containers should have a dedicated liquid tight secondary containment system. Consult engineers if needed.

General Hygiene:

Do not eat, drink, take medication or smoke when direct contact is possible.

Always thoroughly wash hands after leaving a work area where contact is possible or has occurred.

Storage:

Keep storage tanks and containers closed and contents protected from dust, dirt, and moisture. Clean storage tanks on a regular schedule based on inspection and experience. Have storage tanks, containers, and transfer systems properly labeled for contents. Have procedures for determining product quantity in storage tanks and for accepting deliveries. Use tanks, transfer lines, pumps valves and process instrumentation designed for this material using approved materials of construction. Some materials commonly used are mild steel, stainless steel, some plastics, and FRP. Nonferrous metals and their alloys will be damaged by corrosion. Consult engineers if needed.

Temperature for Storage:

Preferred storage temperature range is 10°C-27°C (50°F-80°F). Outside of these temperature ranges optimal product stability and shelf life may be affected.

Ventilation:

No special requirements.

Personal Protection:

If direct contact with material is likely use personal protective equipment.

SECTION 8. EXPOSURE CONTROL / PERSONAL PROTECTION
--

Exposure Limits

Ingredient: Sodium Hydroxide Mists/Vapors

OSHA PEL		ACGIH TLV		NIOSH TLV		NIOSH
TWA	STEL	TWA	CEILING	TWA	CEILING	IDLH
2mg/m ³	none est.	none est.	2mg/m ³	none est.	2mg/m ³	10mg/m ³

Respiratory - Ventilation:

Local passive ventilation is typically used. Under normal conditions respiratory protective equipment is not needed. If work requires direct exposure to product mist, use appropriate, NIOSH approved respiratory protection. Consult engineers if necessary.

Eye - Skin wash:

Have appropriate eye wash and safety shower stations available in the work area.

Eyes:

Use protective eye glasses with side shields/goggles and face shield protection to prevent direct contact.

Skin:

Wear impervious pants, jacket, gloves and boots. For spill cleanup, use impervious pants, jacket, gloves, boots, and hardhat. If Sodium Hydroxide mist/vapor are present, wear NIOSH approved respiratory protection.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES
--

Appearance: Liquid, clear to slight haze, colorless to light grey tint.

Odor: No odor

Odor Threshold: NA

pH: 14 as is basis

Melting/Freeze point-range: -18°C - -12.8°C (0°F-5°F) approx.

Boiling point-range: 110°C-113°C (230°F- 236°F) approx.

Flash point: NA

Evaporation rate: NA

Flammability: Not flammable.
Upper/lower flammability limits: NA
Vapor pressure: NA
Vapor density: NA
Relative Density (Specific Gravity): 1.27 S.G. @ 20°C (68°F)
Water Solubility: Complete.
Partial coefficient: n-octanol/water: NA
Auto ignition: NA
Decomposition temperature: NA
Viscosity: 7-10 cps @ 20°C (68°F)

SECTION 10. STABILITY AND REACTIVITY

Reactivity:

Reacts violently with strong acids.

Chemical Stability:

Product is chemically stable under normal ambient temperature and conditions while stored or used.

Possibility of Hazardous Reactions:

Product will not polymerize.

Conditions to Avoid:

Avoid freezing. Keep away from incompatibles. Contact with metals (aluminum, zinc, tin) and sodium tetrahydroborate liberates hydrogen gas. Corrosive to aluminum, tin, zinc, copper and most alloys in which they are present including brass and bronze. Corrosive to steels at elevated temperatures above 40°C (104°F).

Incompatible Materials:

Oxidizing agents. Acids. Phosphorus. Aluminum. Zinc. Tin. Initiates or catalyzes violent polymerization of acetaldehyde, acrolein or acrylonitrile. Consult engineers if necessary.

Hazardous Decomposition Products:

At elevated temperatures toxic fumes/vapors may be released.

