

**PERMIT DETERMINATION FORM  
GROUNDWATER PUMP  
AND TREATMENT SYSTEM  
NITRO FACILITY  
PUTNAM COUNTY, WEST VIRGINIA**

*Prepared for:*

**Solutia Inc.**

575 Maryville Centre Drive  
St. Louis, Missouri 63141

*Prepared by:*

**Potesta & Associates, Inc.**

7012 MacCorkle Avenue, SE  
Charleston, West Virginia 25304  
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Project No. 0101-01-0081-700F

April 2015

**POTESTA**

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**SECTION I**  
**PERMIT DETERMINATION FORM**



WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF AIR QUALITY  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
Phone: (304) 926-0475  
www.dep.wv.gov/daq

**PERMIT DETERMINATION FORM  
(PDF)**

**FOR AGENCY USE ONLY:** PLANT I.D. # \_\_\_\_\_  
PDF # \_\_\_\_\_ PERMIT WRITER: \_\_\_\_\_

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

Solutia Inc.

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

Solutia Groundwater Pump and Treatment System

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CODE:

562910

4A. MAILING ADDRESS:  
575 Maryville Centre Drive  
St. Louis, Missouri 63141

4B. PHYSICAL ADDRESS:  
1 Flexsys Drive  
Nitro, West Virginia 25143

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE MAP AS ATTACHMENT A):

Take I-64 from Charleston to Exit 45. Take Exit 45 and then a left turn onto WV-25S, drive approximately 0.72 miles and turn right into Pickens Road, drive approximately 0.31 miles and turn right onto Flexsys Drive, drive approximately 0.27 miles to the site on the left.

5B. NEAREST ROAD:  
1<sup>st</sup> Avenue (State Route 25)

5C. NEAREST CITY OR TOWN:  
Nitro

5D. COUNTY:  
Putnam

5E. UTM NORTHING (KM):  
4,254.763

5F. UTM EASTING (KM):  
426.853

5G. UTM ZONE:  
17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:  
Michael L. House

6B. TITLE:  
Manager, Remedial Projects

6C. TELEPHONE:  
(314) 674-6717

6D. FAX:  
NA

6E. E-MAIL:  
mlhous1@solutia.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

NA

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH THIS PROCESS (FOR AN EXISTING FACILITY ONLY):

NA

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST: **NO**

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

NEW SOURCE     ADMINISTRATIVE UPDATE  
 MODIFICATION     OTHER (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?

YES     NO    NA

9. IS DEMOLITION OR PHYSICAL RENOVATION AT AN EXISTING FACILITY INVOLVED?     YES     NO

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

05/20/2015

10B. DATE OF ANTICIPATED START-UP:

05/20/2015

11A. PLEASE PROVIDE A DETAILED PROCESS FLOW DIAGRAM SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS ATTACHMENT B.

11B. PLEASE PROVIDE A DETAILED PROCESS DESCRIPTION AS ATTACHMENT C.

12. PLEASE PROVIDE MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS ATTACHMENT D. FOR CHEMICAL PROCESSES, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

**13A. REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

*PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.*

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR DIVIDED BY 2000 LB/TON)
PM	0.17	0.44
PM <sub>10</sub>	0.17	0.44
VOCs	0.13	0.34
CO		
NO <sub>x</sub>		
SO <sub>2</sub>		
Pb	0.000005	0.00001
HAPs (AGGREGATE AMOUNT)	0.08	0.20
TAPs (INDIVIDUALLY)*	See Attachment E	See Attachment E
OTHER (INDIVIDUALLY)*		

\* ATTACH ADDITIONAL PAGES AS NEEDED

**13B. PLEASE PROVIDE ALL SUPPORTING CALCULATIONS AS ATTACHMENT E.**

*CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).*

**14. CERTIFICATION OF DATA**

I, Edwin Williamson (TYPE NAME) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A **RESPONSIBLE OFFICIAL**\*\* (PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL:



TITLE: Vice President, Legal and Assistant Secretary

DATE: May / 1 / 2015

\*\* THE DEFINITION OF THE PHRASE 'RESPONSIBLE OFFICIAL' CAN BE FOUND AT 45CSR13, SECTION 2.23.

**NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:**

ATTACHMENT A     ATTACHMENT B     ATTACHMENT C     ATTACHMENT D     ATTACHMENT E

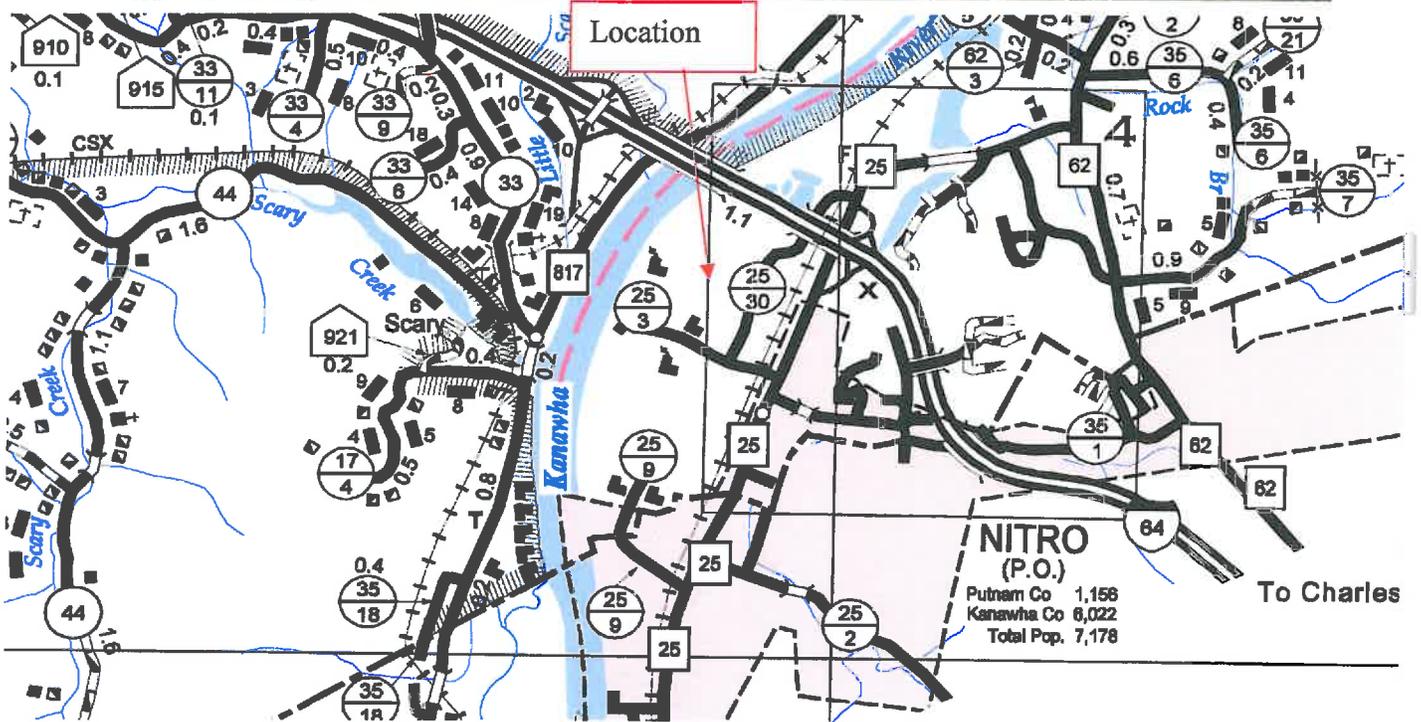
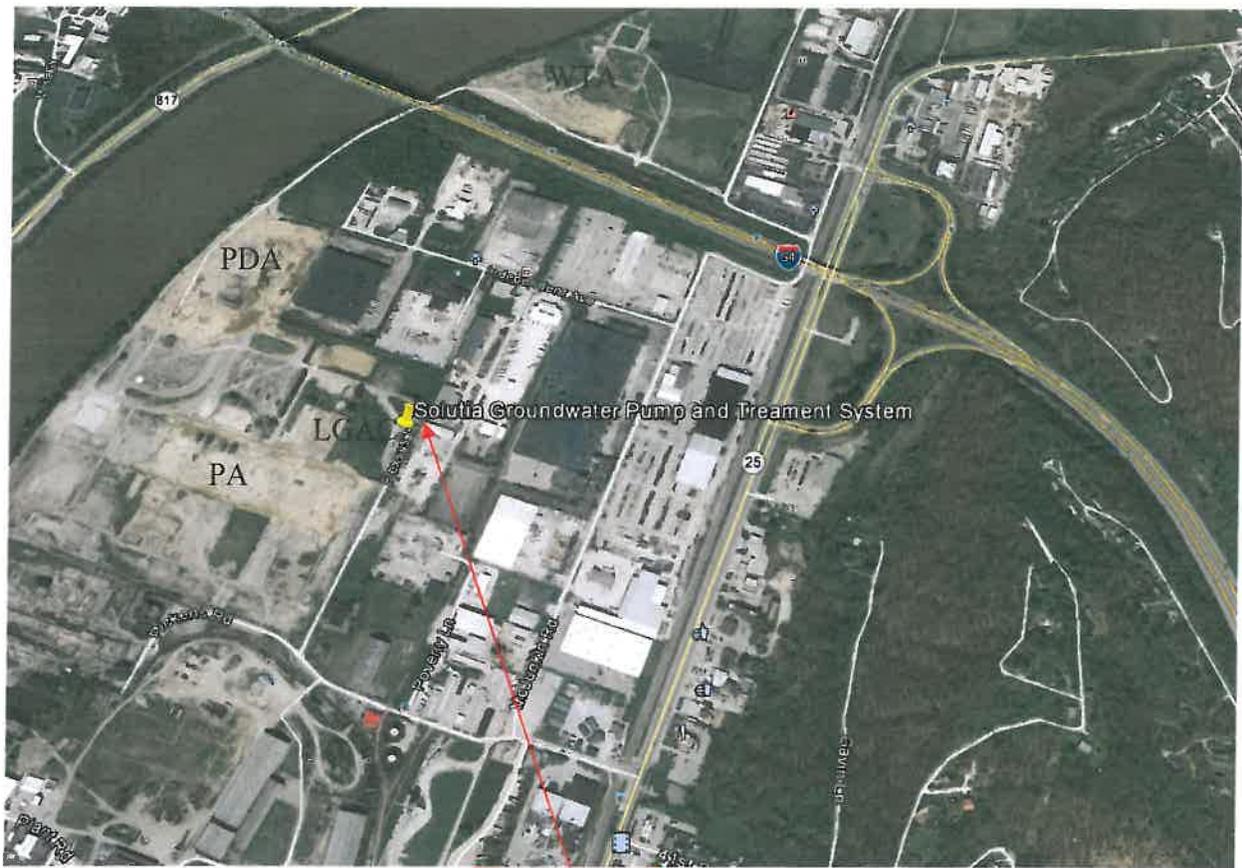
**RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.**

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

[www.dep.wv.gov/daq](http://www.dep.wv.gov/daq)

**ATTACHMENT A**

**AREA MAPS**



7012 MacCorkle Avenue, S.E  
 Charleston, West Virginia 25304  
 Phone: (304) 342-1400  
 Fax: (304) 343-9031

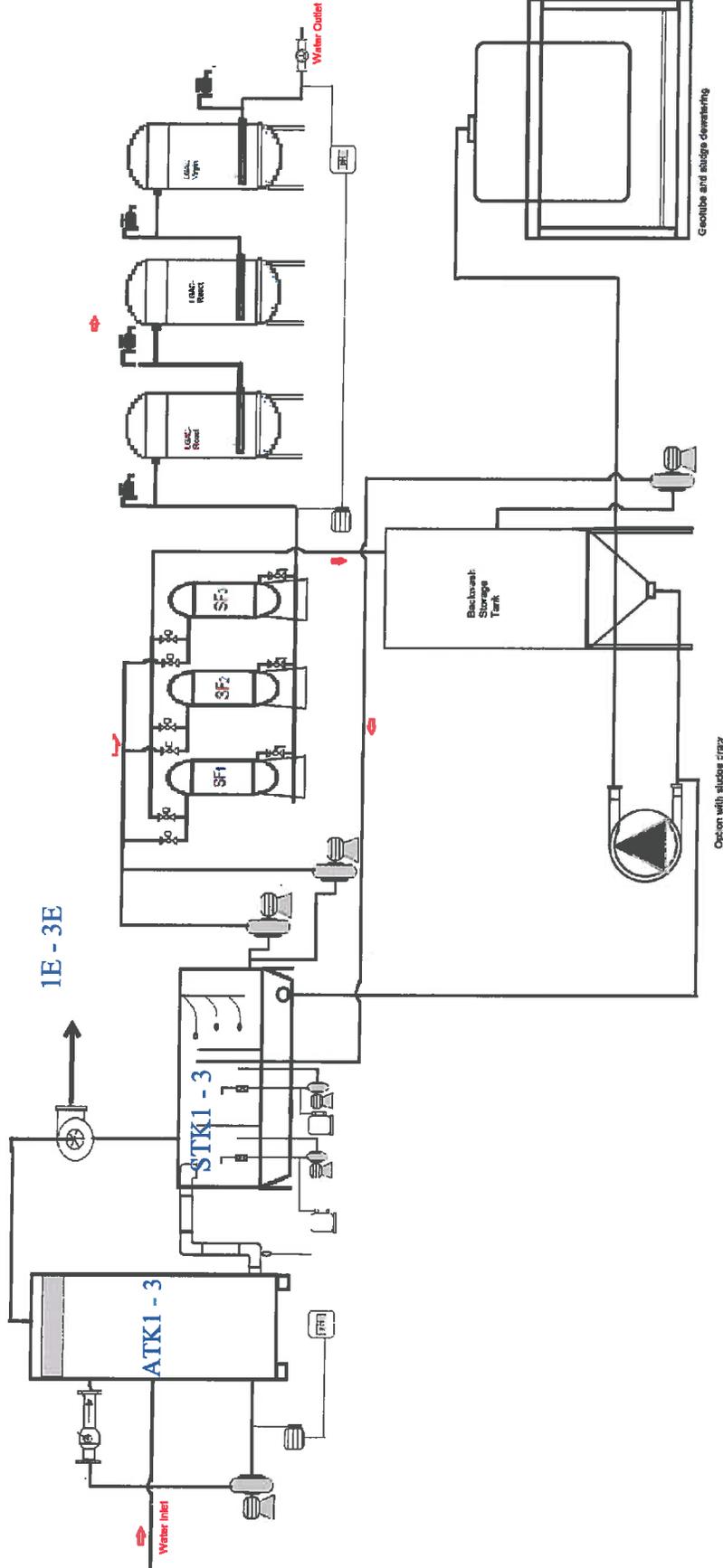
**Area Map**  
**Nitro Facility**  
 Solutia Inc.  
 Putnam County, West Virginia



