June 16, 2016

Ms. Bev McKeone
NSR Program Manager
Division of Air Quality – Permitting Section
West Virginia Department of Environmental Protection
601 57th Street, SE
Charleston, West Virginia 25304

Re: Class II Administrative Update
Fairmont Brine Processing
Permit R13-2794

Dear Ms. McKeone,

Enclosed for your review is West Virginia Department of Environmental Protection (WVDEP) NSR Application for a Class II Administrative Update for Fairmont Brine Processing, LLC's (FBP's) water treatment facility located at 168 AFR Drive, Fairmont, West Virginia 26554. This application is submitted in regard to Permit R13-2794.

The Class II Administrative Update is being submitted upon receipt of comments on the Request for Permit Determination, submitted on May 17, 2016 and after telephone conversations with Mr. Jerry Williams, P.E., WVDEP, who indicated that the Class II Administrative Update was the appropriate next regulatory step. This administrative update includes the following proposed changes:

- Increase Emissions E-3: FBP plans to replace an existing heat exchanger, which will allow for an increase in plant capacity. This change will increase Emissions E-3. Also, information on the air pollution control device for Source S-3 is provided to reflect installed equipment.
- Add Source S-6: FBP plans to expand their pretreatment operations to include chemical precipitation, clarification, and effluent and sludge processing. This includes the installation of a lime silo (new Emissions E-6).
- Add Source S-7: FBP plans to install a second natural gas fueled boiler (new Emissions E-7) to provide a redundant heat source for the evaporation process.

The increased potential to discharge above the existing limitations outlined in Section 4.0 of Permit R13-2794 is estimated to be 0.32 tons per year particulate matter (PM), 0.09 tons per year sulfur dioxide (SO_2), and 0.27 tons per year volatile organic compounds/hazardous air pollutants (VOCs/HAPs).

If you have any questions, or require additional information, please contact me at (412) 680-6244 or via email at bkalt@fairmontbrine.com.

Sincerely,
Fairmont Brine Processing, LLC

B. Kalt

Brian Kalt
President

APPLICATION FOR CLASS II ADMINISTRATIVE UPDATE

June 16, 2016

Submitted To:

West Virginia
Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, West Virginia 25304

By:

Fairmont Brine Processing, LLC
168 AFR Drive
Fairmont, West Virginia 26554

Fairmont Brine Processing

TABLE OF CONTENTS

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☒ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Fairmont Brine Processing, LLC

2. Federal Employer ID No. ***(FEIN):***
45-4924173

3. Name of facility *(if different from above):*

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
1501 Reedsdale Street, Suite 505
Pittsburgh, PA 15233

5B. Facility's present physical address:
168 AFR Drive
Fairmont, WV 26554

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☐ **YES** ☒ **NO**

- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: NA

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

- If **YES,** please explain: Owns proposed site

- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Water treatment facility for flowback and produced fluid from the drilling and hydraulic-fracturing process for oil and natural gas

10. North American Industry Classification System **(NAICS)** code for the facility:
213112

11A. DAQ Plant ID No. (for existing facilities only):
0 4 9 – 0 0 1 3 0

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-2794

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

From I-79, take exit 137. Merge onto WV-310 N toward Downtown/Fairmont. Stay straight to go onto Speedway Avenue/Old WV-73. Continue to follow Speedway Avenue. Turn left onto CR-7/22/Suncrest Boulevard. Turn slight left onto Montana Road/CR-7/24. Turn slight right onto CR-7/24. Turn slight right onto Hoult Road/Suncrest Boulevard. Turn left to stay on Hoult Road Suncrest Boulevard. Turn slight left onto AFR Drive.

12B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
NA	Fairmont	Marion
12E. UTM Northing (KM):	12F. UTM Easting (KM):	12G. UTM Zone:
4,373.5	575.2	17

13. Briefly describe the proposed change(s) at the facility:
    - Increase Emissions E-3: FBP plans to replace an existing heat exchanger, which will allow for an increase in plant capacity. This change will increase Emissions E-3. Also, information on the air pollution control device for Source S-3 is provided to reflect installed equipment.
    - Add Source S-6: FBP plans to expand their pretreatment operations to include chemical precipitation, clarification, and effluent and sludge processing. This includes the installation of a lime silo (new Emissions E-6).
    - Add Source S-7: FBP plans to install a second natural gas fueled boiler (new Emissions E-7) to provide a redundant heat source for the evaporation process.

14A. Provide the date of anticipated installation or change: 08/09/2016 – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: 09/07/2016

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day: 24 Days Per Week: 7 Weeks Per Year: 52

16. Is demolition or physical renovation at an existing facility involved? ☒ **YES** ☐ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☐ Storage Tanks
☐ Grey Iron and Steel Foundry	☒ Indirect Heat Exchanger	

☒ General Emission Unit, specify Source ID S-6 Lime Silo

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☒ Baghouse	☐ Flare
☒ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☐ Wet Collecting System

☐ Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE B: Kalt *(Please use blue ink)* DATE: 6/16/2016 *(Please use blue ink)*

35B. Printed name of signee: Brian Kalt		35C. Title: President
35D. E-mail: BKalt@fairmontbrine.com	36E. Phone: (412) 680-6244	36F. FAX: (412) 231-5891
36A. Printed name of contact person (if different from above):		36B. Title:
36C. E-mail:	36D. Phone:	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☐ **Attachment B: Map(s)**
- ☒ **Attachment C: Installation and Start Up Schedule**
- ☐ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☒ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☐ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☒ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☐ **Attachment Q: Business Confidential Claims**
- ☐ **Attachment R: Authority Forms**
- ☐ **Attachment S: Title V Permit Revision Information**
- ☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ *Forward 1 copy of the application to the Title V Permitting Group and:*
- ☐ *For Title V Administrative Amendments:*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit,*
- ☐ *For Title V Minor Modifications:*
  - ☐ *Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,*
  - ☐ *NSR permit writer should notify Title V permit writer of draft permit.*
- ☐ *For Title V Significant Modifications processed in parallel with NSR Permit revision:*
  - ☐ *NSR permit writer should notify a Title V permit writer of draft permit,*
  - ☐ *Public notice should reference both 45CSR13 and Title V permits,*
  - ☐ *EPA has 45 day review period of a draft permit.*

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

Fairmont Brine Processing

ATTACHMENT A

BUSINESS CERTIFICATE

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED ARE TRUE AND CORRECT COPIES OF ALL DOCUMENTS ON FILE OF "FAIRMONT BRINE PROCESSING, LLC" AS RECEIVED AND FILED IN THIS OFFICE.

THE FOLLOWING DOCUMENTS HAVE BEEN CERTIFIED:

CERTIFICATE OF FORMATION, FILED THE TWENTY-EIGHTH DAY OF MARCH, A.D. 2012, AT 2:14 O`CLOCK P.M.

AND I DO HEREBY FURTHER CERTIFY THAT THE AFORESAID CERTIFICATES ARE THE ONLY CERTIFICATES ON RECORD OF THE AFORESAID LIMITED LIABILITY COMPANY, "FAIRMONT BRINE PROCESSING, LLC".

5131386 8100H
SR# 20151560342

Authentication: 10696634
Date: 12-29-15

You may verify this certificate online at corp.delaware.gov/authver.shtml

State of Delaware
Secretary of State
Division of Corporations
Delivered 02:16 PM 03/28/2012
FILED 02:14 PM 03/28/2012
SRV 120365600 - 5131386 FILE

STATE *of* DELAWARE
LIMITED LIABILITY COMPANY
CERTIFICATE *of* FORMATION

First: The name of the limited liability company is Fairmont Brine Processing, LLC

Second: The address of its registered office in the State of Delaware is 2711 Centerville Road, Suite 400 in the City of Wilmington. Zip code 19808. The name of its Registered agent at such address is Corporation Service Company

Third: (Use this paragraph only if the company is to have a specific effective date of dissolution: "The latest date on which the limited liability company is to dissolve is _____.")

Fourth: (Insert any other matters the members determine to include herein.)

In Witness Whereof, the undersigned have executed this Certificate of Formation this 28th day of March, 2012.

By: David Moniot
Authorized Person (s)

Name: David Moniot

Fairmont Brine Processing

ATTACHMENT C

INSTALLATION AND START UP SCHEDULE

Proposed Change #1: Source E-3

Fairmont Brine Processing (FBP) plans to replace an existing heat exchanger, which will allow for an increase in plant capacity. This change will increase Emissions E-3.

- The installation of equipment is expected to begin on or about August 24, 2016.
- Startup and commissioning is expected to begin on or about September 7, 2016.

Proposed Change #2: Source E-6

FBP plans to expand their pretreatment operations to include chemical precipitation, clarification, and effluent and sludge processing. This includes the installation of a lime silo (new Emissions E-6).

- The installation of equipment is expected to begin on or about August 9, 2016.
- Startup and commissioning is expected to begin on or about September 16, 2016.

Proposed Change #3: Source E-7

FBP plans to install a second natural gas fueled boiler (new Emissions E-7) to provide a redundant heat source for the evaporation process.

- The installation of equipment is expected to begin on or about August 12, 2016.
- Startup and commissioning is expected to begin on or about September 9, 2016.

Fairmont Brine Processing

ATTACHMENT E

PLOT PLAN

ATTACHMENT E

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C15-1205-00 Pittsburgh, PA

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

PLOT PLAN

DRAWING NUMBER ATTACHMENT E

REV. A

VENTURE

NO.	REVISION	DWN	CHK	ENG	PM	DATE
A	FOR AIR PERMIT APPLICATION					

DESIGNED/DWN BY	PC	DATE 06/01/16
CHECKED BY		DATE
CHECKED BY ENGR	LK	DATE 06/03/16
APPROVED BY PM	PEV	DATE 06/06/16
APPROVED BY MANAGER OF ENGR	–	DATE –
SCALE	AS NOTED	

Fairmont Brine Processing

ATTACHMENT F

DETAILED PROCESS FLOW DIAGRAMS

PID-1□□1

K5 | PFD-1003
FROM 02-P-016/017
CLEAN WATER TRANSFER PUMP

01-TK-005
OIL SKIMMER STORAGE TANK

01-P-015
OIL SKIMMER STORAGE TANK PUMP

01-A-001
FLAT BLADE PADDLE AGITATOR

01-TK-003
CLEAN WATER TANK

01-P-016
WATER BOOSTER PUMP

TRUCK LOADING

01-TK-009
OIL STORAGE TANK

TRUCK LOADING

01-P-010
OIL WATER SEPARATOR OIL PUMP

K2 | PFD-1001A
FROM 01-F-002A/B
PRETREAT POD FILTERS

TRUCK LOADOUT STATIONS

01-P-001/008
TRUCK UNLOADING PUMPS (PAD 1-8)

01-TK-004
BRINE BASIN

01-P-009
BRINE BASIN PUMP

01-TK-006
OIL WATER SEPARATOR

01-TK-007
SUMP

01-P-014
PRETREATMENT FEED PUMP

101

B

116

117

01-MX-001
POLYMER DILUTION MIXER

01-P-020
NEAT POLYMER PUMP

NEAT POLYMER DRUM

K4 | PFD-1001A
FROM 01-P-011 PRETREATMENT
CARBON FILTER BACKWASH PUMP

K3 | PFD-1001A
FROM 01-TH-001 OVERFLOW
AND 01-FP-001 FILTRATE

LIME STORAGE SYSTEM

01-TK-015
LIME SILO

01-FDR-015
LIME FEEDER

01-F-015
LIME SILO DUST COLLECTOR

01-BL-015
F-015 EXHAUST BLOWER

01-H-002
LIME SCREW CONVEYOR HOPPER

01-SC-002
LIME SCREW CONVEYOR

01-A-021
TK-021 AGITATOR

118A

111A

A2 | PFD-1001A
TO EFFLUENT TANK
01-TK-019

01-CL-001
CLARIFIER

105A

A5 | PFD-1001A
TO THICKENER
01-TH-001

01-TK-021
FLOC TANK

01-A-022
TK-022 AGITATOR

01-AOD-001
CLARIFIER SLUDGE PUMP

118B

SODIUM SULFATE BAGS

01-H-001
SODIUM SULFATE SCREW CONVEYOR HOPPER

01-SC-001
SODIUM SULFATE SCREW CONVEYOR

108

01-A-011
TK-011 AGITATOR

01-A-012
TK-012 AGITATOR

102

115

A

01-A-017
TK-017 AGITATOR

01-TK-017
LIME SLURRY TANK

109

01-A-013
TK-013 AGITATOR

103A

103B

111B

A2 | PFD-1001A
TO EFFLUENT TANK
01-TK-019

01-CL-002
CLARIFIER

105B

A5 | PFD-1001A
TO THICKENER
01-TH-001

01-TK-022
FLOC TANK

01-AOD-002
CLARIFIER SLUDGE PUMP

110

01-TK-011
SODIUM SULFATE ADDITION TANK

01-TK-012
MIX TANK

01-P-013
PRE-DOSING PUMP

01-TK-013
LIME ADDITION TANK

Fairmont Brine Processing

RELEASED FOR BID

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN	CHK	ENG	PM	DATE
C	RELEASED FOR BID	JSH		LK	PEV	
B	REVISED FOR PRETREAT EXPANSION	JSH		RA	PEV	4/11/16
A	FOR REVIEW & COMMENT	PC		LK	PEV	

DESIGNED/DWN BY PC DATE 10/16/15
CHECKED BY – DATE –
CHECKED BY ENGR – DATE –
APPROVED BY PM – DATE –
APPROVED BY MANAGER OF ENGR – DATE –
SCALE NONE

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING
PRE-TREATMENT FLOW DIAGRAM

DRAWING NUMBER PID-1□□1

REV. C

PD-1□□1A

K4 | PFD-1001
FROM 01-CL-001
CLARIFIER

111A

K5 | PFD-1001
FROM 01-CL-002
CLARIFIER

111B

01-TK-019
EFFLUENT TANK

01-P-012
PRETREATMENT FILTERING
SYSTEM PUMP

104

01-F-002A
PRETREATMENT POD FILTER

01-F-002B
PRETREATMENT POD FILTER

BACK FLUSH OUT (INTERMITTENT)

A2 | PFD-1001
TO 01-TK-004
BRINE BASIN

01-F-003
PRETREATMENT
CARBON FILTER

01-F-004
PRETREATMENT
CARBON FILTER

02-S-001
TOWER PAD SUMP

02-P-004
TOWER PAD SUMP PUMP

114

A4 | PFD-1001
TO 01-CL-001/002
FLOC CHAMBERS

BACK FLUSH IN (INTERMITTENT)

K3 | PFD-1003
FROM 02-P-017
RECYCLE BRINE PUMP

112

113

01-TK-014
BRINE
POND IMPOUNDMENT

01-P-011
PRETREATMENT CARBON
FILTER BACK WASH PUMP

TO TRUCK STATIONS (1-3-5)

A3 | PFD-1001
TO TRUCK LOADOUT

K4 | PFD-1001
FROM 01-AOD-001
CLARIFIER SLUDGE PUMP

105A

K5 | PFD-1001
FROM 01-AOD-002
CLARIFIER SLUDGE PUMP

105B

01-TH-001
THICKENER

01-FP-001
FILTER PRESS

02-P-005
BRINE WATER
FEED PUMP

1

02-F-001/002
BRINE WATER
FEED FILTERS

A3 | PFD-1002
TO 02-PH-001
BRINE FEED PREHEATER

106

SLUDGE

107

01-AOD-003A/B
THICKENER
SLUDGE PUMP

ROLL OFF BOX

RELEASED FOR BID

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN	CHK	ENG	PM	DATE
C	RELEASED FOR BID	JSH		LK	PEV	
B	REVISED FOR PRETREATMENT EXPANSION	JSH		RA	PEV	4/11/16
A	FOR REVIEW & COMMENT	PC		LK	PEV	

DESIGNED/DWN BY	PC	DATE	10/16/15
CHECKED BY	–	DATE	–
CHECKED BY ENGR	LK	DATE	–
APPROVED BY PM	–	DATE	–
APPROVED BY MANAGER OF ENGR	–	DATE	–
SCALE	NONE		

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSEING
FLOW DIAGRAM

DRAWING NUMBER PD-1□□1A

REV. C

PID-1001M

Fairmont Brine Processing PFD-1001/1A Mass Balance	
Project No.:	C15-1205-04
Project Name:	FBP - D&I - Pretreatment Expansion
Rev.:	C
Rev. Date:	5/25/2016

Stream No.	1	101	102	103A/B	104	105A/B (BATCH)	106 (BATCH)	107 (BATCH)	108	109	110	111A/B	112	113	114	115	116	117	118A/B
ChemCAD Ref.	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stream Name	Feed to 02-PH-001	Pretreatment Feed	Dry Hydrated Lime	Feed to Clarifier	Treated Brine	Clarifier Sludge	Thickner Sludge	Pressed Sludge	Dry Sodium Sulfate	Lime Slurry	Reactor Tank Pre-Dosing	Clarifier Effluent	Thickener Overflow	Filter Press Filtrate	Overflow & Filtrate Return	CW to Lime Slurry	CW to Polymer Dilution	Neat Polymer	Diluted Polymer to CL
Temp F	50.82	50	50	50	50	50	50	50	50	55	55	55	55	55	55	55	55	55	55
Pres psia	185.00	45	15	15	56	35	45	15	15	15	27	15	15	30	15	50	50	-	25
Enth MMBtu/hr	-552.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vapor mole frac.	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH value	7.03	4.5-6.5	N/A	11	11	11	11	11	4.5-6.5	12	11	11	11	11	11	7	7	-	-
Ionic str. Molal	4.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total lbmol/hr	4582.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total lb/hr	89275.00	234,683	1,800	122,118	240,192	3,037	6,074	3,037	552	9,000	86,371	119,081	0	3,037	3,037	7,200	477	1.11E-04	477
Total std L gpm	156.75	400	N/A	200	400	4.60	9.19	3.68	-	15	150	195	0	5	5	14	1	0	15
Total std V scfh	1739031.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liquid Flow in lb/hr																			
Water	73475.81	199,680	0	103,440	203,251	1,814	3,629	1,037	0	7,200	77,580	101,626	0	2,592	2,592	7,200	477	0	477
OH-	0.00	-	0	64	126	1	2.25	0.64	0	826	48	63	0.00	1.61	2	0	0	0	0
Cl-	9748.20	20,092	0	10,046	19,740	176	352	101	0	0	7,535	9,870	0	252	252	0	0	0	0
Ca++	1836.74	3,405	0	2,189	4,302	38	77	22	0	974	1,642	2,151	0	55	55	0	0	0	0
SO4--	-	0	0	43	84	1	1	0	0	0	32	42	0	1	1	0	0	0	0
Na+	4214.24	10,014	0	5,096	10,014	89	179	51	0	0	3,822	5,007	0	128	128	0	0	0	0
Sr++	-	802	0	321	630	6	11	3	0	0	241	315	0	8	8	0	0	0	0
Ba++	-	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg++	-	500	0	8	15	0	0	0	0	0	6	7	0	0	0	0	0	0	0
Fe++	-	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total lb/hr	89275.00	**234,683**	**0**	**121,207**	**238,162**	**2,126**	**4,252**	**1,215**	**0**	**9,000**	**90,905**	**119,081**	**0**	**3,037**	**3,037**	**7,200**	**477**	**0**	**477**
Solids Flow in lb/hr																			
Na2SO4	-	0	0	0	0	0	0	0	552	0	0	0	0	0	0	0	0	0	0
BaSO4	-	0	0	136	0	136	272	272	0	0	51	0	0	0	0	0	0	0	0
SrSO4	-	0	0	168	0	168	336	336	0	0	63	0	0	0	0	0	0	0	0
Ca(OH)2	-	0	1,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg(OH)2	-	0	0	583	0	583	1,166	1,166	0	0	219	0	0	0	0	0	0	0	0
Fe(OH)2	-	0	0	24	0	24	48	48	0	0	9	0	0	0	0	0	0	0	0
Total lb/hr	**-**	**0**	**1,800**	**911**	**0**	**911**	**1,822**	**1,822**	**552**	**0**	**342**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Assumptions:

Basis for all elemental values come from the analytical results from treatability report unless otherwise noted.
Raw Brine flow: 400 gpm
Ca: 17,000ppm
Cl: 100,000ppm
Na: 50,000ppm
Sr: 4,000ppm (assumed 20% removal as SrSO4)
Ba: 800ppm (assumed 100% removal as BaSO4)
Mg: 2,500ppm (assumed 97% removal as Mg(OH)2 - based on removal efficiency required to meet ASTM specification for CaCl2 product)
Fe: 150ppm (assumed 100% removal as Fe(OH)2)
OH: Based only on the addition of lime.
Hydrated Lime: 30lb/min (dosing reccomendation from treatability study)
Sodium Sulfate: 9.2lb/min (dosing reccomendation from treatability study)
Stream 105 is based on 30% solids sludge (estimate) and is a batch process.
Stream 106 is based on 30% solids sludge (estimate) and is a batch process.
Stream 107 is based on 60% solids sludge (from Evoqua filter press report) and is a batch process.
Constituents not listed are trace elements that do not make a significant impact on mass flow calculations.
100% efficiency of the sulfate and hydroxide precipitation.

