STOEL RIVES LLP
ATTORNEYS AT LAW

**DOCKET**
**06-AFC-5C**
DATE NOV 25 2009
RECD. NOV 25 2009

980 Ninth Street, Suite 1900
Sacramento, California 95814
main 916.447.0700
fax 916.447.4781
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MELISSA A. FOSTER
*Direct (916) 319-4673*
mafoster@stoel.com

November 25, 2009

Mr. Dale Rundquist
Compliance Project Manager
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

**Re: Panoche Energy Center Project (06-AFC-5C)**
**Petition to Amend**

Dear Mr. Rundquist:

As you know, on September 21, 2009, Panoche Energy Center, LLC ("PECL"), as owner of the Panoche Energy Center ("PEC"), filed a Report of Waste Discharge ("ROWD") with the Regional Water Quality Control Board, Central Valley Region ("RWQCB") for the discharge of some or all of PEC's wastewater to two on-site, unlined wastewater surface impoundments ("UWSI"). Concurrently with the submission of the ROWD, PECL filed a Petition to Amend the Panoche Energy Center Project Final Decision ("PTA") with the California Energy Commission ("CEC"), reflecting the proposed wastewater disposal changes discussed above ("Wastewater Disposal Changes"). On October 19, 2009, RWQCB staff requested PECL to provide six additional items prior to the RWQCB being able to deem the ROWD "complete."

On November 18, 2009, PECL provided the requisite additional information to the RWQCB, a copy of which is enclosed herewith. Since the submission of the ROWD and PTA, PECL determined that the westernmost unlined surface impoundment needs to be two feet deeper than originally designed to ensure adequate freeboard at all times. In addition, PECL has determined that the best way to meet freeboard requirements is to modify the proposed internal center barrier between the two impoundments to sheet piling, concrete, or another durable material. The information submitted to the RWQCB reflects these adjustments.

PECL will shortly provide CEC with adjusted drawings and details on these pond adjustments, which will slightly refine the PTA. These minor revisions do not substantially change the character of the changes proposed by the PTA. The proposed Wastewater Disposal Changes remain in compliance with all applicable laws, ordinances, regulations, and standards ("LORS"). The Wastewater Disposal Changes will also continue to not adversely affect PEC's ability to

comply with all applicable LORS. PECL expects to provide adjusted drawings and additional details regarding the pond adjustments within three weeks.

We look forward to Staff's review of and recommendation on the PTA. In the meantime, if you have any questions, please do not hesitate to contact me directly at (916) 447-0700.

Very truly yours,

Melissa A. Foster

Attachment
MAF:jmw

URS

November 18, 2009

Douglas K. Patteson, RCE
California Regional Water Quality Control Board
1685 "E" Street
Fresno, California 93706

**Subject: Additional Information for Report of Waste Discharge**
**Unlined Wastewater Surface Impoundments**
**Panoche Energy Center**
**Fresno County, California**

Dear Mr. Patteson:

URS Corporation (URS) prepared this letter on behalf of Panoche Energy Center, LLC (PECL, Client). PECL, as owner of the Panoche Energy Center (PEC), filed a Report of Waste Discharge (ROWD), dated September 21, 2009, with the Regional Water Quality Control Board, Central Valley Region (RWQCB) for the discharge of some or all of the facility's wastewater to two on-site, unlined wastewater surface impoundments (UWSI). The RWQCB staff responded with a letter dated October 19, 2009 requesting that six additional items be submitted to complete the ROWD. This letter provides the six additional items, as described below:

1. Attached in Appendix A is a completed Form 200 signed and certified by Warren MacGillivray. Also included in Appendix A is a letter describing Mr. MacGillivray's authority to sign the Form 200.

2. Attached in Appendix B is a check for the filing fee of $14,586 payable to the State Water Resources Control Board.

3. Attached in Appendix C is a monthly water balance for the UWSI, indicating that the UWSI will have at least two feet of freeboard throughout the year.

4. Attached in Appendix D is an Operation & Maintenance Plan (OMP) for the UWSI.

5. Attached in Appendix E is a conceptual grading plan that shows the locations of the two existing water supply wells, the existing water-table groundwater monitoring well MW-4, and the two proposed UWSI.

6. Attached in Appendix F is an inventory of all chemicals that are added to the process-water streams in the facility. The calculation provided in the attachment shows that the sodium added in these chemicals accounts for approximately 0.255-percent of the total sodium

URS Corporation
30 River Park Place West, Suite 180
Fresno, CA 93720
Tel: 559.256.1444
Fax: 559.256.1478

concentration in the wastewater – the remainder is naturally occurring sodium present in the facility source water pumped from the lower confined aquifer. Furthermore, these chemicals do not contain detectable concentrations of arsenic, boron, fluoride, manganese, or molybdenum. However, these constituents may be present in the potable dilution water used in the chemical manufacturing process. As demonstrated in the attachment, the contributions of these added constituents to the respective wastewater concentrations are each expected to be extremely minor (less than 0.00000001-percent).

We trust that this letter provides sufficient information to deem the ROWD complete. We look forward to obtaining a RWQCB staff determination regarding the conceptual acceptability of the UWSI at the earliest opportunity. Please do not hesitate to contact us if you have any questions or require additional information.

Sincerely,
**URS Corporation**

Stuart B. St. Clair, PE
Project Civil Engineer


Attachments:

Appendix A – Signed Form 200 & Letter of Authority
Appendix B – Check
Appendix C – UWSI Water Balance
Appendix D – OMP
Appendix E – Conceptual Grading Plan
Appendix F – Water-Treatment Chemical Inventory

Distribution List:

Douglas Patteson, RWQCB (original & 2 copies)
Don Burkard, PECL
David Jenkins, Apex Power Group
Maggie Fitzgerald, URS, Santa Ana
URS Fresno File

## APPENDIX A

## SIGNED FORM 200 & LETTER OF AUTHORITY

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

# APPLICATION/REPORT OF WASTE DISCHARGE
# GENERAL INFORMATION FORM FOR
# WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

## I. FACILITY INFORMATION

### A. Facility:

| | | | |
|---|---|---|---|
| Name: Panoche Energy Center | | | |
| Address: 43883 West Panoche Road | | | |
| City: Firebaugh | County: Fresno | State: CA | Zip Code: 93622 |
| Contact Person: Don Burkard | | Telephone Number: 925-759-0457 | |

### B. Facility Owner:

| | | | |
|---|---|---|---|
| Name: Panoche Energy Center, LLC | | | Owner Type (Check One) 1. ☐ Individual 2. ☑ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: |
| Address: 43883 West Panoche Road | | | |
| City: Firebaugh | State: CA | Zip Code: 93622 | |
| Contact Person: Don Burkard | Telephone Number: 925-759-0457 | Federal Tax ID: 20-55522298 | |

### C. Facility Operator (The agency or business, not the person):

| | | | |
|---|---|---|---|
| Name: Wood Group, LLC | | | Operator Type (Check One) 1. ☐ Individual 2. ☑ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: |
| Address: 43883 West Panoche Road | | | |
| City: Firebaugh | State: CA | Zip Code: 93622 | |
| Contact Person: Roy Campbell | Telephone Number: 559-659-2270 | | |

### D. Owner of the Land:

| | | | |
|---|---|---|---|
| Name: PAO Investments, LLC | | | Owner Type (Check One) 1. ☐ Individual 2. ☑ Corporation 3. ☐ Governmental Agency 4. ☐ Partnership 5. ☐ Other: |
| Address: 45499 West Panoche Road | | | |
| City: Firebaugh | State: CA | Zip Code: 93622 | |
| Contact Person: Barry Baker | Telephone Number: 559-659-3942 | | |

### E. Address Where Legal Notice May Be Served:

| | | |
|---|---|---|
| Address: 43883 West Panoche Road | | |
| City: Firebaugh | State: CA | Zip Code: 93622 |
| Contact Person: Don Burkard | Telephone Number: 925-759-0457 | |

### F. Billing Address:

| | | |
|---|---|---|
| Address: 43883 West Panoche Road | | |
| City: Firebaugh | State: CA | Zip Code: 93622 |
| Contact Person: Don Burkard | Telephone Number: 925-759-0457 | |

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

# APPLICATION/REPORT OF WASTE DISCHARGE
# GENERAL INFORMATION FORM FOR
# WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

## II. TYPE OF DISCHARGE

**Check Type of Discharge(s) Described in this Application (A or B):**

☑ A. WASTE DISCHARGE TO LAND ☐ B. WASTE DISCHARGE TO SURFACE WATER

**Check all that apply:**

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☑ Cooling Water
- ☐ Mining
- ☐ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Other, please describe: _____
- ☐ Animal Waste Solids
- ☐ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☑ Surface Impoundment
- ☑ Industrial Process Wastewater
- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☐ Storm Water

## III. LOCATION OF THE FACILITY

**Describe the physical location of the facility.**

| 1. Assessor's Parcel Number(s) | 2. Latitude | 3. Longitude |
|---|---|---|
| **Facility:** 027-060-78S | **Facility:** 36.65126 degrees N | **Facility:** 120.58412 degrees W |
| **Discharge Point:** 027-060-78S | **Discharge Point:** 35.65021 deg N | **Discharge Point:** 120.58412 deg W |

## IV. REASON FOR FILING

- ☑ New Discharge or Facility
- ☐ Changes in Ownership/Operator (see instructions)
- ☐ Change in Design or Operation
- ☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Change in Quantity/Type of Discharge
- ☐ Other: _____

## V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

**Name of Lead Agency:** California Energy Commission

**Has a public agency determined that the proposed project is exempt from CEQA?** ☐ Yes ☑ No

**If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.**

**Basis for Exemption/Agency:** _____

**Has a "Notice of Determination" been filed under CEQA?** ☐ Yes ☑ No

**If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.**

Expected CEQA Documents:

☐ EIR ☐ Negative Declaration **Expected CEQA Completion Date:** CEQA equiv. March 2010

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

# APPLICATION/REPORT OF WASTE DISCHARGE
# GENERAL INFORMATION FORM FOR
# WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

## VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

## VII. OTHER

**Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:**

Please see accompanying Report of Waste Discharge, dated September 21, 2009.

**You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.**

## VIII. CERTIFICATION

**"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated 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."**

**Print Name:** Warren MacGillivray **Title:** Director of Member Manager

**Signature:** **Date:** October 30, 2009

**FOR OFFICE USE ONLY**

| Date Form 200 Received: | Letter to Discharger: | Fee Amount Received: | Check #: |
|---|---|---|---|
| | | | |

**EIF Management, LLC**
**Three Charles River Place**
**63 Kendrick Street**
**Needham, MA 02494**

October 30, 2009

Mr. Douglas K. Patteson
Senior Engineer
California Regional Water Quality Control Board
Central Valley Region
1685 E Street
Fresno, California 93706

**RE: Panoche Energy Center**

Dear Mr. Patteson,

I am enclosing with this letter a copy of a Form 200 for Panoche Energy Center ("PEC") which has been signed by Warren MacGillivray.

The purpose of this letter is to provide assurance that Mr. MacGillivray does, indeed, meet the definition of a "duly authorized person" for purposes of the Form 200 and does indeed hold the requisite authority to execute this form on behalf of PEC.

Section 1.9(b) of the Second Amended and Restated Limited Liability Company Agreement of Panoche Energy Center, LLC, dated January 10, 2008, provides that the business and affairs of PEC are to be managed and controlled by the Member Manager. The Member Manager is defined as EIF Panoche, LLC. Thus, there are no appointed officers of PEC. The sole authorized agent for conduct of PEC business is EIF Panoche, LLC.

EIF Panoche, LLC is the sole member of PEC. EIF Panoche, LLC is governed by a Board of Directors; there are no appointed officers. Mr. MacGillivray has been duly appointed as a Director of EIF Panoche. Thus, Mr. MacGillivray holds the highest level of authority within EIF Panoche, the Member Manager of PEC, and is therefore duly authorized and holds the requisite level of authority to execute Form 200 on behalf of PEC.

If you have any questions with regard to this matter, please do not hesitate to contact me at (781) 292-7014.

Sincerely,

Alycia L. Goody
Vice President and Assistant General Counsel

## APPENDIX B

## CHECK (only in original letter)

# APPENDIX C

# UWSI WATER BALANCE

**UWSI WATER BALANCE**
**Panoche Energy Center**
**Western Fresno County, CA**

**November 18, 2009**

The Panoche Energy Center, LLC (PECL), as owner of the Panoche Energy Center (PEC), filed a Report of Waste Discharge (ROWD), dated September 21, 2009, with the Regional Water Quality Control Board, Central Valley Region (RWQCB) for the discharge of some or all of the facility's wastewater to two on-site, unlined wastewater surface impoundments (UWSI). The RWQCB responded with a letter dated October 19, 2009 requesting that six additional items be submitted to complete the ROWD. The third item requested a "month-by-month water balance". This document provides the requested information to address that item.

A water-balance spreadsheet was prepared for the two proposed UWSI. The spreadsheet printout is attached. The water-balance calculations indicate that the proposed UWSI are large enough to maintain greater than 2 feet of freeboard at all times based on the anticipated volume of wastewater. If desired, URS can provide the spreadsheet electronically to RWQCB staff for review. The water-balance input data and assumptions are described and discussed below:

1. The two proposed UWSI have pond bottom areas of 2.94 and 3.19 acres with side slopes of 3:1 (horizontal:vertical) – see attached grading plan, which is slightly revised from the grading plan submitted with the ROWD. The two UWSI will be separated by an internal barrier (constructed of sheet piling, concrete, or a similar durable material) that is approximately five feet wide and extends to a height of two to four feet above the bottom of the UWSI – this is a slight deviation from the original UWSI design. For purposes of the water balance calculation, the two UWSI were modeled as a single surface impoundment with a bottom area of 6.13 acres (334 feet by 799 feet) and side slopes of 3:1.
2. The anticipated maximum monthly wastewater discharge volumes were used, as shown in Column B of the water-balance spreadsheet.
3. Monthly average precipitation rates for the Five Points 5 SSW weather station (No. 043083), located approximately 35 miles south of the PEC, were used. These rates are based on a 58-year record of precipitation. The water balance is not very sensitive to the precipitation rates, because the peak months of UWSI discharge are in the summer when little precipitation occurs. The 100-year, 24-hour storm event is estimated to produce approximately 2.5 inches of precipitation (NOAA, 1974). This 100-year storm event was tried in each of the 12 months on the water balance, and in each case the freeboard at the end of the month was still greater than 2 feet. For the final water-balance calculation, it was placed in February, which is typically one of the wettest months.
4. Monthly average evaporation rates for the Little Panoche Detention Dam, located approximately 25 miles northwest of the PEC, were used. These rates are based on 8 years of record, and are corroborated by other similarly situated stations with

longer periods of record, such as the Los Banos Detention Reservoir station with a 38-year record. The monthly pan evaporation rates were reduced by a standard pan-coefficient of 0.7. Evapotranspiration data from the California Irrigation Management System was not used, because evapotranspiration rates would underestimate evaporation rates from a surface impoundment.

5. The long-term daily percolation rate was assumed to be 2 inches. This value was selected based on review by a geotechnical engineer of on-site percolation-test data, on-site lithologic logs, and regional percolation rates.

The water-balance calculation shows that the UWSI design provides approximately 0.3 foot of depth for accumulation of sediment in the USWI while maintaining the required two feet of freeboard at all times, including at the end of September when the freeboard is predicted to be at its minimum. The UWSI Operation & Maintenance Plan (OMP) calls for the UWSI to be cleaned of sediment in April or May of each year to restore the UWSI to full depth prior to the summer period when the wastewater discharge will be at its greatest. The UWSI will be cleaned more often than once per year, if necessary. Sediment is not expected to accumulate very quickly, as the wastewater is expected to have a relatively low suspended-solids concentration.

Attachments:

UWSI Water Balance Spreadsheet
Revised Conceptual Grading Plan

# UWSI Water Balance
## Panoche Energy Center
## 18-Nov-09

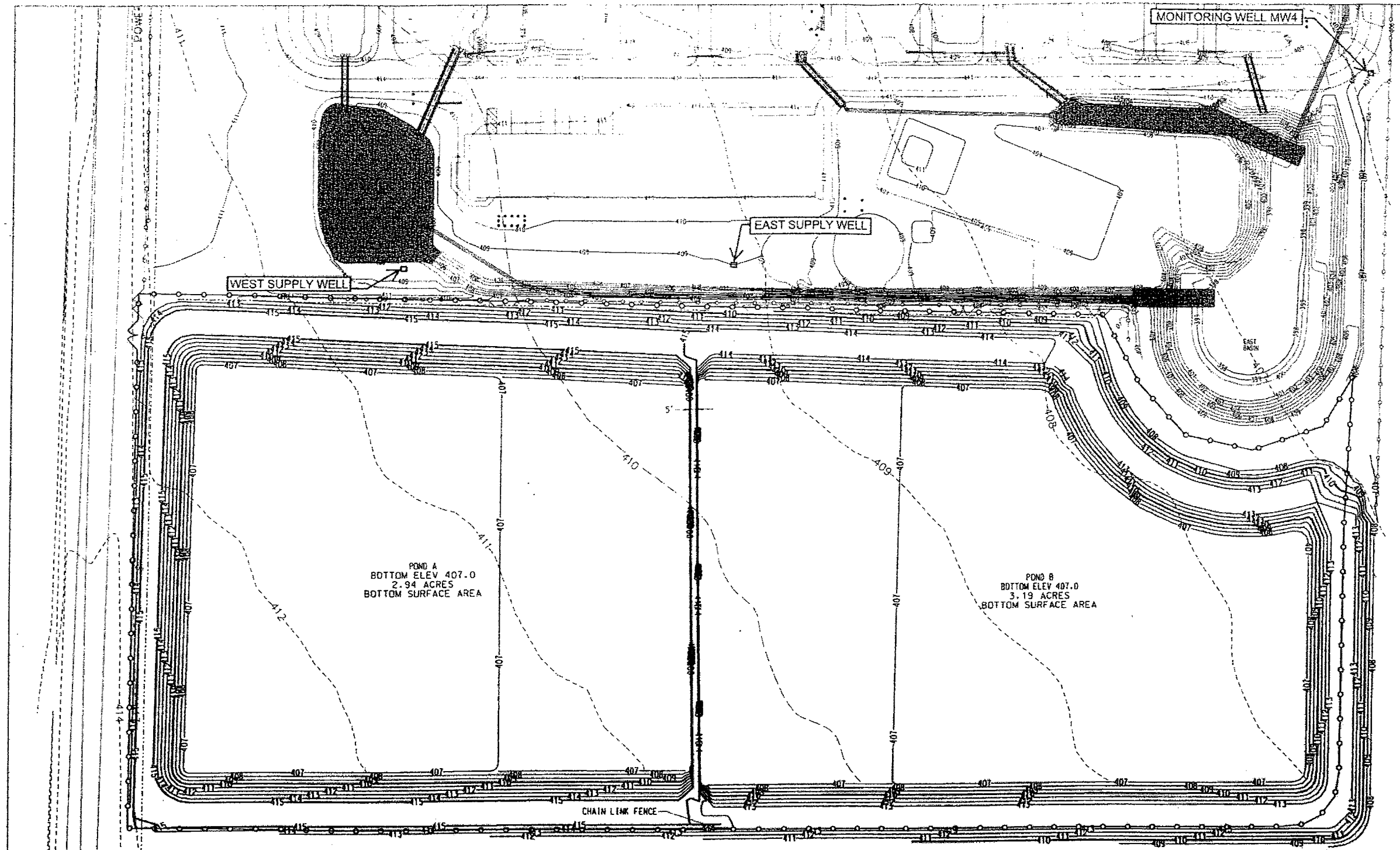
| | | Water Inputs to Pond | | | | Evaporation Output from Pond | | | | Percolation Output from Pond | | Month End Values | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Wastewater | | Precipitation | | Pan Evaporation | 70% Pan Evaporation | Evaporation Area | Max. Volume Evaporated | Average Wetted Area | Max. Volume Percolated | Volume in Pond | Water Height in Pond | Freeboard | | Initial Water Height in Pond on January 1 |
| | Month | gallons | cf | inches | cf | inches | inches | sf | cf | sf | cf | cf | ft | ft | | ft |
| 6 | January | 8,393,000 | 1,122,059 | 1.47 | 44,222 | 1.77 | 1.24 | 273,860 | 28,276 | 270,441 | 1,397,280 | 165,318 | 0.61 | 5.4 | | 1.57 |
| 10 | February | 8,393,000 | 1,122,059 | 3.80 | 114,314 | 2.89 | 2.02 | 267,023 | 45,016 | 267,023 | 1,257,232 | 99,443 | 0.37 | 5.6 | | |
| 12 | March | 8,393,000 | 1,122,059 | 1.04 | 31,286 | 5.87 | 4.11 | 267,023 | 91,430 | 267,023 | 1,379,618 | 0 | 0.00 | 6.0 | | |
| 14 | April | 9,466,800 | 1,265,882 | 0.51 | 15,342 | 9.36 | 6.57 | 267,023 | 146,282 | 267,023 | 1,335,114 | 0 | 0.00 | 6.0 | | |
| 16 | May | 9,466,800 | 1,265,882 | 0.27 | 8,122 | 14.56 | 10.19 | 267,023 | 226,791 | 267,023 | 1,379,618 | 0 | 0.00 | 6.0 | | |
| 18 | June | 9,466,800 | 1,265,882 | 0.09 | 2,707 | 16.91 | 11.42 | 267,023 | 254,050 | 267,023 | 1,335,114 | 0 | 0.00 | 6.0 | | |
| 20 | July | 14,732,800 | 1,969,626 | 0.01 | 301 | 16.45 | 12.02 | 267,023 | 267,383 | 267,023 | 1,379,618 | 302,925 | 1.13 | 4.9 | | |
| 22 | August | 14,732,800 | 1,969,626 | 0.02 | 602 | 16.63 | 11.64 | 273,860 | 265,667 | 270,441 | 1,397,280 | 610,207 | 2.26 | 3.7 | | |
| 24 | September | 14,732,800 | 1,969,626 | 0.19 | 5,716 | 12.46 | 8.72 | 280,768 | 204,072 | 273,898 | 1,369,478 | 1,011,996 | 3.69 | 2.3 | | |
| 26 | October | 9,422,400 | 1,259,679 | 0.36 | 10,830 | 7.60 | 5.32 | 287,749 | 127,569 | 277,396 | 1,433,161 | 721,777 | 2.60 | 3.4 | | |
| 28 | November | 9,422,400 | 1,259,679 | 0.70 | 21,058 | 3.04 | 2.13 | 280,768 | 49,790 | 273,898 | 1,369,478 | 583,246 | 2.13 | 3.9 | | |
| 30 | December | 9,422,400 | 1,259,679 | 0.96 | 28,879 | 1.78 | 1.25 | 280,768 | 29,153 | 273,898 | 1,415,127 | 427,524 | 1.56 | 4.4 | | |
| 32 | Totals | 126,051,000 | 16,851,738 | 9.42 | 283,379 | 110.75 | 77.53 | | 1,755,461 | | 16,448,118 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 35 | Total Wastewater Discharge (af) | 387 | | Precip + WW = | 17,135,117 gallons |
| 36 | Precipitation Area (sf) | 360,992 | | Max. Evap + Perc = | 19,203,579 gallons |
| 37 | Percolation Rate (inches/day) | 2.0 | | | |

| Depth (ft) | Height (ft) | Length (ft) | Width (ft) | Area (sf) |
|---|---|---|---|---|
| 0 | 6 | 835 | 370 | 309,124 |
| 1 | 5 | 828 | 364 | 301,927 |
| 2 | 4 | 823 | 358 | 294,802 |
| 3 | 3 | 817 | 352 | 287,749 |
| 4 | 2 | 811 | 346 | 280,768 |
| 5 | 1 | 805 | 340 | 273,860 |
| 6 | 0 | 799 | 334 | 267,023 |

39 Assumes that none of the site's storm water enters the pond except for the rain that actually falls on the pond and surrounding berm.
40 Assumes average annual precipitation, plus the 100-year, 24-hour storm of 2.5 inches in February.
41 ft = feet
42 sf = square feet
43 cf = cubic feet
44 af = acre feet
45 gpm = gallons per minute

6.13 acres




NOTES:

1. THE EAST AND WEST SUPPLY WELLS ARE SCREENED SOLELY IN THE LOWER CONFINED AQUIFER BELOW THE CORCORAN CLAY.

2. MONITORING WELL MW4 IS SCREENED ACROSS THE WATER TABLE (FROM APPROXIMATELY 150 TO 210 FEET BGS) IN THE UPPER SEMI-CONFINED AQUIFER ABOVE THE CORCORAN CLAY.

