





# Permit Application Form WR-82

10 V.S.A. Chapter 47

For DEC Use:		N (IZ 1/27/202E		
Application #: 3-1588.2501 PIN: Reviewer: MK Receive date: 1/27/2025 Title 3: OY ØN				
Check#: Amount: \$ <u>2094.83</u> Paid By: 10WN	Franklin			
Application For: (Check one) Atta	ch Schedule:	Action Requested: (Check one)		
Municipal Discharge Permit	A	Original Permit		
Industrial Discharge Permit	В	Renewal		
Pretreatment Discharge Permit	В	Amendment		
Emergency Pollution Permit	E	Transfer Permit #		
Status of Discharge: (Check one)		Nature of Waste: (Check one)		
Evisting		Non-Sewage/Industrial	oniy)	
A. Applicant				
1a. Name: Town of Franklin				
1b. Legal Entity (Individual, corporation, partr	nership, firm, state agency, mun	icipality, etc.): Municipality		
2a. Mailing Address: P.O. Box 82				
2b. Town: Franklin	b. Town: Franklin 2c. State: Vermont 2d. Zip:05457		,	
3. Phone:802-285-2101 4. Email:townoff@franklinvt.net				
B. Project Activity				
1. Name of Activity:Lake Carmi Al	1. Name of Activity:Lake Carmi Alum Treatment			
2. Description of waste: Discharge of	of liquid alum and so	odium aluminate		
3. Type of Activity: (Residential subdivis	ion, paper mill, state park	, motel, etc.) In-Lake Phosphorus	Remediation	
4. Name of Landowner: Town of Fra	anklin			
5. Location: Lake Carmi and Town	n of Franklin	6. Town: Franklin		
C. Discharge Schedule				
Using a separate serial number (S/N) described above. Attach a separate s	, identify each indepen chedule for each discha	dent discharge which will result from arge identified below.	nthe activity	
		Use an attached she	eet for additional discharges.	
Discharge	Receiving Water	Latitude (optional)	Longitude (optional)	
S/N 001	Lake Carmi	44.972329 (North)	-72.8755402 (West)	
S/N 002				
S/N 003				
S/N 004				
S/N 005				

D. Permit Renewal		
If this application is for a permit renewal, is Yes No If no, document ch (Note: appropriate Sche	s the previous appli nanges on a separate att dule must be completed	cation still valid in all respects? tachment. I regardless if changes have occurred.)
E. Application Fees		
email jill.draper@verm	3 V.S.A. Section ont.gov for assista	on 2822 Fees: nce calculating the application review fee.
\$240.00 Administrative Processing Fee	\$ 240.00	Does not apply to Emergency Pollution Permits
Plus Application Review Fee	\$ 1,854.83	Applies to all applications (except for name change)
Total Fee Enclosed	\$ 2,094.83	
F. Signature		
LIS a Larvee NAME AND TITLE OF APPLICANT OR LEGALLY. SIGNATURE	AUTHORIZED REPRES	Clerk Treasurer ENTATIVE (please print) 1/27/2025 DATE
SIGNATURE DATE		
By checking this box, I certify that all prior to submission of this application. Is this permit needed to implement of the check box. For more information about the signed by the applicant or a	adjoining property a project funded thi put ARPA, visit: <u>htt</u> n officer in the applican	owners have been sent a DEC Adjoiner form via US mail rough the American Rescue Plan Act (ARPA)? If yes, ps://anr.vermont.gov/special-topics/arpa-vermont.
by the applicant's attorney, engineer, contractor, etc	·	
Submittal of Application: Attach appropria specifications and other supporting materia Refund Policy:	te schedules, admir al.	nistrative processing and application review fees, plans,
- If an application is modified, withdraw	n or denied after te	chnical review has commenced; all fees are retained.
- If an application is withdrawn prior to a	dministrative revie	w; all fees will be refunded.
<ul> <li>If an application is withdrawn after adr deemed administratively incomplete a administrative fees are retained and per</li> </ul>	ninistrative review nd returned to appl ermit application re	but prior to commencement of technical review, icant, or determined that a permit is not required; view fees will be refunded.
Please submit this form and payment formtag=WSMD_Intake. Direct question	using ANROnline ons to <u>ANR.WSM</u> n form along with	at: <u>https://anronline.vermont.gov/?</u> DWastewater@vermont.gov If unable to submit all required supporting materials including a check

in the correct fee amount made payable to State of Vermont to: Vermont DEC - Watershed Management

Division, Wastewater Program - 1 National Life Drive, Davis 3 - Montpelier, VT 05620-3522