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN	CHK	ENG	PM	DATE
C	RELEASED FOR BID	JSH	LK	PEV		
B	REVISED FOR PRETREAT EXPANSION	JSH	RA	PEV		4/11/16
A	FOR REVIEW & COMMENT	PC	LK	PEV		

DESIGNED/DWN BY LK/PC DATE 10/23/15
CHECKED BY – DATE –
CHECKED BY ENGR – DATE –
APPROVED BY PM – DATE –
APPROVED BY MANAGER OF ENGR – DATE –
SCALE NONE

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING
PRE-TREATMENT MASS BALANCE

DRAWING NUMBER PID-1001M REV. C

PFD-1002

K5 | PFD-1004 FROM BOILER HEADER — (60) → (H) STEAM EJECTOR

K2 | PFD-1004 FROM BOILER FEED PUMPS — (189)

K3 | PFD-1004 FROM BOILER HEADER — (180)

02-TC-001 THERMOCOMPRESSOR — (35), (42), (39)

02-DE-001 1ST EFFECT DEMISTER

02-VLS-001 1ST EFFECT VLS

HOTWELL (D)

HOTWELL (E)

02-PH-001 BRINE FEED PREHEATER — (1)

02-PH-002 BRINE FEED PREHEATER — (2)

02-PH-003 BRINE FEED PREHEATER — (3)

02-HX-001 1ST EFFECT HEAT EXCHANGER — (40), (11)

K5 | PFD-1001 FROM BRINE WATER FEED PUMP

K4 | PFD-1004 FROM BOILER HEADER — (192)

(41) → (N) CONDENSATE TANK

(4), (5), (8), (14)

02-P-001 1ST EFFECT VLS PUMP

02-P-006 1ST EFFECT TRANSFER PUMP

(17), (12)

02-VLS-002 2ND EFFECT VLS

RECYCLE BRINE (B) — (36)

02-DE-002 2ND EFFECT DEMISTER — (47)

02-BC-001 2ND EFFECT BAROMETRIC CONDENSER — (J) COOLING WATER (56)

(F) HOTWELL

(44)

(19)

A2 | PFD-1003 TO SETTLER TANK

A4 | PFD-1003 TO 3RD EFFECT VACUUM PUMP

(41) → (N) A4 | PFD-1004 TO CONDENSATE TANK

K3 | PFD-1003 FROM RECYCLE BRINE PUMP — (36) → (B)

K3 | PFD-1003 FROM RECYCLE BRINE PUMP — (37) → (C)

K4 | PFD-1003 FROM COOLING WATER SUPPLY PUMP — (56) → (J)

K4 | PFD-1003 FROM COOLING WATER SUPPLY PUMP — (57) → (K)

K4 | PFD-1003 FROM COOLING WATER SUPPLY PUMP — (58) → (M)

02-TR-001 A/B 2ND EFFECT HX CONDENSATE PUMP TRAPS — (43)

02-HX-002 2ND EFFECT HEAT EXCHANGER — (9)

(15), (6)

02-P-002 2ND EFFECT VLS PUMP

02-P-010 2ND EFFECT TRANSFER PUMP

02-HX-003 3RD EFFECT HEAT EXCHANGER — (18)

(13)

02-DE-003 3RD EFFECT DEMISTER — (48)

02-VLS-003 3RD EFFECT VLS

RECYCLE BRINE (C) — (10), (37)

02-P-003 3RD EFFECT VLS PUMP

02-P-008 3RD EFFECT TRANSFER PUMP

(K) COOLING WATER (57) → 02-BC-002 3RD EFFECT BAROMETRIC CONDENSER A → (G) HOTWELL

(H) BOILER STEAM (60) → 02-SE-001 STEAM EJECTOR

(49) → 02-BC-003 3RD EFFECT BAROMETRIC CONDENSER B — (M) COOLING WATER (58) — (50) → A4 | PFD-1003 TO 3RD EFFECT VACUUM PUMP

(D), (E), (F), (G) → 02-S-002 HOTWELL — (53) → A5 | PFD-1003 TO CLEAN WATER POND

02-TR-002 A/B 3RD EFFECT HX CONDENSATE PUMP TRAPS — (45)

K4 | PFD-1003 FROM 3RD EFFECT VACUUM PUMP SEPARATOR — (62)

K5 | PFD-1004 FROM CONDENSATE TANK — (193)

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN	CHK	ENG	PM	DATE
C	REVISED FOR C15120500 PROJECTS	JSH		LK	PEV	04/11/16
B	REVISED FOR C15120500 PROJECTS	JSH		LK		03/10/16
A	FOR REVIEW & COMMENT	RC	RK	KZ	PEV	08/14/14

DESIGNED/DWN BY	RC	DATE	08/14/14
CHECKED BY	RK	DATE	08/14/14
CHECKED BY ENGR	RK	DATE	08/14/14
APPROVED BY PM	PEV	DATE	08/14/14
APPROVED BY MANAGER OF ENGR	KZ	DATE	08/14/14
SCALE	–		

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING FLOW DIAGRAM

DRAWING NUMBER PFD-1002 REV. C

PD-1002M

Fairmont Brine Processing PFD-1002 Mass Balance

Project No.:	C15-1205-00
Project Name:	FBP - Debottlenecking and Improvements
Rev.:	D
Rev. Date:	4/11/2016

Stream No.	1	2	3	4	5	6	8	9	10	11	12	13	14	15	17	18	19	35	36	37	39
ChemCad Ref. No.	54	55	56	2	100	200	5	15-27	20-40	9	11	24	1-27	12-40	27	40	36	39	49	50	59
Stream Name	Feed to 02-PH-001	Feed to 02-PH-002	Feed to 02-PH-003	Discharge from 02-PH-003	02-PH-003 to 02-HX-001	02-PH-003 to 02-HX-002	Feed to 02-HX-001	Feed to 02-HX-002	Feed to 02-HX-003/02-VLS-003 Recirc.	Feed to 02-VLS-001	Feed to 02-VLS-002	Feed to 02-VLS-003	02-VLS-001 Recirc.	02-VLS-002 Recirc.	02-VLS-001 Transfer	02-VLS-002 Transfer	02-VLS-003 Transfer/Feed to 02-TK-015	02-DE-001 to 02-TC-001	Recycle to 02-VLS-002	Recycle to 02-VLS-003	02-TC-001 to 02-HX-001
Temp F	50.82	93.08	114.94	142.34	142.34	142.34	228.20	174.99	149.29	234.31	186.21	161.41	231.07	173.61	231.44	175.26	149.29	231.07	120.16	120.16	280.99
Pres psia	185.00	175.00	155.00	125.00	125.00	125.00	96.20	55.00	65.00	17.20	10.00	25.00	16.20	4.50	96.20	70.00	65.00	16.20	45.00	45.00	50.00
Enth MMBtu/hr	-552.69	-549.45	-547.78	-545.68	-442.26	-103.43	-12280.00	-12599.00	-10164.00	-12250.00	-12581.00	-10150.00	-12099.00	-12491.00	-260.11	-255.01	-289.57	-46.91	-26.86	-135.34	-178.51
Vapor mole frac.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
pH value	7.03	6.62	6.43	6.20	6.20	6.20	5.71	6.47	7.13	5.69	6.39	7.04	5.70	6.49	5.70	6.47	7.13	0.00	7.35	7.35	8.50
Ionic str. Molal	4.37	4.37	4.37	4.37	4.37	4.37	6.76	9.20	18.46	6.71	9.22	18.47	6.79	9.32	6.79	9.24	18.46	0.00	18.49	18.49	0.00
Total lbmol/hr	4582.69	4582.69	4582.69	4582.69	3714.09	868.59	104225.15	99427.71	78685.02	104150.35	101674.66	80754.73	100410.79	98584.30	2206.33	2056.36	2300.25	456.79	219.77	1107.38	1742.16
Total lb/hr	89275.00	89275.00	89275.00	89275.00	72354.00	16921.00	2162493.25	2326221.18	2008838.55	2162493.25	2372146.50	2056904.38	2090124.68	2309294.42	45925.07	48065.83	58599.45	8229.00	5000.00	25193.83	31385.00
Total std L gpm	156.75	156.75	156.75	156.75	127.04	29.71	3547.38	3509.02	2698.90	3548.23	3583.72	2771.33	3421.54	3479.02	75.18	72.54	78.96	16.46	7.09	35.72	62.76
Total std V scfh	1739031.38	1739031.38	1739031.38	1739031.38	1409419.00	329612.50	39551216.00			39522832.00	38583360.00	30644692.00			837256.19	780343.50	872897.00	173340.52	83399.02	420228.16	661112.25
Flow rates in lb/hr																					
Water	73475.81	73475.81	73475.81	73475.81	59549.36	13926.46	1561899.00	1399941.96	976148.30	1561899.00	1432951.88	1005108.00	1502334.96	1386010.80	33009.92	28959.70	28634.67	8229.00	2962.54	14927.57	31385.00
Sodium Chloride	0.00	0.00	0.00	0.00	0.00	0.00	95711.14	409455.68	352530.01	100082.00	409309.00	360156.09	101523.74	407966.60	2226.85	8406.40	10282.77	0.00	0.00	0.00	0.00
Calcium Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxygen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OH-	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.05	0.01	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl-	9748.20	9748.20	9748.20	9748.20	7900.54	1847.65	312509.41	326652.14	433618.14	309858.00	334710.06	440852.28	301082.80	325707.14	6617.86	6760.86	12546.02	0.00	1298.90	6544.84	0.00
Ca++	1836.74	1836.74	1836.74	1836.74	1488.61	348.13	69818.00	149552.11	241924.51	69818.00	151053.47	245000.13	68329.34	149203.46	1501.36	3075.62	6979.85	0.00	724.56	3650.90	0.00
Na+	4214.24	4214.24	4214.24	4214.24	3415.48	798.76	122555.72	40619.54	4617.66	120836.35	44122.45	5787.85	116853.70	40406.76	2569.08	863.24	156.15	0.00	14.00	70.52	0.00

Stream No.	40	41	42	43	44	45	47	48	49	50	53	56	57	58	60	62	180	189	192	193	
ChemCad Ref. No.	8	51	28	23	25	26	32	47	77	83	-	41	53	78	75	86	43	-	-	-	
Stream Name	02-HX-001 to 02-PH-003 (Shell)	Condensate Return (from 02-PH-003)	02-DE-001 to 02-HX-002	02-HX-002 to 02-TR-001A/B	02-DE-002 to 02-HX-003	02-HX-003 to 02-TR-002A/B	02-DE-002 to 02-BC-001	02-DE-003 to 02-BC-002	02-SE-001 to 02-BC-003	02-BC-003 to 02-VP-001	Hotwell Discharge	02-P-012 to 02-BC-001	02-P-012 to 02-BC-002	02-P-012 to 02-BC-003	Boiler steam to 02-SE-001	02-V-001 to Hotwell	Boiler steam to 02-TC-001	Boiler feed water to 02-TC-001	Boiler steam to condensate pump traps	Condensate Tank to Hotwell	
Temp F	243.08	176.79	231.07	188.25	173.61	155.59	173.61	147.89	206.16	122.17	92.00	90.00	90.00	90.00	414.17	90.93	414.17	235.00	414.20		
Pres psia	48.00	47.50	16.20	15.70	4.50	4.27	4.50	1.50	14.70	14.70	14.70	73.60	73.60	73.60	289.70	16.70	289.70	315.00	289.70		
Enth MMBtu/hr	-208.86	-210.96	-103.15	-121.31	-91.19	-105.79	-25.72	-86.68	-2.18	-0.04		-5957.90	-5957.90	-85.11	-1.08	-37.48	-128.24	0.20			
Vapor mole frac.	0.00	0.00	1.00	0.00	1.00	0.10	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00		
pH value	6.00	6.30	0.00	6.24	0.00	6.46	0.00	0.00	9.41	0.00		6.88	6.88	6.88	5.60	6.88	5.60				
Ionic str. Molal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Total lbmol/hr	1742.16	1742.16	1004.39	1003.55	884.21	884.21	249.39	838.72	23.82	2.97		48575.25	48575.25	693.93	10.55	305.58	1257.56				
Total lb/hr	31385.00	31385.00	18094.01	18078.94	15929.08	15929.08	4492.82	15109.52	457.29	81.66	1828778.91	875083.00	875083.00	12501.19	190.00	5505.07	22655.00	501.00	78.00	6711.00	
Total std L gpm	62.76	62.76	36.18	36.15	31.86	31.86	8.98	30.22	1.22	0.46		1750.00	1750.00	25.00	0.38	11.01	45.31	1.00		13.40	
Total std V scfh	661112.25	661112.25	381143.00	380825.41	335539.63	335539.63	94639.38	318275.84	9038.86	1127.66		18433268.00	18433268.00	263332.41	4002.27	115961.26	477218.38				
Flow rates in lb/hr																					
Water	31385.00	31385.00	18094.01	18078.94	15929.08	15929.08	4492.82	15109.52	382.02	6.55	1828755.64	875083.00	875083.00	12501.19	190.00	5504.96	22655.00	501.00	78.00	6711.00	
Sodium Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Calcium Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Oxygen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.52	16.46	5.14	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00		
Nitrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.75	58.64	17.87	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00		
H+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
OH-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Cl-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Ca++	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Na+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Notes:

Based on ChemCAD simulation entitled FBP - C15120500 - 160411.cc6

ChemCAD simulation does not model slurry transfer as shown on PFD-1002. (Slurry transfer ties into VLS pump suctions in model. PFD-1002 reflects proposed process flow with slurry transfer piped to HX outlets.

Flow rates were extrapolated from ChemCAD results to reflect proposed process.

PFD Stream 9 is ChemCAD Stream 15 (feed to HX-2) minus ChemCAD Stream 27 (slurry transfer from VLS-1).

PFD Stream 10 is ChemCAD Stream 20 (feed to HX-3) minus ChemCAD Stream 40 (slurry transfer from VLS-2).

PFD Stream 14 is ChemCAD Stream 1 (VLS-1 bottoms) minus ChemCAD Stream 27 (slurry transfer to VLS-2).

PFD Stream 15 is ChemCAD Stream 12 (VLS-2 bottoms) minus ChemCAD Stream 40 (slurry transfer to VLS-3).

PFD Stream 53 is the summation of ChemCAD Streams 29 (PH-1 to HW), 18 (PH-2 to HW), 45 (BC-1 to HW), 80 (BC-2 to HW), 81 (BC-3 to HW), and 86 (V-1 to HW) plus PFD Streams 192 (Boiler steam to Condensate Pump Traps) and 193 (Condensate Tank to HW).

Flow rates within +/-0.1% accuracy based on allowable tolerances in ChemCAD simulation.

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE

NO.	REVISION	DWN / CHK	ENG / PM	DATE
D	REVISED FOR C15120500 PROJECTS	JSH	LK / PEV	04/11/16
C	FOR REVIEW & COMMENT	JSH	LK / PEV	03/14/16

DESIGNED/DWN BY LK/JSH DATE 03/14/16
CHECKED BY – DATE –
CHECKED BY ENGR – DATE –
APPROVED BY PM – DATE –
APPROVED BY MANAGER OF ENGR – DATE –
SCALE NONE

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING MASS BALANCE

DRAWING NUMBER PD-1002M REV. D

PFD-1003

K2 | PFD-1002
FROM 3RD EFFECT VLS

(19)

(21)

02-TK-015
SETTLER TANK

(20)

02-P-019
CENTRIFUGE FEED PUMP

(30)

02-CF-001
CENTRIFUGE

(31)

DRYER AND CONVEYOR SYSTEM

02-CV-001/2
ROTARY DRYER CONVEYERS

02-SP-001
CYCLONE SEPARATOR

02-RD-001
ROTARY DRYER

02-FDR-001
DUST COLLECTOR FEEDER

02-BL-001
BURNER BLOWER

02-BL-003
EXHAUST BLOWER

02-BL-002
AUX. BLOWER

TO NACL STORAGE BUILDING

VTA

02-AC-001
3RD EFFECT ACTVATED CARBON BED

(46)

02-TK-016
RECYCLE BRINE TANK

(32)

02-TK-019
CENTRIFUGE DISCHARGE TANK

(63)

02-P-007
CENTRATE PUMP

TO FRAC TANKS

(36)

(37)

A4 | PFD-1002
TO 2ND EFFECT VLS

A4 | PFD-1002
TO 3RD EFFECT VLS

(33)

(34)

02-P-017
RECYCLE BRINE PUMP

A4 | PFD-1001A
TO BRINE POND IMPOUNDMENT OR FRAC TANKS

SEAL WATER

(61)

(52)

(51)

02-V-001
3RD EFFECT VACUUM PUMP SEPARATOR

(62)

A6 | PFD-1002
TO HOTWELL

K4 | PFD-1002
FROM 3RD EFFECT BAROMETRIC CONDENSER B

(50)

02-VP-001
3RD EFFECT VACUUM PUMP

(56)

A5 | PID-1002
TO 2ND EFFECT BAROMETRIC CONDENSER

(57)

A5 | PID-1002
TO 3RD EFFECT BAROMETRIC CONDENSER A

(58)

A5 | PID-1002
TO 3RD EFFECT BAROMETRIC CONDENSER B

K3 | PFD-1002
FROM 2ND EFFECT BAROMETRIC CONDENSER

TO FLUSH WATER HEADER

02-P-013
SEAL WATER PUMP

02-P-009
CLEAN WATER BOOSTER PUMP

CITY WATER

02-CWP-001
CLEAN WATER POND

02-P-012
COOLING WATER SUPPLY PUMP

TO SEAL WATER HEADER

(53)

K5 | PFD-1002
FROM HOTWELL

A1 | PFD-1001
TO CLEAN WATER TANK

02-P-016/17
CLEAN WATER TRANSFER PUMP

OUTFALL

02-AR-001/002
AMMONIA REMOVAL VESSELS

02-F-003
CLEAN WATER DISCHARGE CARBON FILTER

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING
FLOW DIAGRAM

DRAWING NUMBER PFD-1003

REV. C

VENTURE™

NO.	REVISION	DWN / CHK	ENG / PM	DATE
C	REVISED FOR C15120500 PROJECTS	JSH	LK / PEV	04/11/16
B	REVISED FOR C15120500 PROJECTS	JSH	LK	03/10/16
A	FOR REVIEW & COMMENT	RC	RK / KZ / PEV	08/14/14

DESIGNED/DWN BY	RC	DATE	08/14/14
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CHECKED BY ENGR	RK	DATE	08/14/14
APPROVED BY PM	PEV	DATE	08/14/14
APPROVED BY MANAGER OF ENGR	KZ	DATE	08/14/14
SCALE	-		

PFD-1003M

Fairmont Brine Processing PFD-1003 Mass Balance

Project No.:	C15-1205-00
Project Name:	FBP - Debottlenecking and Improvements
Rev.:	D
Rev. Date:	4/11/2016

Stream No.	**19**	**20**	**21**	**30**	**31**	**32**	**33**	**34**	**36**	**37**	**46**	**50**	**51**	**52**	**53**	**56**	**57**	**58**	**61**	**62**	**63**
ChemCad Ref. No.	36	64	66	67	72	70	71	16	49	50	68	83	85	87	-	41	53	78	82	86	74
Stream Name	02-VLS-003 Transfer/Feed to 02-TK-015	02-TK-015 Discharge/Feed to 02-P-019	Recirculation to 02-TK-015	Feed to 02-CF-001	Feed to 02-RD-001	02-TK-016 Discharge/ Overflow to 02-TK-019	02-TK-016 Discharge/Feed to 02-P-017	02-P-017 Discharge	Recycle to 02-VLS-002	Recycle to 02-VLS-003	02-CF-001 to 02-TK-016	02-BC-003 to 02-VP-001	02-VP-001 to 02-V-001	02-V-001 to 02-AC-001	Hotwell Discharge	02-P-012 to 02-BC-001	02-P-012 to 02-BC-002	02-P-012 to 02-BC-003	Seal Water to 02-VP-001	02-V-001 to Hotwell	To Frac Tanks or Brine Impoundment
Temp F	149.29	120.00	120.03	120.03	120.03	120.03	120.03	120.16	120.16	120.16	120.03	122.17	90.18	90.93	92.00	90.00	90.00	90.00	90.00	90.93	120.17
Pres psia	65.00	14.70	25.00	25.00	25.00	14.70	14.70	45.00	45.00	45.00	25.00	14.70	16.70	16.70	14.70	73.60	73.60	73.60	15.00	16.70	45.00
Enth MMBtu/hr	-289.57	-1150.00	-859.49	-290.49	-45.01	-83.28	-162.20	-162.20	-26.86	-135.34	-245.48	-0.04	-37.49	-0.01		-5957.90	-5957.90	-85.11	-37.45	-37.48	-83.27
Vapor mole frac.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pH value	7.13	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	0.00	6.88	0.00		6.88	6.88	6.88	6.88	6.88	7.35
Ionic str. Molal	18.46	18.48	18.48	18.48	18.48	18.48	18.48	18.48	18.49	18.49	18.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.48
Total lbmol/hr	2300.25	9100.27	6801.50	2298.78	290.18	681.38	1327.21	1327.21	219.77	1107.38	2008.59	2.97	308.30	2.72		48575.25	48575.25	693.93	305.33	305.58	681.38
Total lb/hr	58599.45	231980.52	173381.08	58599.46	12908.12	15500.00	30191.34	30191.34	5000.00	25193.83	45691.34	81.66	5582.18	77.11	1828778.91	875083.00	875083.00	12501.19	5500.52	5505.07	15500.00
Total std L gpm	78.96	312.46	233.53	78.93	14.20	21.98	42.82	42.82	7.09	35.72	64.80	0.46	11.46	0.45		1750.00	1750.00	25.00	11.00	11.01	21.98
Total std V scfh	872897.00	3453357.50	2581022.75	872336.00	110117.79	258569.41	503648.75	503648.75	83399.02	420228.16	762218.19	1127.66	116993.91	1032.66		18433268.00	18433268.00	263332.41	115866.26	115961.26	258569.41
Flow rates in lb/hr																					
Water	28634.67	113264.80	84653.54	28611.27	1530.12	9186.81	17894.33	17894.33	2962.54	14927.57	27081.14	6.55	5507.08	2.11	1828755.64	875083.00	875083.00	12501.19	5500.52	5504.96	9186.81
Sodium Chloride	10282.77	40880.23	30553.51	10326.50	10326.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calcium Chloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxygen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.46	16.46	16.42	5.14	0.00	0.00	0.00	0.00	0.04	0.00
Nitrogen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.64	58.64	58.57	17.87	0.00	0.00	0.00	0.00	0.07	0.00
H+	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OH-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl-	12546.02	49621.00	37086.58	12534.55	670.34	4024.73	7839.48	7839.48	1298.90	6544.84	11864.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4024.73
Ca++	6979.85	27678.17	20686.53	6991.65	373.91	2244.95	4372.78	4372.78	724.56	3650.90	6617.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2244.95
Na+	156.15	536.33	400.92	135.50	7.25	43.51	84.75	84.75	14.00	70.52	128.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.51

Notes:

Based on ChemCAD simulation entitled FBP - C15120500 - 160411.cc6

PFD Stream 53 is the summation of ChemCAD Streams 29 (PH-1 to HW), 18 (PH-2 to HW), 45 (BC-1 to HW), 80 (BC-2 to HW), 81 (BC-3 to HW), and 86 (V-1 to HW) plus PFD Streams 192 (Boiler steam to Condensate Pump Traps) and 193 (Condensate Tank to HW).

Flow rates within +/-0.1% accuracy based on allowable tolerances in ChemCAD simulation.

RELEASED FOR REVIEW AND COMMENT

NO.	REVISION	DWN / CHK	ENG / PM	DATE
D	REVISED FOR C15120500 PROJECTS	JSH	LK / PEV	04/11/16
C	FOR REVIEW & COMMENT	JSH	LK / PEV	03/14/16

DESIGNED/DWN BY	LK/JSH	DATE	03/14/16
CHECKED BY	–	DATE	–
CHECKED BY ENGR	–	DATE	–
APPROVED BY PM	–	DATE	–
APPROVED BY MANAGER OF ENGR	–	DATE	–
SCALE	NONE		

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

BRINE PROCESSING
MASS BALANCE

DRAWING NUMBER PFD-1003M REV. D

PD-1□□4

CITY WATER

171

167

169

POTABLE CITY WATER

168

163

164

170

03-F-004/5
WATER SOFTENER FILTERS

03-EC-001
ECONOMIZER

03-DA-002
DEAERATOR VESSEL

151

153

03-P-020/021/022
BOILER FEED PUMPS

A1 PFD-1002
TO THERMOCOMPRESSOR

152

03-TK-00X
BLOW DOWN SEPARATOR

162

161

189

03-B-002
BOILER
800 BHP

180

A2 PFD-1002
TO THERMOCOMPRESSOR

154

155

TO SAN. SEWER

192

192

A4 PFD-1002
TO COND. PUMP TRAPS

CITY WATER

POTABLE WATER

03-F-002/3
SOFTNERS

K1 PFD-1002
CONDENSATE RETURN FROM 02-PH-003

41

03-TK-007
BLOW DOWN SEPARATOR

03-DA-001
DEAERATOR VESSEL

03-TK-003
CONDENSATE RETURN TANK

193

A6 PFD-1002
TO HOTWELL

03-B-001
BOILER
900 BHP
STD-BY

TO SAN. SEWER

60

03-P-015-1/2

A1 PFD-1002
TO STEAM EJECTOR 02-SE-001

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN / CHK	ENG / PM	DATE
D	REVISED FOR AIR PERMIT RFD	PC	LDK / PEV	5/9/16
C	REVISED FOR C15120503 BOILER SYSTEM RELIABILITY IMPROVEMENTS	JSH	MLO / PEV	04/12/16
B	REVISED FOR C15120503 BOILER SYSTEM RELIABILITY IMPROVEMENTS	JSH	MLO / PEV	03/17/16
A	FOR REVIEW & COMMENT	JWR	PC / MLO / PEV	

DESIGNED/DWN BY	JWR	DATE	2/10/2016
CHECKED BY	GK	DATE	3/3/2016
CHECKED BY ENGR	MLO	DATE	–
APPROVED BY PM	PEV	DATE	–
APPROVED BY MANAGER OF ENGR	–	DATE	–
SCALE	–		

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

WATER & STEAM FLOW DIAGRAM

DRAWING NUMBER PD-1□□4

REV. D

PD-1□□4M□

Fairmont Brine Processing PFD Mass Balance	
Project No.:	C15-1205-03
Project Name:	Fairmont Brine Processing
Rev.:	D
Rev. Date:	5/9/2016

Water and Steam New Boiler

Basis: 22,655 Steam Flow to Thermo-Compressor

Stream No.	41	60	151	152	153	154	155	161	162	163	164	167	168	169	170	171	180
Stream Name	STEAM CONDENSATE RETURN	STEAM TO THE EJECTOR	BOILER FEED WATER	BOILER FEED WATER	BOILER FEED WATER	285 PSIA STEAM	285 PSIA STEAM	BOILER BLOW DOWN	BOILER BLOW DOWN	285 PSIA STEAM	20 PSIA STEAM	CITY WATER	CITY WATER	CITY WATER	SOFTENED CITY WATER	POTABLE CITY WATER	285 PSIA STEAM
Temp F	176.79	414.2	235.0	235.0	315.0	414.2	414.2	414.2	110.0	414.2	228.0	60.0	60.0	60.0	60.0	60.0	414.2
Pres psia	47.5	289.7	19.7	314.7	295.0	289.7	289.7	289.7	1.3	289.7	19.7	0.3	0.3	0.3	0.3	0.3	289.7
Enth MMBtu/hr	-211.0	-1.08	5.2	5.1	7.1	28.4	27.6	0.5	0.7	0.8	0.8	0.6	0.2	0.0	0.0	0.1	-128.2
Total lb/hr	31,385.0	190.0	25,374.0	24,873.0	24,873.0	23,623.0	22,923.0	1,250.0	8,756.0	700.0	700.0	20,016.0	7,506.0	0.0	0.0	5,004.0	22,655.0
Total std L gpm	62.76		50.7	49.7	49.7			2.5	17.5			40.0	15.0	0.0	0.0	10.0	

Stream No.	189	192	193														
Stream Name	BOILER FEED WATER	Boiler stm to condensate pump traps	Condensate Tank to Hot well														
Temp F	235.0	414.2															
Pres psia	315.0	289.7															
Enth MMBtu/hr	0.2																
Total lb/hr	501.0	78.0	6,711.0														
Total std L gpm	1.0		13.4														

RELEASED FOR REVIEW AND COMMENT

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

VENTURE™

NO.	REVISION	DWN / CHK	ENG / PM	DATE
D	REVISED FOR AIR PERMIT RFD	PC	LDK / PEV	5-9-16
C	REVISED FOR C15120503 BOILER SYSTEM RELIABILITY IMPROVEMENTS	JSH	MLO / PEV	04/11/16
B	REVISED FOR C15120503 BOILER SYSTEM RELIABILITY IMPROVEMENTS	JSH	MLO / PEV	03/16/16
A	FOR REVIEW & COMMENT	JWR / PC	MLO / PEV	

DESIGNED/DWN BY	JWR	DATE	2/10/2016
CHECKED BY	GK	DATE	3/3/2016
CHECKED BY ENGR	MLO	DATE	–
APPROVED BY PM	PEV	DATE	–
APPROVED BY MANAGER OF ENGR	–	DATE	–
SCALE	NONE		

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

WATER & STEAM MASS BALANCE

DRAWING NUMBER PD-1□□4M□

REV. D

Fairmont Brine Processing

ATTACHMENT G

PROCESS DESCRIPTION

Fairmont Brine Processing, LLC
168 AFR Drive
Fairmont, WV

Type of Business

The Fairmont Brine Processing, LLC, West Virginia Water Treatment Facility produces distilled water for use in natural gas well development. The source water used is from natural gas well development and production. The source water is pretreated at the facility to remove oil and suspended solids. Following pretreatment, the water is processed to remove dissolved solids to a concentration of less than five hundred (500) mg/L.