7012 MacCorkle Avenue, S.E  
Charleston, West Virginia 25304  
Phone: (304) 342-1400  
Fax: (304) 342-1400

**Site Plan**  
**Nitro Facility**  
Solutia Inc.  
Putnam County, West Virginia

**ATTACHMENT B**  
**PROCESS FLOW DIAGRAM**



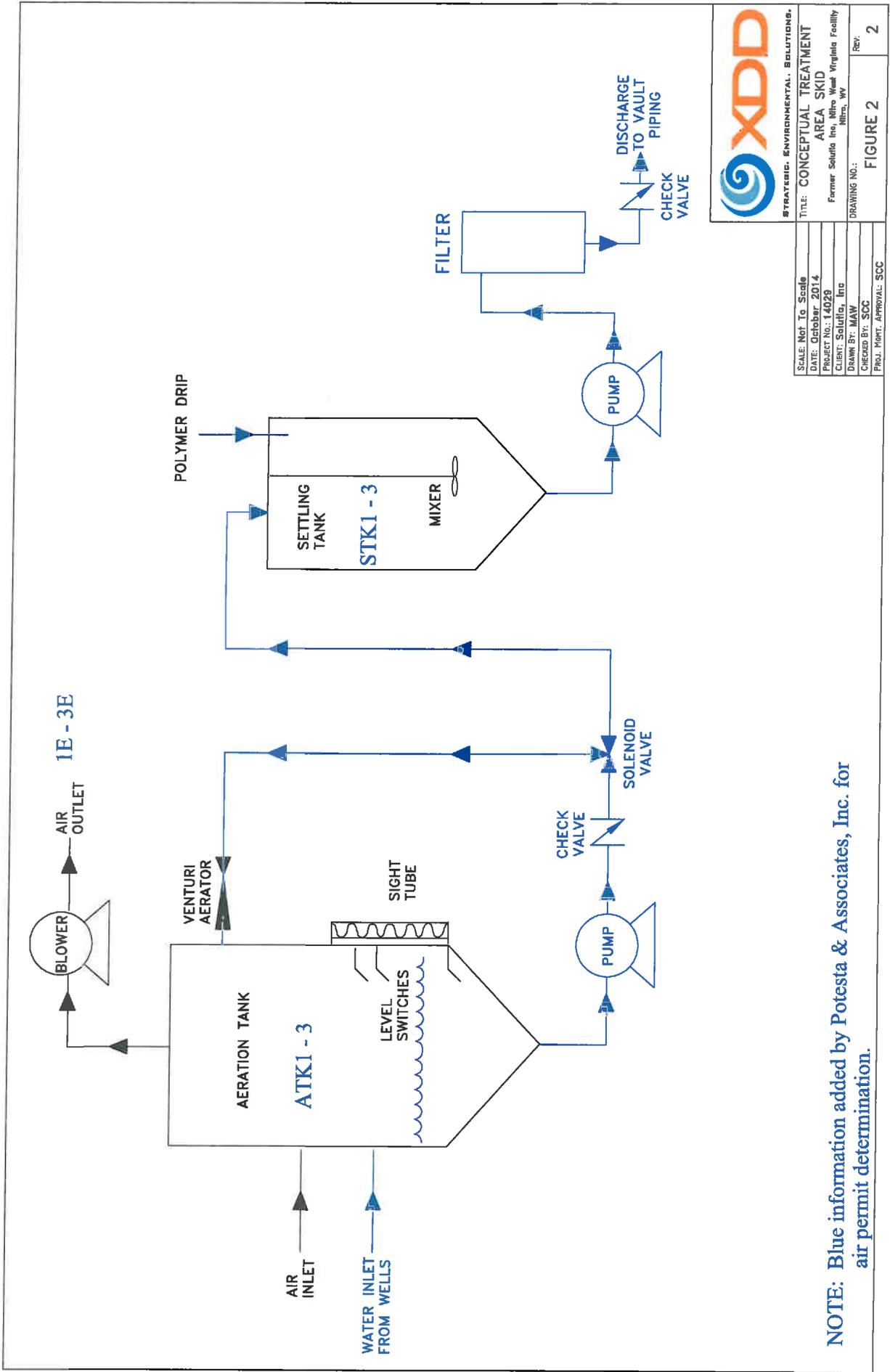
NOTE: Blue information added by Potesta & Associates, Inc. for air permit determination.



Drawing is property of Theia LLC

With Sludge Handling

XDD -Solutia Nitro, WV Site  
Proposed Process Flow



TITLE: CONCEPTUAL TREATMENT AREA SKID  
 Former Solulla Inc, Nitro West Virginia Facility  
 Nitro, WV  
 DRAWING NO.: FIGURE 2  
 Rev: 2

SCALE: Not To Scale
DATE: October 2014
PROJECT No.: 14028
CLIENT: Solulla, Inc
DRAWN BY: MAW
CHECKED BY: SCC
PROJ. MGMT. APPROVAL: SCC

NOTE: Blue information added by Potesta & Associates, Inc. for air permit determination.

**ATTACHMENT C**  
**PROCESS DESCRIPTION**

## **ATTACHMENT C PROCESS DESCRIPTION**

Solutia Inc.'s (Solutia) site, formerly known as Flexsys America L.P. (Flexsys), in Nitro, West Virginia is located along the eastern bank of the Kanawha River in Putnam County, West Virginia. Solutia is proposing to install a pump and treatment system for removing and treating groundwater that is contained within soil-bentonite containment walls on the site. There are three distinct areas from which water is proposed to be treated: the Wastewater Treatment Area (WTA), the Past Disposal Area (PDA), and the Process Area (PA).

### **Groundwater Pump and Treatment System**

The current plan proposes three (3) aeration systems to be installed near the extraction wells in each area. The water from the wells will be treated (aerated) in the aeration tank (ATK1-3 with emission points 1E-3E), filtered, treated with a flocculant/coagulant to aid in iron precipitant removal in a settling tank (STK1-3), and then transferred to a central liquid granular activated carbon treatment system. From the settling tank, the resulting iron sludge is transferred into the geotube sludge dewatering system where the iron sludge is trapped onto the filter and eventually disposed of. The treated water will be discharged to the Kanawha River through a permitted National Pollutant Discharge Elimination System outlet. The portion of the treatment system which is expected to have air emissions is the aeration systems which are being installed to oxidize iron and precipitate it out and avoid clogging of downstream piping and water treatment systems.

Each of the aeration systems will operate in a batch mode. The wells feeding the system will be blanketed with nitrogen gas to keep the iron in solution and allow the iron laden water to be pumped into the aeration tank. The aeration system/tank will be in standby mode until the aeration tank is filled with up to 500 gallons of groundwater. The rate at which the tank is filled depends on the available water within the wells, but will not exceed five (5) gallons per minute. Once the aeration tank is full, the wells will stop pumping and the batch aeration process will start. The aeration system will be initiated and the water will be pumped through a venturi constriction and returned to the aeration tank and be continually recycled during aeration. While the aeration system is operating, a blower is pulling fresh air into the aeration tank to assure there is a constant supply of oxygen for iron oxidation. The batch system will continue to operate until the iron is oxidized and can be precipitated from the solution.

Air emissions coincidentally occur while supplying air to the system. The blower will be pulling fresh air into the aeration tanks (ATK1-3) by evacuating air from the tank through emissions point 1E-3E. The air within the tank is anticipated to carry volatile organic compounds (VOCs) and particulate matter (PM, PM10, and PM2.5), both of which include hazardous air pollutants (HAPS) with metal and volatile HAPS.

To estimate emissions from the process, it has been assumed that each batch is complete in one (1) hour. For VOCs (including HAP and semi-volatiles (VOCs)), it is assumed that, during this

one (1) hour batch time, there is a 100% loss/emission of the materials from the water. PM, PM10, and PM2.5 and metal HAP emissions are calculated by determining the existing concentrations in a batch of water and assuming the aerosol discharged from the tank vent contains the same concentration of the materials. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. The water emission rate is an engineering estimate based on a similar facility and was provided by the process designers. The constituents within the water are based on water samples tested in the three (3) different areas.

Flocculants/coagulants and nitrogen for extraction well blanket gas are used in the process. These materials do not contain regulated air pollutants. Example material safety data sheets for flocculants/coagulants are contained in Attachment D. The emissions estimate based on the water sampling results is contained in Attachment E.

### **Regulatory Discussion**

Regulation 13 contains a list of sources in Table 45-13B which automatically qualify as de minimis sources under the rule. Number 52 is "Operation of groundwater remediation wells, including emissions from the pumps and collection activities. This does not include emissions from air-stripping treatment or storage."

With the oxidation process coincidentally achieving air stripping of VOCs, this system does not automatically qualify as a de minimis source. However, the overall emissions from the process fall below the permit requirements of six (6) pounds per hour and ten (10) tons per year of criteria pollutants or one hundred forty-four (144) pounds per day of a criteria pollutant, and are less than two (2) pounds per hour and five (5) tons per year of hazardous air pollutants. Each toxic air pollutant is also less than the amount in Table 45-13A. Furthermore, we believe that this treatment system does not have a substantive requirement that would require that an air permit be obtained under Regulation 13.

By this submission, we are requesting the Division of Air Quality's concurrence that a permit is not needed to install and operate the proposed treatment system.

**ATTACHMENT D**  
**MATERIAL SAFETY DATA SHEETS**



## Material Safety Data Sheet

LA4875  
Stermpac

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Id:** LA4875  
**Product Name:** Stermpac  
**Synonyms:** Polyaluminum chloride, polyhydroxosulphatoaluminum chloride.  
**Chemical Family:** Polynuclear inorganic salt  
**Application:** Coagulant for portable water treatment.

**Distributed By:**  
Univar Canada Ltd.  
9800 Van Home Way  
Richmond, BC  
V6X 1W5

**Prepared By:** The Safety, Health and Environment Department of Univar Canada Ltd.  
**Preparation date of MSDS:** 07 April 2008  
**Telephone number of preparer:** 1-866-686-4827

**24-Hour Emergency Telephone Number (CANUTEC):** (613) 996-6666

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Percentage (w/w)	LD50s and LC50s Route & Species:
Aluminum Chloride Hydroxide Sulphate 39290-78-3	15-40	Acute Oral LD50 :12800mg/kg

**Note:** No additional remark.

### 3. HAZARDS IDENTIFICATION

**Potential Acute Health Effects:**

**Eye Contact:** Will cause painful burning or stinging of eyes and lids, watering of eyes and inflammation of conjunctiva.  
**Skin Contact:** May cause irritation, swelling or dermatitis. Prolonged contact can cause skin irritation. A single exposure is not likely to result in the material being absorbed through the skin in harmful amounts.  
**Inhalation:** Not a likely route of entry, however, may irritate respiratory tract.  
**Ingestion:** May be harmful if swallowed. May cause pain, nausea, vomiting and diarrhea. May cause liver and kidney damage.

## 6. FIRST AID MEASURES

**Eye Contact:** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

**Skin Contact:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

**Inhalation:** Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.

**Ingestion:** Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

**Notes to Physician:** Treatment based on sound judgment of physician and individual reactions of patient.

## 7. FIRE FIGHTING MEASURES

**Flash Point:** None.

**Flash Point Method:** Pensky-Martens Closed Cup

**Autoignition Temperature:** Not Available.

**Flammable Limits in Air (%):** Not Available.

**Extinguishing Media:** Use extinguishing media appropriate for surrounding fire.

**Special Exposure Hazards:** Containers can build up pressure if exposed to heat (fire). Cool with water spray.

**Hazardous Decomposition/Combustion Materials (under fire conditions):** Hydrogen chloride. Aluminum oxides. Oxides of sulphur.

**Special Protective Equipment:** Fire fighters should wear full protective clothing, including self-contained breathing equipment.

**NFPA RATINGS FOR THIS PRODUCT ARE:** HEALTH 1, FLAMMABILITY 0, INSTABILITY 0

**HMIS RATINGS FOR THIS PRODUCT ARE:** HEALTH 1, FLAMMABILITY 0, REACTIVITY 0

## 8. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures:** Wear appropriate protective equipment.

**Environmental Precautionary Measures:** Prevent entry into sewers or streams, dike if needed. Consult local authorities.

**Procedure for Clean Up:** Isolate hazard area and restrict access. Ventilate area. Dike area to prevent spill from spreading. Neutralize with lime slurry, limestone, or soda ash. Absorb with an inert dry material and place in an appropriate waste disposal container. Flush area with water to remove trace residue.

## 9. HANDLING AND STORAGE

**Handling:** Ensure all containers are labeled. Treat as any dilute acid. Avoid contact with metals. Avoid contact with eyes, skin and clothing. Keep the containers closed when not in use. Wear all protective equipment.

**Storage:** Store in dry rubber-lined, plastic or FRP vessels. Keep containers tightly closed. Product should be used within one (1) year. Store in original container. Do not store in metal containers.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Engineering Controls:

Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

**Respiratory Protection:** If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH approved organic vapor / acid gas cartridge respirator.

### Gloves:

Impervious gloves. Neoprene gloves. Never use leather.