- PRELIMINARY -
NOT FOR CONSTRUCTION

| REV | DESCRIPTION | DWN | CHK | APP | DATE |
|---|---|---|---|---|---|
| A | ISSUED FOR CONCEPTUAL GRADING | MAA | | | 11-17-09 |

PANOCHE ENERGY CENTER, LLC

4 X GE LMS100 PEAKING FACILITY
FRESNO COUNTY, CALIFORNIA

Kiewit

Kiewit Power
8455 Lenexa Drive
Lenexa, Kansas 66214

WASTEWATER PONDS
CONCEPTUAL GRADING

| | by | date |
|---|---|---|
| DESIGNED | MAA | 11-16-09 |
| DRAWN | MAA | 11-16-09 |
| CHECKED | | |
| APPROVED | | |

DRAWING NUMBER

SKC-2007018-CG-111709-1

# APPENDIX D

# OMP

**OPERATION & MAINTENANCE PLAN**
**Unlined Wastewater Surface Impoundments**
**Panoche Energy Center**
**Western Fresno County, CA**

**November 18, 2009**

The Panoche Energy Center, LLC (PECL), as owner of the Panoche Energy Center (PEC), filed a Report of Waste Discharge (ROWD), dated September 21, 2009, with the Regional Water Quality Control Board, Central Valley Region (RWQCB) for the discharge of some or all of the facility's wastewater to two on-site, unlined wastewater surface impoundments (UWSI). The RWQCB responded with a letter dated October 19, 2009 requesting that six additional items be submitted to complete the ROWD. The fourth item requested a "written plan for how the ponds will be managed and maintained". This Operation & Maintenance Plan (OMP) provides the requested information to address that item. This OMP is meant to be a living document that will be updated as needed throughout the operational life of the facility. In particular, after the UWSI are constructed and Waste Discharge Requirements (WDR) have been issued by the RWQCB, the OMP will be reviewed and updated, if necessary, to address any design changes or other changes that occur between now and then, including any additional requirements set forth in the WDR.

## UWSI Operation

Wastewater collected in the plant's wastewater storage tank will be pumped through a pipeline to the UWSI for evaporation and percolation. The wastewater storage tank utilizes a level switch to actuate the pump whenever a pre-determined level of wastewater storage is reached. Prior to reaching the UWSI, the pipeline will split into two pipelines, each of which discharges individually to one of the two UWSI. Each of the two pipelines will have a valve to allow wastewater discharge to one UWSI to be stopped, if desired, while continuing discharge to the other UWSI. Each pipeline will also have a totalizing flow meter to record the instantaneous flow rate in the pipeline and the cumulative number of gallons that have passed through the pipeline.

Some portion of the wastewater may continue to be discharged to the four, onsite, Class 1, non-hazardous, deep injection wells operated under Permit Number CA10600001 issued by the United States Environmental Protection Agency, Region IX (USEPA) under the Underground Injection Control (UIC) Program. Alternatively, the deep injection wells may be used only as a backup wastewater discharge option, or they may be decommissioned altogether if their wastewater acceptance capacity decreases to a point where they are judged to be no longer viable.

Wastewater discharge to the UWSI will be controlled so as to maintain at least two feet of freeboard (i.e., the vertical distance between the water surface in the impoundment and the lowest elevation point at the top of the surrounding berm) in the UWSI at all times. Each UWSI will have a permanent vertical freeboard-measurement rod installed from the bottom

of the UWSI and extending vertically to an elevation greater than the top of the surrounding berm. To allow visual determination of freeboard in the UWSI, and of the sediment/sludge depth when the UWSI is sufficiently dry, the freeboard-measurement rods will include permanent labeled markings at intervals of 0.1 vertical foot beginning at the elevation of the lowest point at the top of the surrounding berm and continuing to the design bottom elevation of the pond. The rods will also contain a prominent marking at the two-foot freeboard level (i.e., at the design capacity of the UWSI).

The UWSI will be managed to minimize odor or other nuisance conditions, mosquito breeding, waterfowl nesting, embankment slope failure, and embankment erosion. Specific activities to minimize these potential problems are discussed below in the UWSI Maintenance section.

Inspections of the UWSI will be performed by trained facility personnel at a minimum on a daily basis whenever wastewater discharge to the UWSI is occurring, and on a weekly basis otherwise. Each inspection will include a complete walk-around of each UWSI. The inspector will document in writing the flow-meter reading of the cumulative number of gallons of wastewater discharged to each UWSI, the freeboard in each UWSI, the sediment/sludge depth if the UWSI is sufficiently dry, and the presence or absence of observations of the following items for each UWSI:

- Water seepage laterally through any of the embankments, as evidenced on the embankment or at the ground surface outside the embankment
- Erosion or slope failure (actual or potential) of any of the embankments
- Animal burrowing into any of the embankments
- Objectionable odors or other nuisance conditions
- Nesting of waterfowl on the embankments
- Large numbers of observable mosquitoes or mosquito larvae
- Weeds on the embankments
- Accumulations of dead algae, vegetation, or other debris on the water surface
- Any other potential problem conditions

If any of the above potential problem conditions are noted during an inspection, corrective action will be implemented within two weeks, or sooner if a human-safety issue is involved. A written record of each inspection, and of corrective actions implemented, will be maintained on file by PECL until the facility ceases operation.

## UWSI Maintenance

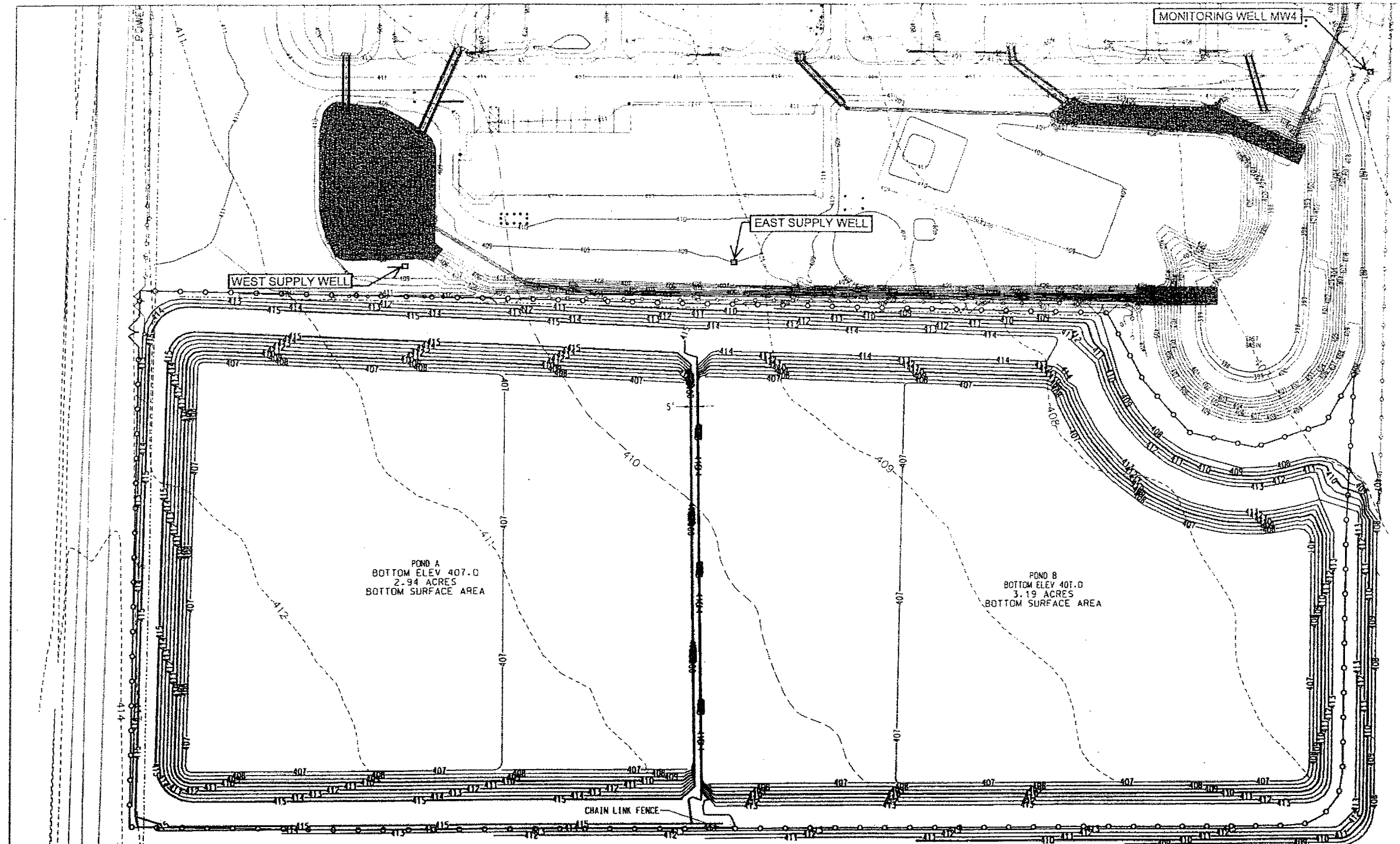
Maintenance of the UWSI will be provided on a regular basis, as needed. If necessary, wastewater will be discharged only to one UWSI for a time to allow the other UWSI to dry out for needed maintenance.

Maintenance items that will be performed on an as-needed basis include the following:

- Mechanical removal of sediment accumulated in the bottom of the UWSI to maintain sufficient wastewater capacity. This will be done each year in April or May before the period of greatest wastewater discharge to the UWSI begins. If necessary, the sediment will be removed from the UWSI more often than once per year. The sediment removed from the UWSI will be re-used or disposed of in accordance with all applicable legal requirements.
- Mechanical disruption (e.g., with a disk harrow) of the soil at the bottom of the UWSI to rejuvenate the infiltration rate. This will be performed, if necessary, after removal of sediment, and possibly at other times during the year.
- Erosion-control measures to minimize irregularities around the perimeter of the water surface that may attract egg-laying mosquitoes.
- Eradication or relocation of burrowing animals and repair of burrows in UWSI embankments.
- Minimization of weeds on the UWSI embankments through control of water depth, harvesting, or use of herbicides that meet all applicable legal requirements.

# APPENDIX E

# CONCEPTUAL GRADING PLAN




NOTES:

1. THE EAST AND WEST SUPPLY WELLS ARE SCREENED SOLELY IN THE LOWER CONFINED AQUIFER BELOW THE CORCORAN CLAY.

2. MONITORING WELL MW4 IS SCREENED ACROSS THE WATER TABLE (FROM APPROXIMATELY 150 TO 210 FEET BGS) IN THE UPPER SEMI-CONFINED AQUIFER ABOVE THE CORCORAN CLAY.

- PRELIMINARY -
NOT FOR CONSTRUCTION

| REV | DESCRIPTION | DWN | CHK | APP | DATE |
|---|---|---|---|---|---|
| A | ISSUED FOR CONCEPTUAL GRADING | MAA | | | 11-17-09 |

PANOCHE ENERGY CENTER, LLC

4 X GE LMS100 PEAKING FACILITY
FRESNO COUNTY, CALIFORNIA

Kiewit

Kiewit Power
8455 Lenexa Drive
Lenexa, Kansas 66214

WASTEWATER PONDS
CONCEPTUAL GRADING

| | by | date |
|---|---|---|
| DESIGNED | MAA | 11-16-09 |
| DRAWN | MAA | 11-16-09 |
| CHECKED | | |
| APPROVED | | |

DRAWING NUMBER

SKC-2007018-CG-111709-1

# APPENDIX F

# WATER-TREATMENT CHEMICAL INVENTORY

# WATER-TREATMENT CHEMICAL INVENTORY
## Panoche Energy Center
## Western Fresno County, CA

## October 29, 2009

This document provides an inventory of the chemicals used in the water-treatment process at the Panoche Energy Center. This document also includes an evaluation of the contribution from the treatment chemicals to determine a conservative estimate of the concentrations of selected constituents (arsenic, boron, fluoride, manganese, molybdenum, and sodium) that are added to the process by their use. Attached to this document are two figures – the first shows the layout of equipment at PEC, and the second shows the water-treatment chemical injection points. Also attached are the product data sheet and the Material Safety Data Sheet for each chemical additive.

The treatment chemicals used at the facility encompass several treatment processes. The processes are as follows:

1) The cooling tower (CT) treatment chemicals
2) The reverse osmosis (RO) treatment chemicals
3) The ultra filtration (UF) treatment chemicals
4) The wastewater treatment (WWT) chemicals for use in the injection wells
5) The service water (SWT) treatment chemicals
6) The potable water treatment (PWT) chemicals

The processes that will contribute treatment chemicals to the final wastewater effluent are the CT, RO, UF, and, the SWT. The potable water chemical treatment process is chlorination only, and the chlorine will be contained within the existing on-site septic system. The wastewater treatment chemicals are for use as pretreatment for the injection well only and are not intended for use in the process for the final effluent to the ponds. As such, those process applications considered to contribute to the final stream going to the ponds are the cooling tower, reverse osmosis, ultra filtration and service water treatment as outlined below.

Table #1 – Treatment chemical information.

| Supplier | Product | Description | Specific Gravity | Application Point | Application Max Concentration | Application Average Concentration | Control Measure | Application Frequency |
|---|---|---|---|---|---|---|---|---|
| ChemTreat | CL-4125 | CT-Corrosion Inhibitor | 1.21 | Cooling Tower | 16 ppm as product | 12 ppm as product | DCS control with testing | Intermittent based upon residual |
| ChemTreat | CI-4657 | CT-Scale Inhibitor | 1.06 | Cooling Tower | 120 ppm as product | 100 ppm as product | DCS control with testing | Intermittent based upon residual |
| ChemTreat | CI-450 | CT-Biodispersant | 1.01 | Cooling Tower | 5 ppm as product | 1.5 ppm as product | DCS control with testing | Intermittent based upon residual |
| ChemTreat | CI-40 | CT-Biodispersant | 1.42 | Cooling Tower | 1 ppm as product | 0.5 ppm as product | DCS control with testing | Intermittent based upon residual |
| ChemTreat | CI-2150 | CT-Nonoxidizing Biocide | 1.03 | Cooling Tower | 200 ppm as product | 120 ppm as product | Single application | Infrequent use for upset condition |
| ChemTreat | CT-9008 | RO-Antiscalent | 1.14 | RO Feedwater | 8 ppm as product | 8 ppm as product | DCS control with testing | Continuous with operation |
| ChemTreat | BI-124 | RO-Dechlorination | 1.23 | RO Feedwater | 12 ppm as product | 4 ppm as product | DCS control with testing | Continuous with operation |
| BCS | Sodium Hypochlorite | CT - 12.5% Bleach | 1.20 | Cooling Tower | 2 ppm | 1 ppm | DCS control with testing | Intermittent based upon residual |
| BCS | Sodium Hypochlorite | SWT - 12.5% Bleach | 1.20 | Service Water | 2 ppm | 1 ppm | DCS control with testing | Intermittent based upon residual |
| BCS | Sodium Hypochlorite | PWS - 12.5% Bleach | 1.20 | Plant Potable Water | 2 ppm | 1 ppm | DCS control with testing | Intermittent based upon residual |
| BCS | Sulfuric Acid | CT - 95% Sulfuric Acid | 1.84 | Cooling Tower | 300 ppm | 200 ppm | DCS control with testing | Intermittent based upon residual |
| BCS | Sulfuric Acid | WW - 95% Sulfuric Acid | 1.84 | WW Injection | 300 ppm | 200 ppm | DCS control with testing | Not to be used for Ponds |
| BCS | Sodium Hypochlorite | WW - 12.5% Bleach | 1.20 | WW Injection | 12 ppm | 12 ppm | DCS control with testing | Not to be used for Ponds |
| BCS | Citric Acid | UF - 50% Citric Acid | 1.24 | Ultra Filter | 20,000 | 20,000 | DCS control | Annual Cleaning - 500 gal tank |
| BCS | Sodium Hydroxide | UF - 50% NaOH | 1.53 | Ultra Filter | 1000 | 1000 | DCS control | Annual Cleaning - 500 gal tank |
| BCS | Sodium Hypochlorite | UF - 12.5% Bleach | 1.20 | Ultra Filter | 2000 | 2000 | DCS control | Annual Cleaning - 500 gal tank |

Table #2 - The concentration of sodium, as such, and the contribution to the final stream for each of the treatment chemicals used is given below. Products CL-2156 is a very low use product used as an upset recovery product that will only be used in the case of a biological upset at 200 ppm application max one time per upset.

| Product | Application Point | Operational Flow (Avg) | Max Conc. In Stream (ppm as product) | wt % Na, as such | Sodium Contribution for Stream (lbs/min) | as ppm | % Contribution Na to Total Flow, as such |
|---|---|---|---|---|---|---|---|
| CL-4125 | Cooling Tower | 390.90 | 16 | 7.41% | 0.00387 | 1.188336 | 0.06807409% |
| CI-4657 | Cooling Tower | 390.90 | 120 | 0.60% | 0.00235 | 0.721661538 | 0.04134054% |
| CI-450 | Cooling Tower | 390.90 | 5 | 0 | 0.00000 | 0 | 0.00000000% |
| CI-40 | Cooling Tower | 390.90 | 1 | 8.94% | 0.00029 | 0.089606308 | 0.00513312% |
| CI-2150 | Cooling Tower | 390.90 | 200 | 0 | 0.00000 | 0 | 0.00000000% |
| CT-9008 | RO Feedwater | 362.00 | 8 | 2.06% | 0.00050 | 0.152968205 | 0.00811496% |
| BI-124 | RO Feedwater | 362.00 | 12 | 6.63% | 0.00240 | 0.73848 | 0.03917637% |
| Sodium Hypochlorite | Cooling Tower | 390.90 | 2 | 5.01% | 0.00033 | 0.100436826 | 0.00575355% |
| Sodium Hypochlorite | Service Water | 1520.10 | 2 | 5.01% | 0.00127 | 0.390570528 | 0.08700586% |
| Sodium Hypochlorite | Plant Potable Water | 2.60 | 2 | 5.01% | 0.00000 | 0.000668037 | n/a |
| Sulfuric Acid | Cooling Tower | 390.90 | 300 | 0 | 0.00000 | 0 | 0.00000000% |
| Sulfuric Acid | Wastewater Injection Well | 390.90 | 300 | 0 | 0.00000 | 0 | n/a |
| Sodium Hypochlorite | Wastewater Injection Well | 390.90 | 12 | 5.01% | 0.00196 | 0.602620956 | n/a |
| Citric Acid | Ultra Filter | 500.00 | 20000 | 0 | 0.00000 | 0 | 0.00000000% |
| Sodium Hydroxide | Ultra Filter | 500.00 | 1000 | 53.25% | 2.22181 | 682.6786457 | 0.00000024% |
| Sodium Hypochlorite | Ultra Filter | 500.00 | 2000 | 5.01% | 0.41811 | 128.4686953 | 0.00000005% |
| | | | | | | **Total %** | **0.25459877%** |

The ultra filter chemical usage is for annual cleaning using a 500-gallon supply day tank. The description of this process is given below. The standard flush cleaning is normal operation of this unit, with the chemical enhanced flush cleaning and/or the membrane soak cleaning being used as needed. We anticipate that at most annual cleanings will be necessary.

**Standard Flush Cleaning**
Water from the permeate tank and air scour is pumped into the permeate side of the membrane creating a back flow across the membrane lifting and removing any solids that have accumulated on the surface. The flow rate is typically 125% of the service rate. The solids flow out of the vessels into the concentrate stream for discharge.

**Chemical Enhanced Flush Cleaning**
Feed water, from the backflush tank is pumped at a high flow rate from top to bottom on the concentrate side of the membrane. Sodium Hypochlorite, Sodium Hydroxide, or Citric Acid is added to this flush as needed to enhance the cleaning process.

**Membrane Soak Cleaning**
Sodium Hypochlorite, Sodium Hydroxide, or Citric Acid is added to this flush as needed to enhance the cleaning process. Unlike the chemical enhanced flush though is once the chemical is added the vessels the system is allowed to sit for two or more hours while the membranes are allowed to soak in the chemicals.

Arsenic, boron, manganese, fluoride and molybdenum are not purposeful additives in the chemical products used at the facility. The detectable concentrations of such species in the products are attributable to background levels in potable water sources used for dilution in the manufacturing processes. The dilution process (% potable water as a component of final treatment product) for each treatment chemical varies so the contribution maximum could be considered as 100% potable water added to the waste stream at the maximum dosage levels (120 ppm) outlined in Table #2. The comparison below is given using Panoche Energy Center's water supply for comparative purposes. Each manufacturing facility will have a different potable water source for dilution, thus PEC is used for demonstration purposes of the impact on the final effluent stream for each of these components.

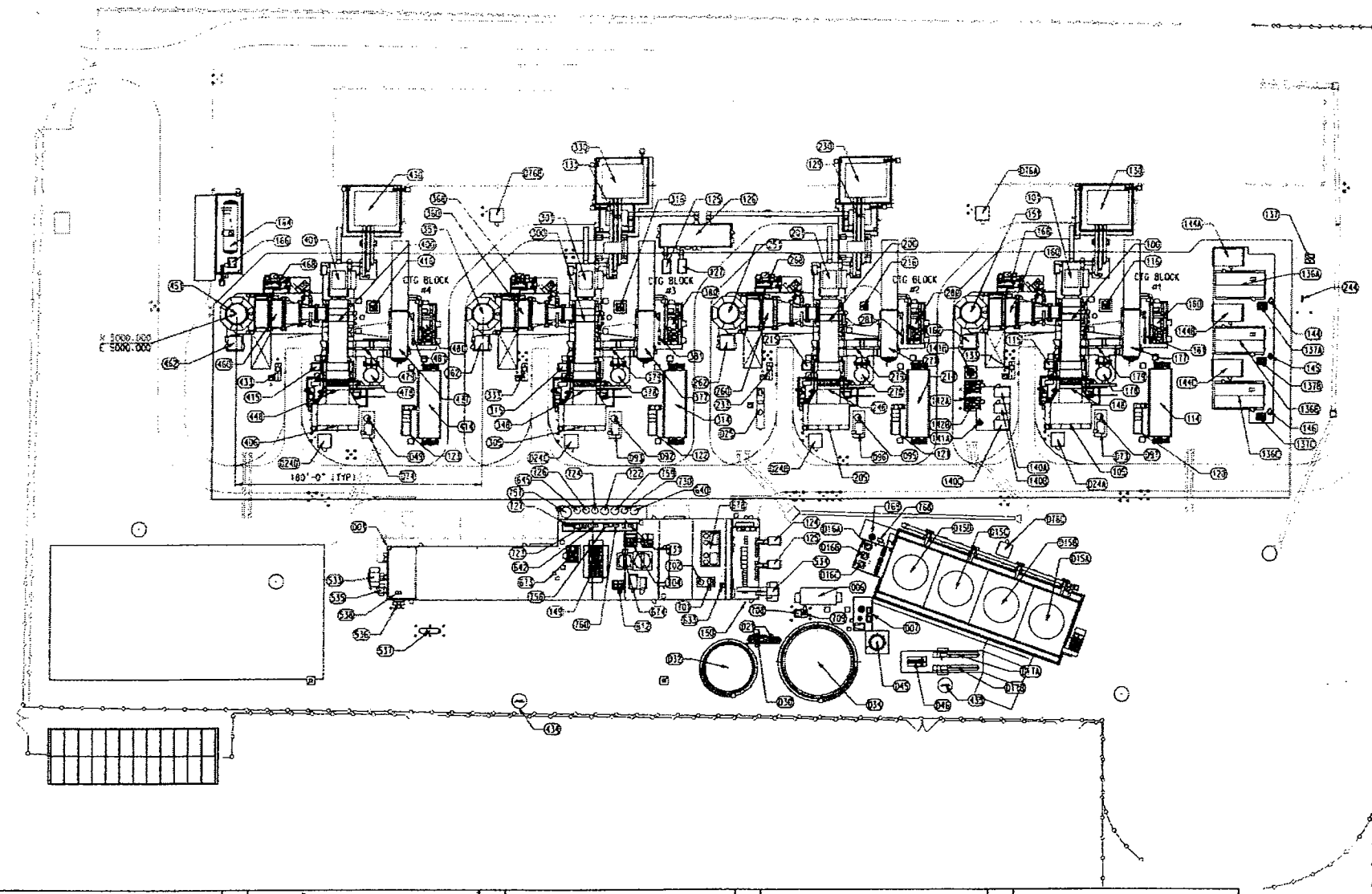
| Species | Operational Flow (Avg) | ppm in PEC Water | Max ppm Addition (100% source water) | Contribution for Stream (lbs/min) | as ppm | % Mass Contribution to Total WW Flow |
|---|---|---|---|---|---|---|
| Molybdenum | 390.90 | 0.051 | 120 | 1.9964E-08 | 6.1341E-06 | 0.000000002005% |
| Floride | 390.90 | 0.41 | 120 | 1.6049E-07 | 4.9314E-05 | 0.000000001988% |
| Arsenic | 390.90 | 0.031 | 120 | 1.2135E-08 | 3.7286E-06 | 0.000000002005% |
| Boron | 390.90 | 3.5 | 120 | 1.3701E-06 | 0.00042097 | 0.000000001992% |
| Manganese | 390.90 | 0.053 | 120 | 2.0747E-08 | 6.3747E-06 | 0.000000001992% |

| Unit App | First Quarter Chemical Usage | Gallons per quarter |
|---|---|---|
| CT | CL-4657 | 2,832.19 |
| CT | CL-450 | 126.15 |
| CT | Cl-40 | 335.74 |
| CT | CL-2156 | 901.26 |
| CT | CL-4215 | 445.65 |
| RO | BL-124 | 340.25 |
| RO | CT-9008 | 246.19 |
| Plant Wide | Bleach 12.5% | 1,834.25 |
| Plant Wide | Acid 93% Sulfuric | 4,146.80 |
| Unit App | Second Quarter Chemical Usage | Gallons per quarter |
| CT | CL-4657 | 3,364.52 |
| CT | CL-450 | 149.86 |
| CT | Cl-40 | 339.47 |
| CT | CL-2156 | 901.26 |
| CT | CL-4215 | 470.59 |
| RO | BL-124 | 344.03 |
| RO | CT-9008 | 248.93 |
| Plant Wide | Bleach 12.5% | 2,097.39 |
| Plant Wide | Acid 93% Sulfuric | 4,926.23 |
| Unit App | Third Quarter Chemical Usage | Gallons per quarter |
| CT | CL-4657 | 4,892.53 |
| CT | CL-450 | 217.91 |
| CT | Cl-40 | 452.63 |
| CT | CL-2156 | 901.26 |
| CT | CL-4215 | 684.31 |
| RO | BL-124 | 458.71 |
| RO | CT-9008 | 331.91 |
| Plant Wide | Bleach 12.5% | 2,979.24 |
| Plant Wide | Acid 93% Sulfuric | 7,163.49 |
| Unit App | Fourth Quarter Chemical Usage | Gallons per quarter |
| CT | CL-4657 | 2,994.32 |
| CT | CL-450 | 133.37 |
| CT | Cl-40 | 339.47 |
| CT | CL-2156 | 901.26 |
| CT | CL-4215 | 418.81 |
| RO | BL-124 | 344.03 |
| RO | CT-9008 | 248.93 |
| Plant Wide | Bleach 12.5% | 1,912.06 |
| Plant Wide | Acid 93% Sulfuric | 4,384.18 |

The chemical usage at the facility is outlined here and is based upon the maximum concentrations given in Table #1 above and quarterly average flow rates for the specified stream. The usage is based upon hourly operation as outlined in the PTA water balance. The quarterly totals were calculated based upon 18 hours per day (HPD) operation in Q1,Q2, and Q4, and 24 HPD operation in Q3. The general plot plan with chemical locations, and application points for the various chemicals, are presented in the two attached figures.