The distilled water is discharged to the Monongahela River under National Pollutant Discharge Elimination System (NPDES) Permit No. WV0116408 or sold to natural gas well drilling companies. The sodium and calcium chloride salts removed from the water are sold as products.

Facility History

This facility was originally permitted by AOP-Clearwater, LLC. The original application was submitted to WVDEP in December 2008 by MSES Consultants, Inc. on behalf of AOP-Clearwater, LLC. Permit R13-2794 was issued to AOP-Clearwater, LLC on May 12, 2009. The property was transferred from AOP to Fairmont Brine Processing (FBP) on March 28, 2012 and Permit R13-2794 was transferred to FBP on April 25, 2012. The plant was idle at the time of transfer. Prior to operating under FBP, a Request for Determination (RFD) was submitted on February 5, 2014 by Venture Engineering & Construction, Inc. on behalf of FBP. Based on this submittal, WVDEP determined that a permit was not required under 45CSR13. FBP has been operating under Permit R13-2794. At this time, the following proposed process/facility changes necessitate submittal of an air permit application:

- Increase Emissions E-3: FBP plans to replace the existing third effect heat exchanger, 02-HX-003, which will allow for an increase in plant capacity. This change will increase Emissions E-3. Also, information on the air pollution control device for Source S-3 is provided to reflect installed equipment.
- Add Source S-6: FBP plans to expand their pretreatment operations to include chemical precipitation, clarification, and effluent and sludge processing. This includes the installation of a lime silo, 01-TK-015 (new Emissions E-6).
- Add Source S-7: FBP plans to install a second natural gas fueled boiler, 03-B-002 (new Emissions E-7) to provide a redundant heat source for the evaporation process.

NOTE: AOP-Clearwater, LLC included an emergency generator (Emissions E-5) on the original permit application. An emergency generator was not installed and FBP has no plans at this time to install an emergency generator.

Process Description

The FBP plant consists of three main processing operations: Brine Treatment, Evaporation and Crystallization. The three processes are described below.

Brine Treatment

The facility receives untreated brine water with limited (less than 0.1%) crude oil, suspended solids, and dissolved solids by tank trucks. After arrival and before unloading (unless previously characterized), the contents of the trucks are sampled and tested for chemical composition and physical properties. The trucks are unloaded on a concrete pad with the untreated brine water transferred to a concrete lined basin. The quantity of water is stored in a computer database for further correspondence. Oil is removed by an oil skimmer from the top of the basin and stored in an oil storage tank (Emissions E-4).

The treated brine water flows from the basin to the oil/water separator for oil removal to the oil storage tank. From the oil/water separator the treated brine water is currently pumped through bag filters for solids removal and then through activated carbon filters to remove the organics. Prior to filtration, FBP proposes to chemically treat the brine water using sodium sulfate (which is currently added to the basin) and two new treatment chemicals: hydrated lime and polymer (for increased flocculation). Hydrated lime will be stored in a lime silo (Emissions E-6). With the pretreatment process upgrades, the treated brine water will be pumped from the oil/water separator through a series of new chemical addition tanks where chemical dosing will occur to enable heavy metal precipitation.

Following chemical treatment, FBP plans to clarify the brine water using two inclined-plate clarifiers operating in parallel. The clarification system will include sludge handling equipment. With these changes, the treated brine water will flow from the chemical addition tanks through the clarifiers and into a new effluent storage tank. The treated brine water will be pumped from the effluent storage tank through the existing bag and activated carbon filters. Finally, the brine water from the pretreatment process will flow into the existing 5.25 million gallon HDPE lined brine pond impoundment allowing additional mixing and capacity prior to the evaporation process.

The sludge from the clarifiers will be pumped into a new thickener vessel and then filter pressed. The overflow from the thickener and filtrate from the new filter press will be returned to the clarifiers for reprocessing.

The solid waste generated will be disposed of via landfill. The oil is stored in the oil storage tank for external sale.

Evaporation

The brine water from the brine pond impoundment is currently processed at a rate of approximately 5,000 barrels per day to remove dissolved solids. With the replacement of the third effect heat exchanger, the process rate will increase to approximately 5,400 barrels per day. The heat source for the process is steam produced by a 30 million Btu per hour natural gas fueled boiler (Emissions E-1). FBP plans to install an additional 27 million Btu per hour natural gas fueled boiler (Emissions E-7) for redundant heat sources. The boilers cannot operate concurrently.

The brine water from the brine pond impoundment is pumped through bag filters and heat exchangers to preheat the brine water for processing. The brine water feed is then pumped to vapor liquid separators (VLSs) for evaporation. In the VLSs the brine water is concentrated as the distilled water is evaporated out the top of the vessel, passing through a mist eliminator vessel. A recirculating stream is pumped through the first effect heat exchanger and heated to allow vaporization of clean water from the brine water in the VLS. The water vapors from the first effect VLS continue to the second effect heat exchanger, which heats the recirculating brine in the second effect VLS system. The second effect VLS operates in the same manner as the first effect VLS where the water vapor from the top of the second VLS flows to the third effect heat exchanger for the recirculating of brine water to the third effect VLS. The brine water is delivered to the first and second VLSs in a parallel feed flow. Hence, the FBP plant has three vapor liquid separators with two operating in parallel for the process stream and three operating in series for efficient steam energy utilization.

The distilled water vapors from this process are condensed in the downstream heat exchangers and in a barometric condenser system. The distilled water is delivered to a hot well for delivery and storage in the existing 1.25 million gallon clean water pond.

The non-condensable vapors from the barometric condenser system and from mist eliminator lines are pumped through a vacuum pump separator and an activated carbon bed to atmosphere (Emissions E-3).

Crystallization

Salt crystallization begins in the VLSs as the water is evaporated and the concentration of the remaining brine exceeds the saturation point of the brine water solution. A salt crystal bearing brine water slurry is transferred between evaporators and then removed as a single stream leaving the third effect VLS. The slurry is pumped to the settler tank where continued salt formation occurs before it is transferred to the centrifuge. The salt crystals are separated from the concentrated brine water in the centrifuge and are then fed via a conveyor to a natural gas fueled rotary dryer (Emissions E-2). The wet salt cake from the conveyor is dried in the rotary dryer and then conveyed to a storage pile to await customer distribution. The concentrated brine water from the centrifuge is returned to the second and third effect VLSs for continued processing, as well as pumped to $CaCl_2$ storage for external sale.

Fairmont Brine Processing

ATTACHMENT H

MATERIAL SAFETY DATA SHEETS (MSDS)

The following MSDSs are provided as ATTACHMENT H:

Brine Treatment

- Untreated Brine
- Sodium Sulfate
- Hydrated Lime (NEW)
- Anionic Emulsion Polymer (NEW; MSDS provided for example only. Polymer selection is pending.)
- Pretreated Brine

Evaporation

- Defoamer
- Sodium Hydroxide (Use may be discontinued once process changes to use hydrated lime are implemented.)
- ISOPLUS – Boiler treatment
- CONDEN-SAF 4675 – Condensate Treatment
- Dubois OH 50 – Alkaline Builder
- ZT-65 – Water Softener Cleaning

Crystallization

- Heavy Brine
- Process Salt

MATERIAL SAFETY DATA SHEET

FILE NO.:

UNTREATED BRINE

MSDS DATE: 10/28/2015

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **UNTREATED BRINE**
SYNONYMS: **RAW WASTEWATER, BRINE SOLUTION, PRODUCED WATER, FORMATION WATER, FRACTIONATION WATER**
PRODUCT CODES: **N/A**

MANUFACTURER: **FAIRMONT BRINE PROCESSING, LLC**
DIVISION: **N/A**
ADDRESS: **168 AFR DRIVE | FAIRMONT, WV 26554**

EMERGENCY PHONE: **(412) 680-6244**
CHEMTREC PHONE: **(800) 424-9300 (24 HOURS)**
OTHER CALLS: **(304) 363-9876**
FAX PHONE: **(412) 231-5891**

CHEMICAL NAME: **BRINE SOLUTION**
CHEMICAL FAMILY: **MIXTURE**
CHEMICAL FORMULA: **MIXTURE**

PRODUCT USE: **EVAPORATION/ CRYSTALLIZATION**
PREPARED BY: **LDK**

SECTION 1 NOTES: Raw wastewater from incoming trucks (various producers)

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO.	% WT
Water	7732-18-5	80-95
Calcium chloride	10043-52-4	0-10
Potassium chloride	7447-40-7	0-10
Sodium chloride	7647-14-5	0-10
Residual metals	Various	<5
Benzene	71-43-2	<1

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: WARNING! Causes eye irritation. The product may contain benzene which may cause cancer and cause blood disorders.

ROUTES OF ENTRY: Eye contact. Skin contact. Ingestion. Inhalation.

POTENTIAL HEALTH EFFECTS

EYES: Causes eye irritation

SKIN: Prolonged or repeated skin contact may cause irritation.

INGESTION: May cause gastrointestinal irritation, nausea, vomiting and diarrhea

INHALATION: No inhalation hazard under normal conditions. If misting occurs: may cause mild mucous membrane irritation of the nose, throat, and upper respiratory tract.

ACUTE HEALTH HAZARDS: Causes eye irritation.

CHRONIC HEALTH HAZARDS: May contain benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established.

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

OSHA:	Benzene (CAS 71-43-2)	Cancer hazard
ACGIH:	Benzene (CAS 71-43-2)	A1 Confirmed human carcinogen
NTP:	Benzene (CAS 71-43-2)	Known carcinogen
IARC:	Benzene (CAS 71-43-2)	1 Carcinogenic to humans

SECTION 4: FIRST AID MEASURES

EYES: In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.

SKIN: Remove contaminated clothing and shoes. Wash affected area with mild soap and water. Get medical attention if irritation develops and persists.

INGESTION: Rinse mouth thoroughly. Get medical attention if any discomfort occurs

INHALATION: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

SECTION 4 NOTES: If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES: This product is not flammable; however sufficient hydrocarbon vapors may accumulate from oil or natural gas condensate floating on the surface of the produced water to cause a flash fire. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water.

EXTINGUISHING MEDIA
SUITABLE EXTINGUISHING MEDIA: Dry chemical powder. Foam. Carbon dioxide (CO2).

PROTECTION OF FIREFIGHTERS
PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: A fire would be associated with vapors related to oil or natural gas condensate floating on the surface of the produced water. Water maybe ineffective on flames and may even spread the fire but should be used to cool pressurized containers in the fire.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS:
Firefighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

SPECIFIC METHODS: Promptly isolate the scene by removing persons from the vicinity of the incident if there is a fire. Do not extinguish flames at leak because of the possibility of a uncontrolled re-ignition exists. If it is safe to do so, cut off fuel supply and/or allow fire to burn out. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water. If leak or spill has not ignited, water spray or ventilation can be used to disperse the vapors.

HAZARDOUS COMBUSTION PRODUCTS: Sodium oxides. Carbon oxides.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: Recover by pumping (use an explosion-proof motor or hand pump) or by sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Where feasible and appropriate, remove contaminated soil or flush with fresh water. On water spills utilize absorbent material to remove oil and natural gas liquid from the surface of the water.

SECTION 6 NOTES: Avoid excess skin contact with spilled material.

SECTION 7: HANDLING AND STORAGE

HANDLING: Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.

STORAGE: Keep containers in well-ventilated area away from flame, sparks, excessive temperatures and open flames. Keep the containers closed and clearly labeled. Empty product containers or vessels may contain vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Do not enter storage areas and confined spaces without adequate ventilation. Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s). Vapors containing benzene may accumulate during storage and transport.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: Ensure adequate ventilation, especially in confined areas.

RESPIRATORY PROTECTION: No personal respiratory equipment normally required.

EYE PROTECTION: If eye contact is likely, safety glasses should be worn.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION (Continued)

SKIN PROTECTION: No special garments required. Wash contaminated clothing prior to reuse.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: No other protective clothing or equipment is needed.

WORK HYGIENIC PRACTICES: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Dirty colored liquid

ODOR: Faint hydrocarbon odor

PHYSICAL STATE: Liquid

pH AS SUPPLIED: 4.5-7.5
pH (Other):

BOILING POINT:
F: 212°
C: 100°
MELTING POINT:
F: N/A
C: N/A
FREEZING POINT:
F: < 32°
C: < 0°
VAPOR PRESSURE (mmHg): 13.6 (approx.)
@ **F:** 68°
C: 20°
VAPOR DENSITY (AIR = 1): <1
@ **F:** 68°
C: 20°
SPECIFIC GRAVITY (H2O = 1): 1.2 (approx.)
@ **F:** 68°
C: 20°

EVAPORATION RATE: N/A

SOLUBILITY IN WATER: Complete

PERCENT SOLIDS BY WEIGHT: N/A

PERCENT VOLATILE: N/A
BY WT/ BY VOL @
F:
C:
VOLATILE ORGANIC COMPOUNDS (VOC): N/A
WITH WATER: **LBS/GAL**
WITHOUT WATER: **LBS/GAL**

MOLECULAR WEIGHT: N/A

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY): Keep away from heat, sparks, and open flame.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide. Wator vapor. May produce oxides of sulfur. Carbon monoxide via incomplete combustion.

HAZARDOUS POLYMERIZATION: Does not occur.

CONDITIONS TO AVOID (POLYMERIZATION): N/A

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: This product may contain detectable but varying quantities of the naturally occurring radioactive substance Radium 226/228. Due to the long half life of Radium 226/228 (1600yr/5.75yr), there should not be significant radiation. The solution may cause eye and skin irritation.

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 12 NOTES: To be expected to be harmful to aquatic organisms.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Reuse or recycle if possible. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer. Waste water treatment system.

SECTION 14: TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
Status: Not regulated
CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
Status: Not regulated
OTHER AGENCIES:

SECTION 15: REGULATORY INFORMATION

U.S. REGULATIONS
OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.
EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.
EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10): Acute Health Hazard
EPCRA SECTION 313 (40 CFR 372.65): To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.
OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119): Not regulated.
STATE REGULATIONS:
INTERNATIONAL REGULATIONS:

SECTION 16: OTHER INFORMATION

IMPORTANT:
The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. **NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY OR OTHERWISE.** This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and OxyChem assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws. OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees.

SALTEX, LLC
America's Sodium Sulfate Supplier

Saltex, LLC
7755 Bellaire South
Ft. Worth, TX 76132
USA Tel:
877-872-5839

MATERIAL SAFETY DATA SHEET
SODIUM SULFATE ANHYDROUS
January 1, 2013

SECTION I: CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: Sodium Sulfate
General Use:
Common Synonyms: Sodium sulfate, Anhydrous; Sulfuric Acid, Disodium Salt; Disodium Sulfate
Chemical Family: Neutral Salts
Formula: Na_2SO_4
Formula Weight: 142.04
CAS No.: 7757-82-6
Manufacturer: Saltex, LLC

SECTION II: COMPOSITION/INFORMATION ON INGREDIENTS

Component	WEIGHT %	CAS #
Sodium Sulfate, Anhydrous	99 – 100	7757-82-6

Component	Hazard	OSHA STEL	OSHA PEL	ACGIH TLV
Sodium Sulfate, Anhydrous	Irritant	N/E	N/E	N/E

EXTENDED INFORMATION

SECTION III: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION! MAY CAUSE IRRITATION. MAY BE HARMFUL IF SWALLOWED OR INHALED. HYGROSCOPIC. During use avoid contact with eyes, skin or clothing. Wash thoroughly after handling. When not in use, keep in tightly closed container.

POTENTIAL HEALTH EFFECTS

EYE CONTACT: Irritation

SKIN CONTACT: Irritation

INGESTION: Gastrointestinal irritation

INHALATION: Irritation of the upper respiratory tract.

CHRONIC: None identified

TARGET ORGANS: Respiratory system, lungs.

Primary routes of entry:

Inhalation ☑ Ingestion ☑

Skin Contact ☑ Eye Contact ☑

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None identified

SECTION IIII: FIRST AID MEASURES

EYE CONTACT:

In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

SKIN CONTACT:

In case of contact, immediately wash skin with plenty of soap and water for at least 15 minutes.

INGESTION:

If swallowed and the person is conscious, immediately give large amounts of water. Get medical attention.

INHALATION:
If a person breathers in large amounts, move the exposed person to fresh air.

NOTES TO PHYSICAN: None

SECTION V: FIRE FIGHTING INFORMATION

Flashpoint (Degrees C) and Method: N/A
Auto ignition Temperature (Degrees C): N/A

FLAMMABLE LIMITS:

Components	Upper Explosive Limit	Lower Explosive Limit
Sodium Sulfate, Anhydrous	N/A	N/A

GENERAL HAZARD:
Unusual Fire and Explosion Hazards: None Identified.

FIRE FIGHTING INSTRUCTIONS:
Use extinguishing media appropriate for surrounding fire.

FIRE FIGHTING EQUIPMENT:
Firefighters should wear proper protective equipment and self-contained breathing Apparatus with full facepiece operated in positive pressure mode.

EXTINGUISHING MEDIA:

Foam ☑ Alcohol Foam ☑ CO2 ☑

Dry Chemical ☑ Water ☑ Other ☑

HAZARDOUS COMBUSTION PRODUCTS:
Combustion may release sulfur dioxide.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):

NFPA Hazard Rating:	0 – Insignificant	1 – Slight	2 – Moderate
	3 - High	4 – Extreme	5 – Unknown
	*- No Information		

Health :0
Flammability :0
Reactivity :0

SPECIAL INFORMATION:

Contact Hazard:	Slight (1)
Explosion Data – Sensitivity to Mechanical Impact:	None Identified
Explosion Data - Sensitivity to Static Discharge:	None Identified

SECTION VI: ACCIDENTAL RELEASE MEASURES

LAND SPILL:
Wear suitable protective clothing. Sweep up and remove.

SECTION VII: HANDLING AND STORAGE

GENERAL STORAGE CONDITIONS:
Keep container tightly closed. Keep from contact with oxidizing materials. Isolate from incompatible materials.
Special Precautions: material is hygroscopic.

SECTION VIII: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
Use adequate general or local exhaust ventilation to keep fume or dust levels as low as possible.

PERSONAL PROTECTION:

RESPIRATOR:
None required where adequate ventilation conditions exist. If airborne concentration is high, use an appropriate respirator or dust mask.

PROTECTIVE CLOTHING:
Safety goggles, rubber gloves recommended.

SECTION VIIII: PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure (mmHg): N/A Solubility in Water: Appreciable
Specific Gravity (water=1): 2.68 pH: 6-10

Boiling Point (Degrees C): N/A Physical State: Sol.id
Freezing Point (Degrees C): 884 Vapor Density (air=1): N/A
Evaporation Rate (BuAc=1): N/A Percent Volatile by Volume:0
Viscosity: Odor: Odorless
Appearance: White crystals or powder

SECTION X: STABILITY AND REACTIVITY

GENERAL:

STABILITY:
Stable: ☑
Unstable: ☐

HAZARDOUS POLYNERIZATION:
Will Not Occur: ☑
Will Occur: ☐

INCOMPATIBLE MATERIALS:
Strong oxidizing agents.

CONDITIONS TO AVOID:
Moisture

HAZARDOUS DECOMPOSITION PRODUCTS:
Oxides of sulfur.

SECTION XI: TOXICOLOGIAL INFORMATION

GENERAL:
Sodium Sulfate, Anhydrous:
5989 mg/kg oral mouse LD50
Carcinogenicity: None identified
Reproductive Effects: None identified

CARCINOGENIC INFORMATION:

Component	CAS#	Weight%	IARC	NTP	OSHA	ACGIH	Other
Sodium Sulfate Anhydrous	7757-82-6	99-100	No	No	No	No	No

SECTION XII: ECOLOGICAL INFORMATION

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. This material is not expected to significantly bioaccumulate.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l. The EC50/48-hour values for daphnia are over 100 mg/l.

SECTION XIII: DISPOSAL CONSIDERATION

RCRA Hazard Class: None

METHOD OF DISPOSAL:

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

SECTION XIIII: TRANSPORTATION INFORMATION

DOT (Department of Transportation)

Proper Shipping Name:	Chemicals, n.o.s. (non-regulated)
Hazard Class:	None
Identification Number:	None / No UN Number assigned

SECTION XV: REGULATORY INFORMATION

TSCA (Toxic Substances Control Act):
In TSCA Inventory? Yes ☑ No ☐

CERCLA (Comprehensive Environmental Response Compensation, and Liability Act):
Classified as a Hazardous Substance? Yes ☐ No ☑

SARA TITLE III (Superfund Amendments and Reauthorization Act):
311/312 Hazard Categories:
Acute ☐ Chronic ☐ Flammability ☐ Pressure ☐ Reactivity ☐ None ☑

313 Reportable Ingredients: None

CALIFORNIA PROPOSITION 65: Not Listed

SECTION XVI: OTHER INFORMATION

Saltex, LLC provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose.

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N/A: Not Available, Not Applicable
N/D: Not Determined
N/E: Not Established

Safety Data Sheet

Issue Date: 27-Jan-2012 **Revision Date:** 20-July-2015 **Version** 1

1. IDENTIFICATION

Product Identifier

Product Name Hydrated Lime

Other means of identification

SDS # WKM-002

Recommended use of the chemical and restrictions on use

Recommended Use Water Treatment, Flue Gas Desulfurization, pH Adjustment, Construction

Details of the supplier of the safety data sheet

Manufacturer Address

Mid-Ohio Valley Lime
16360 State Route Seven South
Marietta, OH 45750

Emergency Telephone Number

Company Phone Number 1-888-847-3090

Emergency Telephone (24 hr) INFOTRAC 1-352-323-3500 (International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Appearance White or grayish-white solid powder **Physical State** solid **Odor** Odorless

Classification

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1
Carcinogenicity	Category 1A
Specific Target Organ Toxicity – Single Exposure	Category 3

Signal Word

Danger

Hazard Statements

Causes severe skin burns and eye damage
May cause respiratory irritation
May cause cancer through inhalation

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not breathe dust
Wash face, hands and any exposed skin thoroughly after handling
Precautionary Statements - Response
Immediately call a poison center or doctor/physician
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting

Precautionary Statements - Storage
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%
Calcium Hydroxide	1305-62-0	>85
Quartz	14808-60-7	<1

If Chemical Name/CAS No is "proprietary" and/or Weight-% is listed as a range, the specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. FIRST-AID MEASURES

First Aid Measures

General Advice Immediately call a poison center or doctor/physician. Provide this SDS to medical personnel for treatment.

Eye Contact IF IN EYES: Rinse generously with water for several minutes. Remove contact lenses, if present and easy to do. Pull back the eyelid to ensure that all lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Skin Contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.

Inhalation IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Ingestion IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Most important symptoms and effects

Symptoms Causes severe skin burns and eye damage. May cause cancer. Contact may aggravate disorders of the eyes, skin, gastrointestinal tract, and respiratory system.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use dry chemical fire extinguisher.