**Skin Protection:** Wear chemical resistant pants and jackets, preferably butyl or nitrile rubber. Rubber boots.

**Eyes:** Chemical goggles; also wear a face shield if splashing hazard exists.

**Other Personal Protection Data:** Ensure that eyewash stations and safety showers are proximal to the work-station location.

Ingredients	Exposure Limit - ACGIH	Exposure Limit - OSHA	Immediately Dangerous to Life or Health - IDLH
Aluminum Chloride Hydroxide Sulphate	Not available.	Not available.	Not Available.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical State:** Liquid.

**Colour:** Clear amber - colourless.

**Odour:** Slight

**pH** 2.6 +/- 0.3

**Specific Gravity:** 1.27 @ 20°C

**Boiling Point:** 102 °C / 215.6 °F

**Freezing/Melting Point:** -12 °C / 10.39 °F(+/-2)

**Vapour Pressure:** 17 mmHg @ 20°C

**Vapour Density:** 1.3

**% Volatile by Volume:** Not Available.

**Evaporation Rate:** Not Available.

**Solubility:** Soluble in water.

**VOCs:** Not Available.

**Viscosity:** Not Available.

**Molecular Weight:** Not Available.

**Other:** Not Available.

## 10. STABILITY AND REACTIVITY

**Chemical Stability:** Stable.

**Hazardous Polymerization:** Will not occur.

**Conditions to Avoid:** High temperatures.

**Materials to Avoid:** Carbon steel. Alkalis. Metals. Aluminum. Carbon. Brass. Nylon.

**Hazardous Decomposition Products:** Oxides of sulphur. Oxides of aluminum. Hydrogen chloride.

**Additional Information:**

No additional remark.

## 11. TOXICOLOGICAL INFORMATION

### Principle Routes of Exposure

**Ingestion:** May be harmful if swallowed. May cause pain, nausea, vomiting and diarrhea. May cause liver and kidney damage.

**Skin Contact:** May cause irritation, swelling or dermatitis. Prolonged contact can cause skin irritation. A single exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

**Inhalation:** Not a likely route of entry, however, may irritate respiratory tract.

**Eye Contact:** Will cause painful burning or stinging of eyes and lids, watering of eyes and inflammation of conjunctiva.

**Additional Information:** No additional information available.

**Acute Test of Product:**

**Acute Oral LD50:** Not Available.

Acute Dermal LD50: Not Available.  
Acute Inhalation LC50: Not Available.

**Carcinogenicity:**

Ingredients	IARC - Carcinogens	ACGIH - Carcinogens
Aluminum Chloride Hydroxide Sulphate	Not listed.	Not listed.

**Carcinogenicity Comment:** No additional information available.

**Reproductive Toxicity/ Teratogenicity/ Embryotoxicity/ Mutagenicity:** Not Available.

**12. ECOLOGICAL INFORMATION**

**Ecotoxicological Information:**

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Aluminum Chloride Hydroxide Sulphate	LC50 (Leuciscus idus melanotus) 1460 - 1500 mg/L	Not Available.	Not Available.

**Other Information:**

No additional remark.

**13. DISPOSAL CONSIDERATIONS**

**Disposal of Waste Method:** Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.

**Contaminated Packaging:** Empty containers should be recycled or disposed of through an approved waste management facility.

**14. TRANSPORT INFORMATION**

**DOT (U.S.):**

**DOT Shipping Name:** CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (ALUMINUM CHLORIDE HYDROXIDE SULPHATE)

**DOT Hazardous Class:** 8

**DOT UN Number:** UN3264

**DOT Packing Group:** III

**DOT Reportable Quantity (lbs):** Not Available.

**Note:** No additional remark.

**Marine Pollutant:** No.

**TDG (Canada):**

**TDG Proper Shipping Name:** CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (ALUMINUM CHLORIDE HYDROXIDE SULPHATE)

**Hazard Class:** 8

**UN Number:** UN3264

**Packing Group:** III

**Note:** No additional remark.

**Marine Pollutant:** No.

**REGULATORY INFORMATION**

**U.S. TSCA Inventory Status:** All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

**Canadian DSL Inventory Status:** All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

**Note:** Not available.

**U.S. Regulatory Rules**

Ingredients	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Aluminum Chloride Hydroxide Sulphate	Not Listed.	Not Listed.	Not Listed.

**California Proposition 65:** Not Listed.

**MA Right to Know List:** Not Listed.

**New Jersey Right-to-Know List:** Not Listed.

**Pennsylvania Right to Know List:** Not Listed.

**WHMIS Hazardous Class:**

**E CORROSIVE MATERIAL**



## ADDITIONAL INFORMATION

**Additional Information:**

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

**Disclaimer:**

**NOTICE TO READER:**

Univar, expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Univar Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Univar makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Univar's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

**\*\*\*END OF MSDS\*\*\***



11800 Wills Road, Ste. 100  
Alpharetta, GA 30009  
Tel: 678-514-2100 / 888-326-2020  
Email: [info@EcologixSystems.com](mailto:info@EcologixSystems.com)  
Web Site: [www.EcologixSystems.com](http://www.EcologixSystems.com)

## MATERIAL SAFETY DATA SHEET

<b>Ecologix Environmental Systems, LLC</b> 11800 Wills Road, Suite 100 Alpharetta, GA 30009 USA Phone: 678-514-2100 - Fax: 678-514-2106	<b>Emergency Telephone Number:</b> <b>ECOLOGIX 1-888-326-2020</b> <b>DATE OF ISSUE:</b> 05/02/00 <b>DATE OF LATEST REVISION:</b> 01/21/08
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### SECTION I: IDENTIFICATION & PRODUCT INFORMATION

TRADE NAME: CIACH  
CHEMICAL NAME: Proprietary Blend of Inorganic Coagulants  
CHEMICAL FAMILY: Industrial Water Conditioner

### SECTION II: COMPOSITION, INFORMATION ON INGREDIENTS

Material	CAS#	%	EXPOSURE LIMIT
Aluminum Chlorohydrate Precise mixture is proprietary.	12042-91-0	<60	Unknown

### SECTION III: PHYSICAL DATA

Boiling Point:	≈ 220°F	Specific Gravity:	1.33
Viscosity:	< 50 CPS	pH:	3.5 (as is)
Vapor Pressure:	NA	Evap. Rate:	NA
Solubility in Water:	Complete	Freezing Point:	≈19°F
Appearance and Odor:	Clear Slightly Yellow liquid, slight odor		

### SECTION IV: FIRE PROTECTION INFORMATION

Flash Point (method used): Non-flammable  
Flammable Limits: Not Applicable, Aqueous System  
Extinguishing Media: Non-flammable (aqueous solution)  
Special Fire-Fighting Procedures: Use self-contained breathing apparatus and protective clothing while extinguishing a fire.  
Unusual Fire and Explosion Hazards: Product is nonflammable as supplied.

National Fire Protection Association (NFPA) Rating (in fire conditions):

Toxicity: 1      Fire: 0      Reactivity: 0      Special: None

Hazard Rating: 4=extreme 3=high 2=moderate 1=slight 0=insignificant

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## SECTION V: HEALTH HAZARDS INFORMATION

Exposure Limit(s): Not established

### EFFECTS OF SINGLE OVEREXPOSURE:

**Inhalation:** Material can cause irritation to respiratory system.

**Skin Contact:** May cause skin irritation, especially on prolonged contact.

**Ingestion:** May cause gastrointestinal irritation, nausea, vomiting and diarrhea.

**Eye Contact:** Direct contact may cause irritation, swelling and redness. Effects of repeated contact with the eyes may result in conjunctivitis.

### EMERGENCY AND FIRST AID PROCEDURES:

**INGESTION:** Seek medical attention immediately. Give large amounts of water to drink. If vomiting should occur spontaneously, keep airway clear.

**SKIN:** Immediately remove contaminated clothing and shoes. Wash skin with soap and water. Obtain medical attention if an irritation persists. Wash clothing before reuse. Discard contaminated leather articles such as shoes and belt.

**INHALATION:** Remove to fresh air. Obtain medical attention immediately if effected person has difficulty breathing.

**EYES:** Immediately flush eyes with water and continue washing for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface.. Obtain immediate medical attention without delay.

**FOR EMERGENCY INFORMATION:** CALL CHEMTREC - 1 (800) 424-9300

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## SECTION VI: REACTIVITY DATA

**Stable:** Yes                      **Hazardous Polymerization:** Will not occur.

**Conditions to Avoid:** Strong oxidizers may react with product. Caustic will precipitate Aluminum Hydroxide.

**Materials to Avoid:** Strong oxidizing agents and alkaline materials.

**Hazardous Decomposition Products:** Thermal decomposition may release toxic and/or hazardous gases such as aluminum, CL<sub>2</sub> and HCL.

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## **SECTION VII: SPILL OR LEAK PROCEDURES AND WASTE DISPOSAL**

Stop leaks immediately. Clean up spills immediately.

If spilled, neutralize with soda ash. Dike spills for recovery with absorbent material. Wash spill area with large amounts of clear water. Soap may precipitate Aluminum Hydroxide. Wear face shield, boots and rubber apron if spilled. Material may be slippery.

Waste Disposal:

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

---

## **SECTION VIII: OCCUPATIONAL PROTECTIVE EQUIPMENT**

Eye: Chemical goggles, safety glasses. Face shield if splashing likely.

Respiratory: None required if good ventilation is maintained. If mists or dusts encountered wear dust mist apparatus.

Skin: Rubber, Nitrile (NBR), Butyl or Polyethylene gloves. Rubber apron and boots if splashing likely.

Other: Eye bath and safety shower.

---

## **SECTION IX: PRECAUTIONARY MEASURES**

Store in cool dry place. Avoid skin and eye contact. **DO NOT TAKE INTERNALLY.** Keep container closed when not in use. Wash thoroughly after handling.

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## **SECTIONX: REGULATORY INFORMATION**

CERCLA: None

SARA TITLE III:

Sec. 313 Toxic Chemical Release: None

Sec. 302-304: Extremely hazardous Substances: None

TSCA: Ingredients of this product are on TSCA inventory.

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## **SECTION XI: TRANSPORTATION**

DOT Classification: Not regulated

MSDS CIACH

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

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## DeIPAC 2020

### Aluminum Chloride Hydroxide Sulfate

The DeIPAC series includes DeIPAC 2020, which has become widely accepted as the polyaluminum chloride of choice for cost effective improvement of finished water quality. When used as a coagulant DeIPAC can provide longer filter runs, reduce or eliminate the need for alkali pH adjustment, and reduce sludge residuals. DeIPAC 2020 meets the specifications of the American Water Works Association Standard B408-10 and complies with the requirements of NSF/ANSI Standard 60: Drinking Water Treatment Chemicals – Health Effects at a maximum dosage of 250 mg/L.

#### PROPERTIES

Appearance: Color may vary  
Specific Gravity @60°F: 1.23 ± 0.03  
Product Weight: ~10.23 Lbs. /US  
Gallon  
pH (neat): 2.5 ± 0.3  
Freezing Point -26°F

#### SPECIFICATIONS

% Al<sub>2</sub>O<sub>3</sub> 10.5 ± 0.5  
% Al 5.6 ± 0.3  
% Basicity > 70  
% Sulfate 1.5 ± 0.5  
% Chloride > 9.0

#### PRINCIPAL USES

Drinking water / wastewater treatment –  
removal of suspended matter and phosphorus

#### SAFETY / HANDLING

Observe caution when handling corrosive materials. Please consult the material safety data sheet (MSDS) for safety and handling precautions.

#### DELIVERY

275 gallon IBCs (totes), tank trucks and railcars

#### PRODUCTION

USALCO has production facilities in:

- Baltimore, Maryland
- Fairfield, Ohio
- Ashtabula, Ohio

#### CUSTOMER SERVICE

If you have any questions concerning this material, please contact our Inside Sales Department at:

**410-918-2230** or **info@usalco.com**



# MATERIAL SAFETY DATA SHEET

## SECTION I - CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: **HIGH CALCIUM  
HYDRATED LIME**

WHMIS – CLASSIFICATION:  
**D2A: MATERIALS CAUSING OTHER TOXIC EFFECTS  
E: CORROSIVE MATERIAL**

### MANUFACTURER'S AND SUPPLIER'S NAME:

<b>GRAYMONT (NB) INC</b>	4634, Route 880, Havelock, New Brunswick, E4Z 5K8.
<b>GRAYMONT (PA) INC.</b>	194, Match Factory Place, Bellefonte, Pennsylvania, 16823
<b>GRAYMONT (QC) INC.</b>	25 – 206, rue De Lauzon, Boucherville, Québec, J4B 1E7.
<b>GRAYMONT (WESTERN CANADA) INC.</b>	#260 – 4311, 12 <sup>th</sup> Street N.E., Calgary, Alberta, T2E 4P9
<b>GRAYMONT WESTERN LIME INC.</b>	206 N. 6 <sup>th</sup> Avenue, West Bend, Wisconsin, 53095
<b>GRAYMONT (WESTERN US) INC.</b>	3950 South, 700 East, Suite 301, Salt Lake City, Utah, 84107
<b>GRAYMONT (WI) INC.</b>	Foot of Hill Avenue, Superior, Wisconsin, 54880

EMERGENCY TEL. No.: (613) 996 – 6666 CANUTEC (Canada) (800) 424 – 9300 CHEMTREC (US)

Chemical Name <b>Calcium hydroxide</b>	Chemical Family <b>Alkaline earth hydroxide</b>	Chemical Formula <b>Complex mixture - mostly Ca(OH)<sub>2</sub></b>
Molecular Weight <b>Ca(OH)<sub>2</sub> = 74.096</b>	Trade Name and Synonyms <b>Hydrated Lime, Lime, Slaked lime, Lime Putty, Lime Slurry, Milk of Lime, Calcium Hydroxide</b>	Material Use <b>Neutralization, Flocculation, Stabilization, absorption</b>

## SECTION II - COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients	Approximate Concentration (% by weight)	C.A.S. Number	Exposure limits (mg/m <sup>3</sup> )					
			OSHA PEL	ACGIH TLV	RSST VEMP	MSHA PEL	NIOSH REL	NIOSH IDLH
(Complex Mixture)	(% by weight)		(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 10/40h	
<b>Calcium hydroxide</b>	<b>92 to 100</b>	<b>1305-62-0</b>	<b>15 (T) 5 (R)</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>N/A</b>
<b>Crystalline Silica, Quartz</b>	<b>0 à 0.1 Or 0.1 à 1 (Note 1)</b>	<b>14808-60-7</b>	<b>30/(%SiO<sub>2</sub>)+2 (T) 10/(%SiO<sub>2</sub>)+2 (R)</b>	<b>0.025 (R)</b>	<b>0.1 (R)</b>	<b>30/(%SiO<sub>2</sub>)+2 (T) 10/(%SiO<sub>2</sub>)+2 (R)</b>	<b>0.05 (R)</b>	<b>50</b>

(Note 1): Concentration of crystalline silica in a series of lime products will vary from source to source. It was not detected on some samples (< 0.1% w/w). Therefore two ranges are being disclosed. (Note 2): ACGIH TLV Version 1973 has been adopted by the Mine Safety Health Administration (MSHA) as the regulatory Exposure Standard. (Note 3): (T) Total Dust; (R): Respirable Dust.