SECTION 11. TOXICOLOGICAL INFORMATION

Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

Sodium Hydroxide(1310-73-2)

Oral LD50 Rat 140-340 mg/kg; Dermal LD50 Rabbit 1350 mg/kg

HEALTH EFFECTS

Inhalation - Acute Exposure

Mists may severely irritate nose, throat, lungs, mucous membranes, respiratory tract. Mists may cause sore throat, coughing, sneezing, labored breathing, burning sensation. Effects will depend on concentration and length of time of exposure.

Inhalation - Chronic Exposure

No data available.

Skin Contact - Acute Exposure

Severely corrosive to the skin. Causes severe burns.

Skin Contact - Chronic Exposure

No data available.

Eye Contact - Acute Exposure

Severely corrosive to the eyes. Causes eye burns. Direct contact with the eyes can cause irreversible damage, including blindness.

Eye Contact - Chronic Exposure

No data available.

Ingestion - Acute Exposure

Can cause chemical burns of the mouth, throat, gastrointestinal tract. May cause pain, nausea, vomiting.

Ingestion - Chronic Exposure

No data available.

Sensitization:

Not sensitizing

Carcinogenicity:

NTP Not listed. IARC Not listed. OSHA Not listed.

Reproductive Toxicity, Mutagenic or teratogenic effects:

No known reproductive toxicity, mutagenic or teratogenic effects in animal experiments are known.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity (aquatic):**Sodium Hydroxide(1310-73-2)**

Fish: 96 Hr LC50 Western Mosquitofish: 125 mg/L; 48 Hr LC50 Bluegill: 99 mg/L

Invertebrate: 48 hr EC50 Daphnia magna: 34.59 - 47.13 mg/L

Persistence and Degradability:

No information available

Bioaccumulation Potential:

This product is not expected to bioaccumulate.

Mobility in Soil:

No information available.

Other Adverse Effects:

No information available

SECTION 13. DISPOSAL CONSIDERATIONS
--

RCRA Hazardous Waste: Not listed. Waste product may be D002 under §261.22(a)(2) if the pH >12.5.

Neutralization:

Product can be neutralized using dry citric acid or weak sulfuric acid. Neutralized residue can be swept up or rinsed down with water and captured using absorbent materials for reuse or disposal in accordance with local, state, province, and federal regulations.

Contaminated Packaging:

Packaging and storage containers that cannot be thoroughly cleaned must be disposed of in accordance with local, state, province, and federal regulations.

SECTION 14. TRANSPORTATION INFORMATION

Land (DOT), Sea (IMDG), Air (ICAO/IATA)

Identification Number: UN1824

Proper Shipping Name: Sodium Hydroxide Solution

Hazard Class: 8

Packing Group: II

Environmental Hazards: Marine pollutant: no; Hazardous substance: yes

Special Precautions: None known

SECTION 15. REGULATORY INFORMATION

RCRA Hazardous Waste: Not Listed.

Unused, un-neutralized product may be a Characteristic Waste (D002). Consult engineers if necessary.

CERCLA Hazardous Substance: yes

CERCLA Reportable Quantity (RQ): 1000 lbs.

SARA 311/312 Categories:

Acute (immediate) health effects: Yes

Chronic (delayed) health effects: No

Sudden release of pressure hazard: No

Reactivity hazard: Yes

Fire hazard: No

SARA 313 Toxic Chemical Listing: Not listed

SARA Extremely Hazardous Substance (EHS): Not listed

OSHA Air (29CFR 1910.10000, Table Z-1, Z-1A): Listed

OSHA Special Regulated Substance (29CFR 1910): Not listed

California Prop 65 Chemical: No

United States TSCA Section Inventory Status: Product exempt or listed on the TSCA Inventory.

State Regulations: State specific regulations have not been determined by GAC Chemical Corporation.

Consult engineers if necessary.