Unsuitable Extinguishing Media Do not use water or halogenated compounds. Only use large amounts of water that can be used to deluge small quantities of this product.

Specific Hazards Arising from the Chemical
Hydrated Lime is not combustible or flammable. However, it reacts vigorously with acids, and may release heat sufficient to ignite combustible materials in specific instances. Hydrated Lime is not considered to be an explosion hazard, although reaction with acids or other incompatible materials may rupture containers. When Hydrated Lime becomes wet, it can be slippery and can result in a slip hazard.

Hazardous Combustion Products Smoke, fumes or vapors, and oxides of carbon.

Protective equipment and precautions for firefighters
Keep personnel away from and upwind of fire. Avoid skin contact or inhalation of dust. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (self-contained breathing apparatus).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions	Use personal protective equipment as required.
Other Information	Spill Procedures: Do not use water on bulk materials spills. Use proper protective equipment. Use personal protective equipment (eyes, skin, and inhalation). Use copious amounts of water to dilute. Follow proper drainage and disposal procedure. Small Spills: Do not clean up with compressed air. Store collected materials in sealed plastic or non-aluminum containers. Residue on surfaces may be water washed. Large Spills: Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in sealed plastic or non-aluminum containers.
Environmental Precautions	See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for Containment	Minimize dust generation and prevent bulk release to sewers or waterways.
Methods for Clean-Up	Residual amounts of material can be flushed with large amounts of water. Avoid dry sweeping. Equipment can be washed with either a mild vinegar and water solution, or detergent and water. Dispose according to federal, provincial/ state and local environmental regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling	Handle in accordance with good industrial hygiene and safety practice. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Avoid generating airborne dust. Do not breathe dust. Wash face, hands, and any exposed skin thoroughly after handling. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions Store in cool, dry, and well-ventilated locations. Keep in tightly closed containers. Do not store near acids or other incompatible materials. Keep away from moisture. Do not store or ship in aluminum containers.

Packaging Materials Do not store or ship in aluminum containers.

Incompatible Materials Acids; reactive fluoridated, brominated or phosphorous compounds; aluminum (may form hydrogen gas), reactive powdered metals; organic acid anhydrides; nitro-organic compounds; interhalogenated compounds.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Calcium Hydroxide 1305-62-0	TWA: 5 mg/m^3	TWA: 15 mg/m^3 total dust TWA: 5 mg/m^3 respirable fraction (vacated) TWA: 5 mg/m^3 not in effect as a result of reconsideration	TWA: 5 mg/m^3
Quartz 14808-60-7	TWA: 0.025 mg/m^3 respirable fraction	(vacated) TWA: 0.1 mg/m^3 respirable dust : (30)/(%SiO2 + 2) mg/m^3 TWA total dust : (250)/(%SiO2 + 5) mppcf TWA respirable fraction : (10)/(%SiO2 + 2) mg/m^3 TWA respirable fraction	IDLH: 50 mg/m^3 respirable dust TWA: 0.05 mg/m^3 respirable dust

Appropriate engineering controls

Engineering Controls Apply technical measures to comply with the occupational exposure limits. Use with local exhaust ventilation. Eye wash and safety showers should be immediately available.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Eye protection (chemical goggles, safety glasses with side shields) should be worn where there is risk of airborne dust. Contact lenses should not be worn when working with this product.

Skin and Body Protection Use appropriate gloves and footwear to prevent skin contact. Clothing should fully cover arms and legs. Should hydrated lime get inside clothing, gloves, or contact skin, remove the clothing and hydrated lime promptly.

Respiratory Protection Use NIOSH/MSHA approved respirators if airborne concentration exceeds PEL.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	solid		
Appearance	White or grayish-white liquid powder	**Odor**	Odorless
Color	White or grayish-white	**Odor Threshold**	Not established

Property	Values	Remarks • Method
pH	12.4	@ 25 °C (77 °F)
Melting Point/Freezing Point	580 °C / 1076 °F	
Boiling Point/Boiling Range	2850 °C / 5162 °F	
Flash Point	Not flammable	

Evaporation Rate	Similar to water
Flammability (Solid, Gas)	Not applicable- liquid
Upper Flammability Limits	Not flammable
Lower Flammability Limit	Not flammable
Vapor Pressure	Non volatile
Vapor Density	Non volatile
Specific Gravity	1.1-1.4
Water Solubility	Slightly soluble in water: .2% @ 0 °C. Soluble in acids, glycerin, and sugar solutions.
Solubility in other solvents	Soluble in acids, glycerol and sugar solutions
Partition Coefficient	Not determined
Auto-ignition Temperature	Not determined
Decomposition Temperature	Not determined
Kinematic Viscosity	Not determined
Dynamic Viscosity	Not determined
Explosive Properties	Not determined
Oxidizing Properties	Not determined
Molecular weight	74.093 g/mol

10. STABILITY AND REACTIVITY

Reactivity
Reacts with acids to form calcium salts while generating heat. Reacts with carbon dioxide in air to form calcium carbonate.

Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid
Incompatible Materials.

Incompatible Materials
Acids; reactive fluoridated, brominated or phosphorous compounds; aluminum (may form hydrogen gas), reactive powdered metals; organic acid anhydrides; nitro-organic compounds; interhalogenated compounds.

Hazardous Decomposition Products
Smoke, fumes or vapors, and oxides of carbon.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Eye Contact Causes serious eye damage.

Skin Contact Causes severe skin burns.

Inhalation Causes severe irritation of the respiratory system.

Ingestion Causes severe irritation or burning of gastrointestinal tract if swallowed.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Calcium Hydroxide 1305-62-0	= 7340 mg/kg (Rat)	-	-
Quartz 14808-60-7	= 500 mg/kg (Rat)	-	-

Information on physical, chemical and toxicological effects

Symptoms Please see section 4 of this SDS for symptoms.

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

Carcinogenicity Hydrated Lime is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product may contain trace amounts of crystalline silica, which has been classified by IARC as carcinogenic to humans when inhaled in the form of quartz crystobalite.

Chemical Name	ACGIH	IARC	NTP	OSHA
Quartz 14808-60-7	A2	Group 1	Known	X

Numerical measures of toxicity
The following toxicological characteristics apply:
LD50: 7,340 mg/kg (oral, rat)
LD50: 7,300 mg/kg (oral, mouse)

12. ECOLOGICAL INFORMATION

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

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Calcium Hydroxide 1305-62-0		160: 96 h Gambusia affinis mg/L LC50 static		

Persistence/Degradability
Not determined.

Bioaccumulation
Not determined.

Mobility
Not determined

Other Adverse Effects
Not determined

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

California Hazardous Waste Status This product contains one or more substances that are listed with the State of California as a hazardous waste

Chemical Name	California Hazardous Waste Status
Calcium Hydroxide 1305-62-0	Corrosive

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT Not regulated

IATA Not regulated

IMDG Not regulated

15. REGULATORY INFORMATION

International Inventories

Chemical Name	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Calcium Hydroxide	Present	X		Present		Present	X	Present	X	X
Quartz	Present	X		Present		Present	X	Present	X	X

Legend:

TSCA *- United States Toxic Substances Control Act Section 8(b) Inventory*

DSL/NDSL *- Canadian Domestic Substances List/Non-Domestic Substances List*

EINECS/ELINCS *- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances*

ENCS *- Japan Existing and New Chemical Substances*

IECSC *- China Inventory of Existing Chemical Substances*

KECL *- Korean Existing and Evaluated Chemical Substances*

PICCS *- Philippines Inventory of Chemicals and Chemical Substances*

AICS *- Australian Inventory of Chemical Substances*

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

Chemical Name	California Proposition 65
Quartz - 14808-60-7	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Calcium Hydroxide 1305-62-0	X	X	X

Quartz 14808-60-7	X	X	X

16. OTHER INFORMATION

NFPA	**Health Hazards**	**Flammability**	**Instability**	**Special Hazards**
	1	0	0	-
HMIS	**Health Hazards**	**Flammability**	**Physical Hazards**	**Personal Protection**
	2	0	0	E

Issue Date: 27-Jan-2012
Revision Date: 13-Apr-2015
Revision Note: New format

Disclaimer

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

End of Safety Data Sheet

SAFETY DATA SHEET

According to Federal Regulation 29 CFR 1910.1200

SECTION 1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product names: TRAMFLOC® 100 to 199 Series Anionic Emulsion polymers

Type of product: Mixture

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

Identified uses: Processing aid for industrial applications.

Uses advised against: none

1.3. Details of the supplier of the safety data sheet

Company:	Tramfloc, Inc.
	6046 FM 2920 Rd. #615
	Spring, TX 77379-2542
Telephone:	888-929-8973
Telefax:	480-383-6895
E-mail address:	water@tramfloc.com

1.4 Emergency telephone number:

24-hour emergency number: 800-424-9300 CHEMTREC (CCN 20412), Outside US 703-527-3887

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

Classification according to paragraph (d) of Regulation 29 CFR 1910.1200:

Not classified.

2.2. Label elements

Labelling according to paragraph (f) of Regulation 29 CFR 1910.1200:

Hazard symbol(s):	none
Signal word:	none
Hazard statement(s):	none
Precautionary statement(s):	none

2.3. Other hazards

Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 3. Composition/information on ingredients

3.1 Substances

Not applicable, this product is not a substance.

3.2 Mixtures

Hazardous components

Distillates (petroleum), hydrotreated light

Concentration/ gamme : 20-45%

CAS Number: 64742-47-8

Classification according to paragraph

(d) of Regulation 29 CFR 1910.1200: Asp. Tox. 1: H304

Notes:

Does not result in classification of the mixture if the kinematic viscosity is greater than 20.5 mm2/s measured at 40°C.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Concentration/ gamme : < 3%

CAS Number: 69011-36-5

Classification according to paragraph

(d) of Regulation 29 CFR 1910.1200: Acute Tox.4; H302, Eye Dam. 1; H318

For explanation of abbreviations see section 16

SECTION 4. First aid measures

4.1. Description of first aid measures

Inhalation:

Move to fresh air. No hazards which require special first aid measures.

Skin contact:

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. In case of persistent skin irritation, consult a physician.

Eye contact:

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Alternatively, rinse immediately with Diphoterine®. Get prompt medical attention.

Ingestion:

Rinse mouth with water. Do NOT induce vomiting. Call a physician or poison control centre immediately.

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

None under normal use.

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

None reasonably foreseeable.

Other information:

None.

SECTION 5. Fire-fighting measures

5.1. Extinguishing media

Suitable extinguishing media:

Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.

Unsuitable extinguishing media:

None.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products:

Carbon oxides (COx). Nitrogen oxides (NOx). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

5.3. Advice for fire-fighters

Protective measures:

Wear self-contained breathing apparatus and protective suit.

Other information:

Spills produce extremely slippery surfaces.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:

Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.

Protective equipment:

Wear suitable protective clothing, gloves and eye/face protection.

Emergency procedures:

Keep people away from spill/leak.

6.2. Environmental precautions

As with all chemical products, do not flush into surface water.

6.3. Methods and material for containment and cleaning up

Small spills:

Do not flush with water. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.

Large spills:

Do not flush with water. Dam up. Clean up promptly by scoop or vacuum.

Residues:

Soak up with inert absorbent material. After cleaning, flush away traces with water.

6.4. Reference to other sections

SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations; SECTION 7: Handling and storage;

SECTION 7. Handling and storage

7.1. Precautions for safe handling

Avoid contact with skin and eyes. Renders surfaces extremely slippery when spilled. When using, do not eat, drink or smoke.

7.2. Conditions for safe storage, including any incompatibilities.

Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material. Incompatible with oxidizing agents.

7.3. Specific end use(s)

None.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:

Distillates (petroleum), hydrotreated light

ACGIH: 200 mg/m3 (8-hour)

8.2. Exposure controls

Appropriate engineering controls:

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Individual protection measures, such as personal protective equipment:

Eye/face protection:	Safety glasses with side-shields.
Skin protection:	Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur.
Hand protection:	PVC or other plastic material gloves.
Respiratory protection:	No personal respiratory protective equipment normally required.
Additional advice:	Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice. Wash hands and face before breaks and immediately after handling the product.

Environmental exposure controls: Do not allow uncontrolled discharge of product into the environment.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance:	Viscous liquid, Milky.
Odor:	Aliphatic
Odor Threshold:	Not applicable.
pH:	5 - 8 @ 5 g/L
Melting point/freezing point:	> 5°C

Initial boiling point and boiling range: > 100°C

Flash point:	Not applicable.

Evaporation rate:	Not applicable.
Flammability (solid, gas):	No data available.

Upper/lower flammability or explosive limits: Not expected to create explosive atmospheres.

Vapour pressure:	2.3 kPa @ 20°C
Relative density:	1.0 – 1.2
Solubility(ies):	Completely miscible.
Partition coefficient:	Not applicable.
Autoignition temperature:	No data available.
Decomposition temperature:	> 150°C
Viscosity:	> 20.5 mm2/s @ 40°C
Explosive properties:	Not expected to be explosive based on the chemical structure.
Oxidizing properties:	Not expected to be oxidizing based on the chemical structure.

9.2. Other information

None.

SECTION 10. Stability and reactivity

10.1. Reactivity

Stable under recommended storage conditions.

10.2. Chemical stability

Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Protect from frost, heat and sunlight.

10.5. Incompatible materials

Incompatible with oxidizing agents.

10.6. Hazardous decomposition products

Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

SECTION 11. Toxicological information

11.1. Information on toxicological effects

Information on the product as supplied:

Acute oral toxicity:	LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 5000 mg/kg
Acute inhalation toxicity:	The product is not expected to be toxic by inhalation.
Skin corrosion/irritation:	Not irritating.

Serious eye damage/eye irritation: Slightly irritating.

Respiratory/skin sensitization: Not sensitizing.

Mutagenicity: Not mutagenic.

Carcinogenicity: Not carcinogenic.

Reproductive toxicity: Not toxic for reproduction.

STOT - single exposure: No known effects.

STOT - repeated exposure: No known effects.

Aspiration hazard: Due to the viscosity, this product does not present an aspiration hazard.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Acute oral toxicity: LD50/oral/rat > 5000 mg/kg (OECD 401)

Acute dermal toxicity: LD50/dermal/rabbit > 5000 mg/kg (OECD 402)

Acute inhalation toxicity: LC50/inhalation/4 h/rat = 4951 mg/m3 (OECD 403)

Skin corrosion/irritation: Not irritating. (OECD 404)

Repeated exposure may cause skin dryness or cracking.

Serious eye damage/eye irritation: Not irritating. (OECD 405)

Respiratory/skin sensitisation: By analogy with similar products, this product is not expected to be sensitizing. (OECD 406)

Mutagenicity: Not mutagenic. (OECD 471, 473, 474, 476, 478, 479)

Carcinogenicity: Carcinogenicity study in rats (OECD 451): Negative

Reproductive toxicity: By analogy with similar substances, this substance is not expected to be toxic for reproduction. NOAEL/rat = 300 ppm (OECD 421)

STOT - single exposure: No known effects.

STOT - repeated exposure: NOAEL/oral/rat/90 days >= 3000 mg/kg/day (OECD 408) (Based on results obtained from tests on analogous products.).

Aspiration hazard: May be fatal if swallowed and enters airways.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Acute oral toxicity: LD50/oral/rat = 200 - 300 mg/kg

Acute dermal toxicity: LD50/dermal/rabbit > 2000 mg/kg

Acute inhalation toxicity: No data available.

Skin corrosion/irritation: Not irritating.

Serious eye damage/eye irritation: Causes serious eye irritation.

Respiratory/skin sensitisation: The results of testing on guinea pigs showed this material to be non-sensitizing.

Mutagenicity: Not mutagenic.

Carcinogenicity: Not carcinogenic.

Reproductive toxicity: Two-Generation Reproduction Toxicity (OECD 416)
NOAEL/rat > 250 mg/kg/day
Prenatal Development Toxicity Study (OECD 414)
NOAEL/Maternal toxicity/rat > 50 mg/kg/day
NOAEL/Developmental toxicity/rat > 50 mg/kg/day

STOT - single exposure: No known effects.

STOT - repeated exposure: NOAEL/oral/rat/600 days = 50 mg/kg/day

Aspiration hazard: No known effects.

SECTION 12. Ecological information

12.1. Toxicity

Information on the product as supplied:

Acute toxicity to fish: LC50/Fish/96 hours > 100 mg/L

Acute toxicity to invertebrates: EC50/Daphnia/48 hours > 100 mg/L

Acute toxicity to algae: IC50/Algae/72 hours > 100 mg/L

Chronic toxicity to fish: No data available.

Chronic toxicity to invertebrates: No data available.

Toxicity to microorganisms: No data available.

Effects on terrestrial organisms: No data available.

Sediment toxicity: No data available.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Acute toxicity to fish: LC0/Oncorhynchus mykiss/96 hours > 1000 mg/L (OECD 203)

Acute toxicity to invertebrates: EC0/Daphnia magna/48 hours > 1000 mg/L (OECD 202)

Acute toxicity to algae: IC0/Pseudokirchneriella subcapitata/72 hours > 1000 mg/L (OECD 201)

Chronic toxicity to fish: NOEC/Oncorhynchus mykiss/28 days > 1000 mg/L

Chronic toxicity to invertebrates: NOEC/Daphnia magna/21 days > 1000 mg/L

Toxicity to microorganisms: EC50/Tetrahymena pyriformis/ 48h > 1000 mg/L

Effects on terrestrial organisms: No data available.

Sediment toxicity: No data available. Readily biodegradable, exposure to sediment is unlikely.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Acute toxicity to fish: LC50/Cyprinus carpio/96 hours = 1 - 10 mg/L (OECD 203)

Acute toxicity to invertebrates: EC50/Daphnia/48 hours = 1 - 10 mg/L (OECD 202)

Acute toxicity to algae: IC50/Desmodesmus subspicatus/72 hours = 1 - 10 mg/L (OECD 201)

Chronic toxicity to fish: No data available.

Chronic toxicity to invertebrates: No data available.

Toxicity to microorganisms: EC10/activated sludge/17 h > 10000 mg/L (DIN 38412-8)

Effects on terrestrial organisms: No data available.

Sediment toxicity: No data available.

12.2. Persistence and degradability

Information on the product as supplied:

Degradation: Not readily biodegradable.

Hydrolysis: Does not hydrolyze.

Photolysis: No data available.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Degradation: Readily biodegradable.

Hydrolysis: Does not hydrolyse.

Photolysis: No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Degradation: Readily biodegradable. > 60% / 28 days (OECD 301 B)

Hydrolysis: Does not hydrolyse.

Photolysis: No data available.

12.3. Bioaccumulative potential

Information on the product as supplied:

Not bioaccumulating.

Partition co-efficient (Log Pow): -2

Bioconcentration factor (BCF): ~0

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Partition co-efficient (Log Pow): 3-6

Bioconcentration factor (BCF): No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Partition co-efficient (Log Pow): > 3

Bioconcentration factor (BCF): No data available.

12.4. Mobility in soil

Information on the product as supplied:

No data available.

Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light

Koc: No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Koc: > 5000 12.5. Other adverse effects

None.

12.5. Other adverse effects

None known.

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Waste from residues / unused products:

Dispose of in accordance with local regulations.

Contaminated packaging:

If recycling is not practicable, dispose of in compliance with local regulations.

Recycling:

The product and its packaging are not suitable for recycling.

SECTION 14. Transport information

Land transport (DOT)

Not classified.

Sea transport (IMDG)

Not classified.

Air transport (IATA)

Not classified.

SECTION 15. Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Information on the product as supplied: TSCA Chemical Substances Inventory:

All components of this product are either listed on the inventory or are exempt from listing.

US SARA Reporting Requirements: SARA (Section 311/312) hazard class:

Not concerned.

RCRA status :

Not RCRA hazardous.

California Proposition 65 Information:

WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, acrylamide.

SECTION 16. Other information

NFPA and HMIS Ratings: NFPA:

Health: 0

Flammability: 1

Instability: 0

HMIS:

Health: 0

Flammability: 1

Physical Hazard: 0

PPE Code: B

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

SECTION 1. Identification of the substance/mixture and of the company/undertaking, SECTION 2. Hazards identification, SECTION 3. Composition/information on ingredients, SECTION 4. First aid measures, SECTION 5. Fire-fighting measures, SECTION 6. Accidental release measures, SECTION 7. Handling and storage, SECTION 8. Exposure controls/personal protection, SECTION 9. Physical and chemical properties, SECTION 10. Stability and reactivity, SECTION 11. Toxicological information, SECTION 12. Ecological information, SECTION 13. Disposal considerations, SECTION 14. Transport information, SECTION 15. Regulatory information, SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Abbreviations

Acute Tox. 4 = Acute toxicity Category Code 4

Asp. Tox. 1 = Aspiration hazard Category Code 1

Eye Dam 1 = Serious eye damage/eye irritation Category Code 1

H-Phrases

H302 - Harmful if swallowed

H304 - May be fatal if swallowed and enters airways

H318 - Causes serious eye damage

This SDS was prepared in accordance with the following:

Federal Regulation 29 CFR 1910.1200

The information contained herein is to the best of our knowledge and belief accurate. However, since the conditions of handling and use are beyond our control, Tramfloc, Inc. makes no guarantee for results obtained, and assumes no responsibility for damages incurred by use of this product. It is the responsibility of the user to comply with all federal, state, and local laws and regulations.

MATERIAL SAFETY DATA SHEET

FILE NO.:

PRETREATED BRINE

MSDS DATE: 10/8/2015

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **PRETREATED BRINE**
SYNONYMS: **BRINE SOLUTION, PRODUCED WATER, FORMATION WATER, FRACTIONATION WATER**
PRODUCT CODES: **N/A**

MANUFACTURER: **FAIRMONT BRINE PROCESSING, LLC**
DIVISION: **N/A**
ADDRESS: **168 AFR DRIVE | FAIRMONT, WV 26554**

EMERGENCY PHONE: **(412) 680-6244**
CHEMTREC PHONE: **(800) 424-9300 (24 HOURS)**
OTHER CALLS: **(304) 363-9876**
FAX PHONE: **(412) 231-5891**

CHEMICAL NAME: **BRINE SOLUTION**
CHEMICAL FAMILY: **MIXTURE**
CHEMICAL FORMULA: **MIXTURE**

PRODUCT USE: **EVAPORATION/ CRYSTALLIZATION**
PREPARED BY: **LDK**

SECTION 1 NOTES: Discharge from pretreatment process (after oil removal, chemical precipitation, clarification, and filtration)

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO.	% WT
Water	7732-18-5	80-95
Calcium chloride	10043-52-4	0-10
Potassium chloride	7447-40-7	0-10
Sodium chloride	7647-14-5	0-10
Residual metals	Various	<1
Benzene	71-43-2	<0.01

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: WARNING! Causes eye irritation. The product may contain benzene which may cause cancer and cause blood disorders.

ROUTES OF ENTRY: Eye contact. Skin contact. Ingestion. Inhalation.

POTENTIAL HEALTH EFFECTS

EYES: Causes eye irritation

SKIN: Prolonged or repeated skin contact may cause irritation.

INGESTION: May cause gastrointestinal irritation, nausea, vomiting and diarrhea

INHALATION: No inhalation hazard under normal conditions. If misting occurs: may cause mild mucous membrane irritation of the nose, throat, and upper respiratory tract.

ACUTE HEALTH HAZARDS: Causes eye irritation.

CHRONIC HEALTH HAZARDS: May contain benzene. Human epidemiology studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-producing system and serious blood disorders, including leukemia. Animal tests suggest that prolonged and/or repeated overexposure to benzene may damage the embryo/fetus. The relevance of these animal studies to humans has not been fully established.

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

OSHA:	Benzene (CAS 71-43-2)	Cancer hazard
ACGIH:	Benzene (CAS 71-43-2)	A1 Confirmed human carcinogen
NTP:	Benzene (CAS 71-43-2)	Known carcinogen
IARC:	Benzene (CAS 71-43-2)	1 Carcinogenic to humans

SECTION 4: FIRST AID MEASURES

EYES: In case of contact, immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Get medical attention if irritation persists.

SKIN: Remove contaminated clothing and shoes. Wash affected area with mild soap and water. Get medical attention if irritation develops and persists.

INGESTION: Rinse mouth thoroughly. Get medical attention if any discomfort occurs

INHALATION: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

SECTION 4 NOTES: If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES: This product is not flammable; however sufficient hydrocarbon vapors may accumulate from oil or natural gas condensate floating on the surface of the produced water to cause a flash fire. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water.

EXTINGUISHING MEDIA
SUITABLE EXTINGUISHING MEDIA: Dry chemical powder. Foam. Carbon dioxide (CO2).