**SECTION III - PHYSICAL AND CHEMICAL DATA**

Physical State Gas <input type="checkbox"/> Liquid <input type="checkbox"/> Solid <input checked="" type="checkbox"/>	Odor and Appearance <b>Slight earthy odor – Fine white powder</b>		Odor Threshold (p.p.m.) <b>Not applicable</b>	Specific Gravity <b>2.3 – 2.4</b>
Vapor Pressure (mm) <b>Not applicable</b>	Vapor Density (Air = 1) <b>Not applicable</b>	Evaporation Rate <b>Not applicable</b>	Boiling Point (°C) <b>Not applicable</b>	Melting Point (°C) <b>Not applicable</b>
Solubility in Water (20°C) <b>0.165g/100g solution</b>	Volatiles (% by volume) <b>Not applicable</b>	pH (25 °C) <b>Sat. soln Ca(OH)<sub>2</sub> 12.45</b>	Bulk Density (kg/m <sup>3</sup> ) <b>320 - 690</b>	Coefficient of water/oil distribution <b>Not applicable</b>

**SECTION IV - FIRE OR EXPLOSION HAZARD DATA**

Flammability Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, under which conditions?			
Extinguishing Media <b>Calcium Hydroxide does not burn. Use extinguishing media appropriate to surrounding fire conditions.</b>			
Special Fire Fighting Procedures <b>Not applicable</b>			
Flash point (°C) and Method <b>Not applicable</b>	Upper flammable limit (% by volume) <b>Not applicable</b>	Lower flammable limit (% by volume) <b>Not applicable</b>	
Auto Ignition Temperature (°C) <b>Not applicable</b>	TDG Flammability Classification <b>Non-flammable</b>	Hazardous Combustion Products <b>None</b>	
Dangerous Combustion Products <b>None</b>			
EXPLOSION DATA			
Sensitivity to Chemical Impact <b>Not applicable</b>	Rate of Burning <b>Not applicable</b>	Explosive Power <b>Not applicable</b>	Sensitivity to Static Discharge <b>Not applicable</b>

**SECTION V - REACTIVITY DATA**

Chemical Stability

Yes  No  If no, under which conditions? **Absorbs carbon dioxide in the air to form calcium carbonate.**

Incompatibility to other substances

Yes  No  If so, which ones? **Boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorus pentoxide; and acids (violent reaction with generating heat and possible explosion in confined area).**

Reactivity

Yes  No  If so, under which conditions? **Reacts violently with strong acids. Reacts chemically with acids and many other compounds and chemical elements to form calcium based compounds. Explosive when mixed with nitro organic compounds.**

Hazardous Decomposition Products **Thermal decomposition at 540°C will produce calcium oxide and water.**

Hazardous Polymerization Products **Will not occur.**

**SECTION VI - TOXICOLOGICAL PROPERTIES**

Route of Entry

Skin Contact     Skin Absorption     Eye Contact     Acute Inhalation     Chronic Inhalation     Ingestion

Effects of Acute Exposure to Product

**Skin: Severe irritation of mucous and skin, removes natural skin oils.**  
**Eyes: Severe eye irritation, intense watering of the eyes, possible lesions, possible blindness when exposed for prolonged period. Eye irritation data: Eye-Rabbit-10mg/ 24 h – Severe.**  
**Inhalation: If inhaled in form of dust, irritation of breathing passages, cough, sneezing.**  
**Ingestion: If ingested: pain, vomiting blood, diarrhea, collapse, drop in blood pressure (indicates perforation of esophagus or stomach).**

Effects of Chronic Exposure to Product:

**Contact dermatitis. Following repeated or prolonged contact, this product can cause redness, desquamation and fissures. This product may contain trace amounts of crystalline silica. Excessive inhalation of respirable crystalline silica dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis.**

LD <sub>50</sub> of Product (Specify Species and Route) <b>7340 mg/kg (Rat, Oral)</b> <b>7300 mg/kg (Mouse, Oral)</b>	Irritancy of Product <b>Severe to moist tissues</b>	Exposure limits of Product <b>Unavailable</b>
LC <sub>50</sub> of Product (Specify Species) <b>Unavailable</b>	Sensitization to Product <b>None</b>	Synergistic materials <b>None reported</b>

**SECTION VI - TOXICOLOGICAL PROPERTIES (Cont'd)**

Carcinogenicity     Reproductive effects     T ratogenicity     Mutagenicity

Calcium Hydroxide is not listed as a carcinogen by ACGIH, MSHA, OSHA, NTP, DFG, RSST or IARC. It may, however, contain trace amounts of Crystalline Silica listed carcinogens by these organizations.

Crystalline Silica, which inhaled in the form of quartz or crystobalite from occupational sources, is classified by IARC as carcinogenic to humans. (Group 1)

Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Crystalline Silica is listed as a chemical known to the State to cause cancer.

NIOSH considers crystalline silica to be potential occupational carcinogen as defined by the OSHA carcinogen policy [29 CFR 1990]. (Ca).

NTP lists respirable Crystalline Silica as known to be human carcinogens based on sufficient evidence of carcinogenicity in humans. (K).

ACGIH lists respirable Crystalline Silica (quartz) as suspected human carcinogen. (A2).

DFG lists respirable Crystalline Silica as a substance that causes cancer in man (1)

RSST lists respirable Crystalline Silica (quartz) as suspected human carcinogen.

**SECTION VII - PREVENTIVE MEASURES**

Personal Protective Equipment (PPE)	Wear clean, dry gloves, full length pants over boots, long sleeved shirt buttoned at the neck, head protection and approved eye protection selected for the working conditions.
Gloves (Specify)	Gauntlets Cuff style.
Respiratory (Specify)	Respirator Recommendations for Calcium Hydroxide: Not available. Respirator Recommendations for Calcium Oxide: NIOSH approved respirator. <u>Up to 10 mg/m<sup>3</sup></u> : (APF = 5) Any quarter-mask respirator. <u>Up to 20 mg/m<sup>3</sup></u> : (APF = 10) Any particulate respirator equipped with an N95, R95 or P95 filter except quarter-mask respirator. Any supplied-air respirator. <u>Up to 25 mg/m<sup>3</sup></u> : (APF = 25) Any supplied-air respirator operated in a continuous-flow mode. Any powered, air purifying respirator with a high-efficiency particulate filter.
Eyes (Specify)	ANSI, CSA or ASTM approved safety glasses with side shields. Tight fitting dust goggles should be worn when excessive (visible) dust conditions are present. Do not wear contact lenses without tight fitting goggles when handling this chemical.
Footwear (Specify)	Resistant to caustics.
Clothing (Specify)	Fully covering skin. Remove when wet or contaminated. Change daily.
Other (Specify)	Evaluate degree of exposure and use PPE if necessary. After handling lime, employees must shower. If exposed daily, use oil, Vaseline, silicone base cr�me etc. to protect exposed skin, particularly neck, face and wrists.
Engineering Controls (e.g. ventilation, enclosed process, specify)	Enclose dust sources; use exhaust ventilation (dust collector) at handling points, keep levels below Max. Concentration Permitted.

**SECTION VII - PREVENTIVE MEASURES (Cont'd)****Leak and Spill Procedure**

**Limit access to trained personnel. Use industrial vacuums for large spills. Ventilate area.**

**Waste Disposal**

**Transport to disposal area or bury. Review Federal, Provincial and local Environmental regulations.**

**Handling Procedures and Equipment**

**Avoid skin and eye contact. Minimize dust generation. Wear protective goggles and in cases of insufficient ventilation, use NIOSH approved dust respirator. An eye wash station and safety shower should be readily available where this material or its water dispersions are used. Contact lenses should not be worn when working with this chemical.**

**Storage Requirements**

**Keep tightly closed containers in a cool, dry and well-ventilated area, away from acids. Keep out of reach of children.**

**Special Shipment Information**

**Calcium Hydroxide is neither regulated by the Transportation of Dangerous Goods (TDG) Regulations (Canada) nor by the Hazardous Materials Regulations (USA).**

**SECTION VIII - FIRST AID MEASURES****Skin**

**Carefully and gently brush the contaminated body surfaces in order to remove all traces of lime. Use a brush, cloth or gloves. Remove all lime-contaminated clothing. Rinse contaminated area with lukewarm water for 15 to 20 minutes. Consult a physician if exposed area is large or if irritation persists.**

**Eyes**

**Immediately rinse contaminated eye(s) with gently running lukewarm water (saline solution is preferred) for 15 to 20 minutes. In the case of an embedded particle in the eye, or chemical burn, as assessed by first aid trained personnel, contact a physician.**

**Inhalation**

**Move source of dust or move victim to fresh air. Obtain medical attention immediately. If victim does not breathe, give artificial respiration.**

**Ingestion**

**If victim is conscious, give 300 ml (10 oz) of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice to neutralize the alkali. Do not induce vomiting. Contact a physician immediately.**

**General Advise**

**Consult a physician for all exposures except minor instances of inhalation.**

**SECTION IX - REGULATORY INFORMATION**

Superfund Amendments and Reauthorization Act of 1986 (SARA Title III). / The Emergency Planning and "Community Right-to-Know" Act (EPCRA). / Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). / Resource Conservation and Recovery Act (RCRA).

Component Calcium Hydroxide has been reviewed against the following regulatory listings:

- SARA Section 302 – Emergency Planning Notification. Extremely Hazardous Substances (EHS) List and Threshold Planning Quantity (TPQ). (40 CFR, Part 355, Section 30) : Not listed.
- SARA Section 304 – Emergency Release Notification. Extremely Hazardous Substances (EHS) and Reportable Quantity (RQ) List. (40 CFR, Part 355, Section 40) : Not listed.
- SARA Section 311/312 – Hazard Categories (40 CFR, Part 370) : This product is regulated under CFR 1910.1200 (OSHA Hazard Communication) as Immediate (Acute) Health Hazards – Irritant.
- SARA Section 313 – Toxics Release Inventory (TRI). Toxic Chemical List (40 CFR, Part 372). Not listed.
- CERCLA – Hazardous Substance (40 CFR, Part 302): Not listed in Table 302.4.
- RCRA – Hazardous Waste Number (40 CFR, Part 261, Subpart D): Not listed.
- RCRA – Hazardous Waste Classification (40 CFR, Part 261, Subpart C): Not classified.

CWA 311. - Clean Water Act List of Hazardous Substances.

Calcium Hydroxide has been withdrawn from the Clean Water Act (CWA) list of hazardous substances. (11/13/79) (44FR65400)

California Proposition 65.

Component Calcium Hydroxide does not appear on the above regulatory listing. This product may contain small amounts of crystalline silica. Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Crystalline silica is listed as a chemical known to the State to cause cancer.

Transportation - Hazardous Materials Regulations (USA) & Transportation of Dangerous Goods (TDG) Regulations (Can).

Calcium Hydroxide does not appear on the above regulatory listings

Toxic Substances Control Act (TSCA).

All naturally occurring components of this product are automatically included in the USEPA TSCA Inventory List per 40 CFR 710.4 (b). All other components are listed on the USEPA TSCA Chemical Substances Inventory. Calcium Hydroxide is subject to inventory update reporting (IUR).

Canadian Environmental Protection Act (CEPA) – Substances Lists (DSL/NDL).

Calcium Hydroxide is specified on the public Portion of the Domestic Substances List (DSL).

ANSI/NSF 60 - Drinking Water Treatment Additives.

Hydrated Lime has been investigated with respect to elements identified by EPA as toxic and it has been classified for use in direct contact with drinking water (in accordance with Standard ANSI/NSF 60). For a list of classified products, refer to Underwriters Laboratories Inc.'s Online Certifications Directory.

FDA - U.S. Food and Drug Administration, Department of Health and Human Services.

Calcium Hydroxide has been determined as "Generally Recognized As Safe" (GRAS) by FDA. See 21CFR184.1205. (CFR Title 21 Part 184 - - Direct food substances affirmed as generally recognized as safe).

**SECTION X - OTHER INFORMATION**

<p>Hazardous Materials Identification System (U.S.)</p>		<p>National Fire Protection Association (U.S.) NFPA 704</p> <p>Health Hazard</p>	<p>Fire Hazard</p>  <p>Instability / Thermal Hazard</p> <p>Specific hazard</p>
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<p>WHMIS – Classification: “E” Corrosive Materials.</p>	<p>WHMIS – Classification: “D2A” Materials causing other toxic effects.</p>
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<p>Symbol:</p> 	<p>Symbol:</p> 
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Additional Information/Comments:  
**The technical data contained herein is given as information only and is believed to be reliable. GRAYMONT makes no guarantee of results and assumes no obligation or liability in connection therewith.**

Sources Used:  
 NFPA, NLA, TDG, CSST, RSST, (LSRO-FASEB), Hazardous Products Act, Environment Canada, Enviroguide, OSHA, ACGIH, IARC, NIOSH, CFR, NTP, HSDB, EPA SRS, RTECS, DFG, Chemistry and Technology of Lime and Limestone (John Wiley and Sons, Inc.), Lime and Limestone (WILEY-VCH).