PG&E GAS PIPE

PG&E METERING AND REGULATION STATION




| NO | EQUIPMENT TITLE |
|---|---|
| 001 | ADMIN / WAREHOUSE / WATER TREATMENT BUILDING |
| 006 | FIRE WATER PUMP ENCLOSURE |
| 007 | WASTEWATER TANK TREATMENT AREA |
| 015A | COOLING TOWER CELL A |
| 015B | COOLING TOWER CELL B |
| 015C | COOLING TOWER CELL C |
| 015D | COOLING TOWER CELL D |
| 016A | CIRCULATING WATER PUMP A |
| 016B | CIRCULATING WATER PUMP B |
| 016C | CIRCULATING WATER PUMP C |
| 017A | WATER INJECTION PUMP |
| 017B | WATER INJECTION PUMP |
| 021 | SERVICE WATER PUMP SKID |
| 024A | AUX SKID FIREWATER VALVE ENCLOSURE #1 |
| 024B | AUX SKID FIREWATER VALVE ENCLOSURE #2 |
| 024C | AUX SKID FIREWATER VALVE ENCLOSURE #3 |
| 024D | AUX SKID FIREWATER VALVE ENCLOSURE #4 |
| 025 | OIL/WATER SEPARATOR |
| 030 | DEMINERALIZED WATER PUMP SKID |
| 032 | DEMINERALIZED WATER STORAGE TANK |
| 034 | SERVICE/FIRE WATER STORAGE TANK |
| 045 | WASTE WATER COLLECTION TANK |
| 046 | WASTEWATER INJECTION CHARGE PUMP SKID |
| 049 | CONDENSATE RECOVERY TANK |
| 073 | CONDENSATE RECOVERY PUMP SKID |
| 074 | CONDENSATE RECOVERY PUMP SKID |
| 076A | EAST TRANSFORMER DELUGE ENCLOSURE |
| 076B | WEST TRANSFORMER DELUGE ENCLOSURE |
| 076C | COOLING TOWER DELUGE ENCLOSURE |
| 092 | CONDENSATE RECOVERY TANK |
| 093 | CONDENSATE RECOVERY PUMP SKID |
| 095 | CONDENSATE RECOVERY TANK |
| 096 | CONDENSATE RECOVERY PUMP SKID |
| 091 | CONDENSATE RECOVERY TANK |
| 100 | LMS100 MAIN UNIT #1 |
| 101 | GENERATOR |
| 105 | FILTERHOUSE |
| 114 | POWER CONTROL MODULE FOR CTG UNIT 101 |
| 115 | CARBON DIOXIDE BOTTLE RACK |
| 116 | FUEL GAS FILTER/SEPARATOR #1 |
| 120 | PAD MOUNT TRANSFORMER 101 |
| 121 | PAD MOUNT TRANSFORMER 201 |
| 122 | PAD MOUNT TRANSFORMER 301 |
| 123 | PAD MOUNT TRANSFORMER 401 |
| 124 | PAD MOUNT TRANSFORMER 001A |
| 125 | PAD MOUNT TRANSFORMER 001B |
| 126 | SKV ELECTRICAL ENCLOSURE |
| 127 | STATION SERVICE TRANSFORMER 001A |
| 129 | UNIT AUXILIARY SUPPLY TRANSFORMER 001A |
| 130 | CTG STEP-UP TRANSFORMER UNIT 1 |
| 131 | UNIT AUXILIARY SUPPLY TRANSFORMER UNIT 001B |
| 133 | COMBUSTION TURBINE DRAINS TANK |
| 136A | FUEL GAS COMPRESSOR SKID A |
| 136B | FUEL GAS COMPRESSOR SKID B |
| 136C | FUEL GAS COMPRESSOR SKID C |
| 137 | FUEL GAS KNOCKOUT DRUM |
| 137A | GAS COMPRESSOR DRAINS TANK A |
| 137B | GAS COMPRESSOR DRAINS TANK B |
| 137C | GAS COMPRESSOR DRAINS TANK C |
| 140A | AIR COMPRESSOR A |
| 140B | AIR COMPRESSOR B |
| 140C | AIR COMPRESSOR C |
| 141A | WET AIR RECEIVER |
| 141B | DRY AIR RECEIVER |
| 142A | AIR DRYER SKID |
| 142B | AIR DRYER SKID |
| 144 | SUCTION ACCUMULATOR A |
| 144A | RECYCLE GAS COOLER A |
| 144B | RECYCLE GAS COOLER B |
| 144C | RECYCLE GAS COOLER C |
| 145 | SUCTION ACCUMULATOR B |
| 146 | SUCTION ACCUMULATOR C |
| 148 | CT AUXILIARY SKID #1 |
| 149 | RO FIRST AND SECOND PASS SUPER SKID |
| 150 | EYE WASH STATION WT BLDG SOUTHEAST |
| 151 | EXHAUST STACK |
| 160 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 162 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 164 | AMMONIA STORAGE TANK |
| 166 | AMMONIA FORWARDING PUMP SKID |
| 168 | AQUEOUS AMMONIA DELIVERY SKID #1 |
| 171 | INTERCOOLER #1 |
| 178 | 90V STACK |
| 179 | INTERCOOLER #1 INTERCONNECTING PIPING SKID |
| 180 | COOLING WATER PUMP SKID 1 |
| 181 | CONDENSATION TANK |
| 200 | LMS100 MAIN UNIT #2 |
| 201 | GENERATOR |
| 205 | FILTERHOUSE |
| 214 | POWER CONTROL MODULE FOR CTG UNIT 201 |
| 215 | CARBON DIOXIDE BOTTLE RACK |
| 216 | FUEL GAS FILTER/SEPARATOR #2 |
| 230 | CTG STEP-UP TRANSFORMER UNIT 2 |
| 233 | COMBUSTION TURBINE DRAINS TANK |
| 244 | FUEL GAS CHROMATOGRAPH |
| 248 | CT AUXILIARY SKID #2 |
| 251 | EXHAUST STACK |
| 260 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 262 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 268 | AQUEOUS AMMONIA DELIVERY SKID #2 |
| 271 | INTERCOOLER #2 |
| 278 | 90V STACK |
| 279 | INTERCOOLER #2 INTERCONNECTING PIPING SKID |
| 280 | COOLING WATER PUMP SKID #2 |
| 281 | CONDENSATION TANK |
| 300 | LMS100 MAIN UNIT #3 |
| 301 | GENERATOR |
| 305 | FILTERHOUSE |
| 314 | POWER CONTROL MODULE FOR CTG UNIT 301 |
| 315 | CARBON DIOXIDE BOTTLE RACK |
| 316 | FUEL GAS FILTER/SEPARATOR #3 |
| 330 | CTG STEP-UP TRANSFORMER UNIT 3 |
| 333 | COMBUSTION TURBINE DRAINS TANK |
| 348 | CT AUXILIARY SKID #3 |
| 351 | EXHAUST STACK |
| 360 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 362 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 368 | AQUEOUS AMMONIA DELIVERY SKID #3 |
| 371 | INTERCOOLER #3 |
| 378 | 90V STACK |
| 379 | INTERCOOLER #3 INTERCONNECTING PIPING SKID |
| 380 | COOLING WATER PUMP SKID #3 |
| 381 | CONDENSATION TANK |
| 400 | LMS100 MAIN UNIT #4 |
| 401 | GENERATOR |
| 406 | FILTERHOUSE |
| 414 | POWER CONTROL MODULE FOR CTG UNIT 401 |
| 415 | CARBON DIOXIDE BOTTLE RACK |
| 416 | FUEL GAS FILTER/SEPARATOR #4 |
| 430 | CTG STEP-UP TRANSFORMER UNIT 4 |
| 433 | COMBUSTION TURBINE DRAINS TANK |
| 434 | INJECTION WELL 2 |
| 435 | INJECTION WELL 1 |
| 436 | INJECTION WELL 3 |
| 437 | INJECTION WELL 4 |
| 448 | CT AUXILIARY SKID #4 |
| 451 | EXHAUST STACK |
| 460 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 462 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 468 | AQUEOUS AMMONIA DELIVERY SKID #4 |
| 471 | INTERCOOLER #4 |
| 478 | 90V STACK |
| 479 | INTERCOOLER #4 INTERCONNECTING PIPING SKID |
| 480 | COOLING WATER PUMP SKID #4 |
| 481 | CONDENSATION TANK |
| 533 | CONTROL ROOM/ADMIN HVAC UNIT |
| 534 | ELECTRICAL ROOM HVAC UNIT |
| 535 | CONTROL ROOM/ADMIN HVAC UNIT |
| 536 | CONTROL ROOM/ADMIN HVAC UNIT |
| 537 | PROPANE TANK |
| 538 | ADMIN/CONTROL ROOM DCS PANEL |
| 612 | RO FEED PUMP SKID |
| 633 | WATER HEATER TANK |
| 642 | CIRCULATING WATER SULFURIC ACID 98% FEED TOTE |
| 642 | CIRCULATING WATER SULFURIC ACID PUMP SKID |
| 645 | WATER TREATMENT RO CAUSTIC TOTE |
| 673 | RO CLEANING SYSTEM |
| 674 | RO PRODUCT WATER STORAGE TANK |
| 678 | MIXED BED POLISHERS |
| 701 | POTABLE WATER FEED SKID |
| 702 | POTABLE WATER FEED TANK |
| 704 | RO PRODUCT WATER FORWARDING PUMP SKID |
| 708 | WATER TREATMENT SODIUM HYPOCHLORITE TOTE |
| 709 | WATER TREATMENT SODIUM HYPOCHLORITE PUMP SKID |
| 722 | CIRCULATING WATER SODIUM HYPOCHLORITE 112.5% TOTE |
| 723 | CIRCULATING WATER SODIUM HYPOCHLORITE PUMP SKID |
| 724 | WATER TREATMENT RO ANTI-SCALANT TOTE |
| 726 | WATER TREATMENT SODIUM BISULFITE TOTE |
| 727 | WATER TREATMENT CHEMICAL PUMP SKID |
| 730 | CIRCULATING WATER BIO-DISPERSANT FEED TOTE |
| 731 | CIRCULATING WATER BIO-DISPERSANT PUMP SKID |
| 757 | CIRCULATING WATER CORROSION INHIBITOR TOTE |
| 758 | CIRCULATING WATER CORROSION INHIBITOR PUMP SKID |
| 759 | CIRCULATING WATER MINERAL DISPERSANT TOTE |
| 760 | CIRCULATING WATER MINERAL DISPERSANT PUMP SKID |
| 768 | CT YELLOW METAL CORROSION INHIBITOR PUMP SKID |
| 769 | COOLING TOWER YELLOW METAL CORROSION INHIBITOR |

SCALE IN FEET
40 0 40 80
SCALE: 1" = 40'-0"

| REV | DESCRIPTION | DRN | CHK | APP | DATE |
|---|---|---|---|---|---|
| 3 | CONFORMED TO CONSTRUCTION RECORDS | DAD | DES | RCB | OPEN |
| 2 | CONFORMED TO CONSTRUCTION RECORDS | CMO | DES | RCB | 09-18-09 |
| 1 | CONFORMED TO CONSTRUCTION RECORDS | CMO | DES | RCB | 05-29-09 |
| 0 | ISSUED FOR CONSTRUCTION | TEF | WFS | RCB | 10-06-08 |

PANOCHE ENERGY CENTER, LLC

4 X GE LMS100 PEAKING FACILITY
FRESNO COUNTY, CALIFORNIA

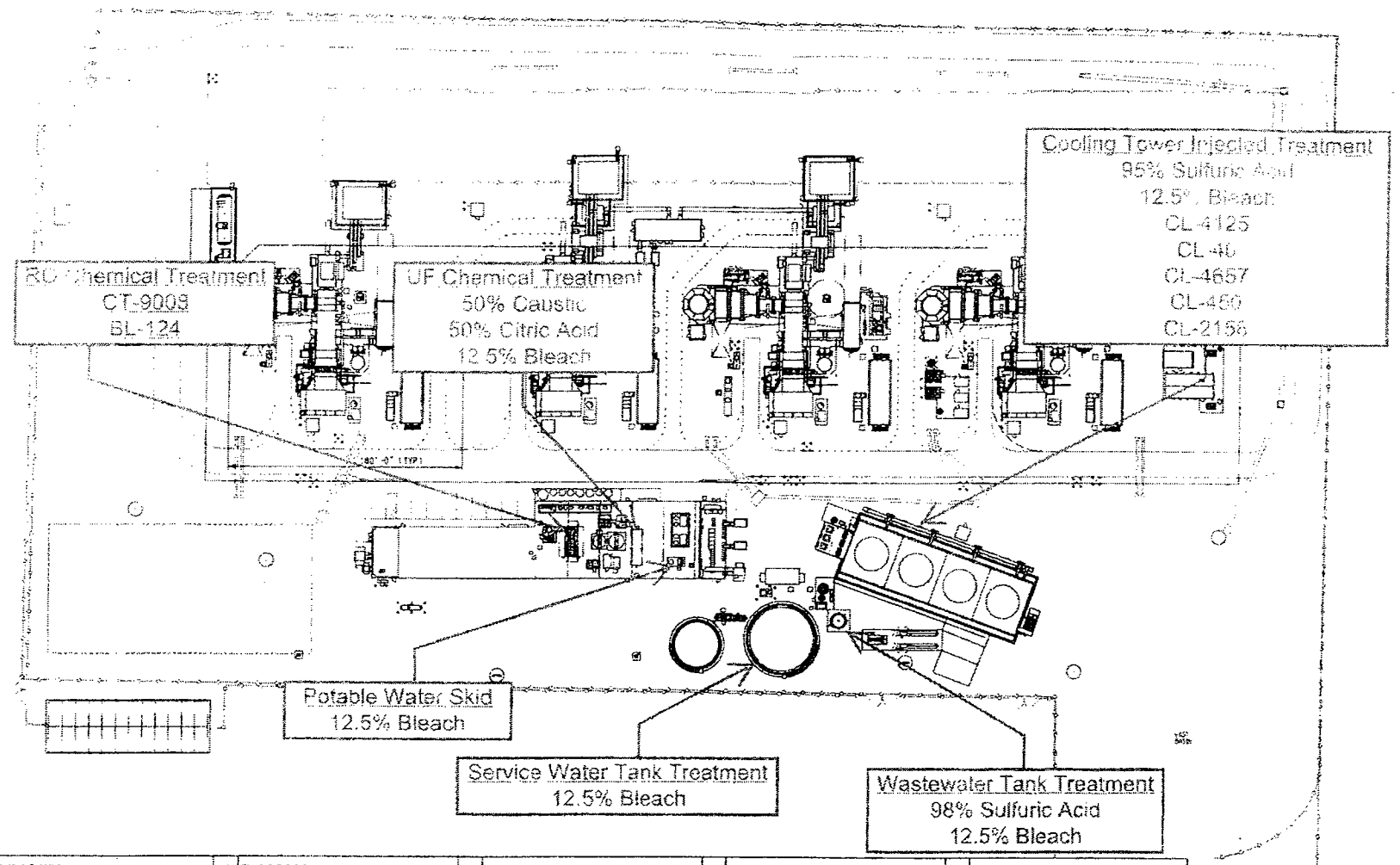
Kiewit — Kiewit Power, 8455 Lenexa Drive, Lenexa, Kansas 66214

REGISTERED PROFESSIONAL ENGINEER — ROBERT E. BROWN — No. M 34002 — Exp. 12-31-09 — MECHANICAL — STATE OF CALIFORNIA

PLOT PLAN

| | by | date |
|---|---|---|
| DESIGNED | TEF | 09-16-07 |
| DRAWN | TEF | 10-01-08 |
| CHECKED | WFS | 10-01-08 |
| APPROVED | RCB | 10-01-08 |

DRAWING NUMBER
2007-018-PP-001




| NO | EQUIPMENT TITLE |
|---|---|
| 001 | ADMIN / WAREHOUSE / WATER TREATMENT BUILDING |
| 006 | FIRE WATER PUMP ENCLOSURE |
| 015A | COOLING TOWER CELL A |
| 015B | COOLING TOWER CELL B |
| 015C | COOLING TOWER CELL C |
| 015D | COOLING TOWER CELL D |
| 016A | CIRCULATING WATER PUMP A |
| 016B | CIRCULATING WATER PUMP B |
| 016C | CIRCULATING WATER PUMP C |
| 017A | WATER INJECTION PUMP |
| 017B | WATER INJECTION PUMP |
| 021 | SERVICE WATER PUMP SKID |
| 024A | AUX SKID FIREWATER VALVE ENCLOSURE #1 |
| 024B | AUX SKID FIREWATER VALVE ENCLOSURE #2 |
| 024C | AUX SKID FIREWATER VALVE ENCLOSURE #3 |
| 024D | AUX SKID FIREWATER VALVE ENCLOSURE #4 |
| 025 | OIL/WATER SEPARATOR |
| 030 | DEMINERALIZED WATER PUMP SKID |
| 032 | DEMINERALIZED WATER STORAGE TANK |
| 034 | SERVICE/FIRE WATER STORAGE TANK |
| 045 | WASTE WATER COLLECTION TANK |
| 046 | WASTEWATER INJECTION CHARGE PUMP SKID |
| 056A | EAST TRANSFORMER DELUGE ENCLOSURE |
| 056B | WEST TRANSFORMER DELUGE ENCLOSURE |
| 076C | COOLING TOWER DELUGE ENCLOSURE |
| 100 | LMS100 MAIN UNIT #1 |
| 101 | GENERATOR |
| 105 | FILTERHOUSE |
| 114 | POWER CONTROL MODULE FOR CTG UNIT 101 |
| 115 | CARBON DIOXIDE BOTTLE RACK |
| 116 | FUEL GAS FILTER/SEPARATOR #1 |
| 120 | PAD MOUNT TRANSFORMER 101 |
| 121 | PAD MOUNT TRANSFORMER 201 |
| 122 | PAD MOUNT TRANSFORMER 301 |
| 123 | PAD MOUNT TRANSFORMER 401 |
| 124 | PAD MOUNT TRANSFORMER 001A |
| 125 | PAD MOUNT TRANSFORMER 001B |
| 126 | SKV ELECTRICAL ENCLOSURE |
| 127 | STATION SERVICE TRANSFORMER 001A |
| 129 | UNIT AUXILIARY SUPPLY TRANSFORMER 001A |
| 130 | CTG STEP-UP TRANSFORMER UNIT 1 |
| 131 | UNIT AUXILIARY SUPPLY TRANSFORMER UNIT 001B |
| 133 | COMBUSTION TURBINE DRAINS TANK |
| 136A | FUEL GAS COMPRESSOR SKID A |
| 136B | FUEL GAS COMPRESSOR SKID B |
| 136C | FUEL GAS COMPRESSOR SKID C |
| 137 | FUEL GAS ENCLOSUP DRUM |
| 137A | GAS COMPRESSOR DRAINS TANK A |
| 137B | GAS COMPRESSOR DRAINS TANK B |
| 137C | GAS COMPRESSOR DRAINS TANK C |
| 140A | AIR COMPRESSOR A |
| 140B | AIR COMPRESSOR B |
| 140C | AIR COMPRESSOR C |
| 141A | WET AIR RECEIVER |
| 141B | DRY AIR RECEIVER |
| 142A | AIR DRYER SKID |
| 142B | AIR DRYER SKID |
| 144 | SUCTION ACCUMULATOR A |
| 144A | RECYCLE GAS COOLER A |
| 144B | RECYCLE GAS COOLER B |
| 144C | RECYCLE GAS COOLER C |
| 145 | SUCTION ACCUMULATOR B |
| 146 | SUCTION ACCUMULATOR C |
| 148 | CT AUXILIARY SKID #1 |
| 149 | RO FIRST AND SECOND PASS SUPER SKID |
| 150 | EYE WASH STATION @T BLDG SOUTHEAST |
| 151 | EXHAUST STACK |
| 160 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 164 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 164 | AMMONIA STORAGE TANK |
| 166 | AMMONIA FORWARDING PUMP SKID |
| 168 | AQUEOUS AMMONIA DELIVERY SKID #1 |
| 177 | INTERCOOLER #1 |
| 178 | VBV STACK |
| 179 | INTERCOOLER #1 INTERCONNECTING PIPING SKID |
| 180 | COOLING WATER PUMP SKID 1 |
| 181 | CONDENSATION TANK |
| 200 | LMS100 MAIN UNIT #2 |
| 201 | GENERATOR |
| 205 | FILTERHOUSE |
| 214 | POWER CONTROL MODULE FOR CTG UNIT 201 |
| 215 | CARBON DIOXIDE BOTTLE RACK |
| 216 | FUEL GAS FILTER/SEPARATOR #2 |
| 230 | CTG STEP-UP TRANSFORMER UNIT 2 |
| 233 | COMBUSTION TURBINE DRAINS TANK |
| 244 | FUEL GAS CHROMATOGRAPH |
| 246 | CT AUXILIARY SKID #2 |
| 251 | EXHAUST STACK |
| 260 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 262 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 268 | AQUEOUS AMMONIA DELIVERY SKID #2 |
| 277 | INTERCOOLER #2 |
| 278 | VBV STACK |
| 279 | INTERCOOLER #2 INTERCONNECTING PIPING |
| 285 | COOLING WATER PUMP SKID #2 |
| 287 | CONDENSATION TANK |
| 300 | LMS100 MAIN UNIT #3 |
| 301 | GENERATOR |
| 305 | FILTERHOUSE |
| 314 | POWER CONTROL MODULE FOR CTG UNIT 301 |
| 315 | CARBON DIOXIDE BOTTLE RACK |
| 316 | FUEL GAS FILTER/SEPARATOR #3 |
| 330 | CTG STEP-UP TRANSFORMER UNIT 3 |
| 333 | COMBUSTION TURBINE DRAINS TANK |
| 346 | CT AUXILIARY SKID #3 |
| 351 | EXHAUST STACK |
| 360 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 362 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 368 | AQUEOUS AMMONIA DELIVERY SKID #3 |
| 377 | INTERCOOLER #3 |
| 378 | VBV STACK |
| 379 | INTERCOOLER #3 INTERCONNECTING PIPING SKID |
| 380 | COOLING WATER PUMP SKID #3 |
| 381 | CONDENSATION TANK |
| 400 | LMS100 MAIN UNIT #4 |
| 401 | GENERATOR |
| 406 | FILTERHOUSE |
| 414 | POWER CONTROL MODULE FOR CTG UNIT 401 |
| 415 | CARBON DIOXIDE BOTTLE RACK |
| 416 | FUEL GAS FILTER/SEPARATOR #4 |
| 430 | CTG STEP-UP TRANSFORMER UNIT 4 |
| 435 | COMBUSTION TURBINE DRAINS TANK |
| 434 | INJECTION WELL 2 |
| 435 | INJECTION WELL 1 |
| 436 | INJECTION WELL 3 |
| 437 | INJECTION WELL 4 |
| 448 | CT AUXILIARY SKID #4 |
| 451 | EXHAUST STACK |
| 460 | SELECTIVE CATALYTIC REDUCTION UNIT |
| 462 | CONTINUOUS EMISSIONS MONITORING SYSTEMS EQUIPMENT BUILDING (CEMS) |
| 468 | AQUEOUS AMMONIA DELIVERY SKID #4 |
| 477 | INTERCOOLER #4 |
| 478 | VBV STACK |
| 479 | INTERCOOLER #4 INTERCONNECTING PIPING SKID |
| 480 | COOLING WATER PUMP SKID #4 |
| 481 | CONDENSATION TANK |
| 533 | CONTROL ROOM/ADMIN HVAC UNIT |
| 534 | ELECTRICAL ROOM HVAC UNIT |
| 535 | CONTROL ROOM/ADMIN HVAC UNIT |
| 536 | CONTROL ROOM/ADMIN HVAC UNIT |
| 537 | PROPANE TANK |
| 538 | ADMIN/CONTROL ROOM DCS PANEL |
| 612 | RO FEED PUMP SKID |
| 633 | WATER HEATER TANK |
| 640 | CIRCULATING WATER SULFURIC ACID (98%) FEED TOTE |
| 642 | CIRCULATING WATER SULFURIC ACID PUMP SKID |
| 645 | WATER TREATMENT RO CAUSTIC TOTE |
| 673 | RO CLEANING SYSTEM |
| 674 | RO PRODUCT WATER STORAGE TANK |
| 678 | MIXED BED POLISHERS |
| 701 | POTABLE WATER FEED SKID |
| 702 | POTABLE WATER FEED TANK |
| 704 | RO PRODUCT WATER FORWARDING PUMP SKID |
| 708 | WATER TREATMENT SODIUM HYPOCHLORITE TOTE |
| 709 | WATER TREATMENT SODIUM HYPOCHLORITE PUMP SKID |
| 722 | CIRCULATING WATER SODIUM HYPOCHLORITE (12.5%) TOTE |
| 723 | CIRCULATING WATER SODIUM HYPOCHLORITE PUMP SKID |
| 724 | WATER TREATMENT RO ANTI-SCALANT TOTE |
| 726 | WATER TREATMENT SODIUM BISULFITE TOTE |
| 727 | WATER TREATMENT CHEMICAL PUMP SKID |
| 730 | CIRCULATING WATER BIO-DISPERSANT FEED TOTE |
| 731 | CIRCULATING WATER BIO-DISPERSANT PUMP SKID |
| 757 | CIRCULATING WATER CORROSION INHIBITOR TOTE |
| 758 | CIRCULATING WATER CORROSION INHIBITOR PUMP SKID |
| 759 | CIRCULATING WATER MINERAL DISPERSANT TOTE |
| 760 | CIRCULATING WATER MINERAL DISPERSANT PUMP SKID |