PROTECTION OF FIREFIGHTERS
PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: A fire would be associated with vapors related to oil or natural gas condensate floating on the surface of the produced water. Water maybe ineffective on flames and may even spread the fire but should be used to cool pressurized containers in the fire.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS:
Firefighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with full face-piece operated in positive pressure mode. Use approved gas detectors in confined spaces.

SPECIFIC METHODS: Promptly isolate the scene by removing persons from the vicinity of the incident if there is a fire. Do not extinguish flames at leak because of the possibility of a uncontrolled re-ignition exists. If it is safe to do so, cut off fuel supply and/or allow fire to burn out. The fire should burn out fairly rapidly depending on the amount of oil and natural gas condensate floating on the surface of the produced water. If leak or spill has not ignited, water spray or ventilation can be used to disperse the vapors.

HAZARDOUS COMBUSTION PRODUCTS: Sodium oxides. Carbon oxides.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: Recover by pumping (use an explosion-proof motor or hand pump) or by sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Where feasible and appropriate, remove contaminated soil or flush with fresh water. On water spills utilize absorbent material to remove oil and natural gas liquid from the surface of the water.

SECTION 6 NOTES: Avoid excess skin contact with spilled material.

SECTION 7: HANDLING AND STORAGE

HANDLING: Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.

STORAGE: Keep containers in well-ventilated area away from flame, sparks, excessive temperatures and open flames. Keep the containers closed and clearly labeled. Empty product containers or vessels may contain vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Do not enter storage areas and confined spaces without adequate ventilation. Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s). Vapors containing benzene may accumulate during storage and transport.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: Ensure adequate ventilation, especially in confined areas.

RESPIRATORY PROTECTION: No personal respiratory equipment normally required.

EYE PROTECTION: If eye contact is likely, safety glasses should be worn.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION (Continued)

SKIN PROTECTION: No special garments required. Wash contaminated clothing prior to reuse.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: No other protective clothing or equipment is needed.

WORK HYGIENIC PRACTICES: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Handle in accordance with good industrial hygiene and safety practice.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Dirty colored liquid

ODOR: Faint hydrocarbon odor

PHYSICAL STATE: Liquid

pH AS SUPPLIED: 4.5-7.5
pH (Other):

BOILING POINT:
F: 212°
C: 100°
MELTING POINT:
F: N/A
C: N/A
FREEZING POINT:
F: < 32°
C: < 0°
VAPOR PRESSURE (mmHg): 13.6 (approx.)
@ **F:** 68°
C: 20°
VAPOR DENSITY (AIR = 1): <1
@ **F:** 68°
C: 20°
SPECIFIC GRAVITY (H2O = 1): 1.2 (approx.)
@ **F:** 68°
C: 20°

EVAPORATION RATE: N/A

SOLUBILITY IN WATER: Complete

PERCENT SOLIDS BY WEIGHT: N/A

PERCENT VOLATILE: N/A
BY WT/ BY VOL @
F:
C:
VOLATILE ORGANIC COMPOUNDS (VOC): N/A
WITH WATER: **LBS/GAL**
WITHOUT WATER: **LBS/GAL**

MOLECULAR WEIGHT: N/A

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY): Keep away from heat, sparks, and open flame.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon dioxide. Wator vapor. May produce oxides of sulfur. Carbon monoxide via incomplete combustion.

HAZARDOUS POLYMERIZATION: Does not occur.

CONDITIONS TO AVOID (POLYMERIZATION): N/A

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: This product may contain detectable but varying quantities of the naturally occurring radioactive substance Radium 226/228. Due to the long half life of Radium 226/228 (1600yr/5.75yr), there should not be significant radiation. The solution may cause eye and skin irritation.

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 12 NOTES: To be expected to be harmful to aquatic organisms.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Reuse or recycle if possible. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer. Waste water treatment system.

SECTION 14: TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
Status: Not regulated
CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
Status: Not regulated
OTHER AGENCIES:

SECTION 15: REGULATORY INFORMATION

U.S. REGULATIONS
OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.
EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.
EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10): Acute Health Hazard
EPCRA SECTION 313 (40 CFR 372.65): To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.
OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119): Not regulated.
STATE REGULATIONS:
INTERNATIONAL REGULATIONS:

SECTION 16: OTHER INFORMATION

IMPORTANT:
The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. **NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY OR OTHERWISE.** This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and OxyChem assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws. OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees.

SAFETY DATA SHEET

Revision Date: 05/26/15

1. IDENTIFICATION

Product Name: **HW 7**

Company: **Henwil Corporation**
P.O. Box 358
Newell, PA 15466
Phone: 724-938-3610 Fax: 724-938-3639

Emergency telephone number: 724-938-3610

Product Use: Silicone-based defoamer

2. HAZARDS IDENTIFICATION

Warning! May cause eye irritation. Prolonged or repeated contact with the undiluted product can cause skin dryness or irritation. Swallowing this product may cause gastrointestinal irritation, diarrhea, nausea, and vomiting.

Precautions – Do not eat, drink or smoke when using this product. Avoid contact with eyes, skin and clothing. Wear protective rubber gloves, safety goggles and protective clothing when handling. Use in well-ventilated area. Avoid breathing mist or vapor. Wash thoroughly after handling. Keep containers closed when not in use.

HMIS & NFPA Ratings:	HMIS	NFPA
Health:	0	-
Flammability:	0	-
Reactivity:	0	-
Additional information:	B	

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE: Possible skin and eye irritation.

CHRONIC OVEREXPOSURE: None known

3. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENTS	CAS NO.	WEIGHT%	PEL	TLV
None	-	-	-	-

Listed carcinogen by: IARC: no NTP: no OSHA: no ACGIH: no

Legend:
PEL: OSHA Permissible Exposure Limit
TD: Total dust
TWA: Time Weighted Average, 8-hr
TLV: ACGIH Threshold Limit
RF: Respirable fraction
NTES: None Established

4. FIRST-AID MEASURES

EYES: Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Seek medical attention.

SKIN: Wash thoroughly with soap and water, remove contaminated clothing and footwear. Wash clothing before reuse. Get medical attention immediately.

INHALATION: Remove victim from contaminated area to fresh air immediately. Get immediate medical attention. If breathing is difficult, give oxygen. Avoid mouth-to-mouth resuscitation.

INGESTION: NA

5. FIRE-FIGHTING MEASURES

FLASH POINT: > 200 °F (TCC)

AUTOIGNITION TEMPERATURE: NA

LOWER FLAMMABILITY LIMIT: NA

UPPER FLAMMABILITY LIMIT: NA

EXTINGUISHING MEDIA: Product will not burn until water is driven off; however, use extinguishing media as appropriate for the materials in the surrounding fire. On large fires, use dry chemical, foam, or water spray

FIRE FIGHTING PROCEDURES: Water spray should be used to keep drums cool if they are involved in a fire since heat will cause the product to expand and possibly cause the drums to explode from internal pressure.

6. ACCIDENTAL RELEASE MEASURES

Contain spill and salvage as much material as possible by pumping to a salvage tank or drum. Pick up remaining material with a suitable absorbent.

7. HANDLING AND STORAGE

Store at normal temperatures and conditions of warehousing. Keep container closed when not in use. Avoid allowing product to freeze. Wash contaminated clothing before re-wearing.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

COMPONENT	OSHA PEL	ACGIH TLV
None	-	-

VENTILATION REQUIREMENTS: Local exhaust, general mechanical.

EYE PROTECTION: Chemical splash goggles and/or face shield

SKIN PROTECTION: Wear appropriate personal protective clothing, including rubber gloves, to prevent skin contact

RESPIRATORY PROTECTION: Not normally required

OTHER REQUIRED EQUIPMENT: Standard work clothing and work shoes. Safety shower and eye wash located in immediate area

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Milky white, liquid emulsion
Odor:	Slight
Odor threshold:	NA
Upper/lower flammability or explosive limits:	NA
Boiling point:	212° F
Melting point/freezing point	NA
Flammability (solid, gas):	NA
Flash point:	NA
Vapor pressure:	NA
Solubility in water:	Translucent emulsion
Vapor density (air = 1):	NA
Specific gravity (water):	0.95 – 1.05
Evaporation rate:	NA
pH:	6 - 8 (neat)
Partition coefficient (n-octanol/water):	NA
Autoignition temperature:	NA
Decomposition temperature:	NA
Viscosity:	< 100 cps

10. STABILITY AND REACTIVITY

STABLE:	Yes. Acids will cause product to become very low in viscosity which will result in separation of the product.
HAZARDOUS POLYMERIZATION:	No
CONDITIONS TO AVOID:	NA
INCOMPATIBLE MATERIALS:	Strong oxidizers. Acids will cause product to become very low in viscosity which will result in separation of the product.
DECOMPOSITION PRODUCTS:	Carbon dioxide, carbon monoxide, and various hydrocarbons may be released during a fire.

11. TOXICOLOGICAL INFORMATION

PRINCIPAL ROUTES OF EXPOSURE: Skin, eyes and respiratory tract.

Ingestion:	May cause gastrointestinal irritation, nausea, vomiting and diarrhea.
Inhalation:	NA
Skin Contact:	Prolonged or repeated contact with the undiluted product can cause skin dryness or irritation.
Eye Contact:	Product is expected to cause eye irritation.

CARCINOGENICITY STATUS: Product does not contain any components in concentrations greater than or equal to 0.1% that are listed as known or suspected carcinogens by NTP, IARC, ACGIH or OSHA.

MUTAGENICITY/GENOTOXICITY/TERATOGENICITY: NA

ACUTE TOXICITY: NA

12. ECOLOGICAL INFORMATION

Acute Toxicity

Toxicity to fish:	N / A
Toxicity to daphnia:	LC_{50} / Daphnia (Ceriodaphnia dubia) / 48hr = 1649.4 mg / L
Toxicity to algae:	N / A

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable federal, state and local regulations. Empty containers should be taken for local recycling, recovery or waste disposal.

14. TRANSPORT INFORMATION

Not subject to DOT, IMDG, IATA regulations

15. REGULATORY INFORMATION

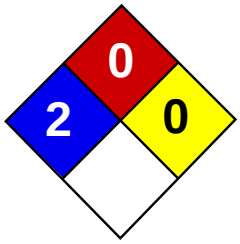
NA

16. OTHER INFORMATION

Person to contact: Product Manager

Legend:
NA = Not available NAPL: Not Applicable NTES = None Established

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



Material Safety Data Sheet
Sodium Hydroxide, 25% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Hydroxide, 25%

Catalog Codes: SLS4210

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Sodium hydroxide; Water

CI#: Not applicable.

Synonym:

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	25
Water	7732-18-5	75

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant), of eye contact (irritant), of ingestion. Hazardous in case of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Non-corrosive for skin. Non-irritant for skin. Non-sensitizer for skin. Non-permeator by skin. Non-irritating to the eyes. Non-hazardous in case of ingestion. Non-hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe

skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Finish by rinsing thoroughly with running water to avoid a possible infection. Cold water may be used.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe gas/fumes/ vapour/spray. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes Keep away from incompatibles such as acids.

Storage:
Alkalis may be stored in heavy duty gauge steel containers. Corrosive materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Sodium hydroxide CEIL: 2 (mg/m3) from ACGIH [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Odorless.

Taste: Alkaline. Bitter. (Strong.)

Molecular Weight: Not applicable.

Color: Clear Colorless.

pH (1% soln/water): Basic.

Boiling Point: The lowest known value is 100°C (212°F) (Water).

Melting Point: Not available.

Critical Temperature: Not available.

Specific Gravity: Weighted average: 1.15 (Water = 1)

Vapor Pressure: The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

Vapor Density: The highest known value is 0.62 (Air = 1) (Water).

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Extremely reactive or incompatible with acids.

Corrosivity:
Highly corrosive in presence of aluminum. Slightly corrosive to corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (corrosive, irritant), of ingestion. Hazardous in case of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 8: Corrosive liquid.

Identification: : Sodium hydroxide, solution (Sodium hydroxide) : UN1824 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Sodium hydroxide Massachusetts RTK: Sodium hydroxide TSCA 8(b) inventory: Sodium hydroxide; Water

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC): R35- Causes severe burns.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:05 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume

MSDS ID: 02450

I. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: ISOPLUS
Product Descriptor: BOILER TREATMENT COMPOUND
MANUFACTURER: DUBOIS CHEMICALS, INC. EMERGENCY PHONE NUMBER:(866)923-4919
3630 E. KEMPER ROAD
CINCINNATI, OH. 45241

II. HAZARDOUS COMPONENTS

Component Name	CAS Number	%	Exposure Limits	Units
POTASSIUM METABISULFITE	16731-55-8	5 - 15%	None established	
POTASSIUM SULFITE	10117-38-7	5 - 15%	None established	
SODIUM METABISULFITE	7681-57-4	5 - 15%	TLV 5	MG/M3
SODIUM SULFITE (7757-83-7)		5 - 15%	None established	

III. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
WARNING - Contains chemicals that cause irritation to eyes and skin. May be harmful if swallowed. Wear eye protection, clothing and rubber gloves to prevent prolonged skin contact. Wash after handling.
POSSIBLE ROUTES OF ENTRY: Inhalation and ingestion.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
ACUTE: EYES: Causes eye irritation. SKIN: Causes skin irritation. INGESTION: If swallowed, may cause gastric distress, diarrhea, vomiting and possible depression of the central nervous system (CNS). INHALATION: May cause irritation of respiratory tract.
CHRONIC: Same as acute effects.
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Dermatitis, sensitive skin, pulmonary function and asthma.
TARGET ORGAN(S) OF CHEMICAL HAZARD(S): Eyes, skin, respiratory tract, and gastrointestinal tract.

IV. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for 15 minutes. Get medical attention.
SKIN: Flush skin with plenty of water and wash with mild soap. If irritation develops, get medical attention.
INGESTION: If swallowed, rinse mouth with water. Dilute by drinking several glasses of water. DO NOT induce vomiting. If patient vomits, rerinse mouth. Get immediate medical attention. NOTE: Never give fluids by mouth to an unconscious person.
INHALATION: Remove to fresh air and seek medical attention.

V. FIRE FIGHTING MEASURES

FLASH POINT (degrees F): NONE FLAME EXTENSION: N/A
FLAMMABLE LIMITS IN AIR BY VOLUME: LEL: NONE UEL: NONE
UNUSUAL FIRE OR EXPLOSIVE HAZARDS: Toxic fumes or vapor may form during fire.
EXTINGUISHING MEDIA: Water, water spray, CO2, foam or dry powder.
FIRE FIGHTING INSTRUCTIONS: Wear full protective gear and positive pressure breathing apparatus SCBA) in fire area.
SPECIAL INSTRUCTIONS: Spilled product may cause slippery surface and fall hazard.

VI. ACCIDENTAL RELEASE MEASURES

IF MATERIAL IS RELEASED OR SPILLED:
Flush small amounts to drain. Collect and return large amounts to container.
This product does not contain a reportable quantity (RQ) under CERCLA.

VII. HANDLING AND STORAGE

HANDLING AND STORAGE PRECAUTIONS: Store in a cool, dry area, keep away from acids. Keep container closed when not in use. Wear protective gear when handling or using. Do not pressurize container to empty.

VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE/FACE PROTECTION: Safety glasses with side shields. Chemical goggles if contact or splash hazard exists.
PROTECTIVE GLOVES: Liquid proof gloves.
RESPIRATORY PROTECTION: Product does not have any established exposure limits. NIOSH/MSHA approved respirator recommended in enclosed or confined spaces where high air concentration or long exposure may occur.
OTHER PROTECTIVE CLOTHING/EQUIPMENT: Chemical apron.
ENGINEERING CONTROLS:
VENTILATION: Good general ventilation should be sufficient to control airborne levels.

IX. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Clear liquid, mild odor.

BOILING POINT (DEG F): 215 FREEZING POINT: 20 F
SPECIFIC GRAVITY/BULK DENSITY: 1.25
pH: 7.3 pH 1% SOLUTION: 7.0
VOLATILE BY VOLUME: 72
SOLUBILITY IN WATER: Soluble
VAPOR PRESSURE(mmHg): 17.5 at 20 C VAPOR DENSITY: 17.3

X. STABILITY AND REACTIVITY

CHEMICAL STABILITY: STABLE
INCOMPATIBILITY WITH OTHER MATERIALS: Acids
HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion forms; oxides of sulfur; oxides of carbon
HAZARDOUS POLYMERIZATION: None known.

XI. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL TESTING: Toxicological testing has not been performed on the product. Listed below is the available toxicology test data for components of the product.

TOXICITY TEST DATA:
Sodium Metabisulfite:

Oral LD50	(rat)	>2 gm/kg
Dermal LD50	(rat)	>2 gm/kg
Intravenous LD50	(rat)	115 mg/kg
Parenteral LD50	(rat)	910 mg/kg

XII. ECOLOGICAL INFORMATION

Toxicological testing has not been performed on the product. Listed below is the available toxicology test data for components of the product.
ECOTOXICITY TEST DATA:
Sodium Metabisulfite:
LC50 (96 hr) (Gambusia affinis) 120 mg/l
ENVIRONMENTAL FATE: No data available.

XIII. DISPOSAL CONSIDERATIONS

RCRA REGULATED: Not Regulated.
Discharge diluted product to industrial sewer in accordance with discharge permit or local POTW regulations. Use product in container until empty. Rinse container with water. Recycle or dispose of container according to product labeling or governmental regulations.

XIV. TRANSPORT INFORMATION

Please refer to the Bill of Lading/receiving documents for up to date shipping information.

XV. REGULATORY INFORMATION

U.S. Federal Regulations:
TSCA: All ingredients in this product are on TSCA inventory.
HAPS: NONE
VOC CONTENT (EPA Method 24A): % VOC: 0 Lb/Gal VOC: 0
CERCLA/EPCRA:
Section 313 Toxic Chemicals:
NONE
SARA Section 311/312:

XV. REGULATORY INFORMATION (Cont.)

ACUTE:YES CHRONIC:NO FIRE:NO REACTIVITY:NO
SUDDEN RELEASE OF PRESSURE:NO
LISTED CARCINOGEN: NONE
NTP: NO IARC: NO OSHA: NO
HMIS RATINGS: HEALTH: 2 FIRE: 0 REACTIVITY: 0
PERSONAL PROTECTIVE EQUIPMENT: C
NFPA RATING: HEALTH: 2 FIRE: 0 REACTIVITY:0 SPECIAL:IRRITANT
STATE RIGHT-TO-KNOW INFORMATION:
SODIUM SULFITE - CAS #7757-83-7
WATER - CAS #7732-18-5
POTASSIUM SULFITE - CAS #10117-38-1
SODIUM METABISULFITE - CAS #7681-57-4
POTASSIUM METABISULFITE - CAS #16731-55-8
CALIFORNIA PROPOSITION 65:
None of the ingredients are on the California proposition 65 list.

XVI. OTHER INFORMATION

Disclaimer: The information contained in this material safety data sheet is based on the knowledge of this specific product and current national legislation. It applies to the product as sold, use dilutions may be less hazardous. It may not be valid for this material if used in combination with any other materials or in a process. It is the user's responsibility to evaluate the handling, and use.

MATERIAL SAFETY DATA SHEET

CONDEN-SAF 4675

HMIS		NFPA	Personal protective equipment
Health	3	3	  
Fire Hazard	2	2	
Reactivity	0	0	

Version Number: 2 *Preparation date: 2008-12-01*

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: CONDEN-SAF 4675

MSDS #: MS0100823
Product Code: 00632070, 00632150, 00632470
Recommended use: Condensate line corrosion inhibitor .

Manufacturer, importer, supplier:
DuBois Chemicals, Inc.
3630 E. Kemper Rd.
Cincinnati, OH 45241
Phone: 1-800-438-2647

Canadian Headquarters
DuBois Chemicals Canada, Inc.
3450 Ridgeway Drive, Unit 2
Mississauga, Ontario L5L 0A2
Phone: 1-866-861-3603

Emergency telephone number: 1-866-923-4919 (US and Canada); 01-651-523-0314 (Int'l and México)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
DANGER. CORROSIVE. CAUSES SKIN AND EYE BURNS. HARMFUL OR FATAL IF SWALLOWED. COMBUSTIBLE LIQUID AND VAPOR.

Principle routes of exposure: Eye contact. Skin contact. Inhalation. Ingestion.
Eye contact: Corrosive. Causes permanent eye damage, including blindness.
Skin contact: Corrosive. Causes permanent damage.
Inhalation: May cause irritation and corrosive effects to nose, throat and respiratory tract.
Ingestion: Corrosive. Causes burns to mouth, throat and stomach.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous ingredients

Ingredient(s)	CAS #	Weight %	LD50 Oral - Rat (mg/kg)	LD50 Dermal - Rabbit	LC50 Inhalation - Rat
Morpholine	110-91-8	10 - 20%	1050	=310 mg/kg	8000 ppm (8h)
Diethylaminoethanol	100-37-8	10 - 20%	1300	=1260 mg/kg	Not available
Cyclohexylamine	108-91-8	10 - 20%	11	=208 mg/kg	>0.7 mg/L (4 h) >1.5 mg/L (1 h)

4. FIRST AID MEASURES

Eye contact: Immediately flush eyes with running water for at least 15-20 minutes, keeping eyelids open. Get medical attention immediately.
Skin contact: Flush immediately with plenty of water for at least 15-20 minutes. Get medical attention immediately.
Inhalation: If breathing is affected, remove to fresh air. Get medical attention immediately.
Ingestion: If swallowed, give a cupful of water or milk. THEN IMMEDIATELY CONTACT A PHYSICIAN OR POISON CENTER. DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Aggravated Medical Conditions: Individuals with chronic respiratory disorders such as asthma, chronic bronchitis, emphysema, etc., may be more susceptible to irritating effects.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media: Dry chemical, water spray, foam, carbon dioxide.
Specific hazards: Keep product and empty container away from heat and sources of ignition.
Unusual hazards: None known
Specific methods: No special methods required

5. FIRE-FIGHTING MEASURES

Special protective equipment for firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear
Extinguishing media which must not be used for safety reasons: No information available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Contaminated surfaces will be extremely slippery. Use personal protective equipment.
Environmental precautions and clean-up methods: Clean-up methods - large spillage. Prevent product from entering drains. Absorb spill with inert material (e.g. dry sand or earth), then place in a chemical waste container. Use a water rinse for final clean-up.

7. HANDLING AND STORAGE

Handling:
Avoid contact with skin, eyes and clothing. Do not taste or swallow. Avoid breathing vapors or mists. Use only with adequate ventilation. Remove and wash contaminated clothing and footwear before re-use. Wash thoroughly after handling. Product residue may remain on/in empty containers. All precautions for handling the product must be used in handling the empty container and residue. FOR COMMERCIAL AND INDUSTRIAL USE ONLY.
Storage:
Protect from freezing. Keep tightly closed in a dry, cool and well-ventilated place. Keep away from heat. KEEP OUT OF REACH OF CHILDREN.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures to reduce exposure:
Good general ventilation should be sufficient to control airborne levels.

Personal Protective Equipment

Eye protection: Chemical-splash goggles.
Hand protection: Chemical-resistant gloves
Skin and body protection: Protective footwear. If major exposure is possible, wear suitable protective clothing and footwear.
Respiratory protection: In case of insufficient ventilation wear suitable respiratory equipment. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.
Hygiene measures: Handle in accordance with good industrial hygiene and safety practice

Ingredient(s)	CAS #	ACGIH	OSHA	Mexico
Morpholine	110-91-8	20 ppm (TWA)	Skin 20 ppm (TWA) 70 mg/m^3 (TWA)	105 mg/m^3 (STEL) 30 ppm (STEL) 70 mg/m^3 (TWA) 20 ppm (TWA)
Diethylaminoethanol	100-37-8	2 ppm (TWA)	Skin 10 ppm (TWA) 50 mg/m^3 (TWA)	10 ppm (TWA) 50 mg/m^3 (TWA)
Cyclohexylamine	108-91-8	10 ppm (TWA)		40 mg/m^3 (TWA) 10 ppm (TWA)

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
pH: 12
Appearance: Liquid
Color: Clear
Odor: Amine
Specific gravity: 0.995 g/mL
Density: 8.3 lbs/gal
VOC: 40% *
Flash point: 145°F 97.5°C
Solubility: completely soluble
Viscosity: No information available

Bulk density: No information available
Dilution pH: 10.9
Vapor density: No information available
Evaporation Rate No information available
Boiling point/range: <200°F >100°C
Melting point/range: Not determined
Decomposition temperature: Not determined
Autoignition temperature: No information available
Partition coefficient (n-octanol/water): No information available
Solubility in other solvents: No information available
Elemental Phosphorus: 0 %P

* - Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Consumer Products, Sections 94508

10. STABILITY AND REACTIVITY

Stability: Stable.
Polymerization: Hazardous polymerization does not occur
Hazardous decomposition products: None reasonably foreseeable.