**SECTION XI - PREPARATION INFORMATION**

<p>Prepared by:  <b>GRAYMONT (QC) INC.</b>  <b>Quality Assurance &amp; Technical Services</b></p>	<p>Telephone number:  <b>(450) 449-2262</b></p>	<p>Date :  <b>May 2012</b></p>
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An electronic version of this MSDS is available at: [www.graymont.com](http://www.graymont.com) under the PRODUCTS section.



# Aluminum Sulfate, Solution

Safety Data Sheet

SDS ID: 00231225

## Section 1 - PRODUCT AND COMPANY IDENTIFICATION

**Material Name:** Aluminum sulfate, solution

### Manufacturer Information

USALCO, LLC  
2601 Cannery Avenue  
Baltimore, MD 21226

Emergency # 1-800-282-5322

### Synonyms

ALUM

### Chemical Family

inorganic, salt

### Product Use

water treatment coagulant, flocculent, alumina source for catalyst, pH control in papermaking/water treatment

## Section 2 - HAZARDS IDENTIFICATION

### EMERGENCY OVERVIEW

**Color:** colorless to amber, colorless to green

**Physical Form:** liquid

**Odor:** odorless

**Health Hazards:** respiratory tract irritation, skin irritation, eye irritation

### POTENTIAL HEALTH EFFECTS

#### Inhalation

**Short Term:** irritation, cough, sore throat

**Long Term:** irritation, difficulty breathing, wheezing, lung damage

#### Skin

**Short Term:** irritation (possibly severe), allergic reactions

**Long Term:** irritation (possibly severe), allergic reactions

#### Eye

**Short Term:** irritation (possibly severe)

**Long Term:** irritation (possibly severe)

#### Ingestion

**Short Term:** digestive disorders

**Long Term:** no information is available

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component	Percent	Symbol(s)	Risk Phrase(s)
7732-18-5	Water 231-791-2	>50	—	—
10043-01-3	Aluminum sulfate 233-135-0	<50	Xi	R:36-37-38

### Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Aluminium compounds.

## Section 4 - FIRST AID MEASURES

### Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

### Skin

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

### Eyes

Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.



# Aluminum Sulfate, Solution

## Safety Data Sheet

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### Ingestion

If a large amount is swallowed, get medical attention.

## Section 5 - FIRE FIGHTING MEASURES

See Section 9 for Flammability Properties

**NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0**

Hazard Scale: 0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe

### Flammable Properties

Negligible fire hazard.

### Extinguishing Media

Use extinguishing agents appropriate for surrounding fire.

### Fire Fighting Measures

Move container from fire area if it can be done without risk. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

### Thermal Decomposition Products

**Combustion:** oxides of sulfur

### Sensitivity to Mechanical Impact

Not sensitive

### Sensitivity to Static Discharge

Not sensitive

## Section 6 - ACCIDENTAL RELEASE MEASURES

### Occupational spill/release

Stop leak if possible without personal risk. **Small spills:** Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

## Section 7 - HANDLING AND STORAGE

### Handling Procedures

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

### Storage Procedures

Store and handle in accordance with all current regulations and standards. Store with acids. See original container for storage recommendations. Keep separated from incompatible substances.

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### Component Exposure Limits

ACGIH and EU have not developed exposure limits for any of this product's components.

### Ventilation

Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

### PERSONAL PROTECTIVE EQUIPMENT

#### Eyes/Face

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

#### Protective Clothing

Wear appropriate chemical resistant clothing.

#### Glove Recommendations

Wear appropriate chemical resistant gloves.

#### Respiratory Protection

Under conditions of frequent use or heavy exposure, respiratory protection may be needed.

Respiratory protection is ranked in order from minimum to maximum.

## Aluminum Sulfate, Solution

### Safety Data Sheet

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Consider warning properties before use.

Any air-purifying full-facepiece respirator equipped with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100 or P100.

Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator or self-contained breathing apparatus (SCBA) with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical State:</b>	Liquid	<b>Odor Threshold:</b>	Not applicable
<b>Characteristics:</b>	colorless to clear amber or clear light green liquid	<b>Odor:</b>	Negligible odor
<b>pH:</b>	2.0 - 2.4 @ 20°C	<b>Boiling Point:</b>	109° C/228° F
<b>Evaporation Rate:</b>	1 water=1	<b>Melting Point:</b>	-13° C/9° F
<b>%VOC</b>	0.0	<b>Flash Point:</b>	Not applicable
<b>Vapor Density (air = 1):</b>	Not applicable	<b>Density:</b>	11.1 lbs/gal 15.5 °C
<b>Vapor Pressure:</b>	Not applicable	<b>Specific Gravity (water = 1):</b>	1.32 - 1.34 @ 15.5 °C
<b>Viscosity:</b>	25 cps @ 20°C/68° F	<b>Water Solubility:</b>	Complete

### Section 10 - STABILITY AND REACTIVITY

#### Chemical Stability

Stable at normal temperatures and pressure.

#### Conditions to Avoid

Protect from freezing. Keep separated from incompatible substances.

#### Materials to Avoid

Alkalis, metals

Alkalis (bases): Violent reaction.

Metals: May be corrosive in the presence of moisture.

#### Thermal Decomposition Products

**Combustion:** Thermal oxidative decomposition of Aluminum Sulfate occurs at temperatures greater than 1400°F and can produce sulfur oxides.

#### Possibility of Hazardous Reactions

Will not polymerize.

### Section 11 - TOXICOLOGICAL INFORMATION

#### Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

**Aluminum sulfate (10043-01-3)**

Oral LD50 Rat 1930 mg/kg

**Water (7732-18-5)**

Oral LD50 Rat >90 mL/kg

#### RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

**Aluminum sulfate (10043-01-3)**

**Oral:** 6207 mg/kg Oral Mouse LD50

**Water (7732-18-5)**

**Oral:** >90 mL/kg Oral Rat LD50

## Aluminum Sulfate, Solution

### Safety Data Sheet

SDS ID: 00231225

#### Acute Toxicity Level

**Aluminum sulfate (10043-01-3)**

**Slightly Toxic:** ingestion

#### Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, or DFG.

#### RTECS Irritation

The components of this material have been reviewed, and RTECS publishes the following endpoints:

**Aluminum sulfate (10043-01-3)**

10 mg/24 hour Eyes Rabbit severe

#### Local Effects

**Aluminum sulfate (10043-01-3)**

**Irritant:** inhalation, skin, eye

#### RTECS Mutagenic

The components of this material have been reviewed, and RTECS publishes the following endpoints:

**Aluminum sulfate (10043-01-3)**

20 mg/L human; 20 mg/L human; 20 mg/L human; 20 mg/L human; 762 mg/kg/7 day(s) continuous rat; 762 mg/kg/7 day(s) continuous rat

#### RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

**Aluminum sulfate (10043-01-3)**

800 mg/kg Intraperitoneal Mouse TDLo (pregnant 10-13 day(s)); 27371 ug/kg Subcutaneous Mouse TDLo (male 30 day(s)); 27371 ug/kg Intratesticular Rat TDLo (male 1 day(s))

#### HEALTH EFFECTS

##### Inhalation - Acute Exposure

Aluminum sulfate: Inhalation may cause irritation of mucous membranes with sore throat and cough due to sulfuric acid which is formed by the hydrolysis of the salt upon contact with moisture.

##### Inhalation - Chronic Exposure

Aluminum sulfate: Repeated or prolonged exposure may cause bronchial irritation, leading to nocturnal wheezing, and breathlessness. Prolonged inhalation of dusts containing high concentrations of aluminum have produced emphysema, non-nodular pulmonary fibrosis and fatalities.

##### Skin Contact - Acute Exposure

Aluminum sulfate: Aluminum sulfate hydrolyzes readily with moisture to form some sulfuric acid which may produce irritation, dermatosis and eczema. Excessive formation of sulfuric acid may produce possible burns. Aluminum sulfate may rarely cause skin sensitization.

##### Skin Contact - Chronic Exposure

Aluminum sulfate: Repeated or prolonged contact with some soluble salts of aluminum results in acid irritation from hydrolysis. A congestive, anesthetic condition of the fingers (acroanesthesia) may occur from prolonged contact. Repeated exposure may result in sensitization.

##### Eye Contact - Acute Exposure

Aluminum sulfate: May cause irritation, redness, and corneal burns due to the reaction of the compound with moisture to form sulfuric acid.

##### Eye Contact - Chronic Exposure

Aluminum sulfate: Repeated or prolonged contact with irritants may cause conjunctivitis or effects similar to those for acute exposure.

##### Ingestion - Acute Exposure

Aluminum sulfate: Ingestion of a large dose was lethal in mice. Aluminum salts, particularly concentrated solutions (20%), may produce gingival necrosis and fatal hemorrhagic gastroenteritis, in coordination, colonic contractions, evidence of nephritis and death.

##### Ingestion - Chronic Exposure

Aluminum sulfate: No data available.



# Aluminum Sulfate, Solution

## Safety Data Sheet

SDS ID: 00231225

### Section 12 - ECOLOGICAL INFORMATION

#### Component Analysis - Aquatic Toxicity

##### Aluminum sulfate (10043-01-3)

Fish: 96 Hr LC50 Carassius auratus: 100 mg/L; 96 Hr LC50 Gambusia affinis: 37 mg/L [static]

Invertebrate: 15 Min EC50 Daphnia magna: 136 mg/L

### Section 13 - DISPOSAL CONSIDERATIONS

#### Disposal Methods

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262.

Hazardous Waste Number(s): D002 (Corrosive) if the pH is <2.

May be D002 under §261.22(a)(2) due to the rate of corrosion of steel.

#### Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

### Section 14 - TRANSPORT INFORMATION

#### US DOT Information, TDG Information, ADR Information, RID Information, IATA Information, ICAO Information, IMDG Information

Shipping Name: UN3264, Corrosive, liquid, acidic, inorganic, n.o.s., (Aluminum sulfate), 8, III, RQ

Required Label(s): 8

### Section 15 - REGULATORY INFORMATION

#### U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

##### Aluminum sulfate (10043-01-3)

CERCLA: 5000 lb final RQ; 2270 kg final RQ

#### SARA Section 311/312 (40 CFR 370 Subparts B and C)

Acute Health: Yes; Chronic Health: No; Fire: No; Pressure: No; Reactive: No

#### U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
Aluminum sulfate	10043-01-3	Yes	Yes	No	Yes	Yes

Not regulated under California Proposition 65

#### Germany Water Classification

##### Aluminum sulfate (10043-01-3)

ID Number 486, hazard class 1 - low hazard to waters (footnote 8)

#### EU Marking and Labeling

##### Symbols

Xi Irritant

##### Risk Phrases

R36/37/38 Irritating to eyes, respiratory system and skin.

#### Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
Aluminum sulfate	10043-01-3	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
Water	7732-18-5	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes

**Section 16 - OTHER INFORMATION****Key / Legend**

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

**Full text of R phrases in Section 3**

**R36** Irritating to eyes.

**R37** Irritating to respiratory system.

**R38** Irritating to skin.

**Other Information**

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End of Sheet 00231225

**ATTACHMENT E**  
**EMISSIONS CALCULATIONS**

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

Facility Emissions

Regulated Pollutant	Total Emissions	
	lb/hr	tpy
PM/PM10/PM2.5	0.16894	0.44314
VOC	0.13044	0.34465
VOC HAP	0.06772	0.17887
Metal HAP	0.00913	0.02395
Total HAP	0.07685	0.20282
TCDD	3.64E-09	9.56E-09

Toxic Air Pollutant	Total TAP Emissions		TAP Limit (lb/yr)	Exceed Limit?
	lb/hr	tpy		
Beryllium	0.000001	0.000002	0.8	NO
Lead	0.000005	0.00001	1,200	NO
Mercury	0.0000001	0.0000002	200	NO
Benzene	0.00165	0.00434	1,000	NO
Carbon Tetrachloride	0.00031	0.00083	1,000	NO
Chloroform	0.00027	0.00073	1,000	NO
Trichloroethylene	0.01097	0.02879	10,000	NO
Vinyl Chloride	0.00515	0.01352	1,000	NO

Pollutant	PA		PDA		WTA	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM/PM10/PM2.5	0.00988	0.02592	0.06870	0.18021	0.09036	0.23700
VOC	0.01501	0.04011	0.08097	0.21331	0.03446	0.09123
VOC HAP	0.00968	0.02578	0.03069	0.08095	0.02735	0.07214
Metal HAP	0.00012	0.00032	0.00274	0.00718	0.00627	0.01644
Total HAP	0.00980	0.02610	0.03343	0.08813	0.03362	0.08858
Beryllium	0.0000006	0.000002	0.00000008	0.0000002	0.00000004	0.00000009
Lead	0.0000015	0.000004	0.0000015	0.0000039	0.0000015	0.0000039
Mercury	0.00000003	0.00000008	0.00000003	0.00000008	0.00000003	0.00000008
Benzene	0.00003	0.00008	0.00121	0.00318	0.00041	0.00108
Carbon Tetrachloride	0.00005	0.00014	0.00025	0.00066	0.00001	0.00003
Chloroform	0.00005	0.00014	0.00021	0.00056	0.00001	0.00003
Trichloroethylene	0.00005	0.00014	0.01085	0.02846	0.00007	0.00019
Vinyl Chloride	0.00055	0.00145	0.00459	0.01204	0.00001	0.00003
TCDD	2.79E-10	7.33E-10	6.38E-10	1.67E-09	2.73E-09	7.15E-09

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		
Flow Rate	5	gal min
Fill Time Per Batch	1.67	hours
Batch Size	500	gallons
Yearly Throughput	5,246	batches
Water Emission Rate	2.5	pounds per minute
	150	pounds per hour