SECTION 16. OTHER INFORMATION

NSF/ANSI 60 Drinking Water Treatment Chemicals:

Sodium Hydroxide-25%: Maximum use 200mg/L

Caustic Soda-25%: Maximum use 200mg/L

HMIS Rating:

Health: 3

Flammability: 0

Reactivity: 1

NFPA Rating:

Health: 3

Fire: 0

Reactivity: 1

Special: NA

Preparatory Statement:

The information in this Safety Data Sheet (SDS) is correct to the best of our knowledge, information we have available, and belief as of the publication date. The information is designed solely as guidance for handling, storage, transportation, release, and disposal and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with other materials or in any process unless specified in the text.

Date Sources for the SDS:

Literature, databases, practice, publications, own tests, regulations

Revision:

February 2015 replaces all earlier

GAC Chemical Corporation

34 Kidder Point Road
Searsport, Maine 04974
U.S.A.
800-266-5155
207-548-2525

Other Chemical Safety Data Sheets



SECTION 1: Identification

1.1. Identification

Product form : Mixture
Product name : Sulfuric Acid, 50% v/v
Product code : LC25640

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

Use of the substance/mixture : For laboratory and manufacturing use only

1.3. Details of the supplier of the safety data sheet

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Skin corrosion/irritation Category 1B H314
Serious eye damage/eye irritation Category 1 H318

Full text of H statements : see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS05

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H314 - Causes severe skin burns and eye damage

Precautionary statements (GHS-US) :

P260 - Do not breathe mist, spray, vapors
P264 - Wash exposed skin thoroughly after handling
P280 - Wear eye protection, face protection, protective clothing, protective gloves
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a poison center or doctor/physician
P363 - Wash contaminated clothing before reuse
P405 - Store locked up
P501 - Dispose of contents/container to comply with local, state and federal regulations
If inhaled: Remove person to fresh air and keep comfortable for breathing

2.3. Other hazards

Other hazards not contributing to the classification :

None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substance

Not applicable

Sulfuric Acid, 50% v/v

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Sulfuric Acid	(CAS No) 7664-93-9	59.23	Skin Corr. 1A, H314 Eye Dam. 1, H318
Water	(CAS No) 7732-18-5	40.77	Not classified

Full text of hazard classes and H-statements : see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
- First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.
- First-aid measures after skin contact : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a poison center or doctor/physician.
- First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician.
- First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Immediately call a poison center or doctor/physician.

4.2. Most important symptoms and effects, both acute and delayed

- Symptoms/injuries : Causes severe skin burns and eye damage.
- Symptoms/injuries after inhalation : Coughing. Irritation of the respiratory tract.
- Symptoms/injuries after skin contact : Caustic burns/corrosion of the skin.
- Symptoms/injuries after eye contact : Corrosion of the eye tissue.
- Symptoms/injuries after ingestion : Bleeding of the gastrointestinal tract.
- Symptoms/injuries upon intravenous administration : Not available.
- Chronic symptoms : Respiratory difficulties. Inflammation/damage of the eye tissue. Irritation of the respiratory tract. Skin rash/inflammation.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.
- Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

- Fire hazard : Reacts exothermically with water (moisture).
- Explosion hazard : Not applicable.
- Reactivity : Thermal decomposition generates : Corrosive vapors.

5.3. Advice for firefighters

- Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.
- Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.
- Other information : Not applicable.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Evacuate area.

6.1.1. For non-emergency personnel

- Protective equipment : Face-shield. Gloves. Protective clothing. Protective goggles.
- Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Equip cleanup crew with proper protection.
- Emergency procedures : Ventilate area.

Sulfuric Acid, 50% v/v

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor. Do not breathe the mist, vapors, spray. Avoid contact during pregnancy/while nursing.

Hygiene measures : Wash exposed skin thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations.

Storage conditions : Keep only in the original container in a cool, well ventilated place away from : incompatible materials. Keep container closed when not in use.

Incompatible products : Strong bases. combustibile materials. metals.

Incompatible materials : Sources of ignition. Direct sunlight.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: (strong) bases. combustibile materials. metals. metal powders.

Storage area : Keep container in a well-ventilated place. Keep only in the original container.