11. TOXICOLOGICAL INFORMATION

11. TOXICOLOGICAL INFORMATION

Acute toxicity: Oral LD50 estimated to be between 500 - 2000 mg/kg. Corrosive.
Component Information: See Section 3

Chronic toxicity: None known

Specific effects

Carcinogenic effects: None known
Mutagenic effects: None known
Reproductive toxicity: None known
Target organ effects: None known

Hazardous ingredients

Ingredient(s)	CAS #	NTP	IARC	OSHA
Cyclohexylamine	108-91-8		3	

12. ECOLOGICAL INFORMATION

Environmental Information: No data available

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products:
Undiluted product is regulated under environmental and transportation laws as a corrosive waste. Dispose of according to all federal, state and local applicable regulations.
RCRA Hazard Class: D002

14. TRANSPORT INFORMATION

DOT/TDG: Please refer to the Bill of Lading/receiving documents for up to date shipping information

15. REGULATORY INFORMATION

International Inventories
All components of this product are listed on the following inventories: U.S.A. (TSCA), Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Australia (AICS), Korea (ECL), Japan (ENCS), Philippines (PICCS), New Zealand (NZIoC), China (IECSC).

U.S. Regulations
California Proposition 65: This product is not subject to the reporting requirements under California's Proposition 65

STATE RIGHT TO KNOW

Ingredient(s)	CAS #	MARTK:	NJRTK:	PARTK:	RIRTK:
Morpholine	110-91-8	X	X	X	X
Water	7732-18-5	-	-	-	-
Diethylaminoethanol	100-37-8	X	X	X	X
Cyclohexylamine	108-91-8	X	X	X	X

CERCLA/ SARA

Ingredient(s)	CAS #	Weight %	CERCLA/SARA RQ (lbs)	Section 302 TPQ (lbs)	Section 313
Cyclohexylamine	108-91-8	10 - 20%		10000	

SARA 311/312 Hazard Categories

Immediate: X
Delayed: -
Fire: X
Reactivity: -
Sudden Release of Pressure: -

Canada
WHMIS hazard class: E Corrosive material , B3 Combustible liquid .

16. OTHER INFORMATION

Reason for revision: Not applicable
Prepared by: NAPRAC
Additional advice: None

16. OTHER INFORMATION

Notice to Reader: This document has been prepared using data from sources considered technically reliable. It does not constitute a warranty, express or implied, as to the accuracy of the information contained within. Actual conditions of use and handling are beyond seller's control. User is responsible to evaluate all available information when using product for any particular use and to comply with all Federal, State, Provincial and Local laws and regulations.

Material Safety Data Sheet

DUBOIS OH 50

1. Product and company identification

Product name : DUBOIS OH 50

Supplier/Manufacturer : DuBois Chemicals, Inc.
3630 E. Kemper Rd.
Cincinnati, OH 45241 USA
Phone: 1-800-438-2647

DuBois Chemicals Canada, Inc.
1155 North Service Road West
Unit 6
Oakville, Ontario, L6M 3E3 Canada
Phone: 1-866-861-3603

Recommended use : Industrial applications: Alkaline Cleaner ADDITIVE

MSDS # : MS0127133

Product code : 11728470, 11728300

Validation date : 12/12/2011.

Version : 1

Responsible name : Regulatory Department 1-800-438-2647

In case of emergency : 1-866-923-4919 (US and Canada)
01-651-523-0314 (Int'l and Mexico)

Hazardous Material Information System (U.S.A.) :

Health	*	3
Flammability		0
Physical hazards		1

2. Hazards identification

Physical state : Liquid.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : DANGER!

CORROSIVE. CAUSES DIGESTIVE TRACT, EYE AND SKIN BURNS.

Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system.

Ingestion : Corrosive to the digestive tract. Causes burns.

Skin : Corrosive to the skin. Causes burns.

Eyes : Corrosive to eyes. Causes burns.

Potential chronic health effects

Carcinogenicity : No known significant effects or critical hazards.

Target organs : Contains material which may cause damage to the following organs: upper respiratory tract, skin, eye, lens or cornea, stomach.

2. Hazards identification

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

3. Composition/information on ingredients

Name	CAS number	% by weight
sodium hydroxide sodium chloride	1310-73-2 7647-14-5	40 - 50 1 - 5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
halogenated compounds
metal oxide/oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from acids. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Separate from acids. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient	Exposure limits
sodium hydroxide	**ACGIH TLV (United States, 2/2010).** C: 2 mg/m³ **OSHA PEL (United States, 6/2010).** TWA: 2 mg/m³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

8. Exposure controls/personal protection

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Recommended: nitrile rubber

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. Recommended: splash goggles

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Personal protective equipment (Pictograms) :

9. Physical and chemical properties

Physical state : Liquid.

Flash point : Closed cup: >93.333°C (>200°F) [Pensky-Martens.]

Color : Colorless.

Odor : Not available.

pH : >13.5

Dilution pH : >13 [Conc. (% w/w): 1%]

Boiling/condensation point : Not available.

Melting/freezing point : Not available.

Specific gravity : 1.53

Density : 12.76785 lbs/gal

Vapor pressure : Not available.

Vapor density : Not available.

Odor threshold : Not available.

Evaporation rate : Not available.

Solubility : Easily soluble in the following materials: cold water and hot water.

Elemental Phosphorus : 0 %

Octanol/water partition coefficient : Not available.

10. Stability and reactivity

Chemical stability : The product is stable.

Conditions to avoid : No specific data.

Materials to avoid : Reactive or incompatible with the following materials:
acids

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
sodium chloride	LD50 Oral	Rat	3000 mg/kg	-

Carcinogenicity

None known.

Acute toxicity estimates

Not available.

12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

None known.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : D002 [corrosive]

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

IATA/IMDG/DOT/TDG: Please refer to the Bill of Lading/receiving documents for up to date shipping information.

15. Regulatory information

United States

U.S. Federal regulations : **TSCA 12(b) one-time export**: No products were found.
TSCA 12(b) annual export notification: No products were found.

United States inventory (TSCA 8b) : All components are listed or exempted.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: DUBOIS OH 50: reactive, Immediate (acute) health hazard

SARA 302/304/311/312 extremely hazardous substances: No products were found.

CERCLA: Hazardous substances.: sodium hydroxide: 1000 lbs. (454 kg);

15. Regulatory information

SARA 313

None identified.

State regulations

Massachusetts : The following components are listed: SODIUM HYDROXIDE

Rhode Island : None of the components are listed.

New Jersey : The following components are listed: SODIUM HYDROXIDE; CAUSTIC SODA

Pennsylvania : The following components are listed: SODIUM HYDROXIDE (NA(OH))

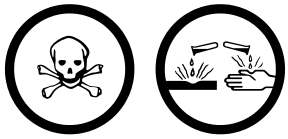
California Prop. 65

None of the components are listed.

Canada

WHMIS (Canada) : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class E: Corrosive material

WHMIS (Pictograms) :



Canadian lists

Canadian NPRI : None of the components are listed.

Canada inventory : All components are listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

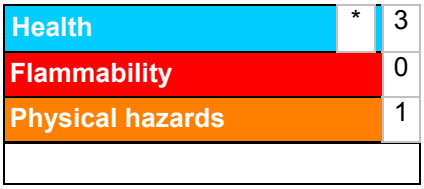
International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16. Other information

Hazardous Material Information System (U.S.A.) :



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

Date of issue : 12/12/2011.

Date of previous issue : No previous validation.

Version : 1

Indicates information that has changed from previously issued version.

Notice to reader

16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

Section I

Product Name	**ZT-65**		
Emergency Telephone No.	**(616) 241 - 4684**	Date Issued	**3/27/2009**
Manufacturer's Name and Address	**Mitco, Inc. 1601 Steele S.W. Grand Rapids, MI 49507**	Supersedes	**10/27/2008**
		Chemical Family	**Aqueous Mixture**
Hazardous Material Description, Shipping Name Hazard Class, Hazard ID No.(49 CFR 172.101)	**Corrosive Liquid, Acidic, Organic, N.O.S., (Citric Acid Solution), 8, UN3265, III**		

Section II – HAZARDOUS INGREDIENTS

		Listed as Carcinogen or Potential Carcinogen						Reporting Required
Chemical Name	CAS Registry Number	National Toxicology Program	I.A.R.C. Mono-graph	OSHA	OSHA Permissible Exposure Limit	ACGIH Threshold Limit Value	Other Exposure Limit	Sec. 313 of Title III And 40CFR 372
Citric Acid	77-92-9	No	No	No	N/A	N/A	N/A	No

Section III – PHYSICAL DATA

Boiling Point (°F)	**212°F**	Specific Gravity (H2O = 1)	**1.2-1.3**
Vapor Pressure (mm Hg)	**17.5 @ 20°C**	Percent, Volatile By Volume (%)	**N/A**
Vapor Density (AIR = 1)	**1**	Evaporation Rate (Water = 1)	**1**
Solubility in Water	**Complete**	pH	**1.4**
Appearance and Odor	**Clear solution with no odor.**		

Section IV – FIRE AND EXPLOSION HAZARD DATA

Flash Point (°F)	**>200**	Flammable Limits	LEL	**N/A**
Method Used	**N/A**		UEL	**N/A**
Extinguishing Media	**Carbon dioxide, dry chemical, foam or water spray.**			
Special Fire Fighting Procedures	**N/A**			
Unusual Fire and Explosion Hazards	**N/A**			

Section V – HEALTH HAZARD DATA

Primary Routes of Entry	Inhalation	**No**	Skin Contact	**Yes**	Eyes	**Yes**
Effects of Overexposure	**Acid solution. Corrosive to skin and eyes. Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of the material from eyes, skin, and clothing.**					
Emergency and First Aid Procedures	**In case of contact with skin, wash at once with soap and water. For eyes, flush with water for at least 15 minutes and get medical attention. Wash contaminated clothing before reuse.**					

Section VI – REACTIVITY DATA

Chemical Stability	**Stable**	Hazardous Polymerization	**Will not occur**
Conditions to Avoid	**N/A**		
Incompatibility (materials to avoid)	**None known.**		
Hazardous Decomposition Products	**None Known**		

Section VII – SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled	**Flush small spills to sanitary sewer with water. Contain large spills.**
Waste Disposal Method	**Neutralize solution carefully with alkaline material and flush to sanitary drain.**

Section VIII – SPECIAL PROTECTION INFORMATION

Respiratory Protection	**Not normally necessary.**						
Ventilation	**Not Necessary**	Local Exhaust	**N/A**	Mechanical (General)	**N/A**	Special	**N/A**
Eye Protection	**Chemical goggles**						
Protective Gloves	**Rubber**						
Other Protective Clothing or Equipment	**Rubber boots and apron if contact appears likely.**						

Section IX – SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage	**N/A**
Other Precautions	**N/A**

Fairmont Brine Processing

Material Safety Data Sheet

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name Heavy Brine

Synonyms: Mother Liquor, Centrate, Mixed Salt Solution

Manufacturer: Fairmont Brine Processing, LLC

Address: 168 AFR Drive
Fairmont, WV 26554

Emergency Phone: 304-363-9876

WHMIS Classification: Not Controlled

Chemical Family: H2O, CaCl2, NaCl, SrCl2, MgCl2, KCl

Product Use: De-icing, Dust Control, Drilling & Hydraulic-Fracturing

MSDS Revision Date: June 17th, 2014

Supercedes: December 6th, 2013

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

Composition:

Name	% by Weight	CAS #
Water	60 – 75%	7732-18-5
Calcium chloride	18-24%	10043-52-4
Sodium chloride	7-12%	7647-14-5
Strontium chloride	0-1%	10476-85-4
Magnesium chloride	0-1%	7786-30-3
Potassium chloride	0-1%	7447-40-7

SECTION 3: PHYSICAL STATE

Physical State: Liquid

Appearance/Odor: Colorless, Orange or Rust

Odor Threshold: Odorless

SECTION 4: HAZARDS IDENTIFICATION

Potential Acute Health Effects: Hazardous in case of sking contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to heart, cardiovascular system. Repeated or Prolonged exposure to the substance can produce target organs damage.

SECTION 4: FIRST AID MEASURES

Eye Contact:

Check for and remove any contact lenses. In cae of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiriation. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediatelly. Loosen tight clothing such as a collar, tie, belt or waistband.

SECTION 5: FIRE AND EXPLOSION DATA

Flammability of the Product:

Non-flammable.

Auto-Ignition Temperature:

Non-applicable.

Flash Points:

Not applicable.

Flammable Limits:

Not applicable.

Products of Combustion:

Not available.

Fire Hazards in Presence of Various Substances:

Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Meida and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Furan-2-peroxycarboxylic acid + calcium chloride causes explosion at room temperature.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Small and/or Large Spill: Contain spilled material if possible. Absorb with materials such as sand. Use appropriate tools to put the spilled liquid in a suitable and properly labled disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

SECTION 7: HANDLING AND STORAGE

Storage Conditions: Keep container tightly closed. Protect from atmospheric moisture.

Handling Procedures: Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Regulatory Exposure Limit(s):

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Particles not otherwise regulated	TWA 15 mg/m3 (total) TWA 5 mg/m3 (respirable)	-------	-------

Non-Regulatory Exposure Limit(s):

Component	CAS #	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (vacated)	OSHA STEL (vacated)	OSHA Ceiling (vacated)
Particles Not Otherwise Specified (PNOS)	--------	TWA 10 mg/m3 (inhalable) TWA 3 mg/m3 (respirable)	-------	--------	-------	-------	--------

OEL: Occupational Exposure Limit

OSHA: United States Occupational Safety and Health Administration

PEL: Permissible Exposure Limit

TWA: Time Weighted Average

STEL: Short Term Exposure Limit

The Non-Regulatory United States Occupational Safety and Health Administration (OSHA) limits shown in the table are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).
- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

Engineering Controls:

Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:

Wear chemical safety goggles.

Skin and Body Protection:

Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly.

Hand Protection:

Use gloves chemically resistant to this material. If hands are cut or scratched, use gloves chemically resistant to this material even for brief exposures. Examples of preferred glove barrier materials include: Neoprene, Polyvinyl chloride ("PVC" or "vinyl"), Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier. Avoid gloves made of Polyvinyl alcohol (PVA).

Respiratory Protection:

Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. In dusty or misty atmospheres, use an approved particulate respirator. The following should be effective types of air-purifying respirators: High efficiency particulate air (HEPA) N95. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical state and appearance:	Liquid.
Color:	Colorless to orange or rust.
Odor:	Odorless.
Boiling Point/Range:	108 C (226 F) Literature.
Freezing Point/Range:	-15 F to -35 F
Melting Point/Range:	Not applicable.
Decomposition Temperature:	Not applicable.
Vapor Pressure:	16 mmHg@ 25 C Literature.
Vapor Density (air=1):	Not applicable.
Specific Gravity (water=1):	1.219 - 1.263 Literature.
Water Solubility:	Completely miscible.
pH:	5-7.5
Flash point:	Not applicable.
Lower Flammability Level (air):	Not applicable.
Upper Flammability Level (air):	Not applicable.
Autoignition Temperature:	Not applicable.
Viscosity:	2.6 cSt @ 25 C Typical

SECTION 10: STABILITY AND REACTIVITY DATA

Stability:	This product is stable.
Conditions to Avoid:	None known.
Incompatibility with various substances:	Avoid contact with: Sulfuric acid. Flammable hydrogen may be generated from contact with metals such as: Zinc and Sodium. Reaction of bromide impurity with oxidizing materials may generate trace levels of impurities such as bromate.
Corrosivity:	Corrosive to some metals. Avoid contact with metals such as brass, ferrous metals, and mild steel.

Hazardous Decomposition Products: Does not decompose.

Hazardous Polymerization: Will not occur.

SECTION 11: TOXICOLOGICAL INFORMATION

Routes of Entry: Abosorbed through skin. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 918 - 1,668 mg/kg (Rat).

Chronic Effects on Humans: MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: heart, cardiovascular system.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Lowest Published Lethal Dose: LDL (Rabbit) – Route: Oral; Dose: >5,000 mg/kg

Carcinogenity: This product is not classified as a carcinogen by NTP, IARC or OSHA.

SECTION 12: ECOLOGICAL INFORMATION

Fate and Transport: Material is practically non-toxic to aquatic organisms on an acute basis.

Biodegradation: Not applicable.

Bioconcentration: No bioconcentration is expected due to relatively high water solubility. Potential for mobility in soil is very high (Koc between 0 and 50). Partitioning from water to n-octanol is not applicable.

SECTION 13: DISPOSAL CONSIDERATIONS

Disposal: Reuse or recycle if possible. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer or Waste Water Treatment System.

SECTION 14: TRANSPORT INFORMATION

U.S. Deparmtnet of Transportation: As applicable to user's operations and state or country regulations.

Department of Environmental Protection: As applicable to user's operations and state or country regulations.

Environmental Protection Agency: As applicable to user's operations and state or country regulations.

State and or County Regulations: As applicable to user's operations and state or country regulations.

SECTION 15: REGULATORY INFORMATION

OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). **CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):** Not regulated. **EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated. **EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):** Acute Health Hazard **EPCRA SECTION 313 (40 CFR 372.65):** To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute. **OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119):** Not regulated.

SECTION 16: OTHER INFORMATION

References: Not available.

Other Special Considerations: Not available.

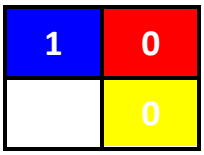
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own invesitgations to determine the suitability of the information for theur particular purposes. In no event shall Fairmont Brine Processing, LLC be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fairmont Brine Processing, LLC has been advised of the possibility of such damages. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and Fairmont Brine Processing, LLC assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws.
OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. Fairmont Brine Processing, LLC requests that you, and it is your legal duty to, make all information in this Material Safety Data Sheet available to your employees.

MATERIAL SAFETY DATA SHEET

Process Salt

FILE NO.: 2.0
MSDS DATE: 1/1/2014

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION



PRODUCT NAME:	**Process Salt**
SYNONYMS:	**Salt, Road Salt, Rock Salt**
MANUFACTURER:	**Fairmont Brine Processing**
ADDRESS:	**168 AFR Drive Fairmont, WV 26554**
EMERGENCY PHONE:	**304-363-9876**
WHMIS Classification:	**Not Controlled**
CHEMICAL FAMILY:	**Inorganic Salt**
PRODUCT USE:	**De-icing**

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

Components:	**CAS NO.**	**% WT**
Sodium Chloride	**7647-14-5**	**94.0% to 98%**

SECTION 3: PHYSICAL DATA

Physical State:	**Solid**
Appearance/Odor	**White to off-white crystals / odorless**
Odor Threshold:	**N/A**
Specific Gravity:	**2.165 g/cm^3**
pH:	**N/A**
Vapor Pressure:	**2.4**
Solubility in Water:	**317 g/L**
% Volaitile:	**N/A**
Vapor Density:	**N/A**

SECTION 4: FIRE AND EXPLOSION HAZARD

Flammability:	**No**
If yes, under what conditions:	**N/A**
Means of Extinguishing:	**N/A**
Special Procedure:	**None. Product can be used to extinguish fire.**
Flash Point:	**N/A**
Upper Explosion Limit:	**N/A**
Lower Explosion Limit:	**N/A**
Auto Ignition Temperature:	**N/A**
Sensitifvity to Mechanical Impact:	**N/A**
Sensitivity to Static Discharge:	**N/A**

SECTION 5: REACTIVITY DATA

Chemical Stability:	**Yes**
If no, under what condition:	**N/A**
Incompatibility With Other Substances:	**Yes**
If so, which ones:	**Corrosive to some metals such as brass, mild steel, aluminum or ferrous metals.**
Reativity Under What Conditions:	**N/A**
Hazardous Decomposition Products:	**Chlorine fumes are given off at temperatures >1600°C**

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SECTION 6: HEALTH HAZARDS

Route of Entry:	**Skin contact and ingestion**
Effect of Acute Exposure to Material:	**Moderately toxic LD50 (oral rate): 1000 mg/Kg**
Effect of Chronic Exposure to Material:	**Unknown**
Exposure Limit:	**TW AEV for nuisance particulates 10 mg/m^3**
Synergetic Material:	**None**
Irritancy of Material:	**Minor irritant**
Sensitivity of Material:	**Does not occur**
Carcinogenetic, Reproductive Effects:	**None**

SECTION 7: FIRST AID MEASURES

Eye Contact:	**In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Seek medical attention immediately.**
Skin Contact:	**Remove from skin by wiping and washing thoroughly with water.**
Inhalation:	**Remove victim to fresh air.**
Ingestion:	**If discomfort exists, induce vomiting. Seek medical attention immediately.**

SECTION 8: PREVENTATIVE MEASURES

Eye Contact:	**Wear safety goggles.**
Skin Contact:	**Wear rubber gloves, boots and long sleeve shirts.**
Inhalation:	**For dusty or misty conditions, wear NIOSH approved dust or mist respirator.**
Engineering Controls:	**Mechanical ventilation recommended in enclosed areas.**
Waste Disposal:	**Dispose of material in government approved landfill site in accordance with local laws.**
Handling Procedures and Equipment:	**Wash skin and equipment with water.**
Storage Rquirements:	**Store in cool dry area.**
Special Shipping Information:	**No special shipping procedures.**

SECTION 9: PREPARATION INFORMATION

Prepared By:	**Fairmont Brine Processing, LLC**
Telephone:	**304-363-9876**
Preparation Date:	**January, 2014**
Superseded Date:	**All Previous Versions**

Fairmont Brine Processing

ATTACHMENT I

EMISSION UNITS TABLE

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
S-1	E-1	Natural Gas Boiler #1	2009	30 mmbtu/hr	Existing	None
S-2	E-2	Rotary Dryer #1	2009	10 mmbtu/hr	Existing	None
S-3	E-3	Evaporator	2016	9,450 gph brine	Modification 2016	GAC-3
T-01	E-4	Crude Oil Storage Tank	2009	15,000 gal	Existing	None
S-5	E-5	Emergency Generator	Not installed	NA	Not installed	NA
S-6	E-6	Lime Silo	2016	5,000 cu. ft.	New 2016	01-F-015
S-7	E-7	Natural Gas Boiler #2	2016	27 mmbtu/hr	New 2016	None

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

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ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
E-1	Upward Vertical Stack	S-1	Boiler	NA	NA	NA	NA	CO NOx PM SO2 VOC	1.40 1.10 0.18 0.02 0.11	6.13 4.80 0.79 0.09 0.50	NA	NA	Gas/Vapor; Solid	EE	
E-2	Upward Vertical Stack	S-2	Rotary Dryer	NA	NA	NA	NA	CO NOx PM SO2 VOC	0.34 0.40 0.03 0.002 0.02	1.48 1.76 0.13 0.01 0.10	NA	NA	Gas/Vapor; Solid	EE	
E-3	Upward Vertical Stack	S-3	Evap-orator	GAC-3	Activated Carbon	NA	NA	VOC HAP TAP	0.80 0.26 0.13	3.50 1.13 0.58	0.16 0.05 0.03	0.70 0.23 0.12	Gas/Vapor	EE	See Tables 3 and 4
								See Tables 3 and 4 on Page 4 of this attachment for speciation profile.							

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data (Continued)

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
E-4	Upward Vertical Stack	T-1	Oil Storage Tank	NA	NA	NA	NA	VOC	19.69	0.27	NA	NA	Gas/Vapor	EE	
E-6	Upward Vertical Stack	S-6	Lime Silo	01-F-015	Bag-house	NA	NA	PM	74	20	0.07	0.02	Solid	EE	NA
E-7	Upward Vertical Stack	S-7	Boiler	NA	NA	NA	NA	CO NOx PM SO2 VOC	1.26 2.34 0.19 0.02 0.12	5.50 10.26 0.82 0.09 0.53	NA	NA	Gas/Vapor	EE	51.58 ppmv 58.62[8] ppmv NA 0.36 ppmv 8 ppmv

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

[8] Assumed all NO_x as NO_2

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{o}F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
E-1	2	302	15,000	80	950	20	4373.520	575.175
E-2	1	250	5,000	106	950	20	4373.520	575.175
E-3	0.83	90	200	6	950	9	4373.520	575.175
E-4	0.25	70	Minimal	Minimal	1,000	20	4373.520	575.175
E-6	0.25' x 0.583'	70	700	80	1,000	67	4373.520	575.175
E-7	2	328	8,350	44	950	32	4373.520	575.175

[1] Give at operating conditions. Include inerts.

[2] Release height of emissions above ground level.