Constants	
1,000	g/L
1,000	mg/g
1,000,000	ug/g
8.34	lb/gal

Hazardous Air Pollutants, Toxic Air Pollutants

0.000834

Task Code: 4Q10							
Sample ID: GW-1A(PS)4Q10							
Chemical Name	Unit	Well GW-1A	Processed		PM Emissions		TAP Limit
			lb/batch	tons/batch yr	lb/hr	tpy	lb/year
Aluminum (fume or dust)	mg/L	0.2	0.000834	0.002188	0.000030	0.000079	
Antimony	mg/L	0.02	0.000084	0.000221	0.000003	0.000008	
Arsenic	mg/L	0.02	0.000084	0.000221	0.000003	0.000008	
Barium	mg/L	0.2	0.000834	0.002188	0.000030	0.000079	
Beryllium	mg/L	0.004	0.000017	0.000045	0.000001	0.000003	0.8
Cadmium	mg/L	0.005	0.000021	0.000056	0.000001	0.000002	
Calcium Metal	mg/L	39	0.162630	0.426579	0.005850	0.015345	
Chromium	mg/L	0.01	0.000042	0.000111	0.000002	0.000004	
Cobalt	mg/L	0.01	0.000042	0.000111	0.000002	0.000004	
Copper	mg/L	0.02	0.000084	0.000221	0.000003	0.000008	
Iron	mg/L	2.3	0.009591	0.025158	0.000345	0.000905	
Lead	mg/L	0.01	0.000042	0.000111	0.000002	0.000004	1,200
Magnesium	mg/L	6.5	0.027105	0.071097	0.000975	0.002557	
Manganese	mg/L	0.68	0.002836	0.007439	0.000102	0.000268	
Nickel	mg/L	0.04	0.000167	0.000439	0.000006	0.000016	
Potassium	mg/L	5.8	0.024186	0.063440	0.000870	0.002282	
Selenium	mg/L	0.02	0.000084	0.000221	0.000003	0.000008	
Silver	mg/L	0.01	0.000042	0.000111	0.000002	0.000004	
Sodium	mg/L	10	0.041700	0.109380	0.001500	0.003935	
Thallium	mg/L	0.025	0.000105	0.000276	0.000004	0.000010	
Vanadium (fume or dust)	mg/L	0.01	0.000042	0.000111	0.000002	0.000004	
Zinc	mg/L	0.02	0.000084	0.000221	0.000003	0.000008	
Mercury	mg/l	0.0002	0.000001	0.000003	0.00000003	0.00000008	200
Total Metals			0.270657	0.709948	0.009736	0.025537	
Metal HAPs			0.003420	0.008978	0.000123	0.000322	

Chemical Name	Unit	Well GW-1A	Emissions		PM Emissions	
			lb/hr	tpy	lb/hr	tpy
Herbicides (VOC)						
2,4,5-T	ug/L	0.49	0.00001	0.00003	0.000074	0.000193
2,4,5-TP	ug/L	0.49	0.00001	0.00003	0.000074	0.000193
2,4-D	ug/L	0.2	0.00001	0.00003		
Pentachlorophenol	ug/L	0.24	0.00001	0.00003		
TCDD	ug/L	6.7E-05	2.79E-10	7.33E-10		
Total Herbicides			0.00004	0.00012	0.00015	0.00039
Herbicide VOC			0.00002	0.00006		
Herbicide HAPs			0.00002	0.00006		

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		Constants	
Flow Rate	5 gal/min	1,000	g/L
Fill Time Per Batch	1.67 hours	1,000	mg/g
Batch Size	500 gallons	1,000,000	ug/g
Yearly Throughput	5,246 batches	8.34	lb/gal
Water Emission Rate	2.5 pounds per minute		
	150 pounds per hour		

Chemical Name	Unit	Well GW-1A	Emissions lb/hr	tpy	TAP Limit lb/year
VOCs					
1,1,1-Trichloroethane	ug/L	10	0.00005	0.00014	
1,1,2,2-Tetrachloroethane	ug/L	10	0.00005	0.00014	
1,1,2-Trichloroethane	ug/L	10	0.00005	0.00014	
1,1-Dichloroethane	ug/L	10	0.00005	0.00014	
1,1-Dichloroethylene	ug/L	10	0.00005	0.00014	
1,2-Dibromo-3-Chloropropane(DBCP)	ug/L	10	0.00005	0.00014	
1,2-Dibromoethane (EDB)	ug/L	10	0.00005	0.00014	
1,2-Dichloroethane	ug/L	10	0.00005	0.00014	
1,2-Dichloropropane	ug/L	10	0.00005	0.00014	
2-Butanone	ug/L	100	0.00042	0.00111	
4-Methyl-2-pentanone	ug/L	100	0.00042	0.00111	
Acetone	ug/L	250	0.00105	0.00276	
Benzene	ug/L	5.8	0.00003	0.00008	1,000
Benzene, (1-methylethyl)-	ug/L	2.7	0.00002	0.00006	
Bromodichloromethane	ug/L	10	0.00005	0.00014	
Bromomethane	ug/L	10	0.00005	0.00014	
Carbon Disulfide	ug/L	20	0.00009	0.00024	
Carbon Tetrachloride	ug/L	10	0.00005	0.00014	1,000
CFC-11	ug/L	10	0.00005	0.00014	
CFC-12	ug/L	10	0.00005	0.00014	
Chlorinated Fluorocarbon (Freon 113)	ug/L	10	0.00005	0.00014	
Chlorobenzene	ug/L	920	0.00384	0.01008	
Chlorodibromomethane	ug/L	10	0.00005	0.00014	
Chloroethane	ug/L	10	0.00005	0.00014	
Chloroform	ug/L	10	0.00005	0.00014	1,000
Chloromethane	ug/L	10	0.00005	0.00014	
cis-1,2-Dichloroethene	ug/L	130	0.00055	0.00145	
cis-1,3-Dichloropropene	ug/L	10	0.00005	0.00014	
Cyclohexane	ug/L	7.9	0.00004	0.00011	
Dichloromethane	ug/L	50	0.00021	0.00056	
Ethylbenzene	ug/L	58	0.00025	0.00066	
Methyl Acetate	ug/L	10	0.00005	0.00014	
Methyl N-Butyl Ketone	ug/L	100	0.00042	0.00111	
Methyl t-butyl ether (MTBE)	ug/L	100	0.00042	0.00111	
Methylbenzene	ug/L	28	0.00012	0.00032	
Methylcyclohexane	ug/L	30	0.00013	0.00035	
Styrene (Monomer)	ug/L	10	0.00005	0.00014	
Tetrachloroethene	ug/L	10	0.00005	0.00014	
trans-1,2-Dichloroethene	ug/L	10	0.00005	0.00014	
trans-1,3-Dichloropropene	ug/L	10	0.00005	0.00014	
Tribromomethane	ug/L	10	0.00005	0.00014	
Trichloroethylene	ug/L	10	0.00005	0.00014	10,000
Vinyl Chloride	ug/L	130	0.00055	0.00145	1,000
Xylenes (Total)	ug/L	30	0.00013	0.00035	
		Total VOC	0.01004	0.02669	
		VOC HAPs	0.00731	0.01941	

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02.25.15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input	
Flow Rate	5 gal/min
Fill Time Per Batch	1.67 hours
Batch Size	500 gallons
Yearly Throughput	5,246 batches
Water Emission Rate	2.5 pounds per minute
	150 pounds per hour

Constants	
1,000	g/L
1,000	mg/g
1,000,000	ug/g
8.34	lb/gal

Chemical Name	Unit	Emissions		
		Well GW-1A	lb/hr	tpy
SVOCs				
1,1-Biphenyl	ug/L	9.5	0.00004	0.00011
1,2,4-Trichlorobenzene	ug/L	2.3	0.00001	0.00003
1,2-Benzphenanthracene	ug/L	9.5	0.00004	0.00011
1,2-Dichlorobenzene	ug/L	9.5	0.00004	0.00011
1,4-Dichlorobenzene	ug/L	130	0.00055	0.00145
2,2'-Oxybis(1-chloropropane)	ug/L	9.5	0.00004	0.00011
2,2'-oxybis(2-chloropropane)	ug/L		0	0
2,4,5-Trichlorophenol	ug/L	9.5	0.00004	0.00011
2,4,6-Trichlorophenol	ug/L	9.5	0.00004	0.00011
2,4-Dichlorophenol	ug/L	9.5	0.00004	0.00011
2,4-Dimethylphenol	ug/L	9.5	0.00004	0.00011
2,4-Dinitrophenol	ug/L	48	0.00021	0.00056
2,4-Dinitrotoluene	ug/L	9.5	0.00004	0.00011
2,6-Dinitrotoluene	ug/L	9.5	0.00004	0.00011
2-Chloronaphthalene	ug/L	9.5	0.00004	0.00011
2-Chlorophenol	ug/L	2.3	0.00001	0.00003
2-Methylnaphthalene	ug/L	9.5	0.00004	0.00011
2-Methylphenol	ug/L	9.5	0.00004	0.00011
2-Nitroaniline	ug/L	48	0.00021	0.00056
2-Nitrophenol	ug/L	9.5	0.00004	0.00011
3,3'-Dichlorobenzidine	ug/L	57	0.00024	0.00063
3,5,5-Trimethyl-2-cyclohexene-1-one	ug/L	9.5	0.00004	0.00011
3,4-Cresol	ug/L		0	0
3-Nitroaniline	ug/L	48	0.00021	0.00056
4,6-Dinitro-2-methylphenol	ug/L	48	0.00021	0.00056
4-Bromophenyl phenyl ether	ug/L	9.5	0.00004	0.00011
4-Chloro-3-methylphenol	ug/L	9.5	0.00004	0.00011
4-Chlorophenyl phenyl ether	ug/L	9.5	0.00004	0.00011
4-Methylphenol	ug/L	9.5	0.00004	0.00011
4-Nitrophenol	ug/L	48	0.00021	0.00056
Acenaphthene	ug/L	9.5	0.00004	0.00011
Acenaphthylene	ug/L	9.5	0.00004	0.00011
Acetophenone	ug/L	9.5	0.00004	0.00011
Aniline	ug/L	19	0.00008	0.00021
Anthracene	ug/L	9.5	0.00004	0.00011
Atrazine	ug/L	9.5	0.00004	0.00011
Benzaldehyde	ug/L	9.5	0.00004	0.00011
Benzo(a)anthracene	ug/L	9.5	0.00004	0.00011
Benzo(a)pyrene	ug/L	9.5	0.00004	0.00011
Benzo(b)fluoranthene	ug/L	9.5	0.00004	0.00011
Benzo(g,h,i)perylene	ug/L	9.5	0.00004	0.00011
Benzo(k)fluoranthene	ug/L	9.5	0.00004	0.00011
Benzyl butyl phthalate	ug/L	9.5	0.00004	0.00011
bis(2-Chloroethoxy)methane	ug/L	9.5	0.00004	0.00011
bis(2-Chloroethoxy)ether	ug/L	9.5	0.00004	0.00011
bis(2-Ethylhexyl)phthalate	ug/L	9.5	0.00004	0.00011
Caprolactam	ug/L	9.5	0.00004	0.00011
Carbazole	ug/L	9.5	0.00004	0.00011
Dibenz(a,h)anthracene	ug/L	9.5	0.00004	0.00011
Dibenzofuran	ug/L	9.5	0.00004	0.00011
Diethyl phthalate	ug/L	9.5	0.00004	0.00011
Dimethyl phthalate	ug/L	9.5	0.00004	0.00011
Di-n-butyl phthalate	ug/L	9.5	0.00004	0.00011
Di-n-octyl phthalate	ug/L	9.5	0.00004	0.00011

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

		Process Input		Constants	
Flow Rate	5	gal/min		1,000	g/L
Fill Time Per Batch	1.67	hours		1,000	mg/g
Batch Size	500	gallons		1,000,000	ug/g
Yearly Throughput	5,246	batches		8.34	lb/gal
Water Emission Rate	2.5	pounds per minute			
	150	pounds per hour			
Ethyl Parathion	ug/L	9.5	0.00004	0.00011	
Fluoranthene	ug/L	9.5	0.00004	0.00011	
Fluorene	ug/L	9.5	0.00004	0.00011	
Hexachloro-1,3-butadiene	ug/L	9.5	0.00004	0.00011	
Hexachlorobenzene	ug/L	9.5	0.00004	0.00011	
Hexachlorocyclopentadiene	ug/L	9.5	0.00004	0.00011	
Hexachloroethane	ug/L	9.5	0.00004	0.00011	
Indeno(1,2,3-cd)pyrene	ug/L	9.5	0.00004	0.00011	
M-Dichlorobenzene	ug/L	48	0.00021	0.00056	
Naphthalene	ug/L	9.5	0.00004	0.00011	
Nitrobenzene	ug/L	9.5	0.00004	0.00011	
N-Nitrosodiphenylamine	ug/L	12	0.00006	0.00016	
n-Nitrosodipropylamine	ug/L	9.5	0.00004	0.00011	
p-chloroaniline	ug/L	19	0.00008	0.00021	
Pentachlorophenol	ug/L	48	0.00021	0.00056	
Phenanthrene	ug/L	9.5	0.00004	0.00011	
Phenol	ug/L	9.5	0.00004	0.00011	
p-Nitroaniline, 4-nitroaniline	ug/L	48	0.00021	0.00056	
Pyrene	ug/L	9.5	0.00004	0.00011	
		Total SVOC	0.00495	0.01336	
		SVOC HAPs	0.00235	0.00631	

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input	
Flow Rate	5 gal/min
Fill Time Per Batch	1.67 hours
Batch Size	500 gallons
Yearly Throughput	5,246 batches
Water Emission Rate =	2.5 pounds per minute
	150 pounds per hour