SCALE IN FEET
SCALE: 1" = 40'-0"

| REV | DESCRIPTION | DRN | CHK | APP | DATE |
|---|---|---|---|---|---|
| 2 | CONFORMED TO CONSTRUCTION RECORDS | CMD | DES | RDB | 09-18-09 |
| 1 | CONFORMED TO CONSTRUCTION RECORDS | CMD | DES | RDB | 05-29-09 |
| 0 | ISSUED FOR CONSTRUCTION | TEF | WFK | RDB | 10-06-08 |

PANOCHE ENERGY CENTER, LLC

4 X GE LMS100 PEAKING FACILITY
FRESNO COUNTY, CALIFORNIA

Kiewit — Kiewit Power, 8450 Lenexa Drive, Lenexa, Kansas 66214

Robert E Brown, Mechanical Engineer

REGISTERED PROFESSIONAL ENGINEER — ROBERT E. BROWN — No. M 34002 — Exp. 12-31-09 — MECHANICAL — STATE OF CALIFORNIA

PLOT PLAN

| | by | date |
|---|---|---|
| DESIGNED | TEF | 08-15-07 |
| DRAWN | TEF | 12-01-08 |
| CHECKED | WFK | 12-01-08 |
| APPROVED | RDB | 12-01-08 |

DRAWING NUMBER: 2007-018-PP-001

# MATERIAL SAFETY DATA SHEET

## Section 1. Chemical Product and Company Identification

| | |
|---|---|
| **Product Name:** | ChemTreat CL40 |
| **Product Use:** | Cooling Water Microbiocide |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424-9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648-4579 |
| **Date of MSDS:** | March 21, 2008 |

## Section 2. Hazard(s) Identification

**Signal Word:** WARNING!

**Hazard Statement(s):** Causes eye irritation.
May be harmful in contact with skin.
May be harmful if inhaled.
May be harmful if swallowed.

**Precautionary Statement(s):** No significant health risks are expected from exposures under normal conditions of use.

## Section 3. Composition/Hazardous Ingredients

| Component | CAS Registry # | Wt.% |
|---|---|---|
| Sodium bromide | 7647-15-6 | 40 |

## Section 4. First Aid Measures

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

**Eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

**Skin:** Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

**Ingestion:** DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

| | |
|---|---|
| **Notes to Physician:** | N/A |
| **Additional First Aid Remarks:** | Have the product container, label or MSDS with you when calling a poison control center or doctor, or when going for treatment. |

## *Section 5. Fire Fighting Measures*

| | |
|---|---|
| **Flammability of the Product:** | Not flammable. |
| **Suitable Extinguishing Media:** | Use extinguishing media suitable to surrounding fire. |
| **Specific Hazards Arising from the Chemical:** | None known. |
| **Protective Equipment:** | If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus. |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Personal Precautions:** | Use appropriate Personal Protective Equipment (PPE). |
| **Environmental Precautions:** | This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, ponds, streams, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA. |
| **Methods for Cleaning up:** | Contain and recover liquid when possible. Flush spill area with water spray. |
| **Other Statements:** | None. |

## Section 7. Handling and Storage

**Handling:** Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

**Storage:** Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only.

## Section 8. Exposure Controls/Personal Protection

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| Sodium bromide | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| Sodium bromide | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick–drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

ChemTreat, Inc.


## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Colorless, Clear |
| **Specific Gravity:** | 1.4250 |
| **pH:** | 7.3 |
| **Freezing Point:** | <−11°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/D |
| **Boiling Point:** | N/D |
| **Solubility in Water:** | Dispersible |
| **Evaporation Rate:** | N/A |
| **Vapor Density:** | N/D |
| **Molecular Weight:** | N/D |
| **Viscosity:** | N/A |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 11.88 lb/ga |
| **Vapor Pressure:** | N/D |
| **% VOC** | 60 |

## *Section 10. Stability and Reactivity*

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Strong acids, Strong oxidizers

**Hazardous Decomposition Products:** Hydrogen, Bromine

**Possibility of Hazardous Reactions:** None known.

## *Section 11. Toxicological Information*

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| ChemTreat CL40 | Oral | LD50 | >5000 mg/kg | Rat |
| | Dermal | LD50 | >2000 mg/kg | Rabbit |

**Comments:** None.

ChemTreat, Inc.

MSDS

## Section 12. Ecological Information

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Bluegill Sunfish | 96h | LC50 | >1000 mg/l |
| Fathead Minnow | 96h | LC50 | >1000 mg/l |
| Daphnia magna | 48h | LC50 | >1000 mg/l |
| Rainbow Trout | 96h | LC50 | >1000 mg/l |
| Ceriodaphnia dubia | 48h | LC50 | >1000 mg/l |

**Comments:** None.

## Section 13. Disposal Considerations

PESTICIDE DISPOSAL: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

## Section 14. Transport Information

**DOT Classification**

**DOT Name:** COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID
**Technical Name:** N/A
**Hazard Class:** Not D.O.T. Regulated.
**UN/NA#:** N/A
**Packing Group:** N/A

## Section 15. Regulatory Information

**Inventory Status**

**United States (TSCA):** All ingredients listed.
**Canada (DSL/NDSL):** All ingredients listed.

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| Sodium bromide | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| Sodium bromide | None |

**International Regulations**

**Canada**

**WHMIS Classification:** N/A

**Controlled Product Regulations (CPR):** N/A

## *Section 16. Other Information*

**HMIS Hazard Rating**

| | |
|---|---|
| **Health:** | 1 |
| **Flammability:** | 0 |
| **Physical Hazard:** | 0 |
| **PPE:** | X |

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for

their use.

**NSF:** N/A

**FDA:** N/A

**KOSHER:** This product is certified by the Orthodox Union as kosher pareve.

**FIFRA:** This product is an EPA registered biocide. 5185-451-15300

**Other:** None

**Abbreviations**

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

## *Disclaimer*

# 50% Citric Acid Solution, FCC Grade

## SPECIFICATION SHEET

**Issue Date:** June 6, 2008

**Replaces:** None

**Chemical Formula:** $C_6H_8O_7$ (Citric Acid), Food Chemical Codex Grade, Kosher Approved

**Description** Liquid Citric acid is produced by dissolving anhydrous citric acid in water. It is a clear, colorless, odorless solution with a pure, fruit-sour flavor. It is a stable, non-volatile solution and completely miscible in water.

**Applications** Citric acid has a wide range of uses including food and beverage, environmental, additive and compounding.

**Typical Properties**

| Parameter: | Result: |
|---|---|
| Assay | 49.00% to 51.00% by weight |
| Identification | Meets USP / FCC tests |
| R.O.I | Not more than 0.5% |
| Oxalate | Passes test – no turbidity |
| Sulfate | Passes test – no turbidity |
| Arsenic (as As) | Not more than 1 ppm |
| Heavy Metals (as Lead) | Not more than 5.0 ppm |
| Lead | Not more than 0.5 ppm |
| Readily Carbonizable Substances | Passes test |
| Tridodecylamine | Not more than 0.1 ppm |
| Ultraviolet Absorbance | 280-289 nm 0.25 max. |
| | 291-299 nm 0.20 max. |
| | 300-359 nm 0.13 max. |
| | 360-400 nm 0.03 max. |
| Organic Volatile Impurities | Meets the requirement |

**Safety and Storage** Individuals handing and storing citric acid should avoid breathing sprays or mists, ingesting, getting in eyes, on skin or on clothing. Citric acid should be stored in a cool (optimal 30F-85F), dry, well ventilated place away from incompatible acids or alkalis.

**Packaging** BCS can provide the appropriate size tank for storage and delivery service.

Contact your Basic Chemical Solutions sales representative for more information at

**800-411-4227 (4BCS)**

**BASIC CHEMICAL SOLUTIONS, L.L.C.**

**Corporate Headquarters**
**525 Seaport Boulevard**
**Redwood City, California 94063**

ChemTreat, Inc.

# Product Data

**REVERSE OSMOSIS MEMBRANE ANTISCALENT/ANTIFOULANT**

## CHEMTREAT CT-9008

### GENERAL DESCRIPTION

**CHEMTREAT CT-9008** is an advanced liquid formulation containing organophosphonates and polymers, including Quadrasperse® quadpolymer designed to control hardness and silica-based deposits in reverse osmosis membranes. Application of **CHEMTREAT CT-9008** provides results superior to polyphosphate or sulfuric acid products. **CHEMTREAT CT-9008** is certified NSF/ANSI Standard 60 for use in potable water at a maximum use rate of 20 mg/L.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear, dark straw-colored liquid |
| Odor | Mild |
| pH | ~4.2 |
| Density | 9.49 pounds/gallon |
| Freeze Point | 32°F |

### APPLICATION

**CHEMTREAT CT-9008** can be fed neat when possible. The preferred feed point is ahead of the 5-micron cartridge filters prior to the membrane inlet. To ensure good mixing, the product should be injected at a point of turbulent flow in the raw water system. For NSF applications, the maximum dosage of **CHEMTREAT CT-9008** is 20 mg/L as product in the feedwater to the reverse osmosis system. Consult your ChemTreat representative for specific application recommendations. **CHEMTREAT CT-9008** can be measured using the PolyTrak® test kit, Part Number PTK-3.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CT-9008** is available in 55-gallon drums, 300-gallon returnable totes, and bulk.

*Rev. 06/2007 JZ*

# MATERIAL SAFETY DATA SHEET

## Section 1. Chemical Product and Company Identification

| | |
|---|---|
| **Product Name:** | ChemTreat CT9008 |
| **Product Use:** | Reverse Osmosis Treatment |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424–9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648–4579 |
| **Date of MSDS:** | August 11, 2008 |

## Section 2. Hazard(s) Identification

**Signal Word:** WARNING!

**Hazard Statement(s):**

Causes eye irritation.
May be harmful in contact with skin.
May be harmful if inhaled.
Harmful if swallowed.

**Precautionary Statement(s):**

No significant health risks are expected from exposures under normal conditions of use.

## Section 3. Composition/Hazardous Ingredients

| Component | CAS Registry # | Wt.% |
|---|---|---|
| 1–Hydroxyethylidene–1,1–diphosphonic acid, dipotassium salt | 21089–06–5 | 1–5 |

## Section 4. First Aid Measures

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

**Eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

**Skin:** Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

**Ingestion:** DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician.

ChemTreat, Inc.


**Notes to Physician:** N/A

**Additional First Aid Remarks:** N/A

## *Section 5. Fire Fighting Measures*

**Flammability of the Product:** Not flammable.

**Suitable Extinguishing Media:** Use extinguishing media suitable to surrounding fire.

**Specific Hazards Arising from the Chemical:** Use water spray to keep containers cool.

**Protective Equipment:** If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus.

## *Section 6. Accidental Release Measures*

**Personal Precautions:** Use appropriate Personal Protective Equipment (PPE).

**Environmental Precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

**Methods for Cleaning up:** Contain and recover liquid when possible. Flush spill area with water spray.

**Other Statements:** None.

## *Section 7. Handling and Storage*

**Handling:** Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

**Storage:** Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only.

ChemTreat, Inc.

MSDS

## *Section 8. Exposure Controls/Personal Protection*

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| 1-Hydroxyethylidene-1,1-diphosphonic acid, dipotassium salt | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| 1-Hydroxyethylidene-1,1-diphosphonic acid, dipotassium salt | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full-face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick-drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Dark Straw, Clear |
| **Specific Gravity:** | 1.1380 |
| **pH:** | 4.2 |
| **Freezing Point:** | 32°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/A |
| **Boiling Point:** | N/D |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | N/D |
| **Vapor Density:** | Similar to water |
| **Molecular Weight:** | N/D |
| **Viscosity:** | <100 |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 9.49 lb/ga |

| | |
|---|---|
| **Vapor Pressure:** | Similar to water |
| **% VOC** | 0 |

## *Section 10. Stability and Reactivity*

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Strong bases, Strong oxidizers

**Hazardous Decomposition Products:** Oxides of carbon, Oxides of nitrogen, Oxides of phosphorus

**Possibility of Hazardous Reactions:** None known.

## *Section 11. Toxicological Information*

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| N/D | | | | |

**Comments:** None.

## *Section 12. Ecological Information*

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| N/D | | | |

**Comments:** Not tested.

## *Section 13. Disposal Considerations*

Dispose of in accordance with local, state and federal regulations.
Not a RCRA-regulated hazardous waste when disposed in the original product form.

## Section 14. Transport Information

**DOT Classification**

| | |
|---|---|
| **DOT Name:** | COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID |
| **Technical Name:** | N/A |
| **Hazard Class:** | Not D.O.T. Regulated. |
| **UN/NA#:** | N/A |
| **Packing Group:** | N/A |

## Section 15. Regulatory Information

**Inventory Status**

| | |
|---|---|
| **United States (TSCA):** | All ingredients listed. |
| **Canada (DSL/NDSL):** | All ingredients listed. |

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| 1-Hydroxyethylidene-1,1-diphosphonic acid, dipotassium salt | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| 1-Hydroxyethylidene-1,1-diphosphonic acid, dipotassium salt | None |

**International Regulations**

**Canada**

| | |
|---|---|
| **WHMIS Classification:** | N/A |
| **Controlled Product Regulations (CPR):** | N/A |

## *Section 16. Other Information*

**HMIS Hazard Rating**

| | |
|---|---|
| **Health:** | 1 |
| **Flammability:** | 0 |
| **Physical Hazard:** | 0 |
| **PPE:** | X |

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

**NSF:** Certified to NSF/ANSI Standard 60
Maximum use rate for potable water – 20 mg/L
This product ships as NSF from:
Ashland, VA

**FDA:** N/A

**KOSHER:** This product has not been evaluated for Kosher approval.

**FIFRA:** N/A

**Other:** None

ChemTreat, Inc.


## Abbreviations

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

# *Disclaimer*

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, ChemTreat, Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ChemTreat, Inc. be responsible for damages of any nature whatsoever resulting from the use or reliance upon information. No representation or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature are made hereunder with respect to information or the product to which information refers.

ChemTreat, Inc.

# *MATERIAL SAFETY DATA SHEET*

## *Section 1. Chemical Product and Company Identification*

| | |
|---|---|
| **Product Name:** | ChemTreat CL4657 |
| **Product Use:** | Cooling Water Treatment |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424-9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648-4579 |
| **Date of MSDS:** | March 26, 2008 |

## *Section 2. Hazard(s) Identification*

**Signal Word:** WARNING!

**Hazard Statement(s):** May be harmful in contact with skin.
May be harmful if inhaled.
May be harmful if swallowed.

**Precautionary Statement(s):** No significant health risks are expected from exposures under normal conditions of use.

## *Section 3. Composition/Hazardous Ingredients*

| Component | CAS Registry # | Wt.% |
|---|---|---|
| There are no hazardous ingredients in this product as defined in 29 CFR 1910-1200. | Proprietary | N/A |

## *Section 4. First Aid Measures*

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

**Eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

**Skin:** Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

**Ingestion:** DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

**Notes to Physician:** N/A

**Additional First Aid Remarks:** N/A

## *Section 5. Fire Fighting Measures*

**Flammability of the Product:** Not flammable.

**Suitable Extinguishing Media:** Use extinguishing media suitable to surrounding fire.

**Specific Hazards Arising from the Chemical:** None known.

**Protective Equipment:** If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus.

## *Section 6. Accidental Release Measures*

**Personal Precautions:** Use appropriate Personal Protective Equipment (PPE).

**Environmental Precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

**Methods for Cleaning up:** Contain and recover liquid when possible. Flush spill area with water spray.

**Other Statements:** None.

## *Section 7. Handling and Storage*

**Handling:** Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

**Storage:** Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only.

ChemTreat, Inc.


## *Section 8. Exposure Controls/Personal Protection*

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| There are no hazardous ingredients in this product as defined in 29 CFR 1910-1200. | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| There are no hazardous ingredients in this product as defined in 29 CFR 1910-1200. | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full-face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick-drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Yellow, Clear |
| **Specific Gravity:** | 1.0610 |
| **pH:** | 4.1 |
| **Freezing Point:** | 34°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/A |
| **Boiling Point:** | 212°F |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | N/D |
| **Vapor Density:** | N/D |
| **Molecular Weight:** | N/D |
| **Viscosity:** | N/A |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 8.85 lb/ga |

ChemTreat, Inc.

MSDS

| | |
|---|---|
| **Vapor Pressure:** | N/D |
| **% VOC** | 0 |

## *Section 10. Stability and Reactivity*

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Bases, Strong oxidizers

**Hazardous Decomposition Products:** Oxides of nitrogen, Oxides of carbon

**Possibility of Hazardous Reactions:** None known.

## *Section 11. Toxicological Information*

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| N/D | | | | |

**Comments:** None.

## *Section 12. Ecological Information*

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Fathead Minnow | 96h | LC50 | 3475 mg/l |
| Ceriodaphnia dubia | 48h | NOEC | >2500 mg/l |
| | 48h | LC50 | 3415 mg/l |
| Fathead Minnow | 96h | NOEC | 1250 mg/l |

**Comments:** NOEC effect = Survival

## *Section 13. Disposal Considerations*

Dispose of in accordance with local, state and federal regulations.

## Section 14. Transport Information

**DOT Classification**

| | |
|---|---|
| **DOT Name:** | COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID |
| **Technical Name:** | N/A |
| **Hazard Class:** | Not D.O.T. Regulated. |
| **UN/NA#:** | N/A |
| **Packing Group:** | N/A |

## Section 15. Regulatory Information

**Inventory Status**

| | |
|---|---|
| **United States (TSCA):** | All ingredients listed. |
| **Canada (DSL/NDSL):** | All ingredients listed. |

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| There are no hazardous ingredients in this product as defined in 29 CFR 1910–1200. | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| There are no hazardous ingredients in this product as defined in 29 CFR 1910–1200. | None |

**International Regulations**

**Canada**

**WHMIS Classification:** N/A

**Controlled Product Regulations (CPR):** N/A

## *Section 16. Other Information*

**HMIS Hazard Rating**

**Health:** 1
**Flammability:** 0
**Physical Hazard:** 0
**PPE:** X

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

**NSF:** N/A

**FDA:** N/A

**KOSHER:** This product has not been evaluated for Kosher approval.

**FIFRA:** N/A

**Other:** None

**Abbreviations**

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |

| | |
|---|---|
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

## *Disclaimer*

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ChemTreat, Inc.

# Product Data

COOLING WATER
TREATMENT

## CHEMTREAT CL-4657

### GENERAL DESCRIPTION

**CHEMTREAT CL-4657** is an all-organic, non-phosphorous (non-P) treatment that contains a unique Quadrasperse® quadpolymer, specifically designed for use in high hardness, high alkalinity waters with Langelier Saturation Index in the range 2.0 to 2.5. **CHEMTREAT CL-4657** effectively inhibits formation of mineral scale and deposition through a combination of crystal modification, threshold inhibition and dispersancy. **CHEMTREAT CL-4657** is particularly well suited for high cycle, non-acid feed cooling water applications with phosphate or phosphorous effluent discharge limitations.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear, yellow liquid |
| Odor | Mild |
| pH | ~4.1 |
| Weight per Gallon | 8.85 |
| Freeze Point | 34°F |

### DOSAGE AND FEEDING

**CHEMTREAT CL-4657** should be fed to the recirculating cooling water system at a rate sufficient to develop a residual of 100–300 ppm. The specific dosage will be dependent on the LSI scale index of the cooling water system. **CHEMTREAT CL-4657** can be measured using the PolyTrak® test kit, Part Number PTK-3. **CHEMTREAT CL-4657** should be fed directly from the drum, tote bin or bulk tank. Continuous feeding is preferable and normal materials of feed pump construction are suitable.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CL-4657** is available in 55-gallon drums, 300-gallon returnable totes, and in bulk.