Packaging materials : MATERIAL TO AVOID: aluminium, bronze, copper, iron, lead, monel steel, nickel, steel, tin, zinc.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sulfuric Acid (7664-93-9)		
ACGIH	ACGIH TWA (mg/m ³)	0.2 mg/m ³ (Sulfuric acid; USA; Time-weighted average exposure limit 8 h; TLV - Adopted Value; Thoracic fraction)
OSHA	OSHA PEL (TWA) (mg/m ³)	1 mg/m ³
IDLH	US IDLH (mg/m ³)	15 mg/m ³
NIOSH	NIOSH REL (TWA) (mg/m ³)	1 mg/m ³
Water (7732-18-5)		
Not applicable		

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Protective goggles. Gloves. Protective clothing. Face shield. Mist formation: aerosol mask with filter type P1.



Hand protection : Wear protective gloves.

Eye protection : Chemical goggles or face shield.

Skin and body protection : Wear suitable protective clothing.

Respiratory protection : Mist formation: aerosol mask.

Thermal hazard protection : None necessary.

Other information : Do not eat, drink or smoke during use.

Sulfuric Acid, 50% v/v

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Clear, colorless liquid.
Color	: Colorless
Odor	: odorless
Odor threshold	: No data available
pH	: ≤ 1
Melting point	: No data available
Freezing point	: No data available
Boiling point	: No data available
Flash point	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: Not flammable Non flammable.
Vapor pressure	: No data available
Relative vapor density at 20 °C	: No data available
Relative density	: No data available
Specific gravity / density	: 1.49 g/ml
Molecular mass	: 98.08 g/mol
Solubility	: Exothermically soluble in water.
Log Pow	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity, kinematic	: 3.9 cSt
Viscosity, dynamic	: No data available
Explosion limits	: No data available
Explosive properties	: Not applicable.
Oxidizing properties	: None.

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Thermal decomposition generates : Corrosive vapors.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Reacts violently with (some) bases: release of heat.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

metals. Strong bases. combustible materials.

10.6. Hazardous decomposition products

Sulfur compounds. Thermal decomposition generates : Corrosive vapors.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure	: Skin and eye contact
Acute toxicity	: Not classified

Sulfuric Acid, 50% v/v

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Sulfuric Acid (7664-93-9)	
LD50 oral rat	2140 mg/kg body weight (Rat; Experimental value)
Water (7732-18-5)	
LD50 oral rat	≥ 90000 mg/kg
ATE US (oral)	90000.000 mg/kg body weight
Skin corrosion/irritation	: Causes severe skin burns and eye damage. pH: ≤ 1
Serious eye damage/irritation	: Causes serious eye damage. pH: ≤ 1
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
	Based on available data, the classification criteria are not met
Carcinogenicity	: Not classified

Sulfuric Acid (7664-93-9)	
Additional information	Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens
Reproductive toxicity	: Not classified Based on available data, the classification criteria are not met
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified
Potential Adverse human health effects and symptoms	: Based on available data, the classification criteria are not met.
Symptoms/injuries after inhalation	: Coughing. Irritation of the respiratory tract.
Symptoms/injuries after skin contact	: Caustic burns/corrosion of the skin.
Symptoms/injuries after eye contact	: Corrosion of the eye tissue.
Symptoms/injuries after ingestion	: Bleeding of the gastrointestinal tract.
Symptoms/injuries upon intravenous administration	: Not available.
Chronic symptoms	: Respiratory difficulties. Inflammation/damage of the eye tissue. Irritation of the respiratory tract. Skin rash/inflammation.

SECTION 12: Ecological information

12.1. Toxicity

Sulfuric Acid (7664-93-9)	
LC50 fish 1	42 mg/l (LC50; 96 h)
EC50 Daphnia 1	29 mg/l (EC50; 24 h)

12.2. Persistence and degradability

Sulfuric Acid, 50% v/v	
Persistence and degradability	Not established.
Sulfuric Acid (7664-93-9)	
Persistence and degradability	Biodegradability: not applicable.
Biochemical oxygen demand (BOD)	Not applicable
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
Water (7732-18-5)	
Persistence and degradability	Not established.