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 3: Emissions Point E-3
Maximum Potential Uncontrolled Emissions

Pollutant	VOC/HAP/TAP	lb/hour	tons/year	ppmv
Arsenic	HAP	0.024	0.11	9.48
Benzene	VOC/HAP/TAP	0.132	0.58	49.85
Bis(2-ethylhexyl)phthalate	SVOC/HAP	0.002	0.01	0.12
Cadmium	HAP	0.003	0.01	0.87
Chromium	HAP	0.006	0.03	3.62
Cobalt	HAP	0.012	0.05	6.15
Decane	SVOC	0.503	2.20	104.27
Dimethyl phthalate	SVOC	0.002	0.01	0.31
Lead	HAP	0.018	0.08	2.58
Nickel	HAP	0.047	0.21	23.85
Nitrated Hydrocarbons, Total	SVOC	0.006	0.03	NA
Octadecane	SVOC	0.153	0.67	17.79
Selenium	HAP	0.013	0.06	4.76
VOC		**0.80**	**3.50**	**-**
HAP		**0.26**	**1.13**	**-**
TAP		**0.13**	**0.58**	**-**

Table 4: Emissions Point E-3
Maximum Potential Controlled Emissions

Pollutant	VOC/HAP/TAP	lb/hour	tons/year	ppmv
Arsenic	HAP	0.005	0.021	1.90
Benzene	VOC/HAP/TAP	0.026	0.116	9.97
Bis(2-ethylhexyl)phthalate	SVOC/HAP	0.0003	0.001	0.02
Cadmium	HAP	0.001	0.003	0.17
Chromium	HAP	0.001	0.006	0.72
Cobalt	HAP	0.002	0.011	1.23
Decane	SVOC	0.101	0.441	20.85
Dimethyl phthalate	SVOC	0.0004	0.002	0.06
Lead	HAP	0.004	0.016	0.52
Nickel	HAP	0.009	0.042	4.77
Nitrated Hydrocarbons, Total	SVOC	0.001	0.005	NA
Octadecane	SVOC	0.031	0.134	3.56
Selenium	HAP	0.003	0.011	0.95
VOC		**0.16**	**0.70**	**-**
HAP		**0.05**	**0.23**	**-**
TAP		**0.03**	**0.12**	**-**

Fairmont Brine Processing

ATTACHMENT L

EMISSIONS UNIT DATA SHEETS

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Source ID S-6

1. Name or type and model of proposed affected source:

   Storage silo for hydrated lime

   Reference Attachment L-1.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   Hydrated lime estimated filling rate = 29,333 pounds per hour (based on 44,000 pounds per fill event and a 1.5-hour filling duration)

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   Hydrated lime estimated usage rate = 1,800 pounds per hour

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

NA

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

NA

(c) Theoretical combustion air requirement (ACF/unit of fuel):

NA @ NA °F and NA psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

NA

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: NA $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ 70 °F and 22 psia

a.	NO_X		lb/hr		grains/ACF
b.	SO_2		lb/hr		grains/ACF
c.	CO		lb/hr		grains/ACF
d.	PM_{10}	74	lb/hr	10	grains/ACF
e.	Hydrocarbons		lb/hr		grains/ACF
f.	VOCs		lb/hr		grains/ACF
g.	Pb		lb/hr		grains/ACF
h.	Specify other(s)				
			lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Reference Attachment M for 01-F-015.	Reference Attachment M for 01-F-015.
REPORTING	**TESTING**
Reference Attachment M for 01-F-015.	Reference Attachment M for 01-F-015.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

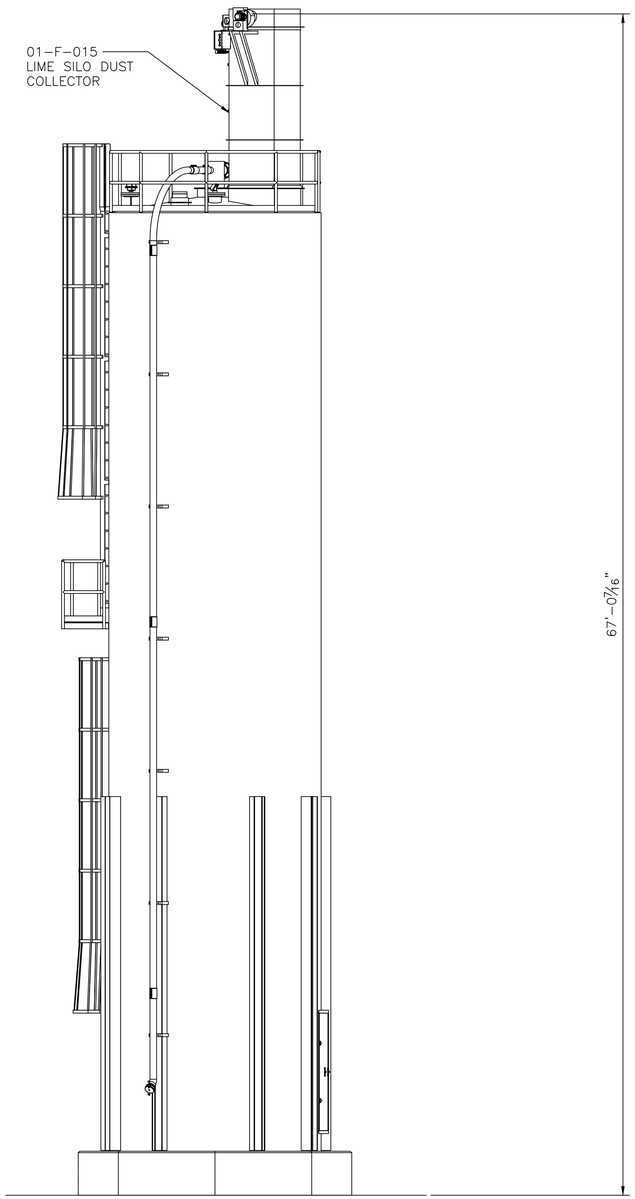
NA

Fairmont Brine Processing

ATTACHMENT L-1

Source ID S-6 Lime Silo

SK-0007



01-TK-015 "LIME SILO"

SCALE: 1/4"=1'-0"

REVISION A IN PROGRESS

PRELIMINARY

NO.	REVISION	DWN	CHK	ENG	PM	DATE
A	FOR AIR PERMIT APPLICATION	JSH				

DESIGNED/DWN BY	JSH DATE 06/10/16
CHECKED BY	– DATE –
CHECKED BY ENGR	– DATE –
APPROVED BY PM	– DATE –
APPROVED BY MANAGER OF ENGR	– DATE –
SCALE	–

VENTURE

Fairmont Brine Processing

Venture Engineering & Construction

CONTRACT C12-1110-00 Pittsburgh, PA

FAIRMONT BRINE PROCESSING
FAIRMONT, WV

BRINE PROCESSING PLANT

ATTACHMENT L-1
LIME SILO

DRAWING NUMBER SK-0007

REV. A

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): No control device Source ID S-7

Equipment Information

1. Manufacturer: Cleaver-Brooks	2. Model No. CB 800-300# Stm. Serial No. 78837
3. Number of units: 1	4. Use Process steam for evaporator (redundant heat source)
5. Rated Boiler Horsepower: 800 hp	6. Boiler Serial No.: 78837
7. Date constructed: 1982	8. Date of last modification and explain: 2016; added flue-gas recirculation system
9. Maximum design heat input per unit: 33.48 $\times 10^6$ BTU/hr	10. Peak heat input per unit: 33.48 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: 27,600 LB/hr 300 psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☒ Natural Gas Burner ☐ Others, specify	14. Proposed type of burners and orientation: ☐ Vertical ☒ Front Wall ☐ Opposed ☐ Tangential ☐ Others, specify
15. Type of draft: ☒ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flyash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flyash: NA %

Stack or Vent Data

19. Inside diameter or dimensions: 2 ft.	20. Gas exit temperature: 328 °F
21. Height: 31.5 ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: 8,350 ft^3/min	
24. Estimated percent of moisture: 12 %	

Fuel Requirements

25.	Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Other:
	Quantity (at Design Output)	gph@60°F	33,480 ft^3/hr	ft^3/hr	TPH	
	Annually	$\times 10^3$ gal	293.3 $\times 10^6$ ft^3/yr	$\times 10^6$ ft^3/hr	tons	
	Sulfur	Maximum: wt. % Average: wt. %	0 gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	
	Ash (%)		NA		Maximum	
	BTU Content	BTU/Gal. Lbs/Gal.@60°F	1000 BTU/ft^3	BTU/ft^3	BTU/lb	
	Source		NA			
	Supplier		Dominion			
	Halogens (Yes/No)		No			
	List and Identify Metals		NA			

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☒ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture: Cleaver-Brooks

28. Oil burner manufacture: NA

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure ☐ Compressed Air ☐ Rotary Cup ☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
5,320 acfm @ 60 °F, 14.7 PSIA, 50 % moisture

33. Emission rate at rated capacity: 25,194 lb/hr

34. Percent excess air actually required for combustion of the fuel described: 10 %

Coal Characteristics

35. Seams: NA

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur:
% of Moisture: % of Volatile Matter:
% of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	1.26	0.018	328	14.7
Hydrocarbons				
NO_x	2.34	0.033	328	14.7
Pb				
PM_{10}	0.19	0.003	328	14.7
SO_2	0.02	0.0003	328	14.7
VOCs	0.12	0.002	328	14.7
Other (specify)				

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO				
Hydrocarbons				
NO_x				
Pb				
PM_{10}				
SO_2				
VOCs				
Other (specify)				

39. How will waste material from the process and control equipment be disposed of?
NA

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. No

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? Yes

42. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Boiler inspections with stack testing will be performed annually.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Records of annual boiler inspections and stack testing will be retained.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

NA

Fairmont Brine Processing

ATTACHMENT M

AIR POLLUTION CONTROL DEVICE SHEETS

Attachment M
Air Pollution Control Device Sheet
(ADSORPTION SYSTEM)

Control Device ID No. (must match Emission Units Table): GAC-3

Equipment Information

1. Name of Control Device: Carbon Adsorber	2. Manufacturer: Tigg Model No. N-1800-PDB
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. **Reference Attachment M-1.**	

Gas Stream Characteristics

4. Gas Flow Rate into the Collector:
   ACFM 200 @ 90 °F
   Relative Humidity 100%

5. Emission Rate of each Pollutant (Specify) into and out of Collector:

	IN			OUT		
Pollutant	**lb/hr**	**grains/acf**	**ppm (volume)**	**lb/hr**	**grains/acf**	**ppm (volume)**
A						
B						
C	**Reference Attachment M-2.**					
D						
E						

6. LEL (lower explosive limit) for most volatile pollutant: Pollutant PPM

7. List vapor pressure (mmHg) at the operating temperature for each pollutant in inlet stream:

	Pollutant	**Temp**	**MmHg**
A			
B			
C	**Reference Attachment M-2.**		
D			
E			

Adsorbent Characteristics

8. Adsorbent: Type: Activated Carbon
   Manufacturer: Tigg
   Grade No.: 5CC, 60 CCl_4
   Specifications: 5CC 0408

9. Maximum adsorbate loading:
   0.29 lb pollutant/lb of adsorbent

10. Pressure drop across unit:
    3.5 (in inches of water)

11. Number of beds per unit:
    One (1)

12. Weight of adsorbent material per bed:
    1700 lb

13. Adsorbent media average particle size:
    4000 microns

14. Adsorber geometry:

Length:	6	ft
Diameter:	4.75	ft
Bed Depth:	4	ft
Bed Surface Area:	17.7	ft^2
Bed Volume:	70	ft^3

15. Temperature Range Adsorption:

Min. Temp.	NA	°F
Max. Temp.	180	°F
Average Temp.	90	°F

16. Cycle time for adsorption: Continuous

17. Frequency of adsorbent replacement:
    As required based on pressure drop

18. Cycle time for drying before adsorbing:
    NA hr

19. Saturation Capacity of Pollutant on adsorbent (supply units): 0.29 lb pollutant/lb of adsorbent

20. Length of mass transfer zone: 48 in

Regenerative Systems

21. Type of regeneration: ☒ Replacement ☐ Stream ☐ Other, specify:

22. Method of Regeneration:
☐ Alternate use of entire units ☒ Source shut down
☐ Alternate use of beds in a single unit ☐ Other (describe):

23. Cycle time for regeneration: NA hr

24. Emission steam velocity through bed: NA ft/min

25. Steam flow rate: NA lb/min
Steam temp.: NA °F
Steam pressure: NA PSIA

26. Disposition of vapors during regeneration:

NA – Replacement will require plant during shut down

27. Guaranteed minimum efficiency per pollutant captured:

	Captured Pollutant	Minimum Efficiency
A	All	Assumed 80 %
B		%
C		%
D		%
E		%

28. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

None

29. Describe the collection material disposal system:

Off-site treatment by vendor.

30. Have you included ***Adsorption Control Device*** in the Emissions Points Data Summary Sheet? Yes

31. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Continuous monitoring of system pressure	System pressure readings can be obtained from the process control system historian.
REPORTING:	TESTING:

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

32. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

For well adsorbed organics it is expected that the contaminants would be removed to non-detectable limits.

33. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

80% assumed for emissions calculations

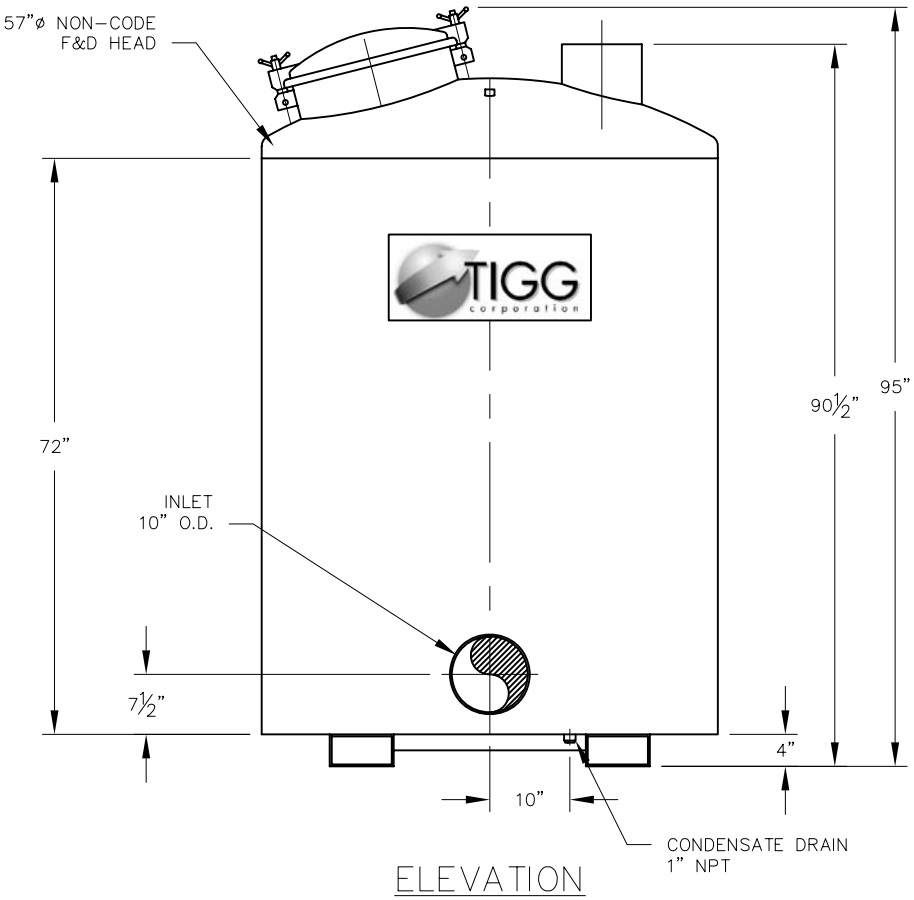
34. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

NA

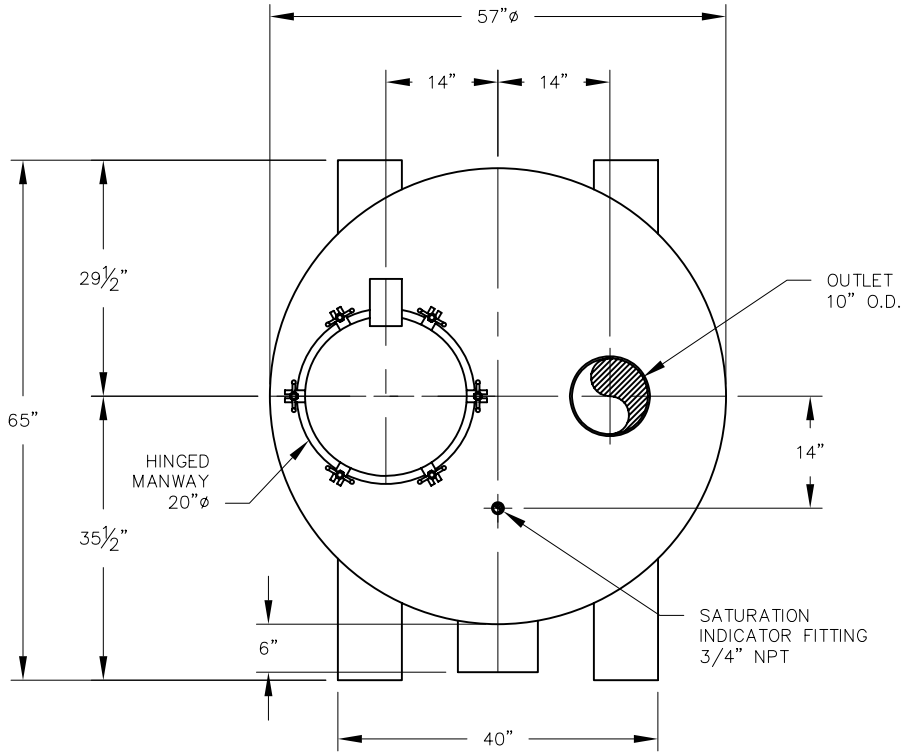
Fairmont Brine Processing

ATTACHMENT M-1

GAC-3 Vessel Drawing



ELEVATION



PLAN

* STAINLESS STEEL BED RETENTION PLATE; 140°F WITH PE PLATE

NO.	REVISION	BY	DATE
5	HINGED MANWAY	JB	9/6/06
4	REVISE CARBON FILL	JB	1/20/04
3	SUBTRACT VENT	JB	5/14/03
2	CHANGE EXTERIOR PAINT	JB	5/7/03
1	TITLE BLOCK	JB	8/27/02

VESSEL STANDARDS

VESSEL MATERIALS : A36 CARBON STEEL	LIQUID DRAIN ASSEMBLY : 1" HDPE PLUG
LINING : HIGH SOLIDS EPOXY	VOLUME OF VESSEL : 82 FT (NOT INCLUDING TOP HEAD)
EXTERIOR PAINT : ACRYLIC ALKYD ENAMEL	STANDARD/MAX CARBON FILL : 1500 LBS / 2000 LBS
HEAD THICKNESS : 3/16"	SHIP WT. STD.FILL : 2925 LBS
BOTTOM PLATE THICKNESS : 3/16"	CARBON TYPE : TIGG 4MM PELLET VAPOR PHASE
INTERNALS : PLENUM	MAX. OPERATING PRESSURE : 15 PSIG
ADSORBENT OUTLET ASSEMBLY : 20" MANWAY	MAX. OPERATING TEMP. : 180°F

PROJECT

PROJ. NO. SALES

P.O. NO.

DRAWN BY	ZS
DESIGN BY	BL
CHKD. BY	BL
DATE	9/6/06
SCALE	NTS

TIGG corporation

N-1800-PDB

DWG. NO. N-1800PDN-1001 REV. 5

Fairmont Brine Processing

ATTACHMENT M-2

Emission Rate and Vapor Pressure Table

Attachment M-2
EMISSION RATE AND VAPOR PRESSURE TABLE
(Items 5 and 7 of Attachment M)

Pollutant Type		Emission Rate (Uncontrolled)			Emission Rate (with GAC-3)			Vapor Pressure	
Pollutant	**VOC/HAP/TAP**	**lb/hour**	**grains/acf**	**ppmv**	**lb/hour**	**grains/acf**	**ppmv**	**Temp. (°F)**	**VP (mmHg)**
Arsenic	HAP	0.024	0.014	9.48	0.005	0.003	1.90	90	$7.62E10^{-12}$
Benzene	VOC/HAP/TAP	0.132	0.077	49.85	0.026	0.015	9.97	90	131.5
Bis(2-ethylhexyl)phthalate	SVOC/HAP	0.002	0.001	0.12	0.0003	0.000	0.02	68[1]	1.2
Cadmium	HAP	0.003	0.002	0.87	0.001	0.000	0.17	90	$3.4E10^{-5}$
Chromium	HAP	0.006	0.004	3.62	0.001	0.001	0.72	90	approx. 0
Cobalt	HAP	0.012	0.007	6.15	0.002	0.001	1.23	90	$2.36E10^{-63}$
Decane	SVOC	0.503	0.293	104.27	0.101	0.059	20.85	90	2.23
Dimethyl phthalate	SVOC	0.002	0.001	0.31	0.0004	0.000	0.06	90	0.08
Lead	HAP	0.018	0.011	2.58	0.004	0.002	0.52	90	$2.04E10^{-25}$
Nickel	HAP	0.047	0.028	23.85	0.009	0.006	4.77	90	$1.76E10^{-4}$
Nitrated Hydrocarbons, Total	SVOC	0.006	0.003	NA	0.001	0.001	NA	90	Variable
Octadecane	SVOC	0.153	0.090	17.79	0.031	0.018	3.56	90	$4.94E10^{-4}$
Selenium	HAP	0.013	0.007	4.76	0.003	0.001	0.95	90	$2.47E10^{-4}$
VOC		**0.80**	**-**	**-**	**0.16**	**-**	**-**	**-**	**-**
HAP		**0.26**	**-**	**-**	**0.05**	**-**	**-**	**-**	**-**
TAP		**0.13**	**-**	**-**	**0.03**	**-**	**-**	**-**	**-**

[1]No data available at 90°F.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): 01-F-015

Equipment Information and Filter Characteristics

1. Manufacturer: Bulk Conveyor Specialist, Inc.
   Model No. BV96-25 Bin Vent

2. Total number of compartments: 1

3. Number of compartment online for normal operation: 1

4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. **Reference Attachment M-3.**

5. Baghouse Configuration: (check one)
   ☒ Open Pressure ☐ Closed Pressure ☐ Closed Suction
   ☐ Electrostatically Enhanced Fabric
   ☐ Other, Specify

6. Filter Fabric Bag Material:
   ☐ Nomex nylon ☐ Wool
   ☒ Polyester ☐ Polypropylene
   ☐ Acrylics ☐ Ceramics
   ☐ Fiber Glass
   ☐ Cotton Weight 14.5 – 16.5 oz./sq.yd
   ☐ Teflon Thickness 0.055 - 0.075 in
   ☐ Others, specify

7. Bag Dimension:
   Diameter 4.5 in.
   Length 8 ft.

8. Total cloth area: 235 ft^2

9. Number of bags: 25

10. Operating air to cloth ratio: 3 ft/min

11. Baghouse Operation: ☐ Continuous ☐ Automatic ☒ Intermittent

12. Method used to clean bags:
   ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet
   ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other:
   ☐ Bag Collapse ☒ Pulse Jet
   ☐ Manual Cleaning ☐ Reverse Jet

13. Cleaning initiated by:
   ☒ Timer ☐ Frequency if timer actuated
   ☐ Expected pressure drop range in. of water ☐ Other

14. Operation Hours: Max. per day: 1.5
   Max. per yr: 537

15. Collection efficiency: Rating: 99.9 %
   Guaranteed minimum: 99.9 %

Gas Stream Characteristics

16. Gas flow rate into the collector: 700 ACFM at 50 - 90 °F and 22 PSIA
   ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA

17. Water Vapor Content of Effluent Stream: NA lb. Water/lb. Dry Air

18. Gas Stream Temperature: 50 - 90 °F

19. Fan Requirements: 2 hp
   OR ft^3/min

20. Stabilized static pressure loss across baghouse. Pressure Drop: High 6 in. H_2O
   Low 1 in. H_2O

21. Particulate Loading: Inlet: 10 (assumed) grain/scf Outlet: 0.01 (assumed) grain/scf

22. Type of Pollutant(s) to be collected (if particulate give specific type):
Hydrated lime

23. Is there any SO_3 in the emission stream? ☒ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

	IN		OUT	
Pollutant	**lb/hr**	**grains/acf**	**lb/hr**	**grains/acf**
Hydrated lime	74	10	0.07	0.01

25. Complete the table:

	Particle Size Distribution at Inlet to Collector	**Fraction Efficiency of Collector**
Particulate Size Range (microns)	**Weight % for Size Range**	**Weight % for Size Range**
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50	98.6% < 44 micron	
50 – 60		
60 – 70		
70 – 80	99.4% < 74 micron	
80 – 90		
90 – 100		
>100	99.6% < 150 micron	

26. How is filter monitored for indications of deterioration (e.g., broken bags)?
- ☐ Continuous Opacity
- ☒ Pressure Drop
- ☐ Alarms-Audible to Process Operator
- ☐ Visual opacity readings, Frequency:
- ☐ Other, specify:

27. Describe any recording device and frequency of log entries:

Pressure drop – continuously monitored with visual alarming on operator HMI

28. Describe any filter seeding being performed:

None.