05/2004

| ChemTreat, Inc. | **Product Data**<br>COOLING WATER<br>CORROSION INHIBITOR |
|---|---|

## CHEMTREAT CL-4125

### GENERAL DESCRIPTION

**CHEMTREAT CL-4125** is a concentrated formulation of organonitrogen compound designed to effectively inhibit corrosion of nonferrous metals in utility condensers and process cooling water systems. **CHEMTREAT CL-4125** reduces the influence of copper alloys on galvanic corrosion of adjacent ferrous metals.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Amber liquid |
| Odor | Mild |
| pH | ~ 13.4 |
| Density | 10.06 lbs./gal. |
| Freeze Point | <-11°F |

### DOSAGE

**CHEMTREAT CL-4125** should be fed continuously to the cooling water at a rate sufficient to develop a treatment residual of 5 to 25 ppm.

### FEEDING

**CHEMTREAT CL-4125** should be fed directly from the drum for optimum results. Chemical feed pumps with PVC or stainless steel liquid handling construction are recommended.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CL-4125** is available in 5, 30, 55-gallon drums, totes and in bulk.

# MATERIAL SAFETY DATA SHEET

## Section 1. Chemical Product and Company Identification

| | |
|---|---|
| **Product Name:** | ChemTreat CL4125 |
| **Product Use:** | Cooling Water Treatment |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424–9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648–4579 |
| **Date of MSDS:** | December 5, 2008 |

## Section 2. Hazard(s) Identification

**Signal Word:** **DANGER!**

**Hazard Statement(s):**

Causes severe skin burns and eye damage.
Causes serious eye damage.
Harmful in contact with skin.
Harmful if inhaled.
Harmful if swallowed.

**Precautionary Statement(s):**

Wear protective gloves/clothing and eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Use only outdoors or in a well–ventilated area.

## Section 3. Composition/Hazardous Ingredients

| Component | CAS Registry # | Wt.% |
|---|---|---|
| Tolyltriazole, sodium salt | 64665–57–2 | 30 – 60 |

## Section 4. First Aid Measures

**Inhalation:**

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

**Eyes:**

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.

**Skin:**

Immediately remove/take off all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before re–use. Immediately call a poison center or doctor/physician.

| | |
|---|---|
| **Ingestion:** | DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician. |
| **Notes to Physician:** | N/A |
| **Additional First Aid Remarks:** | N/A |

## *Section 5. Fire Fighting Measures*

| | |
|---|---|
| **Flammability of the Product:** | Not flammable. |
| **Suitable Extinguishing Media:** | Use extinguishing media suitable to surrounding fire. |
| **Specific Hazards Arising from the Chemical:** | Product may emit toxic gases or fumes under fire conditions. |
| **Protective Equipment:** | If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus. |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Personal Precautions:** | Use appropriate Personal Protective Equipment (PPE). |
| **Environmental Precautions:** | Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers. |
| **Methods for Cleaning up:** | Contain and recover liquid when possible. Flush spill area with water spray. |
| **Other Statements:** | None. |

## *Section 7. Handling and Storage*

| | |
|---|---|
| **Handling:** | Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust. |
| **Storage:** | Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only. |

ChemTreat, Inc.

MSDS

## *Section 8. Exposure Controls/Personal Protection*

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| Tolyltriazole, sodium salt | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| Tolyltriazole, sodium salt | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick–drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Amber, Clear |
| **Specific Gravity:** | 1.2070 |
| **pH:** | 13.4 |
| **Freezing Point:** | <–11°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/A |
| **Boiling Point:** | 212°F |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | <1 |
| **Vapor Density:** | N/D |
| **Molecular Weight:** | N/D |
| **Viscosity:** | N/A |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 10.07 lb/ga |
| **Vapor Pressure:** | N/D |
| **% VOC** | N/D |

## Section 10. Stability and Reactivity

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Strong oxidizers, Acids

**Hazardous Decomposition Products:** Oxides of carbon, Oxides of nitrogen

**Possibility of Hazardous Reactions:** None known.

## Section 11. Toxicological Information

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| Tolyltriazole, sodium salt | Oral | LD50 | 920 mg/kg | Rat |
| | Dermal | LD50 | >2 g/kg | Rabbit |

**Comments:** None.

## Section 12. Ecological Information

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Fathead Minnow | 96h | LC50 | 70 – 154 mg/l |
| Ceriodaphnia dubia | 48h | LC50 | 141.789 mg/l |
| Bluegill Sunfish | 96h | LC50 | 173 mg/l |
| Rainbow Trout | 96h | LC50 | 25 mg/l |
| Daphnia magna | 14d | LC50 | 13.2 mg/l |
| | 21d | LC50 | 5.8 mg/l |

**Comments:** None.

## Section 13. Disposal Considerations

Dispose of in accordance with local, state and federal regulations.
EPA corrosivity characteristic hazardous waste D002 when disposed of in the original product form.

ChemTreat, Inc.


## *Section 14. Transport Information*

**DOT Classification**

| | |
|---|---|
| **DOT Name:** | CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. |
| **Technical Name:** | (TOLYLTRIAZOLE, SODIUM SALT) |
| **Hazard Class:** | Corrosive |
| **UN/NA#:** | UN3267 |
| **Packing Group:** | PGIII |

## *Section 15. Regulatory Information*

**Inventory Status**

| | |
|---|---|
| **United States (TSCA):** | All ingredients listed. |
| **Canada (DSL/NDSL):** | All ingredients listed. |

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| Tolyltriazole, sodium salt | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| Tolyltriazole, sodium salt | None |

**International Regulations**

**Canada**

| | |
|---|---|
| **WHMIS Classification:** | D2B (Toxic Material)<br>E (Corrosive Material) |
| **Controlled Product Regulations (CPR):** | This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR. |

## *Section 16. Other Information*

**HMIS Hazard Rating**

| | |
|---|---|
| **Health:** | 3 |
| **Flammability:** | 1 |
| **Physical Hazard:** | 0 |
| **PPE:** | X |

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

**NSF:** N/A

**FDA:** N/A

**KOSHER:** This product has not been evaluated for Kosher approval.

**FIFRA:** N/A

**Other:** None

ChemTreat, Inc.


## Abbreviations

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

# *Disclaimer*

ChemTreat, Inc.

# Product Data

**COOLING WATER MICROBIOCIDE**

## CHEMTREAT CL-2156

**EPA Reg. No. 707-133-15300**

### GENERAL DESCRIPTION

**CHEMTREAT CL-2156** is a formulation of two organosulfur antimicrobials designed to control bacteria, algae, and fungi in recirculating cooling water systems. **CHEMTREAT CL-2156** is particularly effective against those slime-forming organisms common to both open and closed cooling water systems and non-potable reverse osmosis systems. **CHEMTREAT CL-2156** is effective at low concentrations and is highly resistant to the inhibitory effects of most organic and inorganic compounds. **CHEMTREAT CL-2156** is metal-free, containing no copper- or iron-based stabilizers.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear, colorless to yellow liquid |
| Odor | Mild |
| pH | ~3.5 |
| Density | 8.57 pounds/gallon |
| Freeze Point | 31°F |

### DOSAGE AND FEEDING

Dosage levels of **CHEMTREAT CL-2156** and frequency of addition will depend on the nature and severity of contamination. Typical requirements fall within the range of 50 to 150 ppm. **CHEMTREAT CL-2156** may be pumped continuously to the recirculating water or added intermittently by slug dosage. Contact your ChemTreat representative for specific application recommendations.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CL-2156** is available in 5-gallon pails, 30- and 55-gallon drums, 300-gallon returnable totes, and bulk.

*Rev. 06/2007*

ChemTreat, Inc.

MSDS

# *MATERIAL SAFETY DATA SHEET*

## *Section 1. Chemical Product and Company Identification*

| | |
|---|---|
| **Product Name:** | ChemTreat CL2156 |
| **Product Use:** | Cooling Water Microbiocide |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424–9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648–4579 |
| **Date of MSDS:** | June 24, 2009 |

## *Section 2. Hazard(s) Identification*

**Signal Word:** **DANGER!**

**Hazard Statement(s):**

Causes severe skin burns and eye damage.
Causes serious eye damage.
Harmful in contact with skin.
Harmful if inhaled.
Harmful if swallowed.
Harmful to aquatic life.

**Precautionary Statement(s):**

Wear protective gloves/clothing and eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Use only outdoors or in a well–ventilated area.

## *Section 3. Composition/Hazardous Ingredients*

| Component | CAS Registry # | Wt.% |
|---|---|---|
| 5–chloro–2–methyl–4–isothiazolin–3–one | 26172–55–4 | 1.11 |
| 2–methyl–4–isothiazolin–3–one | 2682–20–4 | 0.39 |
| Magnesium nitrate | 10377–60–3 | 1.61 |
| Magnesium chloride | 7786–30–3 | 0.96 |

ChemTreat, Inc.


## *Section 4. First Aid Measures*

| | |
|---|---|
| **Inhalation:** | Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician. |
| **Eyes:** | 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. |
| **Skin:** | Immediately remove/take off all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before re–use. Immediately call a poison center or doctor/physician. |
| **Ingestion:** | DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician. |
| **Notes to Physician:** | N/A |
| **Additional First Aid Remarks:** | N/A |

## *Section 5. Fire Fighting Measures*

| | |
|---|---|
| **Flammability of the Product:** | Not flammable. |
| **Suitable Extinguishing Media:** | Use extinguishing media suitable to surrounding fire. |
| **Specific Hazards Arising from the Chemical:** | Use water spray to keep containers cool. |
| **Protective Equipment:** | If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus. |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Personal Precautions:** | Use appropriate Personal Protective Equipment (PPE). |
| **Environmental Precautions:** | This pesticide is toxic to fish and wildlife. Do not discharge effluent containing this product into lakes, ponds, streams, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA. |

**Methods for Cleaning up:** Contain and recover liquid when possible. Flush spill area with water spray.

**Other Statements:** None.

## *Section 7. Handling and Storage*

**Handling:** Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

**Storage:** Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations.
For Industrial use only.
Do not store in steel containers.
Do not store below 32°F.
Do not store above 131°F.

## *Section 8. Exposure Controls/Personal Protection*

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| 5-chloro-2-methyl-4-isothiazolin-3-one | | N/E |
| 2-methyl-4-isothiazolin-3-one | | N/E |
| Magnesium nitrate | | N/E |
| Magnesium chloride | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| 5-chloro-2-methyl-4-isothiazolin-3-one | | | N/E |
| 2-methyl-4-isothiazolin-3-one | | | N/E |
| Magnesium nitrate | | | N/E |
| Magnesium chloride | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

| | |
|---|---|
| **Eyes:** | Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area. |
| **Skin:** | Maintain quick–drench facilities in work area. Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact. |
| **Respiratory:** | If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134. |

## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Colorless, Clear |
| **Specific Gravity:** | 1.0270 |
| **pH:** | 3.8 |
| **Freezing Point:** | 34°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/A |
| **Boiling Point:** | 212°F |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | <1 |
| **Vapor Density:** | N/D |
| **Molecular Weight:** | N/D |
| **Viscosity:** | <100 |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 8.57 lb/ga |
| **Vapor Pressure:** | 0.62 mmHg |
| **% VOC** | 0 |

## *Section 10. Stability and Reactivity*

| | |
|---|---|
| **Chemical Stability:** | Stable at normal temperatures and pressures. |
| **Incompatibility with Various Substances:** | Strong oxidizers, Strong bases |
| **Hazardous Decomposition Products:** | Oxides of nitrogen, Hydrogen chloride, Sulfur dioxide gas |
| **Possibility of Hazardous Reactions:** | None known. |

## Section 11. Toxicological Information

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| ChemTreat CL2156 | Oral | LD50 | 5500 mg/kg | Rat |
| | Dermal | LD50 | >2000 mg/kg | Rat |

**Comments:** None.

## Section 12. Ecological Information

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Bluegill Sunfish | 96h | LC50 | 23 mg/l |
| Daphnia magna | 48h | EC50 | 8.4 mg/l |
| Rainbow Trout | 96h | LC50 | 16 mg/l |

**Comments:** None.

## Section 13. Disposal Considerations

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. METAL CONTAINERS: Triple rinse (or equivalent). Offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. PLASTIC CONTAINERS: Do not reuse empty container. Triple rinse (or equivalent). Then puncture and dispose of in a sanitary landfill, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke. TOTES: Verify that the tote is empty. Do not rinse or clean. Seal tote and contact appropriate vendor for tote pickup.

## Section 14. Transport Information

**DOT Classification**

**DOT Name:** CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
**Technical Name:** (5-CHLORO-2-METHYL-4-ISOTHIAZOLIN-3-ONE AND 2-METHYL-4-ISOTHIAZOLIN-3-ONE)
**Hazard Class:** Corrosive
**UN/NA#:** UN3265
**Packing Group:** PGIII

## *Section 15. Regulatory Information*

**Inventory Status**

**United States (TSCA):** All ingredients listed.
**Canada (DSL/NDSL):** All ingredients listed.

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

**Fire Hazard:** No
**Reactive Hazard:** No
**Release of Pressure:** No
**Acute Health Hazard:** Yes
**Chronic Health Hazard:** No

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| 5-chloro-2-methyl-4-isothiazolin-3-one | N/A | N/A | N/A |
| 2-methyl-4-isothiazolin-3-one | N/A | N/A | N/A |
| Magnesium nitrate | N/A | N/A | N/A |
| Magnesium chloride | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| 5-chloro-2-methyl-4-isothiazolin-3-one | None |
| 2-methyl-4-isothiazolin-3-one | None |
| Magnesium nitrate | MA, PA |
| Magnesium chloride | None |

**International Regulations**

**Canada**

**WHMIS Classification:** N/A

**Controlled Product Regulations (CPR):** N/A

## *Section 16. Other Information*

**HMIS Hazard Rating**

**Health:** 3
**Flammability:** 0
**Physical Hazard:** 0
**PPE:** X

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

**NSF:** N/A

**FDA:** N/A

**KOSHER:** This product is certified by the Orthodox Union as kosher pareve.

**FIFRA:** This product is an EPA registered biocide. 707–133–15300

**Other:** None

**Abbreviations**

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |

| | |
|---|---|
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

## *Disclaimer*

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, ChemTreat, Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ChemTreat, Inc. be responsible for damages of any nature whatsoever resulting from the use or reliance upon information. No representation or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature are made hereunder with respect to information or the product to which information refers.

ChemTreat, Inc.

# Product Data

COOLING WATER
DISPERSANT

## CHEMTREAT CL-450

### GENERAL DESCRIPTION

**CHEMTREAT CL-450** is a highly efficient dispersant for many of the organic contaminants common to recirculating cooling water systems. **CHEMTREAT CL-450** effectively disperses oils and grease providing improved removal through blowdown. The penetrating properties of **CHEMTREAT CL-450** provide improved contact of biocides with those micro-organisms entrapped in oils and organic debris. The low odor and foaming levels of **CHEMTREAT CL-450** make it particularly suitable for air washer treatment.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear colorless liquid |
| Odor | Mild |
| Functionality | Non-ionic |
| pH | ~6.1 |
| Density | 8.41 lbs./gal. |
| Freeze point | 36°F |

### DOSAGE

**CHEMTREAT CL-450** may be pumped continually or manually added to the recirculating water, depending on the nature and severity of contaminants present. Your ChemTreat Technical Representative will recommend the proper product feed rate for your system.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CL-450** is available in 5, 30, 55, and 275-gallon drums, and in bulk quantities.

# *MATERIAL SAFETY DATA SHEET*

## *Section 1. Chemical Product and Company Identification*

| | |
|---|---|
| **Product Name:** | ChemTreat CL450 |
| **Product Use:** | Cooling Water Treatment |
| **Supplier's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424-9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648-4579 |
| **Date of MSDS:** | September 22, 2009 |

## *Section 2. Hazard(s) Identification*

**Signal Word:** **WARNING!**

**Hazard Statement(s):**

Causes eye irritation.
May be harmful in contact with skin.
May be harmful if inhaled.
May be harmful if swallowed.
Harmful to aquatic life.

**Precautionary Statement(s):** No significant health risks are expected from exposures under normal conditions of use.

## *Section 3. Composition/Hazardous Ingredients*

| Component | CAS Registry # | Wt.% |
|---|---|---|
| Alcohol (C8 – 10) ethoxylated propoxylated | 68603-25-8 | 10 – 30 |

## *Section 4. First Aid Measures*

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

**Eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

**Skin:** Wash with plenty of soap and water. Call a poison center or doctor/physician if you feel unwell.

**Ingestion:** DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.



**Notes to Physician:** N/A

**Additional First Aid Remarks:** N/A

## *Section 5. Fire Fighting Measures*

**Flammability of the Product:** Not flammable.

**Suitable Extinguishing Media:** Use extinguishing media suitable to surrounding fire.

**Specific Hazards Arising from the Chemical:** None known.

**Protective Equipment:** If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus.

## *Section 6. Accidental Release Measures*

**Personal Precautions:** Use appropriate Personal Protective Equipment (PPE).

**Environmental Precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

**Methods for Cleaning up:** Contain and recover liquid when possible. Flush spill area with water spray.

**Other Statements:** None.

## *Section 7. Handling and Storage*

**Handling:** Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust.

**Storage:** Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only.

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## *Section 8. Exposure Controls/Personal Protection*

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| Alcohol (C8 – 10) ethoxylated propoxylated | | N/E |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| Alcohol (C8 – 10) ethoxylated propoxylated | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full–face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick–drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

## *Section 9. Physical and Chemical Properties*

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Colorless, Clear |
| **Specific Gravity:** | 1.0080 |
| **pH:** | 6.1 |
| **Freezing Point:** | 36°F |
| **Flash Point:** | N/D |
| **Odor:** | Mild |
| **Melting Point:** | N/A |
| **Boiling Point:** | 212°F |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | N/D |
| **Vapor Density:** | As Water |
| **Molecular Weight:** | N/D |
| **Viscosity:** | N/A |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 8.41 lb/ga |
| **Vapor Pressure:** | As Water |
| **% VOC** | N/D |

## Section 10. Stability and Reactivity

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Strong bases, Strong oxidizers

**Hazardous Decomposition Products:** Oxides of carbon

**Possibility of Hazardous Reactions:** None known.

## Section 11. Toxicological Information

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| N/D | | | | |

**Comments:** None.

## Section 12. Ecological Information

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Fathead Minnow | 96h | LC50 | 32 mg/l |
| | 7d | NOEC | 10 mg/l |
| | 7d | LOEC | 20 mg/l |
| | 7d | IC25 | 14 mg/l |
| Rainbow Trout | 96h | LC50 | 37 mg/l |
| Ceriodaphnia dubia | 48h | LC50 | 61 mg/l |
| | 7d | NOEC | 15 mg/l |
| | 7d | LOEC | 30 mg/l |
| | 7d | IC25 | 20 mg/l |

**Comments:** NOEC effect = Reproduction

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## *Section 13. Disposal Considerations*

Dispose of in accordance with local, state and federal regulations.
Not a RCRA–regulated hazardous waste when disposed in the original product form.

## *Section 14. Transport Information*

**DOT Classification**

| | |
|---|---|
| **DOT Name:** | COMPOUND, INDUSTRIAL WATER TREATMENT, LIQUID |
| **Technical Name:** | N/A |
| **Hazard Class:** | Not D.O.T. Regulated. |
| **UN/NA#:** | N/A |
| **Packing Group:** | N/A |

## *Section 15. Regulatory Information*

**Inventory Status**

| | |
|---|---|
| **United States (TSCA):** | All ingredients listed. |
| **Canada (DSL/NDSL):** | All ingredients listed. |

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| Alcohol (C8 – 10) ethoxylated propoxylated | N/A | N/A | N/A |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| Alcohol (C8 – 10) ethoxylated propoxylated | None |

**International Regulations**

**Canada**

**WHMIS Classification:** D2B (Toxic Material)

**Controlled Product Regulations (CPR):** This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

## *Section 16. Other Information*

**HMIS Hazard Rating**

**Health:** 1
**Flammability:** 0
**Physical Hazard:** 0
**PPE:** X

**Notes:** The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.
The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use.

**NSF:** N/A

**FDA:** N/A

**KOSHER:** This product is certified by the Orthodox Union as kosher pareve.

**FIFRA:** N/A

**Other:** None

ChemTreat, Inc.


## Abbreviations

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

# *Disclaimer*

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ChemTreat, Inc.

# Product Data

COOLING WATER
MICROBIOCIDE

## CHEMTREAT CL-40
## EPA Registration No. 5185-451-15300

### GENERAL DESCRIPTION

**CHEMTREAT CL-40** is a liquid product containing 40% sodium bromide by weight. Used in conjunction with an oxidizer, such as sodium hypochlorite (NaOCL) bleach or gaseous chlorine, **CHEMTREAT CL-40** forms hypobromus acid which is an effective microbiocide for cooling water systems. **CHEMTREAT CL-40** is particularly beneficial in systems with organic contamination, or in systems operating at alkaline pH ranges.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear liquid |
| Odor | Odorless |
| pH | 6 - 8 |
| Density | 11.88 lbs./gal. |
| Freeze Point | <-11°F |

### FEEDING AND FEEDING

**CHEMTREAT CL-40** should be fed by dilution with a service water by-pass loop as shown in ChemTreat Technical Drawing #13.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first aid, please review the product's Material Safety Data Sheet.

### SHIPPING

**CHEMTREAT CL-40** is available in 55-gallon drums, in bulk and in 300-gallon tote bins.

ChemTreat, Inc.


# *MATERIAL SAFETY DATA SHEET*

## *Section 1. Chemical Product and Company Identification*

| | |
|---|---|
| **Product Name:** | ChemTreat BL124 |
| **Product Use:** | Boiler Water Treatment |
| **Manufacturer's Name:** | ChemTreat, Inc. |
| **Emergency Telephone Number:** | (800) 424-9300 |
| **Address (Corporate Headquarters):** | 4461 Cox Road<br>Glen Allen, VA 23060 |
| **Telephone Number for Information:** | (800) 648-4579 |
| **Date of MSDS:** | January 16, 2009 |

## *Section 2. Hazard(s) Identification*

**Signal Word:** **WARNING!**

**Hazard Statement(s):** Causes eye irritation.
Causes skin irritation.
Harmful if inhaled.
May be harmful if swallowed.

**Precautionary Statement(s):** Wear protective gloves/clothing and eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Use only outdoors or in a well-ventilated area.

## *Section 3. Composition/Hazardous Ingredients*

| Component | CAS Registry # | Wt% |
|---|---|---|
| Sodium bisulfite | 7631-90-5 | 15 - 40 |

## *Section 4. First Aid Measures*

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or doctor/physician if you feel unwell.

**Eyes:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

**Skin:** Wash with plenty of soap and water. Take off contaminated clothing and wash before re-use. If skin irritation occurs, seek medical advice/attention.

| | |
|---|---|
| **Ingestion:** | DO NOT INDUCE VOMITING. Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell. |
| **Notes to Physician:** | N/A |
| **Additional First Aid Remarks:** | N/A |

## *Section 5. Fire Fighting Measures*

| | |
|---|---|
| **Flammability of the Product:** | Not flammable. |
| **Suitable Extinguishing Media:** | Use extinguishing media suitable to surrounding fire. |
| **Specific Hazards Arising from the Chemical:** | Use water spray to keep containers cool. |
| **Protective Equipment:** | If product is involved in a fire, wear full protective clothing including a positive–pressure, NIOSH approved, self–contained breathing apparatus. |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Personal Precautions:** | Use appropriate Personal Protective Equipment (PPE). |
| **Environmental Precautions:** | Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers. |
| **Methods for Cleaning up:** | Contain and recover liquid when possible. Flush spill area with water spray. |
| **Other Statements:** | If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1–800–424–8802. |

## *Section 7. Handling and Storage*

| | |
|---|---|
| **Handling:** | Wear appropriate Personal Protection Equipment (PPE) when handling this product. Do not get in eyes, or on skin and clothing. Wash thoroughly after handling. Do not ingest. Avoid breathing vapors, mist or dust. |
| **Storage:** | Store away from incompatible materials (see Section 10). Store at ambient temperatures. Keep container securely closed when not in use. Label precautions also apply to empty container. Recondition or dispose of empty containers in accordance with government regulations. For Industrial use only.<br>Do not store below 30°F. |

## Section 8. Exposure Controls/Personal Protection

**Exposure Limits**

| Component | Source | Exposure Limits |
|---|---|---|
| Sodium bisulfite | ACGIH TLV | 5 mg/m³ TWA |

**Carcinogenicity Category**

| Component | Source | Code | Brief Description |
|---|---|---|---|
| Sodium bisulfite | | | N/E |

**Engineering Controls:** Use only with adequate ventilation. The use of local ventilation is recommended to control emission near the source.