Constants
1,000 g/L
1,000 mg/g
1,000,000 ug/g
8.34 lb/gal

**Hazardous Air Pollutants: Toxic Air Pollutants**

Task Code: 4Q10		Sample ID: GW-9A(PS)4Q10, GW-10A(PS)4Q10, GW-11A(PS)4Q10									
Chemical Name	Unit	Well				Processed		Emissions		TAP Limit	
		GW-9A	GW-10A	GW-11A	MAX	lb/batch	tons/batch yr	lb/hr	tpy	lb/year	
<b>Metal:</b>											
Aluminum (fume or dust)	mg/L	0.2	0.2	0.2	0.2	0.00084	0.00221	0.000030	0.000079		
Antimony	mg/L	0.02	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008		
Arsenic	mg/L	0.02	0.01	0.02	0.02	0.00009	0.00024	0.000003	0.000008		
Barium	mg/L	0.051	0.067	0.031	0.067	0.00028	0.00074	0.000010	0.000026		
<b>Beryllium</b>	mg/L	0.00043	0.00034	0.00051	0.00051	0.00001	0.00003	0.000001	0.000002	0.8	
Cadmium	mg/L	0.0036	0.005	0.0022	0.005	0.00003	0.00008	0.000001	0.000002		
Calcium Metal	mg/L	74	100	160	160	0.6672	1.75007	0.024000	0.062952		
Chromium	mg/L	0.01	0.0035	0.0048	0.01	0.00005	0.00014	0.000002	0.000004		
Cobalt	mg/L	0.052	0.068	0.11	0.11	0.00046	0.00121	0.000017	0.000043		
Copper	mg/L	0.02	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008		
Iron	mg/L	0.032	19	12	19	0.07923	0.20783	0.002850	0.007476		
<b>Lead</b>	mg/L	0.01	0.01	0.01	0.01	0.00005	0.00014	0.0000015	0.0000039	1,200	
Magnesium	mg/L	40	42	55	55	0.22935	0.60159	0.008250	0.021640		
Manganese	mg/L	7.4	15	16	18	0.07506	0.19688	0.002700	0.007082		
Nickel	mg/L	0.059	0.023	0.041	0.059	0.00025	0.00066	0.000008	0.000023		
Potassium	mg/L	3.9	2.9	1.7	3.9	0.01627	0.04268	0.000585	0.001534		
Selenium	mg/L	0.0084	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008		
Silver	mg/L	0.01	0.0013	0.0016	0.01	0.00005	0.00014	0.000002	0.000004		
Sodium	mg/L	130	120	190	190	0.7923	2.07821	0.028500	0.074756		
Thallium	mg/L	0.025	0.025	0.025	0.025	0.00011	0.00029	0.000004	0.000010		
Vanadium (fume or dust)	mg/L	0.01	0.01	0.01	0.01	0.00005	0.00014	0.000002	0.000004		
Zinc	mg/L	0.05	0.013	0.051	0.051	0.00022	0.00058	0.000008	0.000020		
<b>Mercury</b>	mg/L	0.0002	0.0002	0.0002	0.0002	0.00001	0.00003	0.00000003	0.00000008	200	
Total Metals						1.8622	4.88462	0.066981	0.175690		
Metal HAPs						0.0762	0.1999	0.002738	0.007182		

Chemical Name	Unit	Well				Emissions		PM Emissions	
		GW-9A	GW-10A	GW-11A	MAX	lb/hr	tpy	lb/hr	tpy
<b>Herbicides</b>									
2,4,5-T	ug/L	0.49	0.49	0.49	0.49	0.00001	0.00003	0.000074	0.000193
2,4,5-TP	ug/L	0.19	1.4	11	11.0	0.00005	0.00014	0.001650	0.004328
2,4-D	ug/L	0.49	1.7	1.2	1.7	0.00001	0.00003		
Pentachlorophenol	ug/L	0.24	0.24	0.25	0.25	0.00001	0.00003		
TCDD	ug/L				0.00015	6.78E-10	1.67E-05		
Total Herbicides						0.00008	0.00023	0.00172	0.00452
Herbicide VOC						0.00002	0.00006		
Herbicide HAPs						0.00002	0.00006		

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input	
Flow Rate	5 gal/min
Fill Time Per Batch	1.67 hours
Batch Size	500 gallons
Yearly Throughput	5,246 batches
Water Emission Rate =	2.5 pounds per minute
	150 pounds per hour

Constants	
	1,000 g/L
	1,000 mg/g
	1,000,000 ug/g
	8.34 lb./gal

**Hazardous Air Pollutants, Toxic Air Pollutants**

Chemical Name	Unit	Well				Emissions		TAP Limit lb./year
		GW-9A	GW-10A	GW-11A	MAX	lb./hr	tpy	
<b>VOCs</b>								
1,1,1-Trichloroethane	ug/L	25	10	50	50	0.00021	0.00056	
1,1,2,2-Tetrachloroethane	ug/L	25	10	50	50	0.00021	0.00056	
1,1,2-Trichloroethane	ug/L	25	10	50	50	0.00021	0.00056	
1,1-Dichloroethane	ug/L	25	10	50	50	0.00021	0.00056	
1,1-Dichloroethylene	ug/L	25	10	15	15	0.00007	0.00019	
1,2-Dibromo-3-Chloropropane(DBCP)	ug/L	25	10	50	50	0.00021	0.00056	
1,2-Dibromoethane (EDB)	ug/L	25	10	50	50	0.00021	0.00056	
1,2-Dichloroethane	ug/L	16	22	17	22	0.0001	0.00027	
1,2-Dichloropropane	ug/L	12	7	50	50	0.00021	0.00056	
2-Butoxane	ug/L	250	100	500	500	0.00209	0.00549	
4-Methyl-2-pentanone	ug/L	250	100	500	500	0.00209	0.00549	
Acetone	ug/L	620	250	1,200	1,200	0.00501	0.01315	
Benzene	ug/L	51	100	290	290	0.00121	0.00318	1,000
Benzene, (1-methylethyl)-	ug/L	25	10	7.4	25	0.00011	0.00029	
Bromodichloromethane	ug/L	25	10	50	50	0.00021	0.00056	
Bromomethane	ug/L	25	10	50	50	0.00021	0.00056	
Carbon Disulfide	ug/L	50	20	100	100	0.00042	0.00111	
Carbon Tetrachloride	ug/L	50	10	50	50	0.00025	0.00066	1,000
CFC-11	ug/L	25	10	50	50	0.00021	0.00056	
CFC-12	ug/L	25	10	50	50	0.00021	0.00056	
Chlorinated Fluorocarbon (Freon 113)	ug/L	25	10	50	50	0.00021	0.00056	
Chlorobenzene	ug/L	36	520	21	320	0.00134	0.00352	
Chlorodibromomethane	ug/L	25	10	50	50	0.00021	0.00056	
Chloroethane	ug/L	25	10	50	50	0.00021	0.00056	
Chloroform	ug/L	25	11	50	50	0.00021	0.00056	1,000
Chloroethane	ug/L	25	10	50	50	0.00021	0.00056	
cis-1,2-Dichloroethene	ug/L	2,100	930	9,000	9000	0.03753	0.09845	
cis-1,3-Dichloropropene	ug/L	25	10	50	50	0.00021	0.00056	
Cyclohexane	ug/L	9.5	11	50	50	0.00021	0.00056	
Dichloromethane	ug/L	120	50	250	250	0.00105	0.00276	
Ethylbenzene	ug/L	25	10	50	50	0.00021	0.00056	
Methyl Acetate	ug/L	25	10	50	50	0.00021	0.00056	
Methyl N-Butyl Ketone	ug/L	250	100	500	500	0.00209	0.00549	
Methyl t-butyl ether (MTBE)	ug/L	13	10	14	14	0.00006	0.00016	
Methylbenzene	ug/L	25	6.5	50	50	0.00021	0.00056	
Methylcyclohexane	ug/L	9.9	8	50	50	0.00021	0.00056	
Styrene (Monomer)	ug/L	25	10	50	50	0.00021	0.00056	
Tetrachloroethene	ug/L	25	2.4	50	50	0.00021	0.00056	
trans-1,2-Dichloroethene	ug/L	7.3	4.6	60	60	0.00026	0.00069	
trans-1,3-Dichloropropane	ug/L	25	10	50	50	0.00021	0.00056	
Tribromomethane	ug/L	25	10	50	50	0.00021	0.00056	
Trichloroethylene	ug/L	210	52	2,600	2600	0.01085	0.02846	10,000
Vinyl Chloride	ug/L	1,100	610	500	1,100	0.00459	0.01104	1,000
Xylenes (Total)	ug/L	50	2.4	100	100	0.00042	0.00111	
Total VOC						0.075	0.19707	
VOC HAPs						0.0279	0.0734	

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		Constants	
Flow Rate	3 gal/min	1,000	g/L
Fill Time Per Batch	1.67 hours	1,000	mg/g
Batch Size	500 gallons	1,000,000	ug/g
Yearly Throughput	5,246 batches	8.34	lb./gal
Water Emission Rate =	2.5 pounds per minute		
	150 pounds per hour		

**Hazardous Air Pollutants, Toxic Air Pollutants**

Chemical Name	Unit	Well				Emissions	
		GW-9A	GW-10A	GW-11A	MAX	lb/yr	tpy
1,1-Biphenyl	ug/L	2.4	9.7	9.7	9.7	0.00005	0.00014
1,2,4-Trichlorobenzene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
1,2-Benzophenanthracene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
1,2-Dichlorobenzene	ug/L	9.4	2.3	9.7	9.7	0.00005	0.00014
1,4-Dichlorobenzene	ug/L	9.4	4.6	9.7	9.7	0.00005	0.00014
2,2'-Oxybis(1-chloropropane)	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2,2'-oxybis(2-chloropropane)	ug/L				0.0	0	0
2,4,5-Trichlorophenol	ug/L	9.4	45	9.7	43	0.00018	0.00048
2,4,6-Trichlorophenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2,4-Dichlorophenol	ug/L	9.4	18	9.7	18	0.00008	0.00021
2,4-Dimethylphenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2,4-Dinitrophenol	ug/L	47	48	49	49	0.00021	0.00056
2,4-Dinitrotoluene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2,6-Dinitrotoluene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2-Chloronaphthalene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2-Chlorophenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2-Methylnaphthalene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2-Methylphenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
2-Nitroaniline	ug/L	47	48	49	49	0.00021	0.00056
2-Nitrophenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
3,3'-Dichlorobenzidine	ug/L	57	57	58	58	0.00025	0.00066
3,5,5-Trimethyl-2-cyclohexene-1-one	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
3,4-Cresol	ug/L				0	0	0
3-Nitroaniline	ug/L	47	48	49	49	0.00021	0.00056
4,6-Dinitro-2-methylphenol	ug/L	47	48	49	49	0.00021	0.00056
4-Bromophenyl phenyl ether	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
4-Chloro-3-methylphenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
4-Chlorophenyl phenyl ether	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
4-Methylphenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
4-Nitrophenol	ug/L	47	130	49	130	0.00055	0.00145
Acenaphthene	ug/L	47	9.5	9.7	47	0.0002	0.00053
Acenaphthylene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Acetophenone	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Amthal	ug/L	9.4	19	19	19	0.00008	0.00021
Anthracene	ug/L	19	9.5	9.7	19	0.00008	0.00021
Atrazine	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzaldehyde	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzo(a)anthracene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzo(a)pyrene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzo(b)fluoranthene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzo(g,h,i)perylene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzo(k)fluoranthene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Benzyl butyl phthalate	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
bis(2-Chloroethoxy)methane	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
bis(2-Chloroethyl)ether	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
bis(2-Ethylethyl)phthalate	ug/L	2.5	9.5	9.7	9.7	0.00005	0.00014
Caprolactam	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Carbazole	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Dibenz(a,h)anthracene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Dibenzofuran	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Diethyl phthalate	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Dimethyl phthalate	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Di-n-butyl phthalate	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Di-n-octyl phthalate	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Ethyl Parathion	ug/L	9.4	58	9.7	58.0	0.00025	0.00066
Fluoranthene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Fluorene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Heptachloro-1,3-butadiene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Hexachlorobenzene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Hexachlorocyclopentadiene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Hexachlorothiane	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Indeno(1,2,3-cd)pyrene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
M-Dichlorobenzene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Naphthalene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
Nitrobenzene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
N-Nitrosodiphenylamine	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
n-Nitrosodipropylamine	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
p-Chloroaniline	ug/L	9.4	19	19	19	0.00008	0.00021
Perachloropentachlor	ug/L	19	49	49	49	0.00021	0.00056
Phenanthrene	ug/L	47	9.5	9.7	47	0.0002	0.00053
Phenol	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
p-Nitroaniline, 4-nitroaniline	ug/L	9.4	48	49	49	0.00021	0.00056
Pyrene	ug/L	9.4	9.5	9.7	9.7	0.00005	0.00014
					Total SVOC	0.00595	0.01618
					SVOC HAPs	0.00277	0.00749

By: CCS  
Date: 02/27/15

Checked By: ADM  
Date: 02/25/15

The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		Constants	
Flow Rate	5 gal/min	1,000	g/L
Fill Time Per Batch	1.67 hours	1,000	mg/g
Batch Size	500 gallons	1,000,000	ug/g
Yearly Throughput	5,246 batches	8.34	lb/gal
Water Emission Rate <sup>1</sup>	2.5 pounds per minute		
	150 pounds per hour		