29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

None.

30. Describe the collection material disposal system:

Returns to lime silo, 01-TK-015 (Source ID S-6)

31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet? Yes.

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Pressure drop – continuously monitored with visual alarming on operator HMI Visual observation – supplier's standard procedure requires continuous monitoring during unloading operations Filter bag and filter housing inspections – completed semi-annually	Records of filter bag and filter housing inspections will be retained.
REPORTING:	TESTING:

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

99.9%

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

99.9%

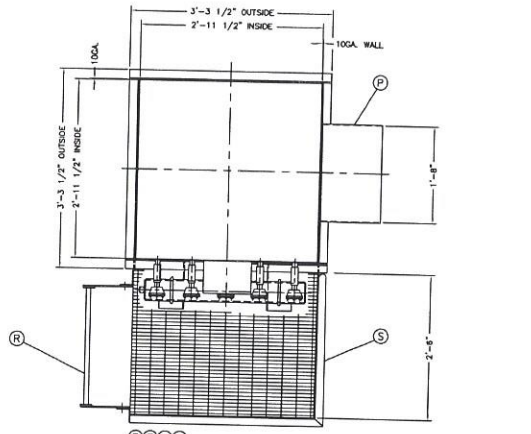
35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

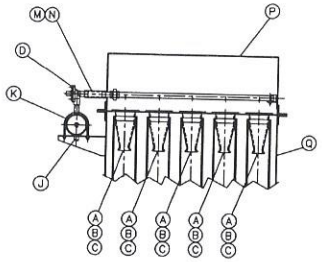
NA

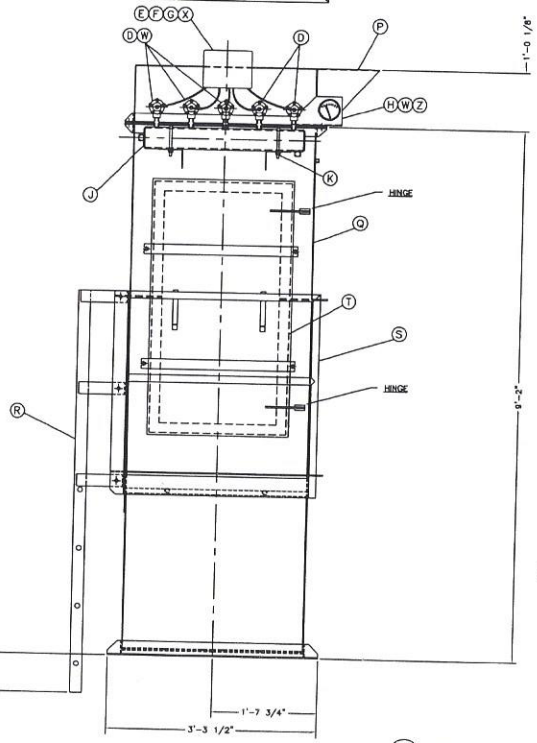
Fairmont Brine Processing

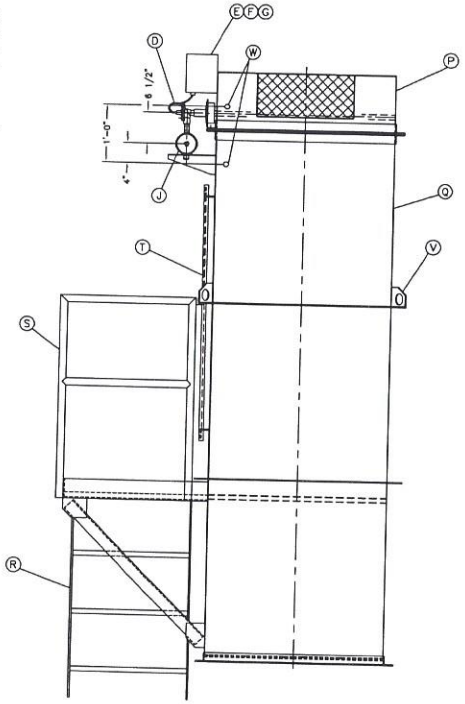
ATTACHMENT M-3

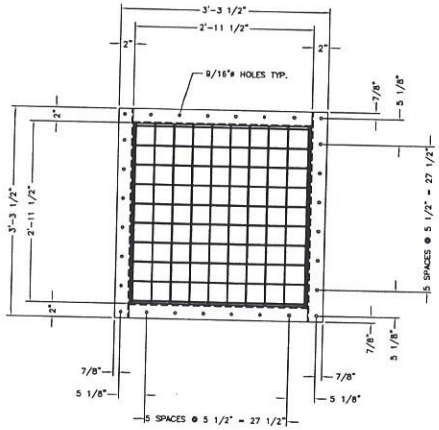
01-F-015 Drawing











MOUNTING FLANGE DETAIL

BILL OF MATERIAL

ITEM	MARK	NO. REQ'D	DESCRIPTION
1		ONE	WRC - 2596 BIN VENT
	A	25	4 1/2" DIA X 8'-6" LG., 16 OZ. POLYESTER FELT BAG
	B	25	MICRO SPUN STEEL VENTURI
	C	25	CARBON STEEL CAGES, 10 WIRE, 8" SPACES, BOTTOM MOUNT X 8'-0" LG.
	D	5	DIAPHRAM VALVE, 3/4", MODEL 2009, (GOYEN) #RCA20T/402
	E	5	SOLENOID VALVE, 1/8" PILOT, 120/1/60 HZ, (GOYEN) #RCA3D2-T-QT/10048
	F	1	SEQUENCE PROGRAMER W/ MTG PLATE, (SPECIAL TIMER CORP) #7937-5-7
	G	1	PULSE JET TIMER CONTROL ENCLOSURE
	H	1	MANOMETER, 1/4" TUBE X 1/8" NPT, (DWYER) #2008
	J	1	MANIFOLD ASSEMBLY (SEE DWG. NO. 9504-28-08)
	K	2	U-BOLT W/NUTS & WASHERS, FOR 4" SCH. 40 PIPE
	M	5	RUBBER TUBING, 1" I.D. X 5" LG.
	N	10	HOSE CLAMPS, RANGE: 13/16" DIA TO 1 3/4" DIA
	P	1	TOP ASSEMBLY (SEE DWG. NO. 9504-28-09)
	Q	1	BODY ASSEMBLY (SEE DWG. NO. 9504-28-10)
	R	1	LADDER ASSEMBLY (SEE DWG. NO. 9504-28-11)
	S	1	PLATFORM ASSEMBLY (SEE DWG. NO. 9504-28-12)
	T	1	ACCESS DOOR, 24" X 48" (SEE DWG. NO. 9504-28-13)
	V	4	LIFTING LUGS
	W	9	FLARELESS TUBE FITTING, BRASS, MALE CONNECTOR, 1/4" TUBE X 1/8" NPT
	X	5	FLARELESS TUBE FITTING, BRASS, MALE ELBOW, 1/4" TUBE X 1/8" NPT
	Y	15'-0"	TUBING, POLYETHYLENE, 1/4" O.D. X .040 WALL
	Z	1	MANOMETER MOUNT

CLOTH AREA:	235 SQUARE FEET
FILTER MATERIAL:	16 OZ. POLYESTER FELT, 4 1/2" DIA. x 8'-0" LG.
VENTURI:	SPUN STEEL
BLOWTUBES:	3/4" DIA. SCH. 40 PIPE
TUBESHEET	10 GA. CARBON STEEL
DIAPHRAGM VALVES:	GOYEN MODEL 2009 #RCA20T (5201SV)
SOLENOID VALVES:	GOYEN #RCA3D2
TIMER:	SPECIAL #7937
MANOMETER:	MODEL 2008

⑤ NOTE: FOR DETAILS SEE DWG D-9504-28-8/9/10/11/12/13

(1) WRC - 2596 BIN VENT

NO.	REVISION	BY	DATE

WRC Industrial Sales Inc.

SCALE: NONE	DRAWN BY: T.P.B.
DATE:	REVISED:

GENERAL ARRANGEMENT - BV96-25 BIN VENT

DWG. NO. D-9504-28-05

WRC DWG #2520 12/1

Fairmont Brine Processing

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

Proposed Change #1: Source S-3

Fairmont Brine Processing (FBP) plans to replace the existing third effect heat exchanger, 02-HX-003, which will allow for an increase in plant capacity. This change will increase Emissions E-3. Previous emissions calculations were based on very limited water analyses. These calculations are based on analytical results for ten (10) recent samples pulled from two (2) sample locations. Outlet 201 samples represent untreated brine sampled from incoming trucks at the loading bays. Outlet 101 samples represent pretreated brine sampled after the carbon vessels prior to the brine impoundment. The parameters required under NPDES Permit WV0116408 were analyzed. The maximum values for VOC/HAP/TAP components from these analyses are listed in the following table:

Pollutant	**No. of Samples**	**Sample Loc. (Outlet)**	**mg/l**
Arsenic	10	101	0.102
Benzene	10	201	0.559
Bis(2-ethylhexyl)phthalate	10	101	0.0068
Cadmium	10	101	0.0141
Chromium	10	101	0.027
Cobalt	10	101	0.052
Decane	10	101	2.13*
Dimethyl phthalate	10	201	0.0087
Lead	10	101	0.0767
Nickel	10	101	0.201
Nitrated Hydrocarbons, Total	10	201	0.0254
Octadecane	10	101	0.65
Selenium	10	101	0.054
Pollutant	**No. of Samples**	**Sample Loc. (Outlet)**	**pCi/l**
Gross Alpha	10	201	14,920
Gross Beta	10	201	2,440
Radium-226	10	201	8,813
Radium-228	10	201	1,483

* One data point was removed from the data set based the value being more than 1.5 interquartile ranges above the third quartile (outlier by definition).

Proposed Change #1: Source S-3 (CONTINUED)

VOC/HAP/TAP concentrations were factored by 3 to account for potential variability.
Water Process Rate = 5,400 barrels/day = 35,772 liters/hour

Emissions Point E-3: Evaporator Maximum Potential Uncontrolled Emissions

Pollutant	VOC/HAP/TAP	mg/l	lb/hour	tons/year
Arsenic	HAP	0.306	0.024	0.11
Benzene	VOC/HAP/TAP	1.677	0.132	0.58
Bis(2-ethylhexyl)phthalate	SVOC/HAP	0.020	0.002	0.01
Cadmium	HAP	0.042	0.003	0.01
Chromium	HAP	0.081	0.006	0.03
Cobalt	HAP	0.156	0.012	0.05
Decane	SVOC	6.39	0.503	2.20
Dimethyl phthalate	SVOC	0.026	0.002	0.01
Lead	HAP	0.230	0.018	0.08
Nickel	HAP	0.603	0.047	0.21
Nitrated Hydrocarbons, Total	SVOC	0.076	0.006	0.03
Octadecane	SVOC	1.95	0.153	0.67
Selenium	HAP	0.162	0.013	0.06
VOC			**0.80**	**3.50**
HAP			**0.26**	**1.13**
TAP			**0.13**	**0.58**

Example calculations for Arsenic emissions (lb/hour and tons/year),

(0.306 mg/l x 35,772 liters/hour) / (10^6 mg/kg) x 2.2 lb/kg = 0.024 lb/hour
0.024 lb/hour x 8,760 hours/year / 2,000 lb/ton = 0.11 tons/year

Proposed Change #1: Source S-3 (CONTINUED)

An existing air pollution control device (identified as GAC-3) was installed to control emissions from Source S-3. GAC-3 was manufactured by TIGG Corporation. The device is an N 1800PDB vessel filled with 1,700 lbs. of TIGG 5CC coconut based carbon. A minimum efficiency of 80% was used to determine the controlled air emissions.

Emissions Point E-3: Evaporator Maximum Potential Controlled Emissions with GAC-3

Pollutant	**VOC/HAP/TAP**	**lb/hour**	**tons/year**
Arsenic	HAP	0.005	0.021
Benzene	VOC/HAP/TAP	0.026	0.116
Bis(2-ethylhexyl)phthalate	SVOC/HAP	0.0003	0.001
Cadmium	HAP	0.001	0.003
Chromium	HAP	0.001	0.006
Cobalt	HAP	0.002	0.011
Decane	SVOC	0.101	0.441
Dimethyl phthalate	SVOC	0.0004	0.002
Lead	HAP	0.004	0.016
Nickel	HAP	0.009	0.042
Nitrated Hydrocarbons, Total	SVOC	0.001	0.005
Octadecane	SVOC	0.031	0.134
Selenium	HAP	0.003	0.011
VOC		**0.16**	**0.70**
HAP		**0.05**	**0.23**
TAP		**0.03**	**0.12**

Example calculations for Arsenic emissions (lb/hour and tons/year),

0.024 lb/hour x 0.20 = 0.005 lb/hour
0.11 tons/year x 0.20 = 0.021 tons/year

Proposed Change #1: Source S-3 (CONTINUED)

Example calculation for Arsenic emissions (grains/acf),

0.024 lb/hour x 7000 gr/1 lb x 1 hour/60 minutes / 200 acfm = 0.014 gr/acf

Example calculation for Arsenic emissions (ppmv),

Temperature = 90°F = 549.67°R
Pressure = 16.7 psia = 34.00 inHg
R = 21.9 inHg-ft^3/lb-mol-°R

Volume of 1 lb-mol of ideal gas at process conditions = R x T / P
= 21.9 inHg-ft^3/(lb-mol-°R) x 549.67°R / 34.00 inHg = 354 acf/lb-mol

(0.014 gr As/acf x 354 acf/lb-mol x 1E6 µlb-mol As/lb-mol Air) / (74.9215 lb As/lb-mol As x 7000 gr/lb) = 9.48 ppmv As

Calculation for velocity,

200 acfm / 60 sec/min / (π x ((10 in / 12 in/ft) / 2)^2) = 6 fps

Proposed Change #2: Source S-6

FBP plans to expand their pretreatment operations to include chemical precipitation, clarification, and effluent and sludge processing. This includes the installation of a lime silo, 01-TK-015 (new Emissions E-6).

01-TK-015 will be equipped with a roof-mounted dust collector (01-F-015). When hydrated lime is pneumatically conveyed into 01-TK-015, the excess air will be vented through 01-F-015.

Dust Collector Specification	
Manufacturer	Bulk Conveyor Specialist, Inc.
Model No.	BV96-25 Bin Vent
Cloth Area	235 ft^2
Filter Fabric	16 oz. polyester felt, 4 ½" diameter x 8' length
Filter Efficiency	99.9%

Estimated Lime Silo Operating Data	
Hydrated lime usage (lb/hr)	1,800
Annual operating hours	8,760
Annual usage (lb/year)	15,768,000
Lime added (lb/fill event)	44,000
Filling frequency (fill/year)	358
Filling duration (hours)	1.5 (based on an unloading rate of 500 lb/min)
Air flow rate (cfm)	700
Lime density (lb/ft^3)	25
Lime volume added (ft^3/fill)	1,760
Safety factor (%)	20

Air volume through filter = 700 ft^3/min x 60 min/hr x 1.5 hr/event + 1,760 ft^3/event
Air volume through filter = 64,760 ft^3/event

Proposed Change #2: Source S-6 (CONTINUED)

Emissions Point E-6: Limo Silo Maximum Potential Uncontrolled Emissions

Based on an assumed inlet dust loading of 10 gr/dscf,

Maximum estimated hourly PM emissions =
64,760 ft^3/event x 10 gr/dscf x 1 lb/7000 gr x 1 event/1.5 hr x 1.20 = 74 lb/hr

Maximum estimated annual PM emissions =
74 lb/hr x 1.5 hr/event x 358 event/year x 1 ton/2000 lb = 20 tons/year

Emissions Point E-6: Limo Silo Maximum Potential Controlled Emissions with 01-F-015

Based on an assumed PM emission rate of 0.01 gr/dscf,

Maximum estimated hourly PM emissions =
64,760 ft^3/event x 0.01 gr/dscf x 1 lb/7000 gr x 1 event/1.5 hr x 1.20 = 0.07 lb/hr

Maximum estimated annual PM emissions =
0.074 lb/hr x 1.5 hr/event x 358 event/year x 1 ton/2000 lb = 0.02 tons/year

Calculation for velocity,

700 acfm / 60 sec/min / (3 in / 12 in/ft x 7 in / 12 in/ft) = 80 fps

Proposed Change #3: Source S-7

FBP plans to install a second natural gas fueled boiler, 03-B-002 (new Emissions E-7) to provide a redundant heat source for the evaporation process.

Boiler Specification	
Manufacturer	Cleaver-Brooks
Model No.	CB 800-300# Stm.
Serial No.	78837
Boiler output (MBH)	26,780
Horsepower	800
Maximum design steaming capacity (lb/hour)	27,600
Annual operating hours	8,760
Gas 100% firing rate (MBH)	33,480

Reference: Attachment N-1 – Cleaver-Brooks Boiler Expected Emission Data

Emissions Point E-7: Natural Gas Fired Boiler Maximum Potential Uncontrolled Emissions

Pollutant	**lb per 10^6 btu Input**	**lb/hour**	**tons/year**
CO	0.0375	1.26	5.50
NO_x	0.0700	2.34	10.26
PM	0.0056	0.19	0.82
SO_2	0.0006	0.02	0.09
VOC	0.0036	0.12	0.53

Example calculation for CO emissions (lb/hour and tons/year),

0.0375 lb / 10^6 btu x 33,480,000 btu/hour = 1.26 lb/hour
1.26 lb/hour x 8,760 hours/year / 2,000 lb/ton = 5.50 tons/year

Proposed Change #3: Source S-7 (CONTINUED)

Example calculation for CO emissions (grains/acf),

1.26 lb/hour x 7000 gr/1 lb x 1 hour/60 minutes / 8,350 acfm = 0.018 gr/acf

Example calculation for CO emissions (ppmv),

Temperature = 328°F = 787.67°R
Pressure = 14.7 psia = 29.92 inHg
R = 21.9 inHg-ft^3/lb-mol-°R

Volume of 1 lb-mol of ideal gas at process conditions = R x T / P
= 21.9 inHg-ft^3/(lb-mol-°R) x 787.67°R / 29.92 inHg = 577 acf/lb-mol

(0.018 gr CO/acf x 577 acf/lb-mol x 1E6 µlb-mol CO/lb-mol Air) / (28.011 lb CO/lb-mol CO x 7000 gr/lb) = 51.58 ppmv CO

Calculation for velocity,

8,350 acfm / 60 sec/min / (π x ((24 in / 12 in/ft)/2)^2) = 44 fps

Calculation for fuel requirements,

33.48 x 10^6 btu/hr x 1,000 btu/ft^3 = 33,480 ft^3/hr
33,480 ft^3/hr x 8,760 hours/year = 293.3 ft^3/yr

Fairmont Brine Processing

ATTACHMENT N-1

Cleaver-Brooks Boiler Expected Emission Data

Cleaver-Brooks Boiler Expected Emission Data

Producing Steam Firing **Nat Gas**

BACKGROUND INFORMATION

Date	02/11/16	Boiler Model	CB(LE)
Author	Chris Mays	Altitude (feet)	700
Customer	Nick Reuter	Operating Pressure (psig)	275.00
City & State	Virginia Beach, VA	Furnace Volume (cuft)	230.17
		Furnace Heat Release (btu/hr/cu ft)	154,600
		Heating Surface (sqft)	3500
		Nox System	60

Nat Gas		Firing Rate			
		25%	**50%**	**75%**	**100%**
Horsepower		200	400	600	800
Input , Btu/hr		8,398,000	16,477,000	24,739,000	33,057,000
CO	ppm	50	50	50	50
	lb/MMBtu	0.0375	0.0375	0.0375	0.0375
	lb/hr	0.31	0.62	0.93	1.24
	tpy	1.379	2.705	4.061	5.427
NOx	ppm	60	60	60	60
	lb/MMBtu	0.0700	0.0700	0.0700	0.0700
	lb/hr	0.59	1.15	1.73	2.31
	tpy	2.575	5.052	7.585	10.135
NO	ppm	51.0	51.0	51.0	51.0
	lb/MMBtu	0.060	0.060	0.060	0.060
	lb/hr	0.50	0.98	1.47	1.97
	tpy	2.06	4.04	6.07	8.11
NO_2	ppm	9.0	9.0	9.0	9.0
	lb/MMBtu	0.011	0.011	0.011	0.011
	lb/hr	0.09	0.17	0.26	0.35
	tpy	0.51	1.01	1.52	2.03
SOx	ppm	0.34	0.34	0.34	0.34
	lb/MMBtu	0.0006	0.0006	0.0006	0.0006
	lb/hr	0.0049	0.0097	0.0146	0.0195
	tpy	0.022	0.042	0.064	0.085
VOCs	ppm	8	8	8	8
(Non-Methane Only)	lb/MMBtu	0.0036	0.0036	0.0036	0.0036
	lb/hr	0.030	0.059	0.088	0.118
	tpy	0.131	0.257	0.386	0.516
VOCs does not include any background VOC emissions.					
PM10 (Filterable)	ppm	N/A	N/A	N/A	N/A
	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.016	0.031	0.046	0.062
	tpy	0.069	0.134	0.202	0.270
PM10 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.047	0.092	0.138	0.185
	tpy	0.206	0.403	0.606	0.809
PM2.5 (Filterable)	lb/MMBtu	0.0019	0.0019	0.0019	0.0019
	lb/hr	0.016	0.031	0.046	0.062
	tpy	0.069	0.134	0.202	0.270
PM2.5 (Condensable)	lb/MMBtu	0.0056	0.0056	0.0056	0.0056
	lb/hr	0.047	0.092	0.138	0.185
	tpy	0.206	0.403	0.606	0.809
Exhaust Data					
Temperature, F		426	438	449	461
Flow	ACFM	3,134	5,355	8,148	11,032
	SCFM (70 Degrees Fah.)	1,917	3,232	4,853	6,484
	DSCFM	1,733	2,870	4,309	5,758
	lb/hr	8,627	14,545	21,837	29,179
Velocity	ft/sec	16.63	28.41	43.23	58.52
	ft/min	998	1,705	2,594	3,511

Notes:

1) All ppm levels are corrected to dry at 3% oxygen.
2) Emission data based on actual boiler efficiency.
3) % H2O , by volume in exhaust gas is **17.24** % O2, by volume **2.47**
4) Water vapor in exhaust gas is **98.91** lbs/MMBtu of fuel fired
5) CO2 produced is **116.31** lbs/MMBtu of fuel fired
6) Particulate is exclusive of any particulates in combustion air or other sources of residual particulates from material.
PM level indicated on this form is based on combustion air and fuel being clean and turndown up to 4:1.
7) Heat input is based on high heating value (HHV).
8.) Emission produced in tons per year (tpy) is based on 24 hours per day for 365 days = 8,760 hours per year
9.) Exhaust data is based on a clean and properly sealed boiler.
10.) Emission data is based on a burner turndown of 4 to 1, However the burner is capable of a higher turndown.

14) Fuel High Heating Value = **1000** Btu/FT^3

Fairmont Brine Processing

ATTACHMENT O

MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

All applicable Monitoring/Recordkeeping/Reporting/Testing Plans are provided as part of the following documents:

- Attachment L – Source ID S-7
- Attachment M – GAC-3
- Attachment M – 01-F-015

Fairmont Brine Processing

ATTACHMENT P

PUBLIC NOTICE

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Fairmont Brine Processing has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class II Administrative Update for air emission sources associated with a brine water recycling plant located on 168 AFR Drive, Fairmont, in Marion County, West Virginia. The latitude and longitude coordinates are: 39.508, -80.126.

The applicant estimates the increased potential to discharge the following Regulated Air Pollutants will be: 0.32 tons per year particulate matter (PM), 0.09 tons per year sulfur dioxide (SO_2), and 0.27 tons per year volatile organic compounds/hazardous air pollutants (VOCs/HAPs).

Startup of operation is planned to begin on or about the 7th day of September, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.
Dated this the 16th day of June, 2016.

By: Fairmont Brine Processing
Brian Kalt
President
1501 Reedsdale Street, Suite 505
Pittsburgh, PA 15233