**Personal Protection**

**Eyes:** Wear chemical splash goggles or safety glasses with full-face shield. Maintain eyewash fountain in work area.

**Skin:** Maintain quick-drench facilities in work area.
Wear butyl rubber or neoprene gloves. Wash them after each use and replace as necessary. If conditions warrant, wear protective clothing such as boots, aprons, and coveralls to prevent skin contact.

**Respiratory:** If misting occurs, use NIOSH approved organic vapor/acid gas dual cartridge respirator with a dust/mist prefilter in accordance with 29 CFR 1910.134.

## Section 9. Physical and Chemical Properties

| | |
|---|---|
| **Physical State and Appearance:** | Liquid, Yellow, Clear |
| **Specific Gravity:** | 1.2350 |
| **pH:** | 3.9 |
| **Freezing Point:** | 30°F |
| **Flash Point:** | N/D |
| **Odor:** | Strong |
| **Melting Point:** | N/A |
| **Boiling Point:** | 212°F |
| **Solubility in Water:** | Complete |
| **Evaporation Rate:** | <1 |
| **Vapor Density:** | N/D |
| **Molecular Weight:** | N/D |
| **Viscosity:** | <100 |
| **Flammable Limits:** | N/A |
| **Autoignition Temperature:** | N/A |
| **Density:** | 10.30 lb/ga |
| **Vapor Pressure:** | <17.5 |
| **% VOC** | N/D |

## Section 10. Stability and Reactivity

**Chemical Stability:** Stable at normal temperatures and pressures.

**Incompatibility with Various Substances:** Strong oxidizers, Strong bases, Strong acids

**Hazardous Decomposition Products:** Sulfur dioxide gas

**Possibility of Hazardous Reactions:** None known.

## Section 11. Toxicological Information

| Chemical Name | Exposure | Type of Effect | Concentration | Species |
|---|---|---|---|---|
| Sodium bisulfite | Oral | LD50 | 2000 mg/kg | Rat |

**Comments:** None.

## Section 12. Ecological Information

| Species | Duration | Type of Effect | Test Results |
|---|---|---|---|
| Fathead Minnow | 96h | LC50 | >1000 mg/l |
| Sheepshead Minnow | 96h | LC50 | 100 mg/l |
| Ceriodaphnia dubia | 48h | LC50 | 390.4 mg/l |
| Mysid Shrimp | 48h | LC50 | 70.7 mg/l |

**Comments:** None.

## Section 13. Disposal Considerations

Dispose of in accordance with local, state and federal regulations.

## Section 14. Transport Information

**DOT Classification**

| | |
|---|---|
| **DOT Name:** | BISULFITES, AQUEOUS SOLUTIONS, N.O.S. |
| **Technical Name:** | (SODIUM BISULFITE) |
| **Hazard Class:** | Corrosive |
| **UN/NA#:** | UN2693 |
| **Packing Group:** | PGIII |

## Section 15. Regulatory Information

**Inventory Status**

| | |
|---|---|
| **United States (TSCA):** | All ingredients listed. |
| **Canada (DSL/NDSL):** | All ingredients listed. |

**Federal Regulations**

**SARA Title III Rules**

**Sections 311/312 Hazard Classes**

| | |
|---|---|
| **Fire Hazard:** | No |
| **Reactive Hazard:** | No |
| **Release of Pressure:** | No |
| **Acute Health Hazard:** | Yes |
| **Chronic Health Hazard:** | No |

**Other Sections**

| Component | Section 313 Toxic Chemical | Section 302 EHS TPQ | CERCLA RQ |
|---|---|---|---|
| Sodium bisulfite | N/A | N/A | 5000 |

**State Regulations**

**California Proposition 65:** None known.

**Special Regulations**

| Component | States |
|---|---|
| Sodium bisulfite | MA, MN, NY, PA, WA |

**International Regulations**

**Canada**

| | |
|---|---|
| **WHMIS Classification:** | D2B (Toxic Material)<br>E (Corrosive Material) |
| **Controlled Product Regulations (CPR):** | This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR. |

## *Section 16. Other Information*

**HMIS Hazard Rating**

| | |
|---|---|
| **Health:** | 2 |
| **Flammability:** | 0 |
| **Physical Hazard:** | 0 |
| **PPE:** | X |
| **Notes:** | The PPE rating depends on circumstances of use. See Section 8 for recommended PPE.<br>The Hazardous Material Information System (HMIS) is a voluntary, subjective alpha–numeric symbolic system for recommending hazard risk and personal protection equipment information. It is a subjective rating system based on the evaluator's understanding of the chemical associated risks. The end–user must determine if the code is appropriate for their use. |
| **NSF:** | N/A |
| **FDA:** | All ingredients in this product are authorized in 21 CFR 173.310 for use as "Boiler Water Additives" where the steam may contact food. |
| **KOSHER:** | This product has not been evaluated for Kosher approval. |
| **FIFRA:** | N/A |
| **Other:** | None |

ChemTreat, Inc.


## Abbreviations

| Abbreviation | Definition |
|---|---|
| < | Less Than |
| > | Greater Than |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| EHS | Environmental Health and Safety Dept |
| N/A | Not Applicable |
| N/D | Not Determined |
| N/E | Not Established |
| OSHA | Occupational Health and Safety Dept |
| PEL | Personal Exposure Limit |
| STEL | Short Term Exposure Limit |
| TLV | Threshold Limit Value |
| TWA | Time Weight Average |
| UNK | Unknown |

**Prepared by: Regulatory Affairs Department**

# *Disclaimer*

ChemTreat, Inc.

# Product Data

**BOILER WATER TREATMENT**
**OXYGEN SCAVENGER**

## CHEMTREAT BL-124

### GENERAL DESCRIPTION

**CHEMTREAT BL-124** is a noncatalyzed, liquid sulfite oxygen scavenger designed to remove chlorine from a variety of water streams. This includes water being processed by reverse osmosis (R.O.) membranes, cooling water bleedoff streams, etc. **CHEMTREAT BL-124** can also be used for elimination of oxygen in boiler feedwater. **CHEMTREAT BL-124** is composed of ingredients cleared by the FDA as "Boiler Water Additives" which may be used in the preparation of steam that may contact food. Clearance is given at 21 CFR 173.310 or by letter of No Objection from the FDA. **CHEMTREAT BL-124** is not acceptable at USDA regulated facilities.

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Form | Clear, colorless to straw-colored liquid |
| Odor | Strong |
| pH | ~3.9 |
| Density | 10.30 pounds/gallon |
| Freeze point | 30°F |

### DOSAGE AND FEEDING

**CHEMTREAT BL-124** should be continuously fed for either chlorine or oxygen removal. Acid resistant feeding equipment is required. **CHEMTREAT BL-124** compatibilities with materials of construction are available upon request from a ChemTreat representative. For optimum performance, **CHEMTREAT BL-124** should be applied in accordance with the control parameters established by a ChemTreat representative for the specific application.

### SAFETY PRECAUTIONS

For specific information on handling, safety and first-aid, please review the product's Material Safety Data Sheet.

### SHIPPING AND STORAGE

**CHEMTREAT BL-124 must be shipped and stored above 30°F. CHEMTREAT BL-124** is available in 55-gallon drums, 250-gallon nonreturnable and 300-gallon returnable totes, and bulk.

# MATERIAL SAFETY DATA SHEET

*Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards*

## BASIC CHEMICAL SOLUTIONS

## PART I *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

| | |
|---|---|
| TRADE NAME (AS LABELED): | **BCS SULFURIC ACID (>51%)** |
| CHEMICAL NAME/CLASS: | Sulfuric Acid Solution |
| PRODUCT USE: | Neutralization, metal processing, battery acid. |
| SUPPLIER/MANUFACTURER'S NAME: | **BASIC CHEMICAL SOLUTIONS** |
| ADDRESS: | **Corporate Office**<br>525 Seaport Blvd.<br>Redwood City, CA 94063 |
| BUSINESS PHONE: | 800-411-4227 |
| EMERGENCY PHONE: | **CHEMTREC**: 800-424-9300 |
| DATE OF PREPARATION: | February 16, 2004 |

**Si usted no entiende las Hojas de Informacion de Seguridad sobre Materials, busque a alguien para que se la explique a usted en detalle.**
**(If you do not understand the Material Safety Data Sheet, find someone to explain it to you in detail.)**

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS # | %w/w | EXPOSURE LIMITS IN AIR | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ACGIH | | OSHA | | | |
| | | | TLV $mg/m^3$ | STEL $mg/m^3$ | PEL $mg/m^3$ | STEL $mg/m^3$ | IDLH | OTHER $mg/m^3$ |
| Sulfuric Acid | 7664-93-9 | >51 | 1 $mg/m^3$ | 10 | 1 $mg/m^3$ | 3 $mg/m^3$ | 15 $mg/m^3$ | NA |
| Water and other ingredients. The other ingredients are each present in less than 1 percent concentration in this product. | | Balance | The components present in the balance of this product do not contribute any significant, additional hazards. All hazard information pertinent to this product has been presented in the remaining sections of this Material Safety Data Sheet, per the requirements of Federal Occupational Safety and Health Hazard Communication Standard (29 CFR 1910.1200). | | | | | |

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW**: This product is a clear solution. Danger! Extremely corrosive. Causes sever burns. Reacts with water. Harmful if ingested or inhaled, can be fatal. In the event of fire or spill, adequate precautions must be taken. This product may decompose to produce a variety of compounds (i.e. carbon monoxide, carbon dioxide and oxides of sulfur). Flammable hydrogen gas can evolve when in contact with most metals. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. Transport in approved vehicles and containers.

## 3. HAZARD IDENTIFICATION (Continued)

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: If mists or sprays of this solution are inhaled, this product may cause pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Inhalation of high concentrations of this product may cause damage to the tissues of the respiratory system, producing potentially fatal lung disorders (chemical pneumonitis and pulmonary edema) and erosion of the tooth enamel.

CONTACT WITH SKIN or EYES: Contact with the eyes can cause severe irritation, eye burns and permanent eye damage. Contact with the skin can cause severe irritation, skin burns and permanent skin damage. Prolonged exposure may result in ulcerating burns which could leave scars.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure to any component of this product.

INGESTION: Though ingestion is not anticipated to be a significant route of over-exposure to this product, if ingestion does occur burning and irritation of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Ingestion of large quantities may be fatal.

INJECTION: Though injection is not anticipated to be a significant route of over-exposure to this product, if it occurs, may cause local reddening, tissue swelling, and discomfort.

HAZARDOUS MATERIAL INFORMATION SYSTEM

| | | |
|---|---|---|
| HEALTH | (BLUE | 3 |
| FLAMMABILITY | (RED | 0 |
| REACTIVITY | (YELLOW | 2 |
| PROTECTIVE | | D |

| EYES | RESPIRATOR | HAND | BODY |
|---|---|---|---|
|  | SEE SECTION |  |  |

For routine industrial applications

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

**ACUTE**: This solution is corrosive, and can burn and damage eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, irritation of the respiratory system may occur, with coughing, and breathing difficulty. Though unlikely to occur during occupational use, ingestion or injection of large quantities may be fatal.

**CHRONIC**: This product contains ingredients that are considered to be probable or suspected human carcinogens (see Section 11).

# PART II *What should I do if a hazardous situation occurs?*

## 4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention.
EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.
INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. If shortness of breath occurs, evaluate the possibility of bronchitis or pneumonitis. Chest x-ray and arterial blood gasses can be used to determined the presence of pulmonary edema. In severe causes, use of humidified oxygen and assisted ventilation including positive end expiratory pressure (PEEP) may be needed. Parenteral steroids may be useful in limiting the extent of pulmonary damage.
INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, **do not induce vomiting.** Victim should rinse mouth with large amounts of water. Victim should drink 2-3 glasses of water to dilute the ingested material. Never induce vomiting or give diluents (water) to someone who is unconscious, having convulsions, or who cannot swallow. The use of gastric lavage is controversial. The removal of acid must be weighed against the risk of perforation or bleeding. If a large amount of acid (greater than 1ml /kg body weight ) has been ingested , cautious gastric lavage is generally advised if the patient is alert and there is little risk of convulsions. Consultation with a gastroenterologist and/or surgeon is advised. Serious complications such as perforation or stricture of the esophagus may occur requiring care by specialist. Laryngeal edema may develop requiring intubation or tracheostomy.

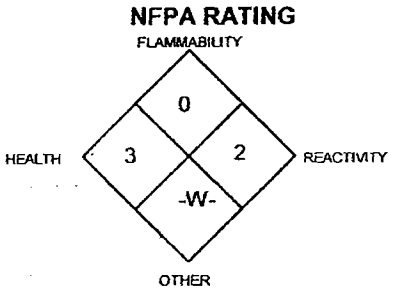
Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with victim.

## 5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not flammable.
AUTOIGNITION TEMPERATURE, °C: Not flammable.
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (Expect reaction)
Foam: YES
Halon: YES
Carbon Dioxide: YES
Dry Chemical: YES
Other: NO.




UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is corrosive, and presents a significant contact hazard to fire-fighters. For large fires, flood fire area from a distance. Expect a reaction with water. Do not let solid stream of water contact spilled materials. When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (including carbon monoxide, carbon dioxide and oxides of sulfur).

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas.

## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

The proper personal protective equipment for incidental releases (e.g.-1 L of the product released in a well-ventilated area) use impermeable gloves, specific for the material handled, goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard-hat. Self Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, Select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.
Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with lime or soda ash or other acid neutralizing agent. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization. Place all spill residue in a suitable container. Dispose of in accordance with Federal, State and local hazardous waste disposal regulations (see Section 13 – Disposal Considerations.)

# PART III *How can I prevent hazardous situations from occurring*

## 7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat or drink while handling this material. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location.

**For Non-Bulk Containers:** Cannot be handled in metal containers. Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Wash thoroughly after using this material. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

Empty containers may contain residual liquid. Therefore, empty containers should be handled with care.

## 7. HANDLING and STORAGE (Continued)

**Bulk Containers:** Cannot be handled in metal containers. All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

**Tank Car Shipments:** *Cannot be transported in unlined cold rolled, stainless steel or rubber lined tank cars. Determine compatibility with the vessel prior to shipment.* Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment before maintenance begins by a triple-rinse with water followed, if necessary, by using acid neutralizing agent and an additional rinse. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: If required use a corrosion-resistant ventilation system separate from other exhaust ventilation systems to ensure that there is no potential for overexposure to sprays, or mists of this product and that exposures are below those in section 2. Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. If adequate ventilation is not available or if there is potential for airborne exposure above the exposure limits (listed in Section 2) a respirator may be worn up to respirator exposure limitations, check with respirator equipment manufactures recommendations/limitations. For a higher level of protection use positive pressure supplied air respiration protection or Self Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
Positive pressure, full-facepiece Self Contained Breathing Apparatus; or positive pressure, full-facepiece Self Contained Breathing Apparatus with an auxiliary positive pressure Self Contained Breathing Apparatus.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields are recommended when the operation can generate splashes, sprays or mists.

HAND PROTECTION: Wear appropriate gloves for routine industrial use. Use appropriate gloves for spill response, as stated in Section 6 of this MSDS (Accidental Release Measures).

BODY PROTECTION: Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from natural rubber or other appropriate materials are generally acceptable, depending upon the task.

## 9. PHYSICAL and CHEMICAL PROPERTIES

Physical and chemical properties for Sulfuric Acid.

**Appearance:** Clear oily liquid.
**Odor:** Odorless.
**Solubility:** Miscible with water, liberates much heat.
**Specific Gravity:** 1.84 (98%), 1.71 (78%), 1.40 (50%)
**pH:** 1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
**% Volatiles by volume @ 21C (70F):** No information found.
**Boiling Point:** ca. 290C (ca. 554F) (decomposes at 340C)
**Melting Point:** 3C (100%), -32C (93%), -38C (78%), -64C (65%).
**Vapor Density (Air=1):** 3.4
**Vapor Pressure (mm Hg):** 1 @ 145.8C (295F)
**Evaporation Rate (BuAc=1):** No information found.

ODOR THRESHOLD: Not available.
APPEARANCE AND COLOR: No odor.
HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red upon contact with even low concentrations of this solution.

## 10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition products of this solution can include carbon monoxide, carbon dioxide and oxides of sulfur.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product reacts with bases, reducing agents, alkali metals, carbides, cyanides, sulfides and metal powders. Do not mix this product with sodium hypochlorite, sodium bisulfite, Chlorine Sanitizers or Chlorinated Cleaners – a deadly gas can be formed.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures and incompatible chemicals.

# PART IV *Is there any other useful information about this material?*

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration is provided below.
**SULFURIC ACID:**
$LD_{50}$ (oral, rat) 2140 mg/kg $LC_{50}$ (rat) 510 mg/m2 /2 hrs $LC_{50}$ (rat) 347 ppm/1 hr

SUSPECTED CANCER AGENT: The components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA; and are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

BCS,LLC only adds water to produce lower concentrations of sulfuric acid. The following quote is from a 93% sulfuric acid MSDS dated 5/7/97 from Rhodia Inc., who is a producer of sulfuric acid and is regarding cancer and strong acid mists. "The International Agency for Research on cancer (IARC) has classified strong inorganic acid mists containing sulfuric as a known human carcinogen (IARC Category 1). This classification applies to sulfuric acid when it is generated as a mist. There is still debate in the scientific community whether the studies reviewed by IARC adequately controlled for confounding occupational exposures and personal habits such as smoking and alcohol consumption. A few epidemiology studies have suggested a possible association between sulfuric acid exposure and laryngeal or lung cancer; however, in all these studies, workers were exposed to many other chemicals, some of which are recognized carcinogens, such as diethylsulfate and nickel. Considering the multiple chemical exposures and other limitations of the studies we (Rhodia Inc.) disagree with IARC's conclusions that a cause and effect relationship between cancer and exposure to strong inorganic acid mist containing sulfuric acid has been demonstrated."

## 11. TOXICOLOGICAL INFORMATION (Continued)

IRRITANCY OF PRODUCT: This product is severely irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans.
Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to cause teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

*A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

BIOLOGICAL EXPOSURE INDICES: Currently there are no Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Skin disorders can be aggravated by over-exposure to this product. Inhalation of this products mists may aggravate respiratory conditions.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure to this product.

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: No chemical fate data found.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is harmful or fatal to plant and animal life if released into the environment. As with all chemicals, work practices should be aimed at eliminating environmental releases. Refer to Section 11 (Toxicological Information) for further toxicological data.

EFFECT OF CHEMICAL ON AQUATIC LIFE The toxicity of sulfuric acid to fish is dependent on the resulting pH of the water. lethality at a ph of 5.0 or below. Required to cause lethality varies depending on the hardness of the water (hard water has some buffering capacity) and the species of fish (some fish are more resistant to the effects of acidity) McKee, JE, and Wolf, HA (Editors) Water Quality Criteria, 2nd ed., Publications No. 3-A, p. 279, California State Water Quality Resources Control Board, Sacramento, CA (Rev. 1963).

As with all chemicals, work practices should be aimed at eliminating environmental releases.

## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: D002 (Characteristic, Corrosivity), applicable to wastes consisting only of this solution.

## 14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

| | |
|---|---|
| PROPER SHIPPING NAME: | Sulfuric Acid with more than 51% acid |
| HAZARD CLASS NUMBER and DESCRIPTION: | 8 (Corrosive Material) |
| UN IDENTIFICATION NUMBER: | UN 1830 |
| PACKING GROUP: | II |
| DOT LABEL(S) REQUIRED: | Corrosive |

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 137

## 14. TRANSPORTATION INFORMATION—(Continued)

MARINE POLLUTANT: This product does not contain any components which are designated by the Department of Transportation to be Marine Pollutants. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

Note: The latest DOT information is provided, please verify all DOT information as it is subject to change without notice.

## 15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product subject to the reporting requirements of Section 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act are as follows.

| COMPONENT | SARA 302 | SARA 304 | SARA 313 |
|---|---|---|---|
| Sulfuric Acid | Yes | Yes | No |

SARA Threshold Planning Quantity: NA

TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Sulfuric Acid = 1000 lbs,
OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Not determined.

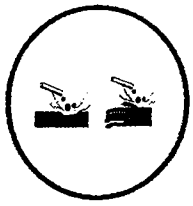
CALIFORNIA PROPOSITION 65: No component of this product is on the California Proposition 65 lists.

LABELING (Precautionary Statements): **DANGER!** CORROSIVE MATERIAL! LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. MAY CAUSE LUNG DAMAGE. Do not get into eyes, on skin or clothing. Avoid breathing spray or mist. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to the mist or spray. When handling, wear chemical splash goggles, face shield, rubber gloves and protective clothing. Do not transfer to unlabeled containers. Wash thoroughly after handling. Keep container closed when not in use. FIRST AID: In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do not induce vomiting. IN CASE OF FIRE: Use water, dry chemical, $CO_2$, or alcohol foam. IN CASE OF SPILL: Neutralize residue with acid neutralizing agent. Refer to MSDS for additional information.

TARGET ORGANS: Skin, eyes and respiratory system.
WHMIS SYMBOLS:

D1A- Poisonous and Infectious Materials
Very Toxic Materials

E- Corrosive Material



## 16. OTHER INFORMATION

**INFORMATION SOURCE:** CHEMICAL SAFETY ASSOCIATES, Inc.
Rhodia Inc.

**PREPARED BY:** BASIC CHEMICAL SOLUTIONS



## DEFINITIONS OF TERMS

## 15. OTHER INFORMATION (Continued)

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

**CAS #**: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

**EXPOSURE LIMITS IN AIR:**
**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.
**TLV - Threshold Limit Value** - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.
**OSHA** - U.S. Occupational Safety and Health Administration.
**PEL - Permissible Exposure Limit** - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.
**IDLH - Immediately Dangerous to Life and Health** - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

**FLAMMABILITY LIMITS IN AIR:**
Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

**TOXICOLOGICAL INFORMATION:**
Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **$LD_{50}$** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **$LC_{50}$** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **$mg/m^3$** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

**REGULATORY INFORMATION:**
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

# MATERIAL SAFETY DATA SHEET

*Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards*

## BASIC CHEMICAL SOLUTIONS

## PART I *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

| | |
|---|---|
| TRADE NAME (AS LABELED): | **BCS SODIUM HYPOCHLORITE SOLUTION (5 - 12.5%)** |
| CHEMICAL NAME/CLASS: | Hypochlorous acid salt |
| PRODUCT USE: | Bleach, disinfectant, waste water treatment additive. |
| SUPPLIER/MANUFACTURER'S NAME: | **BASIC CHEMICAL SOLUTIONS** |
| ADDRESS: | **Corporate Office**<br>525 Seaport Blvd.<br>Redwood City, CA 94063 |
| BUSINESS PHONE: | 800-411-4227 |
| EMERGENCY PHONE: | **CHEMTREC**: 800-424-9300 |
| DATE OF PREPARATION: | November 13, 2003 |

**Si usted no entiende las Hojas de Informacion de Seguridad sobre Materials, busque a alguien para que se la explique a usted en detalle.**
**(If you do not understand the Material Safety Data Sheet, find someone to explain it to you in detail.)**

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS # | % w/w | EXPOSURE LIMITS IN AIR | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ACGIH | | OSHA | | NIOSH | |
| | | | TWA $mg/m^3$ | STEL $mg/m^3$ | PEL $mg/m^3$ | STEL $mg/m^3$ | IDLH $mg/m^3$ | OTHER $mg/m^3$ |
| Sodium Hypochlorite Solution | 7681-52-9 | 5-15 | 0.5 ppm as $Cl_2$ | 1 ppm as $Cl_2$ | 0.5 ppm as $Cl_2$ | 1 ppm as $Cl_2$ | 10 ppm as $Cl_2$ | NE |
| Water and other ingredients. The other ingredients are each present in less than 1 percent concentration in this product. | | Balance | The components present in the balance of this product do not contribute any significant, additional hazards. All hazard information pertinent to this product has been presented in the remaining sections of this Material Safety Data Sheet, per the requirements of Federal Occupational Safety and Health Hazard Communication Standard (29 CFR 1910.1200). | | | | | |

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

## 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW**: This product is light-yellow to green solution with a strong chlorine-like smell. This solution is corrosive to skin. Causes burns to skin, eyes, respiratory tract and mucous membranes. Harmful or fatal if swallowed. In the event of fire or spill, adequate precautions must be taken. This product will react with acids to release toxic chlorine gas. If involved in a fire, this product may decompose to produce a variety of compounds (i.e. chlorine, sodium oxide, oxygen). Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

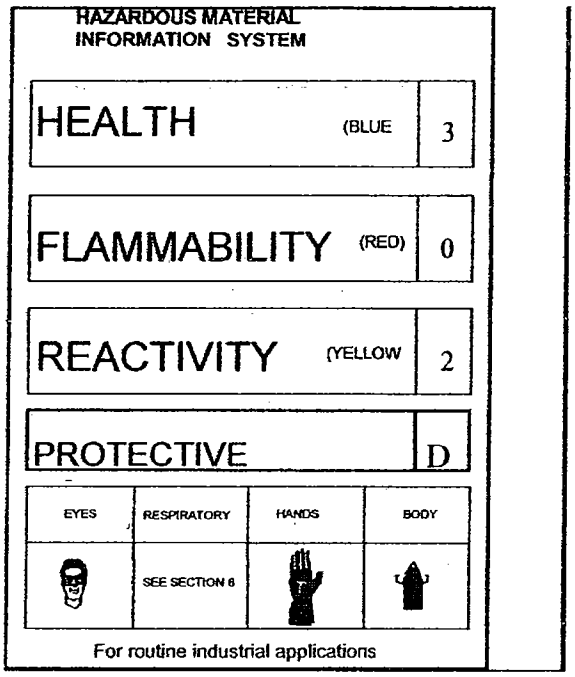
SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: If mists or sprays of this solution are inhaled, this product may cause pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Inhalation of this product may cause damage to the tissues of the respiratory system producing potentially fatal lung disorders (chemical pneumonitis and pulmonary edema). If mixed with acids, hypochlorite solutions release large amounts of chlorine gas. This gas can cause severe irritation of the nose and throat. Exposure to high levels of chlorine gas may result in severe lung damage.