**Hazardous Air Pollutants, Toxic Air Pollutants**

Chemical Name	Unit	Task Code: 4Q10		Sample ID: GW-6A(PS)4Q10, GW-14A(PS)4Q10		Well		Processed		Emissions		TAP Limit lb/year
		GW-6A	GW-14A	MAX	lb/batch	tons/batch yr	lb/hr	tpy				
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Aluminum (fume or dust)	mg/L	0.2	0.2	0.2	0.00084	0.00221	0.000030	0.000079				
Antimony	mg/L	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008				
Arsenic	mg/L	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008				
Barium	mg/L	0.094	0.021	0.094	0.00040	0.00105	0.000014	0.000037				
Beryllium	mg/L	0.0001	0.00024	0.00024	0.00001	0.00003	0.00000004	0.00000009			0.8	
Cadmium	mg/L	0.005	0.0034	0.005	0.00003	0.00008	0.000001	0.000002				
Calcium Metal	mg/L	180	180	180	0.75060	1.96883	0.027000	0.070821				
Chromium	mg/L	0.01	0.016	0.016	0.00007	0.00019	0.000002	0.000006				
Cobalt	mg/L	0.01	0.24	0.24	0.00117	0.00307	0.000042	0.000110				
Copper	mg/L	0.02	0.02	0.02	0.00009	0.00024	0.000003	0.000008				
Iron	mg/L	9.3	7.5	9.3	0.03879	0.10175	0.001395	0.003659				
Lead	mg/L	0.01	0.01	0.01	0.00005	0.00014	0.0000015	0.0000039			1,200	
Magnesium	mg/L	18.0	100	100	0.41700	1.09380	0.015000	0.039345				
Manganese	mg/L	2	41	41	0.17097	0.44846	0.006150	0.016131				
Nickel	mg/L	0.04	0.42	0.42	0.00176	0.90462	0.000063	0.000165				
Potassium	mg/L	10	11	11	0.04587	0.12032	0.001650	0.004328				
Selenium	mg/L	0.02	0.02	0.02	0.00008	0.00024	0.000003	0.000008				
Silver	mg/L	0.01	0.0019	0.01	0.00005	0.00014	0.000002	0.000004				
Sodium	mg/L	48	130	130	0.54210	1.42193	0.019500	0.051149				
Thallium	mg/L	0.025	0.025	0.025	0.00011	0.00029	0.000004	0.000010				
Vanadium (fume or dust)	mg/L	0.01	0.01	0.01	0.00005	0.00014	0.000002	0.000004				
Zinc	mg/L	0.02	0.22	0.22	0.00092	0.00242	0.000033	0.000087				
Mercury	ug/L	0.0002	0.0002	0.0002	0.00001	0.00003	0.00000003	0.00000008			200	
Total Metals					1.9712	5.17046	0.070901	0.185972				
Metal HAPs					0.1743	0.45734	0.006269	0.016443				

Chemical Name	Unit	Well			Emissions		PM Emissions	
		GW-6A	GW-14A	MAX	lb/hr	tpy	lb/hr	tpy
Herbicides	ug/L	0.49	120	120	0.00051	0.00134	0.018000	0.047214
2,4,5-T	ug/L	0.49	9.7	9.7	0.00005	0.00014	0.001455	0.003816
2,4,5-TP	ug/L	0.49	780	780	0.00326	0.00856		
2,4-D	ug/L	5.6	5.6	5.6	0.00003	0.00008		
Pentachlorophenol	ug/L							
TCDD	ug/L				0.000654	2.73E-09	7.15E-09	
Total Herbicides					0.00385	0.01012		
Herbicide VOC					0.00329	0.00864		
Herbicide HAPs					0.00329	0.00864	0.01946	0.05103

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The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		Constants	
Flow Rate	5 gal/min	1,000	g/L
Fill Time Per Batch	1.67 hours	1,000	mg/g
Batch Size	500 gallons	1,000,000	ug/g
Yearly Throughput	5,246 batches	8.34	lb/gal
Water Emission Rate	2.5 pounds per minute		
	150 pounds per hour		

Hazardous Air Pollutants Toxic Air Pollutants

Chemical Name	Unit	Well			Emissions		TAP Limit lb/year
		GW-6A	GW-14A	MAX	lb/hr	tpy	
VOCs							
1,1,1-Trichloroethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
1,1,2,2-Tetrachloroethane	ug/L	2.5	1.0	2.5	0.00002	0.00006	
1,1,2-Trichloroethane	ug/L	0.27	1.0	1.0	0.00001	0.00003	
1,1-Dichloroethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
1,1-Dichloroethylene	ug/L	0.71	1.0	1.0	0.00001	0.00003	
1,2-Dibromo-3-Chloropropane(DBCP)	ug/L	1.0	1.0	1.0	0.00001	0.00003	
1,2-Dibromoethane (EDB)	ug/L	1.0	1.0	1.0	0.00001	0.00003	
1,2-Dichloroethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
1,2-Dichloropropane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
2-Butanone	ug/L	10	2.2	10	0.00005	0.00014	
3-Methyl-2-pentanone	ug/L	10	10	10	0.00005	0.00014	
Acetone	ug/L	25	8	25	0.00011	0.00029	
Benzene	ug/L	96	75	96	0.00041	0.00108	1,000
Benzene, (1-methylethyl)-	ug/L	11	0.25	11	0.00005	0.00014	
Bromodichloromethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Bromomethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Carbon Disulfide	ug/L	2.0	2.0	2.0	0.00001	0.00003	
Carbon Tetrachloride	ug/L	1.0	1.0	1.0	0.00001	0.00003	1,000
CFC-11	ug/L	1.0	1.0	1.0	0.00001	0.00003	
CFC-12	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Chlorinated Fluorocarbon (Freon 113)	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Chlorobenzene	ug/L	37	13	37	0.00016	0.00042	
Chlorodibromomethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Chloroethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Chloroform	ug/L	1.0	0.9	1.0	0.00001	0.00003	1,000
Chloroethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
cis-1,2-Dichloroethene	ug/L	120	1.7	120	0.00051	0.00134	
cis-1,3-Dichloropropene	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Cyclohexane	ug/L	0.97	1.0	1.0	0.00001	0.00003	
Dichloromethane	ug/L	5.0	2.6	5	0.00005	0.00008	
Ethylbenzene	ug/L	13	37	37	0.00016	0.00042	
Methyl Acetate	ug/L	1.0	1.0	1	0.00001	0.00003	
Methyl N-Butyl Ketone	ug/L	10	10	10	0.00005	0.00014	
Methyl t-butyl ether (MTBE)	ug/L	10	10	10	0.00005	0.00014	
Methylbenzene	ug/L	5.7	23	23	0.00010	0.00027	
Methylcyclohexane	ug/L	0.99	9.8	10	0.00005	0.00014	
Styrene (Monomer)	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Tetrachloroethene	ug/L	1.4	1.0	1.4	0.00001	0.00003	
trans-1,2-Dichloroethene	ug/L	1.2	1.0	1.2	0.00001	0.00003	
trans-1,3-Dichloropropene	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Tribromomethane	ug/L	1.0	1.0	1.0	0.00001	0.00003	
Trichloroethylene	ug/L	2.2	16	16	0.00007	0.00019	10,000
Vinyl Chloride	ug/L	1.3	0.76	1.3	0.00001	0.00003	1,000
Xylenes (Total)	ug/L	21	95	95	0.00040	0.0011	
					Total VOC	0.00255	0.00693
					VOC HAPs	0.00159	0.00434

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The purpose of this calculation is to determine the VOC, PM, and HAP loss through the aeration of the well water. Each batch is assumed to be complete in one (1) hour. For VOC, VOC HAP, SVOC, and SVOC HAP 100% loss is assumed. PM emissions from metals are calculated by determining the PM levels in a batch in parts per million and applying the result to the aerosol discharged from the tank vent. The water emissions rate is the mass of water aerosol discharged from the aeration tank vent. This is an engineering estimate based on a similar facility.

Process Input		Constants	
Flow Rate	5 gal/min	1,000	g/L
Fill Time Per Batch	1.67 hours	1,000	mg/g
Batch Size	500 gallons	1,000,000	ug/g
Yearly Throughput	5,246 batches	8.34	lb/gal
Water Emission Rate <sup>1</sup>	2.5 pounds per minute		
	150 pounds per hour		

Hazardous Air Pollutants Toxic Air Pollutants

Chemical Name SVOC's	Unit	Well			Emissions	
		GW-6A	GW-14A	MAX	lb/hr	tpy
1,1-Dibutyl	ug/L	10	9.5	10	0.00005	0.00014
1,2,4-Trichlorobenzene	ug/L	10	0.9	10	0.00005	0.00014
1,2-Benzophenanthrene	ug/L	10	9.5	10	0.00005	0.00014
1,2-Dichlorobenzene	ug/L	10	9.5	10	0.00005	0.00014
1,4-Dichlorobenzene	ug/L	0.79	0.76	0.8	0.00001	0.00003
2,2'-Oxybis(1-chloropropane)	ug/L	10	9.5	10	0.00005	0.00014
2,2'-oxybis(2-chloropropane)	ug/L			0	0	0
2,4,5-Trichlorophenol	ug/L	3.0	1,400	1,400	0.00584	0.01532
2,4,6-Trichlorophenol	ug/L	2.1	2.5	9.5	0.00004	0.00011
2,4-Dichlorophenol	ug/L	10	380	380	0.00159	0.00418
2,4-Dimethylphenol	ug/L	10	420	420	0.00176	0.00462
2,4-Dinitrophenol	ug/L	50	48	50	0.00021	0.00056
2,4-Dinitrotoluene	ug/L	10	9.5	10	0.00005	0.00014
2,6-Dinitrotoluene	ug/L	10	9.5	10	0.00005	0.00014
2-Chloronaphthalene	ug/L	10	9.5	10	0.00005	0.00014
2-Chlorophenol	ug/L	10	9.5	10	0.00005	0.00014
2-Methylnaphthalene	ug/L	10	9.5	10	0.00005	0.00014
2-Methylphenol	ug/L	10	22	22	0.00010	0.00027
2-Nitroaniline	ug/L	50	48	50	0.00021	0.00056
2-Nitrophenol	ug/L	10	9.5	10	0.00005	0.00014
3,3'-Dichlorobenzidine	ug/L	60	57	60	0.00026	0.00069
3,5,5-Trimethyl-2-cyclohexene-1-one	ug/L	10	9.5	10	0.00005	0.00014
3,4-Cresol	ug/L			0	0	0
3-Nitroaniline	ug/L	50	48	50	0.00021	0.00056
4,6-Dinitro-2-methylphenol	ug/L	50	48	50	0.00021	0.00056
4-Bromophenyl phenyl ether	ug/L	10	9.5	10	0.00005	0.00014
4-Chloro-3-methylphenol	ug/L	10	28	28	0.00012	0.00032
4-Chlorophenyl phenyl ether	ug/L	10	9.5	10	0.00005	0.00014
4-Methylphenol	ug/L	10	120	120	0.00051	0.00134
4-Nitrotoluene	ug/L	50	48	50	0.00021	0.00056
Acenaphthene	ug/L	10	9.5	10	0.00005	0.00014
Acenaphthylene	ug/L	10	9.5	10	0.00005	0.00014
Acetophenone	ug/L	10	9.5	10	0.00005	0.00014
Amiline	ug/L	20	3,400	3,400	0.01418	0.0372
Anthracene	ug/L	10	9.5	10	0.00005	0.00014
Atrazine	ug/L	10	9.5	10	0.00005	0.00014
Benzaldehyde	ug/L	10	9.5	10	0.00005	0.00014
Benzo(a)anthracene	ug/L	10	9.5	10	0.00005	0.00014
Benzo(a)pyrene	ug/L	10	9.5	10	0.00005	0.00014
Benzo(b)fluoranthene	ug/L	10	9.5	10	0.00005	0.00014
Benzo(g,h,i)perylene	ug/L	10	9.5	10	0.00005	0.00014
Benzo(k)fluoranthene	ug/L	10	9.5	10	0.00005	0.00014
Benzyl butyl phthalate	ug/L	10	9.5	10	0.00005	0.00014
bis(2-Chloroethoxy)methane	ug/L	10	9.5	10	0.00005	0.00014
bis(2-Chloroethyl)ether	ug/L	10	9.5	10	0.00005	0.00014
bis(2-Ethylhexyl)phthalate	ug/L	10	9.5	10	0.00005	0.00014
Caprolactam	ug/L	10	9.5	10	0.00005	0.00014
Carbazole	ug/L	10	9.5	10	0.00005	0.00014
Dibenz(a,h)anthracene	ug/L	10	9.5	10	0.00005	0.00014
Dibenzofuran	ug/L	10	9.5	10	0.00005	0.00014
Diethyl phthalate	ug/L	10	9.5	10	0.00005	0.00014
Dimethyl phthalate	ug/L	10	9.5	10	0.00005	0.00014
Di-n-butyl phthalate	ug/L	10	9.5	10	0.00005	0.00014
Di-n-octyl phthalate	ug/L	10	9.5	10	0.00005	0.00014
Ethyl Parathion	ug/L	10	9.5	10	0.00005	0.00014
Fluoranthene	ug/L	10	9.5	10	0.00005	0.00014
Fluorene	ug/L	10	3.7	10	0.00005	0.00014
Hexachloro-1,3-butadiene	ug/L	10	9.5	10	0.00005	0.00014
Hexachlorobenzene	ug/L	10	9.5	10	0.00005	0.00014
Hexachlorocyclopentadiene	ug/L	10	9.5	10	0.00005	0.00014
Hexachlorocyclohexane	ug/L	10	9.5	10	0.00005	0.00014
Indeno(1,2,3-cd)pyrene	ug/L	10	9.5	10	0.00005	0.00014
M-Dichlorobenzene	ug/L	10	9.5	10	0.00005	0.00014
Naphthalene	ug/L	10	9.5	10	0.00005	0.00014
Nitrobenzene	ug/L	10	9.5	10	0.00005	0.00014
N-Nitrosodiphenylamine	ug/L	10	9.5	10	0.00005	0.00014
n-Nitrosodipropylamine	ug/L	10	9.5	10	0.00005	0.00014
p-chloroaniline	ug/L	20	19	20	0.00009	0.00024
Pentachlorophenol	ug/L	9.1	46	46	0.00021	0.00056
Phenanthrene	ug/L	10	9.5	10	0.00005	0.00014
Phenol	ug/L	10	9.5	10	0.00005	0.00014
p-Nitroaniline, 4-nitroaniline	ug/L	50	48	50	0.00021	0.00056
Pyrene	ug/L	10	9.5	10	0.00005	0.00014
Total SVOC					0.02862	0.07566
SVOC HAPs					0.02247	0.05916