Sulfuric Acid, 50% v/v

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

12.3. Bioaccumulative potential

Sulfuric Acid, 50% v/v	
Bioaccumulative potential	Not established.
Sulfuric Acid (7664-93-9)	
Log Pow	-2.20 (Estimated value)
Bioaccumulative potential	Bioaccumulation: not applicable.
Water (7732-18-5)	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on the global warming	: No known effects from this product.
GWPMix comment	: No known effects from this product.
Other information	: Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations	: Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to comply with local, state and federal regulations.
Ecology - waste materials	: Avoid release to the environment.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description	: UN1830 Sulfuric acid (with more than 51 percent acid), 8, II
UN-No.(DOT)	: UN1830
Proper Shipping Name (DOT)	: Sulfuric acid with more than 51 percent acid
Transport hazard class(es) (DOT)	: 8 - Class 8 - Corrosive material 49 CFR 173.136
Packing group (DOT)	: II - Medium Danger
Hazard labels (DOT)	: 8 - Corrosive



DOT Packaging Non Bulk (49 CFR 173.xxx)	: 202
DOT Packaging Bulk (49 CFR 173.xxx)	: 242

Sulfuric Acid, 50% v/v

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- DOT Special Provisions (49 CFR 172.102) :
- A3 - For combination packaging, if glass inner packaging (including ampoules) are used, they must be packed with absorbent material in tightly closed metal receptacles before packing in outer packaging
 - A7 - Steel packaging must be corrosion-resistant or have protection against corrosion
 - B3 - MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 and DOT 406 cargo tanks and DOT 57 portable tanks are not authorized
 - B83 - Bottom outlets are prohibited on tank car tanks transporting sulfuric acid in concentrations over 65.25 percent
 - B84 - Packaging must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance for sulfuric acid or spent sulfuric acid in concentration up to 65.25 percent
 - IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized
 - N34 - Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material
 - T8 - 4 178.274(d)(2) Normal..... Prohibited
 - TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively
 - TP12 - This material is considered highly corrosive to steel
- DOT Packaging Exceptions (49 CFR 173.xxx) : 154
- DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L
- DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 30 L
- DOT Vessel Stowage Location : C - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel
- DOT Vessel Stowage Other : 14 - For metal drums, stowage permitted under deck on cargo vessels
- Other information : No supplementary information available.

SECTION 15: Regulatory information

15.1. US Federal regulations

Sulfuric Acid, 50% v/v	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.

Sulfuric Acid, ACS	CAS No 7664-93-9	59.23%
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Sulfuric Acid (7664-93-9)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	1000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard

15.2. International regulations

CANADA

Sulfuric Acid, 50% v/v	
Listed on the Canadian DSL (Domestic Substances List)	
WHMIS Classification	Class E - Corrosive Material

Sulfuric Acid, 50% v/v

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Sulfuric Acid (7664-93-9)	
WHMIS Classification	Class E - Corrosive Material
Water (7732-18-5)	
WHMIS Classification	Uncontrolled product according to WHMIS classification criteria

EU-Regulations

No additional information available

National regulations

Sulfuric Acid, 50% v/v	
Listed on the Canadian IDL (Ingredient Disclosure List)	
Sulfuric Acid (7664-93-9)	
Listed on IARC (International Agency for Research on Cancer)	
Listed as carcinogen on NTP (National Toxicology Program)	

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

Revision date : 09/07/2016

Other information : None.

Full text of H-phrases: see section 16:

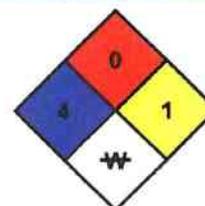
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage

NFPA health hazard : 4 - Very short exposure could cause death or serious residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 1 - Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy, but not violently.

NFPA specific hazard : W - Unusual reactivity with water. This indicates a potential hazard using water to fight a fire involving this material. When a compound is both water-reactive and an oxidizer, the W/bar symbol should go in this quadrant and the OX warning is placed immediately below the NFPA diamond.



HMIS III Rating

Health : 4 Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Personal protection : H

H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US LabChem

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