CONTACT WITH SKIN or EYES: Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage possibly blindness. Sodium hypochlorite mist and solutions can cause skin irritation. In severe cases, chemical burns may result. This product is a skin sensitizer; prolonged or repeated over-exposures can result in allergic contact dermatitis.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure to any component of this product.

INGESTION: Though ingestion is not anticipated to be a significant route of over-exposure to this product. If ingestion does occur, hypochlorite solutions release hypochlorous acid on contact with gastric juices, and ingestion causes irritation and corrosion of mucous membranes, pain, vomiting, and edema of the pharynx and larynx; reduced blood pressure, delirium and coma may occur. Ingestion of large quantities may be fatal.




INJECTION: Though injection is not anticipated to be a significant route of over-exposure to this product, if it occurs, local reddening, tissue swelling, and discomfort may result.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

**ACUTE**: This solution is corrosive, and can burn and damage eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, irritation of the respiratory system may occur, with coughing, and breathing difficulty. Though unlikely to occur during occupational use, ingestion or inhalation of large quantities may be fatal.

**CHRONIC**: Repeated skin contact with this product may result in dermatitis (inflammation and reddening of the skin). Sodium Hypochlorite, a component of this product, is a skin sensitizer; prolonged or repeated over-exposures can result in allergic contact dermatitis.

# PART II *What should I do if a hazardous situation occurs?*

## 4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, Rinse skin immediately with plenty of water for 15-20 minutes. Take off contaminated clothing, taking care not to contaminate eyes. Washing with large amounts of clean water should continue until affected skin surface no longer feels slippery. Victim must seek medical attention.
Call a poison control center or doctor for treatment advice.

## 4. FIRST-AID MEASURES (Continued)

EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Do not attempt to neutralize. Oils or ointments should not be used at this time. Call a poison control center or doctor for treatment advice. Victim must seek immediate medical attention.
INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Remove or cover gross contamination to avoid exposure to rescuers. Do not give anything by mouth to an unconscious person.

INGESTION: If this product is swallowed, call a poison control center or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a poison control center or doctor. Have person sip a glass of water if able to swallow. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water.

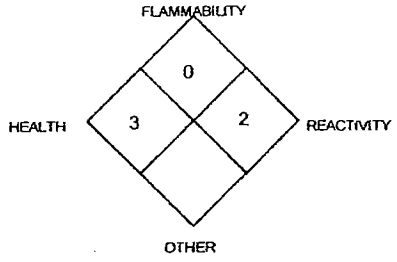
Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

Note to Physicians: Symptomatic. Treatment and supportive therapy as indicated. Do NOT give acidic antidotes such as juice, soft drink, vinegar, etc. This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed. Following exposure the patient should be kept under medical review for at least 48 hours as delayed pneumonitis may occur. Pulmonary edema is likely and may be delayed. Steroid therapy, if given early, may be effective in preventing or alleviating edema.

## 5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not flammable.
AUTOIGNITION TEMPERATURE, °C: Not flammable.
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

**NFPA RATING**




FIRE EXTINGUISHING MATERIALS:

Water Spray: YES
Foam: YES
Halon: YES
Carbon Dioxide: YES
Dry Chemical: YES
Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Sodium hypochlorite is a strong chemical oxidant, but solutions do not support combustion. Not considered flammable or combustible. Reaction with nitrogen compounds, chloroorganic compounds, or easily oxidizable compounds (reducing agents) may be explosive. This material is non-flammable but is decomposed by heat and light, causing a pressure build-up, which could result in an explosion. When heated, it may release chlorine gas. Vigorous reaction with oxidizable or organic materials may result in fire. Contact with aluminum, tin or zinc will result in the generation of heat and release of hydrogen gas. Run-off from fire control may cause pollution. Keep fire-exposed containers cool with water spray to prevent rupture due to excessive heat. High pressure water hose may spread product from broken containers increasing contamination. If involved in a fire, this product may decompose to produce a variety of compounds (i.e. chlorine, sodium oxide, oxygen). Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. Products of combustion are irritating to the respiratory tract and may cause breathing difficulty. Symptoms may be delayed several hours or longer depending upon the extent of exposure

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed containers, if it can be done without risk to firefighters. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, discard or decontaminate fire response equipment using water and sodium bicarbonate before returning such equipment to service.

## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

The proper personal protective equipment for incidental releases (e.g.-1 L of the product released in a well-ventilated area) use impermeable gloves, specific for the material handled, goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard-hat. Self Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, Select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.
Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with sodium bicarbonate and water rinse. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization. Place all spill residue in a suitable container. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

**Deactivation For Small Spills:** Hypochlorite can be broken down by covering it with a reducing agent such as sodium sulfite or sodium thiosulfate.

# PART III *How can I prevent hazardous situations from occurring*

## 7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat or drink while handling this material. Remove contaminated clothing immediately. Discard contaminated clothing items, or launder before re-use. Inform anyone handling such contaminated laundry of the hazards associated with this product. Use ventilation and other engineering controls to minimize potential exposure to this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location.

**For Non-Bulk Containers:** Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Wash thoroughly after using this material. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Empty containers may contain residual liquid, therefore, empty containers should be handled with care.

**Bulk Containers:** All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

**Tank Car Shipments:** Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment before maintenance begins by a triple-rinse with water followed, if necessary, by using sodium bicarbonate and an additional rinse. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: If required use a corrosion-resistant ventilation system separate from other exhaust ventilation systems to ensure that there is no potential for overexposure to sprays, or mists of this product and that exposures are below those in section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. If adequate ventilation is not available or if there is potential for airborne exposure above the exposure limits (listed in Section 2) a respirator may be worn up to respirator exposure limitations, check with respirator equipment manufactures recommendations/limitations. For a higher level of protection use positive pressure supplied air respiration protection or Self Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:

Positive pressure, full-facepiece Self Contained Breathing Apparatus; or positive pressure, full-facepiece Self Contained Breathing Apparatus with an auxiliary positive pressure Self Contained Breathing Apparatus.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields are recommended when the operation can generate splashes, sprays or mists.

HAND PROTECTION: Wear appropriate gloves for routine industrial use. Use appropriate gloves for spill response, as stated in Section 6 of this MSDS (Accidental Release Measures).

BODY PROTECTION: Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from natural rubber are generally acceptable, depending upon the task.

## 9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not available.
SPECIFIC GRAVITY (water = 1): 1.198
SOLUBILITY IN WATER: Completely soluble.
VAPOR PRESSURE, mm Hg @ 21 °C: 12 mmHg.
ODOR THRESHOLD: 0.06 ppm (detection), for Chlorine.
LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not available.

EVAPORATION RATE (n-BuAc=1): Similar to water.
MELTING/FREEZING POINT: -13.6°C (7.5°F).
BOILING POINT: Decomposes above 40°C (104°F).
pH: 11-13

APPEARANCE AND COLOR: This product is light-yellow to green solution with a strong chlorine-like smell.
HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn blue-purple upon contact with this solution.

## 10. STABILITY and REACTIVITY

STABILITY: Stable at room temperature.

DECOMPOSITION PRODUCTS: Thermal decomposition products of this solution can include: Chlorine, sodium oxide, oxygen, oxides of chlorine, sodium chlorate, and hydrogen.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product reacts with strong acids producing heat and chlorine gas, which is toxic. Other incompatibles include organic material, cellulose, oxidizable materials, ammonia, urea, ammonium salts, ethyleneimine, cyanides, nitrogen compounds, alcohols, metals, and metal oxides. Reacts with metals to produce flammable hydrogen gas. Metal and metal oxide catalysts decompose hypochlorites, evolving oxygen and often causing explosions. May react explosively with nitrogen containing compounds or form chloroamines, which are explosive. Alkaline hypochlorite solutions may react explosively with some chloroorganic compounds.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures and incompatible chemicals.

# PART IV *Is there any other useful information about this material?*

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration is provided below.

**SODIUM HYPOCHLORITE:**
Eye effects-Rabbit, adult 10 mg Moderate irritation effects
Microsomal Mutageniticity Assay-*Salmonella typhimurium* 1 mg/plate
Cytogenetic Analysis-Human: lymphocyte, 100 ppm/24 hours
Oral-Woman TDLo: 1 g/kg: Central nervous system effects, Blood pressure effects,
Intravenous-Man TDLo: 45 mg/kg: Pulmonary system effects
Oral-Mouse $LD_{50}$: 5800 mg/kg
Oral-Rat $LD_{50}$: 8910 mg/kg

SUSPECTED CANCER AGENT: The major components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA; and are therefore not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: This product is severely irritating and corrosive to contaminated tissue.

SENSITIZATION TO THE PRODUCT: Sodium Hypochlorite, a component of this product, is a sensitizer. Prolonged or repeated skin contact can result in the development of rashes, welts, and other allergy-like symptoms.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans. Sodium hypochlorite caused mutations in several short-term studies using bacteria and cultured mammalian cells. The significance of these tests is unclear. It was not mutagenic in tests (chromosome aberration and micronucleus) on live animals.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to cause teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

*A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

BIOLOGICAL EXPOSURE INDICES: Currently there are no Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Skin disorders can be aggravated by over-exposure to this product. Inhalation of this products mists may aggravate respiratory conditions.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure to this product.

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product are relatively stable in the environment; they may degrade, after time, into other organic and inorganic constituents. Additional environmental data are available as follows:

**SODIUM HYPOCHLORITE:** Water solubility = 29.4 g/ 100 mL (25◦C).

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is harmful or fatal to plant and animal life if this product is released into the environment. Refer to Section 11 (Toxicological Information) for further data on the effects of this product's components on test animals.
Invertebrate and Microbial Toxicity: LOEC Oncorhynchus kisutch 0.02 mg/ l.

## 12. ECOLOGICAL INFORMATION (Continued)

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product can substantially raise the pH of an aquatic environment and can be extremely toxic to fish and aquatic plants. As with all chemicals, work practices should be aimed at eliminating environmental releases.

Fish Toxicity: LC50 (48 hr) rainbow trout 0.07 mg/ l.
LC50 (96 hr) fathead minnow 5.9 mg/l.

## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: D002 (Characteristic, Corrosivity), applicable to wastes consisting only of this solution.

## 14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

| | |
|---|---|
| PROPER SHIPPING NAME: | Hypochlorite solution |
| HAZARD CLASS NUMBER and DESCRIPTION: | 8 (Corrosive Material) |
| UN IDENTIFICATION NUMBER: | UN 1791 |
| PACKING GROUP: | III |
| DOT LABEL(S) REQUIRED: | Corrosive |

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 154

MARINE POLLUTANT: This product does not contain any components which are designated by the Department of Transportation to be Marine Pollutants. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.
Note: The latest DOT information is provided, please verify all DOT information as it is subject to change without notice.

## 15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product subject to the reporting requirements of Section 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act are as follows.

| COMPONENT | SARA 302 | SARA 304 | SARA 313 |
|---|---|---|---|
| Sodium Hypochlorite | No | Yes | No |

SARA Threshold Planning Quantity: Not applicable.

TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Sodium Hypochlorite = 100 lbs.

OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

**Illinois - Toxic Substance List:** Sodium Hypochlorite.
**New Jersey - Right to Know Hazardous Substance List:** Sodium Hypochlorite
**North Dakota - List of Hazardous Chemicals, Reportable Quantities:** Sodium Hypochlorite.

CALIFORNIA PROPOSITION 65 No component of this product is on the California Proposition 65 lists.

## 15. REGULATORY INFORMATION (Continued)

If this product is used for the purpose of a pesticide it would be a violation of federal law to use this product in a manner inconsistent with its labeling. Call BCS to see if your required use is covered by our label. The following labeling section is taken from our pesticide label but has no directions for use. It does not constitute a pesticide label. It is for information only.

LABELING (Precautionary Statements): KEEP OUT OF REACH OF CHILDREN - DANGER - PELIGRO

HAZARDS TO HUMANS AND DOMESTIC ANIMALS: DANGER: Corrosive, may cause severe skin or chemical burns to broken skin. Causes eye damage. May be fatal if swallowed. Avoid breathing vapors. Do not get in eyes, on skin, or on clothing. Wear goggles or face shield and rubber gloves when handling this product. Wash hands after handling. Vacate poorly ventilated areas as soon as possible. Do not return until odors have dissipated.

ENVIRONMENTAL HAZARDS: This product is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NDPES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL OR CHEMICAL HAZARDS: STRONG OXIDIZIING AGENT: Mix only with water according to label directions. Mixing this product with chemicals (e.g. ammonia. acids, detergents, etc.) or organic matter (e.g. urine, feces, etc.) will release chlorine gas which is irritating to eyes, lungs and mucous membranes.

STORAGE AND DISPOSAL: Store this product in a cool dry area, away from direct sunlight and heat to avoid deterioration. In case of spill, flood areas with large quantities of water. Product or rinsates that cannot be used should be diluted with water before disposal in sanitary sewer (see Environmental Hazards). Do not contaminate food or feed by storage, disposal or cleaning of equipment.

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice. Call a poison control center or doctor for further treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If swallowed: 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 a poison control center or doctor.

If inhaled: If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Do not give anything by mouth to an unconscious person.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

In case of fire: Use dry chemical, $CO_2$, or alcohol foam. In case of spill: Neutralize residue with sodium bicarbonate and rinse area. Place in suitable container. Refer to MSDS for additional information.

TARGET ORGANS: Skin, eyes and respiratory system.

WHMIS SYMBOLS:

E- Corrosive Material

D2B- Poisonous and Infectious Materials/Other Effects I

## 16. OTHER INFORMATION

**INFORMATION SOURCE:** CHEMICAL SAFETY ASSOCIATES, Inc.

**PREPARED BY:** BASIC CHEMICAL SOLUTIONS

THIS INFORMATION IS DRAWN FROM RECOGNIZED SOURCES BELIEVED TO BE RELIABLE. BASIC CHEMICAL SOLUTIONS MAKES NO GUARANTEES NOR ASSUMES ANY LIABILITY IN CONNECTION WITH THIS INFORMATION. THE USER SHOULD BE AWARE OF CHANGING TECHNOLOGY, RESEARCH, REGULATIONS AND ANALYTICAL PROCEDURES THAT MAY REQUIRE CHANGES HEREIN. THE ABOVE DATA IS SUPPLIED UPON THE CONDITION THAT PERSONS WILL EVALUATE THIS INFORMATION AND THEN DETERMINE ITS SUITABILITY FOR THEIR USE.

## DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

**CAS #**: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

**EXPOSURE LIMITS IN AIR:**

**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

**TLV - Threshold Limit Value** - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.

**OSHA** - U.S. Occupational Safety and Health Administration.

**PEL - Permissible Exposure Limit** - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

**IDLH - Immediately Dangerous to Life and Health** - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

**HAZARD RATINGS:**

**HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:** Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime over-exposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime over-exposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

**NATIONAL FIRE PROTECTION ASSOCIATION:** Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

**FLAMMABILITY LIMITS IN AIR:**

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoigntion Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

**TOXICOLOGICAL INFORMATION:**

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **$LD_{50}$** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **$LC_{50}$** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **$mg/m^3$** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and LDo, or **TC**, **TCo**, LCLo, and LCo, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

**REGULATORY INFORMATION:**

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

# MATERIAL SAFETY DATA SHEET

*Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards*

## BASIC CHEMICAL SOLUTIONS

## PART I *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **BCS SODIUM HYDROXIDE LIQUID**
**(1% - 50%)**

CHEMICAL NAME/CLASS: Sodium Hydroxide Solution

PRODUCT USE: Metal finishing, neutralization, industrial cleaners, chemical processing.

SUPPLIER/MANUFACTURER'S NAME: **BASIC CHEMICAL SOLUTIONS**
ADDRESS: **Corporate Office**
525 Seaport Blvd.
Redwood City, CA 94063

BUSINESS PHONE: 800-411-4227

EMERGENCY PHONE: **CHEMTREC**: 800-424-9300

DATE OF PREPARATION: May 7, 2003
DATE OF REVISION: July 21, 2006

**Si usted no entiende las Hojas de Informacion de Seguridad sobre Materials, busque a alguien para que se la explique a usted en detalle.**
**(If you do not understand the Material Safety Data Sheet, find someone to explain it to you in detail.)**

### 2. COMPOSITION AND INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS # | %w/w | EXPOSURE LIMITS IN AIR | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ACGIH | | OSHA | | | |
| | | | TLV $mg/m^3$ | STEL $mg/m^3$ | PEL $mg/m^3$ | STEL $mg/m^3$ | IDLH $mg/m^3$ | OTHER $mg/m^3$ |
| Sodium Hydroxide | 1310-73-2 | 1-50 | 2, C | NE | 2, C (Vacated 1989 PELs) | NE | 10 | NIOSH REL: 2 DFG MAKs: 2 |
| Water and other ingredients. The other ingredients are each present in less than 1 percent concentration in this product. | | Balance | The components present in the balance of this product do not contribute any significant, additional hazards. All hazard information pertinent to this product has been presented in the remaining sections of this Material Safety Data Sheet, per the requirements of Federal Occupational Safety and Health Hazard Communication Standard (29 CFR 1910.1200). | | | | | |

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

## 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW**: This product is a clear to turbid liquid solution. This solution is corrosive, and can be damaging to contaminated tissue. Ingestion of large quantities can be fatal. In the event of fire or spill, adequate precautions must be taken. This solution reacts with water to generate heat. If involved in a fire, this product may decompose to produce sodium oxides and a variety of other compounds (i.e. carbon monoxide and carbon dioxide). Emergency responders must wear the proper personal protective equipment suitable for the situation to which the are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: This solution can damage skin, eyes, mucous membranes, and other contaminated tissue. Burns may not be immediately painful or visible.

INHALATION: If mists or sprays of this solution are inhaled, this product may cause pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Damage to the tissues of the respiratory system may occur.

CONTACT WITH SKIN or EYES: Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage possibly blindness. Skin contact may result in a "soapy" feel and cause reddening, discomfort, and irritation. Prolonged exposure may result in ulcerating burns which could leave scars.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure to any component of this product.

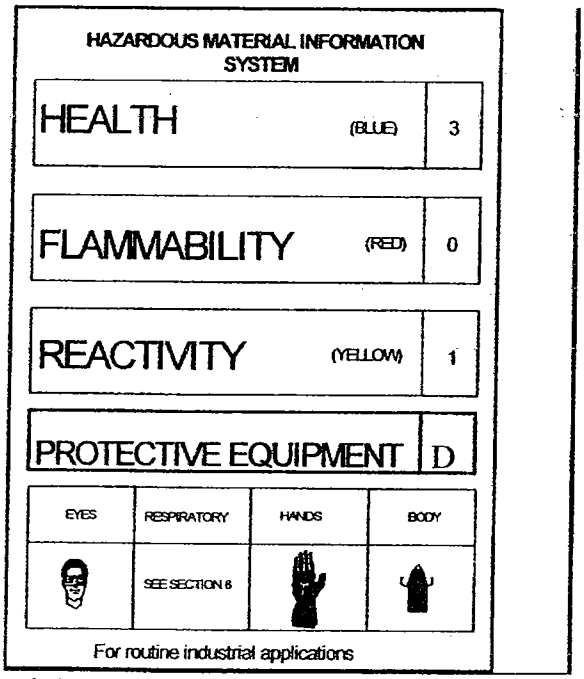
INGESTION: Though ingestion is not anticipated to be a significant route of over-exposure to this product, if ingestion does occur burning and irritation of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Ingestion of large quantities may be fatal.

INJECTION: Though injection is not anticipated to be a significant route of over-exposure to this product, if it occurs, may cause local reddening, tissue swelling, and discomfort.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

**ACUTE**: This solution is corrosive, and can burn and damage eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, irritation of the respiratory system may occur, with coughing, and breathing difficulty. Though unlikely to occur during occupational use, ingestion of large quantities may be fatal.

**CHRONIC**: Repeated skin contact with this product may result in dermatitis (inflammation and reddening of the skin).




# PART II *What should I do if a hazardous situation occurs?*

## 4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. Washing with large amounts of clean water should continue until affected skin surface no longer feels slippery. Victim must seek medical attention.

EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Do not attempt to neutralize. Oils or ointments should not be used at this time. Victim must seek immediate medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with victim.

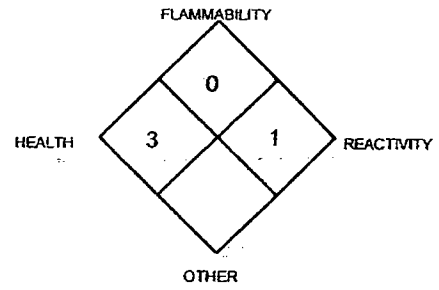
## 5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not flammable.
AUTOIGNITION TEMPERATURE, °C: Not flammable.
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES
Carbon Dioxide: YES
Foam: YES
Dry Chemical: YES
Halon: YES
Other: Any "ABC" Class.

**NFPA RATING**




UNUSUAL FIRE AND EXPLOSION HAZARDS: Not considered flammable or combustible. Does not support combustion. However, contact with water or acids may generate sufficient heat to ignite nearby combustible materials. Contact with aluminum, tin or zinc will result in the generation of heat and release of hydrogen gas. Run-off from fire control may cause pollution. Keep fire-exposed containers cool with water spray to prevent rupture due to excessive heat. High pressure water hose may spread product from broken containers increasing contamination. When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (including carbon monoxide, carbon dioxide and sodium oxides). Products of combustion are irritating to the respiratory tract and may cause breathing difficulty. Symptoms may be delayed several hours or longer depending upon the extent of exposure.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas.

## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

The proper personal protective equipment for incidental releases (e.g.-1 L of the product released in a well-ventilated area) use impermeable gloves, specific for the material handled, goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard-hat. Self Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, Select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.
Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with citric acid or other caustic neutralizing agent. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization. Place all spill residue in a suitable container. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

# PART III *How can I prevent hazardous situations from occurring*

## 7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat or drink while handling this material. Remove contaminated clothing immediately. Discard contaminated clothing items, or launder before re-use. Inform anyone handling such contaminated laundry of the hazards associated with this product. Use ventilation and other engineering controls to minimize potential exposure to this product.

## 7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. It is best to never add water to this product, always add product, with constant stirring, slowly to surface of lukewarm (80-100 °F, 27-38 °C) water, to assure product is being completely dispersed as it is added. Only trained personnel can add water to this product. Never add more product than can be absorbed by solution while maintaining temperatures below 200 °F(93 °C) to prevent boiling and spattering of caustic solution. Use in a well-ventilated location.
**For Non-Bulk Containers:** Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Wash thoroughly after using this material. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Empty containers may contain residual liquid, therefore, empty containers should be handled with care.

**Bulk Containers:** All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

**Tank Car Shipments:** Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment before maintenance begins by a triple-rinse with water followed, if necessary, by using caustic neutralizing agent and an additional rinse. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: If required use a corrosion-resistant ventilation system separate from other exhaust ventilation systems to ensure that there is no potential for overexposure to sprays, or mists of this product and that exposures are below those in section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. If adequate ventilation is not available or if there is potential for airborne exposure above the exposure limits (listed in Section 2) a respirator may be worn up to respirator exposure limitations, check with respirator equipment manufactures recommendations/limitations. For a higher level of protection use positive pressure supplied air respiration protection or Self Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
Positive pressure, full-facepiece Self Contained Breathing Apparatus; or positive pressure, full-facepiece Self Contained Breathing Apparatus with an auxiliary positive pressure Self Contained Breathing Apparatus.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields are recommended when the operation can generate splashes, sprays or mists.

HAND PROTECTION: Wear appropriate gloves for routine industrial use. Use appropriate gloves for spill response, as stated in Section 6 of this MSDS (Accidental Release Measures).

BODY PROTECTION: Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from natural rubber are generally acceptable, depending upon the task.

## 9. PHYSICAL and CHEMICAL PROPERTIES

Physical and chemical properties for various concentrations of **Sodium Hydroxide**, the main component of this product are as follows:

| | Series | | | |
|---|---|---|---|---|
| | 10 | 20 | 30 | 50 |
| **PHYSICAL STATE:** | Liquid | | | |
| **BOILING POINT @ 760 mm Hg:** | 110°C | 113°C | 119°C | 140°C |
| **FREEZING POINT:** | -12°C 10°F | -26°C -14°F | 0°C 32°F | 12°C 53.6°F |
| **VAPOR PRESSURE mm Hg @ 60°C:** | 135 | 110 | 76 | 13 |
| **SPECIFIC GRAVITY @ 15.6° C** | 1.11 | 1.22 | 1.33 | 1.53 |
| **DENSITY – lb-gal @ 15.6°C:** | 9.26 | 10.17 | 11.09 | 12.76 |
| **VAPOR DENSITY:** | Not Determined | | | |
| **EVAPORATION RATE (water = 1):** | Similar to or slower than water depending upon weight percent. | | | |
| **pH:** | 14.0 pH @ 7.5% solution | | | |
| **SOLUBILITY in $H_2O$ - % by wt:** | Completely Soluble | | | |

ODOR THRESHOLD: Not available.

APPEARANCE AND COLOR: This product is a clear light straw to turbid liquid solution.
HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn blue-purple upon contact with this solution even with low concentrations.

## 10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition products of this solution can include carbon monoxide, carbon dioxide, and sodium compounds.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product reacts with strong acids. Additionally, it is incompatible with organic halogen compounds, organic nitro compounds, aluminum, zinc, tin, and other metals. Avoid contact with leather and wool. **Reactions with various food sugars may form carbon monoxide.**

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures and incompatible chemicals.

# PART IV *Is there any other useful information about this material?*

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration is provided below.

**SODIUM HYDROXIDE:**
Eye Irritancy (monkey) = 1% solution, 24 hr, Severe.
Skin Irritancy (rabbit) = 500 mg, 24 hr, Severe.
Eye Irritancy (rabbit) = 4 g, 24 hr, Mild.
Eye Irritancy (rabbit) = 1% solution, 24 hr, Severe.
Eye Irritancy (rabbit) = 50 g, 24 hr, Severe.
Eye Irritancy (rabbit) = 1 mg, 24 hr, Severe.
Eye Irritancy (rabbit) = 100 mg with rinse, 24 hr, Severe.
Cytogenic Analysis System (grasshopper, parenteral) = 20 mg
$LD_{50}$ (intraperitoneal, mouse) = 40 mg/kg.
LDLo (oral, rabbit) = 500 mg/kg.

## 11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of this product's ingredients are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA; and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: This product is severely irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans. Mutation data is available for the Sodium Hydroxide (component of this product), obtained during clinical studies on animal tissues exposed to high doses of this compound.
Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to cause teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

*A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

BIOLOGICAL EXPOSURE INDICES: Currently there are no Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Skin disorders can be aggravated by over-exposure to this product. Inhalation of this products mists may aggravate respiratory conditions.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure to this product.

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product are relatively stable in the environment; they may degrade, after time, into other organic and inorganic constituents. Additional environmental data is available for the components of this product as follows:

**SODIUM HYDROXIDE:** $K_{ow}$ = too low to be measured. Water solubility = 9 g/0.9 ml water. BOD: None.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is harmful to plant and animal life if this product is released into the environment. As with all chemicals, work practices should be aimed at eliminating environmental releases.

EFFECT OF CHEMICAL ON AQUATIC LIFE This product can substantially raise the pH of an aquatic environment and can be extremely toxic to fish and aquatic plants. As with all chemicals, work practices should be aimed at eliminating environmental releases. Additional aquatic data for the components of this product is available as follows:

**SODIUM HYDROXIDE:**
$LC_{100}$ (*Cyprimus carpio*) = 180 ppm/24 hr/25 °C
$TL_m$ (mosquito fish) = 125 ppm/96 hr (fresh water)
$TL_m$ (bluegill) = 99 mg/L/48 hr (tap water)

## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: D002 (Characteristic, corrosive), applicable to wastes consisting only of this solution.

## 14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

| | |
|---|---|
| PROPER SHIPPING NAME: | Sodium Hydroxide solution |
| HAZARD CLASS NUMBER and DESCRIPTION: | 8 (Corrosive Material) |
| UN IDENTIFICATION NUMBER: | UN 1824 |
| PACKING GROUP: | II |
| DOT LABEL(S) REQUIRED: | Corrosive |

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 154

MARINE POLLUTANT: This product does not contain any components which are designated by the Department of Transportation to be Marine Pollutants. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

Note: The latest DOT information is provided, please verify all DOT information as it is subject to change without notice.

## 15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act are as follows.

| COMPONENT | SARA 302 | SARA 304 | SARA 313 |
|---|---|---|---|
| Sodium Hydroxide | No | Yes | No |

SARA Threshold Planning Quantity: Not applicable.

TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Sodium Hydroxide = 1000 lbs.

OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

**Alaska - Designated Toxic and Hazardous Substances: Sodium Hydroxide.**
**California - Permissible Exposure Limits for Chemical Contaminants: Sodium Hydroxide.**
**Florida - Substance List: Sodium Hydroxide.**
**Illinois - Toxic Substance List: Sodium Hydroxide.**
**Kansas - Section 302/313 List: Sodium Hydroxide.**
**Minnesota - List of Hazardous Substances: Sodium Hydroxide.**
**Missouri - Employer Information/Toxic Substance List: Sodium Hydroxide.**
**New Jersey - Right to Know Hazardous Substance List: Sodium Hydroxide.**
**North Dakota - List of Hazardous Chemicals, Reportable Quantities: Sodium Hydroxide.**
**Pennsylvania - Hazardous Substance List: Sodium Hydroxide.**
**Rhode Island - Hazardous Substance List: Sodium Hydroxide.**
**Texas - Hazardous Substance List: Sodium Hydroxide.**
**West Virginia Substance List: Sodium Hydroxide.**
**Wisconsin - Toxic and Hazardous Substances: Sodium Hydroxide.**

CALIFORNIA PROPOSITION 65 No component of this product is on the California Proposition 65 lists.

LABELING (Precautionary Statements): **DANGER!** CORROSIVE MATERIAL! LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. MAY CAUSE LUNG DAMAGE. REACTS VIOLENTLY WITH ACIDS. REACTS WITH WATER TO GENERATE HEAT. AVOID SPATTERING BY SLOWLY ADDING TO SOLUTION. Do not get into eyes, on skin or clothing. Avoid breathing spray or mist. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to the mist or spray. When handling, wear chemical splash goggles, face shield, rubber gloves and protective clothing. Do not transfer to unlabeled containers. Use with adequate ventilation. Wash thoroughly after handling, Keep container closed when not in use. FIRST-AID: In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do not induce vomiting. IN CASE OF FIRE: Use water, dry chemical, $CO_2$, or alcohol foam. IN CASE OF SPILL: Dike area to contain spill. Only trained personnel equipped full acid- protective gear should be permitted in this area. Spilled material may be absorbed into an appropriate absorbent material. Spills should be removed using a vacuum truck. Neutralize remaining traces of material with any dilute inorganic acid or citric acid and then flush with water. If necessary a liberal covering of sodium bicarbonate should then be applied and then rinsed with water. Do not wash into storm or sanitary sewer system.

TARGET ORGANS: Skin, eyes and respiratory system.

## 15. REGULATORY INFORMATION (Continued)

WHMIS SYMBOLS: E- Corrosive Material

## 16. OTHER INFORMATION

**INFORMATION SOURCE:** CHEMICAL SAFETY ASSOCIATES, Inc.

**PREPARED BY:** BASIC CHEMICAL SOLUTIONS



## DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

**CAS #**: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

**EXPOSURE LIMITS IN AIR**:
**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.
**TLV - Threshold Limit Value** - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.
**OSHA** - U.S. Occupational Safety and Health Administration.
**PEL - Permissible Exposure Limit** - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.
**IDLH - Immediately Dangerous to Life and Health** - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

**FLAMMABILITY LIMITS IN AIR**:
Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

**TOXICOLOGICAL INFORMATION:**
Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **$LD_{50}$** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **$LC_{50}$** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **$mg/m^3$** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo, LDLo**, and **LDo**, or **TC, TCo, LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

**REGULATORY INFORMATION:**
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

# MATERIAL SAFETY DATA SHEET

*Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards*

## BASIC CHEMICAL SOLUTIONS

## PART I *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **BCS CITRIC ACID**

CHEMICAL NAME/CLASS: Organic Acid

PRODUCT USE: Food additive

SUPPLIER/MANUFACTURER'S NAME: **BASIC CHEMICAL SOLUTIONS**

ADDRESS: **Corporate Office**
525 Seaport Blvd.
Redwood City, CA 94063

BUSINESS PHONE: 800-411-4227

EMERGENCY PHONE: **CHEMTREC**: 800-424-9300

DATE OF PREPARATION: May 24, 2004

**Si usted no entiende las Hojas de Informacion de Seguridad sobre Materials, busque a alguien para que se la explique a usted en detalle.**
**(If you do not understand the Material Safety Data Sheet, find someone to explain it to you in detail.)**

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS # | %w/w | EXPOSURE LIMITS IN AIR | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | ACGIH | | OSHA | | | OTHER |
| | | | TLV ppm | STEL ppm | PEL ppm | STEL ppm | IDLH ppm | |
| Citric Acid | 77-92-9 | 50 | NE | NE | NE | NE | NE | NE |
| Water and other ingredients. The other ingredients are each present in less than 1 percent concentration in this product. | | | Balance | The components present in the balance of this product do not contribute any significant, additional hazards. All hazard information pertinent to this product has been presented in the remaining sections of this Material Safety Data Sheet, per the requirements of Federal Occupational Safety and Health Hazard Communication Standard (29 CFR 1910.1200). | | | | |

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used. NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

## 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW**: This product is a clear to pale yellow to amber liquid with an odor that ranges between none to a very slightly sugar odor. Skin contact with citric acid can irritate the skin and can cause the skin to redden, sting, and swell at the point of contact. Severe irritation characterized by stinging, reddening, tearing, and swelling may occur following eye exposure. Contact may cause damage to the eye if not treated immediately. Inhalation of this material can be irritating to the nose, mouth, throat and lungs. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

## 3. HAZARD IDENTIFICATION (Continued)

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: Inhalation of this material can be irritating to the nose, mouth, throat and lungs. Low inhalation hazard for usual industrial handling or commercial handling by trained personnel.

CONTACT WITH SKIN or EYES: Skin contact with citric acid can irritate the skin and can cause the skin to redden, sting, and swell at the point of contact. Individuals with preexisting skin disorders may be more susceptible to the effects of this product. Severe irritation characterized by stinging, reddening, tearing, and swelling can occur following eye exposure. Contact may cause damage to the eye if not treated immediately. Individuals with preexisting eye disorders may be more susceptible to the effects of this product.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure for any component of this product.

INGESTION: Ingestion is not anticipated to be a significant route of over-exposure to this product. Expected to be a low ingestion hazard, when small amounts are ingested. May cause gastrointestinal irritation if excess amounts are consumed seek emergency medical attention immediately.

**HAZARDOUS MATERIAL INFORMATION SYSTEM**

| | | |
|---|---|---|
| HEALTH | (BLUE) | 1 |
| FLAMMABILITY | (RED) | 0 |
| REACTIVITY | (YELLOW) | 0 |
| PROTECTIVE EQUIPMENT | | B |

| EYES | RESPIRATORY | HANDS | BODY |
|---|---|---|---|
|  | SEE SECTION 8 |  | - |

For routine industrial applications

**See Section 16 for Definition of Ratings**

INJECTION: Though injection is not anticipated to be a significant route of over-exposure to this product, if it occurs, it may cause local reddening, tissue swelling, and discomfort.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

**ACUTE**: Severe irritation characterized by stinging, reddening, tearing, and swelling can occur following eye exposure. Contact may cause damage to the eye if not treated immediately. Skin contact with citric acid can irritate the skin and can cause the skin to redden, sting, and swell at the point of contact. **CHRONIC**: The effects of long-term, low-level exposures to this product have not been determined. Safe handling of this material on a long-term basis should emphasize the avoidance of all effects from repetitive acute exposure. This chemical is food grade material and is considered to have a low order of toxicity.

# PART II *What should I do if a hazardous situation occurs?*

## 4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, immediately begin decontamination by flush all affected areas with large amounts of soap and running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. Do not attempt to neutralize with chemical agents. Victim must seek medical attention if irritation develops.

EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Do not attempt to neutralize. Oils or ointments should not be used at this time. Victim must seek immediate medical attention.

INHALATION: If mists or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Victim must seek immediate medical attention.

## 4. FIRST-AID MEASURES (Continued)

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, victim should drink water and seek medical attention. Never induce vomiting or give water to someone who is unconscious, having convulsions, or unable to swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS to health professional with victim.

## 5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.
AUTOIGNITION TEMPERATURE: NE.
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): NE. Upper (UEL): NE.

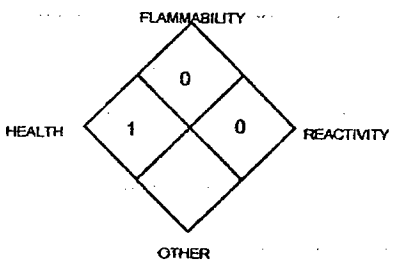
FIRE EXTINGUISHING MATERIALS:

| | |
|---|---|
| Water Spray: YES | Carbon Dioxide: YES |
| Foam: YES | Dry Chemical: YES |
| Halon: YES | Other: Any "ABC" Class. |

UNUSUAL FIRE AND EXPLOSION HAZARDS: Not considered to be a fire or an explosion hazard. Use standard fire fighting techniques to extinguish surrounding materials. Aqueous citric acid does not pose a fire or explosion hazard. Combustion of citric acid produces carbon dioxide ($CO_2$) and carbon monoxide (CO).

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

**NFPA RATING**




**See Section 16 for Definition of Ratings**

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment appropriate for the surrounding fire. Move fire-exposed containers, if it can be done without risk to firefighters. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, discard or decontaminate fire response equipment using water before returning such equipment to service.

## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: In case of a release, clear the affected area, protect people, and respond with trained personnel. Uncontrolled releases should be responded to by appropriately trained personnel in proper personal protective equipment, using pre-planned procedures.

The proper personal protective equipment for incidental releases (e.g.-1 L of the product released in a well-ventilated area) use impermeable gloves, specific for the material handled, goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard-hat. Self Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, Select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.
Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with lime or soda ash or other acid neutralizing agent. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization. Place all spill residue in a suitable container. Dispose of in accordance with Federal, State and local hazardous waste disposal regulations (see Section 13 – Disposal Considerations.)

# PART III *How can I prevent hazardous situations from occurring*

## 7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location. Wash thoroughly after using this material. Do not eat, drink, or smoke while handling this material. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location.

## 7. HANDLING and STORAGE (Continued)

**For Non-Bulk Containers:** Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Wash thoroughly after using this material. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Empty containers may contain residual liquid, therefore, empty containers should be handled with care.

**Bulk Containers:** All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

**Tank Car Shipments:** Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment before maintenance begins by a triple-rinse with water followed, if necessary, by using acid neutralizing agent and an additional rinse. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: If required use local ventilation systems to ensure that there is no potential for overexposure to sprays, or mists of this product and that exposures are below those in section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. If adequate ventilation is not available or if there is potential for airborne exposure above the exposure limits (listed in Section 2) a respirator may be worn up to respirator exposure limitations, check with respirator equipment manufactures recommendations/limitations. For a higher level of protection use positive pressure supplied air respiration protection or Self Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
Positive pressure, full-facepiece Self Contained Breathing Apparatus; or positive pressure, full-facepiece Self Contained Breathing Apparatus with an auxiliary positive pressure Self Contained Breathing Apparatus.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields are recommended when the operation can generate splashes, sprays or mists.

HAND PROTECTION: Wear appropriate gloves for routine industrial use. Use appropriate gloves for spill response, as stated in Section 6 of this MSDS (Accidental Release Measures).

BODY PROTECTION: Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from natural rubber are generally acceptable, depending upon the task.

## 9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): NE
SPECIFIC GRAVITY (water = 1): 1.24@ 15.6°C(68°F)
SOLUBILITY IN WATER: Completely soluble.
VAPOR PRESSURE, mm Hg @ 25°C: NE
ODOR THRESHOLD: Not available.
EVAPORATION RATE (n-BuAc=1): NE
MELTING/FREEZING POINT: NE
BOILING POINT: 104°C (219°F)
pH: 2
LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not applicable.

APPEARANCE AND COLOR: This product is a clear to pale yellow to amber liquid with an odor that ranges between none to a very slightly sugar odor.

## 9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance and odor may be a distinguishing characteristic of this product. Litmus paper will turn red upon contact with this solution.

## 10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition products of this mixture can include carbon monoxide and carbon dioxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Reactions with bases will produce excessive heat. Metal nitrates (potentially explosive reaction), alkali carbonates and bicarbonates, potassium tartrate. Will corrode copper, zinc, aluminum and their alloys.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Heat flames ignition sources and incompatibles.

# PART IV *Is there any other useful information about this material?*

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology Information is for this product:

$LD_{50}$ (oral, rat) 3 g/kg
Irritation(skin, rabbit) 500 mg/24H mild
Irritation (eye, rabbit) 750 mg/24H severe

SUSPECTED CANCER AGENT: The product's components are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA and are, therefore, not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Severe irritation characterized by stinging, reddening, tearing, and swelling can occur following eye exposure. Contact may cause damage to the eye if not treated immediately. Skin contact with citric acid can irritate the skin and can cause the skin to redden, sting, and swell at the point of contact.

SENSITIZATION TO THE PRODUCT: This product is not known to cause skin or respiratory sensitization reactions in humans after prolonged or repeated exposures.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans.
Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to cause teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

*A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin disorders can be aggravated by over-exposure to this mixture. Inhalation of this product may aggravate respiratory conditions.

BIOLOGICAL EXPOSURE INDICES: Currently, Biological Exposure Indices (BEIs) are not applicable to components of this product.

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product are relatively stable in the environment. The following environmental data are available for the components of this product over 1 percent by weight:

No information found.

## 12. ECOLOGICAL INFORMATION (Continued)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No information found.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No information found. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA. The following aquatic toxicity data are available for the product and its components of this product over 1 percent by weight: Not available.

## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: Not applicable.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by State or local authorities by burning. If product is burned, stay out of smoke.

Metal Container: Triple rinse (or equivalent), then offer for recycling or reconditioning, or dispose of in a sanitary landfill, or by other procedures approved by state or local authorities.

Containers Under 1-Gallon or Less in Size: Do not reuse empty container (bottle, can, bucket). Wrap container and put in trash.

## 14. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

| | |
|---|---|
| PROPER SHIPPING NAME: | Not regulated. |
| HAZARD CLASS NUMBER and DESCRIPTION: | Not regulated. |
| UN IDENTIFICATION NUMBER: | Not regulated. |
| PACKING GROUP: | Not regulated. |
| DOT LABEL(S) REQUIRED: | Not regulated. |

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): Not regulated.

MARINE POLLUTANT: This product does not contain any components which are designated by the Department of Transportation to be Marine Pollutants. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

## 15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product are not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

CANADIAN DSL INVENTORY: The components of this product are listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

None determined.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 lists.

LABELING (Precautionary Statements): WARNING! CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. Do not get into eyes, on skin or clothing. Avoid breathing mists or sprays. Do not

## 15. REGULATORY INFORMATION (Continued)

take internally. Use with adequate ventilation and employ respiratory protection when exposed to mists or sprays. When handling, wear chemical splash goggles, face shield, rubber gloves and protective clothing. Do not transfer to unlabeled containers. Wash thoroughly after handling. Keep container closed when not in use. FIRST-AID: In case of contact, immediately flush skin or eyes for at least 15 minutes. Remove contaminated clothes and shoes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If ingested, get medical attention. IN CASE OF FIRE: Use water, dry chemical, $CO_2$ or alcohol foam. IN CASE OF SPILL: Absorb with an inert material. Refer to MSDS for additional information.

CANADIAN WHMIS SYMBOLS: Not Regulated.

## 16. OTHER INFORMATION

**INFORMATION SOURCE:** CHEMICAL SAFETY ASSOCIATES, Inc.

**PREPARED BY:** BASIC CHEMICAL SOLUTIONS



## DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

**CAS #**: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

**EXPOSURE LIMITS IN AIR**:
**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.
**TLV - Threshold Limit Value** - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.
**OSHA** - U.S. Occupational Safety and Health Administration.
**PEL - Permissible Exposure Limit** - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.
**IDLH - Immediately Dangerous to Life and Health** - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

**FLAMMABILITY LIMITS IN AIR**:
Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

**TOXICOLOGICAL INFORMATION:**
Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **$LD_{50}$** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **$LC_{50}$** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **$mg/m^3$** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo, LDLo**, and **LDo**, or **TC, TCo, LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

**REGULATORY INFORMATION:**
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; **the Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act **(Proposition 65)**; **the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

# Bleach (Sodium Hypochlorite)

## National Sanitary Foundation (NSF) or equivalent certification

## SPECIFICATION SHEET

**Issue Date: March 1, 2009** **Replaces: All Previous**

**Chemical Formula: Sodium Hypochlorite (NaOCl)**

| PROPERTY | BASIS | SPECIFICATION |
|---|---|---|
| NaOCl | Wt % | 12.5 min |
| Total Alkalinity as NaOH | Wt % | 2.0 max |
| Iron (Fe) | ppm | 3.0 max |
| Specific Gravity @ 20° C (68° F) | 1.2 | |
| Appearance | Clear, pale yellow-green liquid | |
| Odor | Faint chlorine odor | |

**Contact your Basic Chemical Solutions sales representative for more information at**

**800-411-4227 (4BCS)**

**BASIC CHEMICAL SOLUTIONS, L.L.C.**

Corporate Headquarters
525 Seaport Boulevard
Redwood City, California 94063

# 50% Sodium Hydroxide
# Diaphragm Grade

## SPECIFICATION SHEET

**Issue Date: March 1, 2009** **Replaces: All Previous**

**Chemical Formula: NaOH (Caustic Soda, Liquid Caustic, Lye)**

| Property | Specification |
|---|---|
| Sodium Hydroxide(NaOH), wt % | 48.5 - 52.0 |
| Sodium Oxide($Na_2O$), wt % | 37.6 - 40.3 |
| Sodium Chloride(NaCl), wt % | 1.10 Max |
| Sodium Carbonate($Na_2CO_3$), wt % | 0.2 Max |
| Sodium Chlorate($NaClO_3$), wt % | 0.3 Max |
| Sodium Sulfate($Na_2SO_4$),. wt % | 0.075 Max |
| Iron(Fe), PPM by wt. | 10 Max |

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Redwood City, California 94063

# Sulfuric Acid
# Technical Grade

## SPECIFICATION SHEET

Issue Date: March 1, 2009 Replaces: All Previous

**Description:** Sulfuric Acid is a strong acidic, colorless, corrosive, oily liquid.

| Component | Basis | Specification |
|---|---|---|
| H2SO4 concentration | wt % | 93 min. |
| Iron (Fe) | ppm by wt. | 100.0 |
| SO2 | ppm by wt. | 50.0 |
| Color | APHA | 100 |

| Typical Properties: | | |
|---|---|---|
| | Freezing Point: | - 31 °F |
| | Specific Gravity @ 60 °F: | 1.8354 |
| | Weight Per Gallon: | 15.302 lbs. |
| | Molecular Weight: | 98.08 |

**DOT Hazard Class:** Corrosive Material

**CAS Number:** 7664-93-9

**Contact your Basic Chemical Solutions sales representative for more information at**

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