# SCHEDULE B: INDUSTRIAL/COMMERCIAL/INSTITUTIONAL WR-82B

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1. Name: Town of Franklin			
2. Activity: Lake Carmi Alum Treatment			
3. Discharge: Discharge of alu	um and sodium aluminate		
4. S/N Designation: 001	For each dis	scharge point, enter a S/N designation	on (001, 002, 003, etc)
5. Exact location on receiving w	ater (describe and locate on	map) or receiving wastewater tre	atment facility:
Lake Carmi - see map and Sedin	nent Inactivation Dosing Plan a	as defined in the Technical Memora	ndum included in this submission
6. Nature of Activity:			
The treatment plan includes treatment greater to improve the water quality of 29.4 sections and treating one section approximately 14,000 gallons/day for	of approximately 775 acres of Lake Lake Carmi and reduce algal bloom per day during the fall of 2025. Divid alum and approximately 7,000 gallo	Carmi with alum and sodium aluminate a s. The proposed treatment plan involves of ding treatment into 29.4 sections assumes ns/day for sodium aluminate.	t depths of 19.2 feet (6 meters) and dividing the total treatment area into s that the daily application rate is
7. Point source category (EPA)	N/A	40 CFR Sub-part	N/A
SIC	N/A	Sub category	N/A
Product	N/A		
Production Process	N/A		
Production Ton/Day	N/A		
7b. If the discharge is regulate toxic organic management pla	d by either 40 CFR Part 423 (	OR CFR Part 433 (metal finishing Attached	or electroplating), include a
8. Describe wastes to be disch	arged:		
Alum and sodium alumina	ate		
9a. Existing discharge?	Yes 🖌 No	If "yes", are wastes being treated	d? Yes No
9b. Explain and describe any less than full time operation of treatment facilities:			
No treatment facilities will be operated. The planned activity will occur only once. The proposed lake treatment plan involves dividing the total treatment area into 29.4 sections and treating one section per day the fall of 2025. Dividing treatment into 29.4 sections assumes that the daily application rate is approximately 14,000 gallons/day for alum and approximately 7,000 gallons/day for sodium aluminate.			
9c. If "no", give the date the d	ischarge will commence:		
9d. Will wastes be treated prior to discharge? Yes V			∕ No
9e. Explain and describe any less than full time operation of treatment facilities:			
N/A			
10a. Are new treatment facilities or modifications to existing facilities in design or under construction? Yes Vo			
10b. If "yes", describe and provide schedule for attainment of operational level:			

10c. If design of proposed treatment facility requires a period for data collection, how much time is required?					
N/A					
11. Have modifications was submitted?	to the production Yes	on proo	cess or treatment facilities occurred durin No	g since the prev	vious application
12. If "yes", please desc	cribe:				
N/A					
13. Describe flow seque	ence of discharg	e, inclu	Iding source of intake water, operations c	contributing was	stewater to the
Application (treatment	t) of alum and	sodiu	nawing showing the water now through the analysis of the second sec	ne raciity. Inducted with a	treatment barge
As the barge travels a	across Lake Ca	armi, it	t delivers liquid alum and sodium alum	ninate below th	ne lake surface
(tubes from the barge	deliver the ch	emica	ls subsurface), floc will form instantan	eously and st	art to settle to the
bottom as soon as the	e alum and soc montal Techn	dium a lical M	Iluminate contact the lake water. Deta	ails of the trea	tment plan are
14 Volumos of wastos	after treatment		to be discharged		
14. Volumes of wastes,		., II ally	, to be discharged		
		CDD	(A) Sanitary Wastes		
weekdays average		GPD			
Weekends average		GPD			
Weekdays average	24.222	CDD	(B) All other wastes		
weekuays average	21,000	GPD	Alum and Sodium Aluminate		
Weekends average		GPD		_	
15. Will discharges in (B) above be essentially uniform over a 12 month period?			✓ No		
15b. If "No", provide m	onthly or seaso	nal bre	eakdown:		
The application of al	lum and sodiu	im alu 5	iminate to Lake Carmi will be a one	e-time event v	with application
		J.			
16 is the person who is	or will be resr	onsihl	e for operation and maintenance of the tr	reatment facility	v cortified by the
Office of Professional Regulation as a Treatment Plant Operator?					
17. Describe the proc	edures used fo	or the o	disposal of all solids, sludges, filter bac	kwash or othe	er pollutants
removed in the course of treatment or control of wastewaters. Include disposal site or location:					
N/A					

18. Describe the effluent characteristics of wastes, (B-12(a) and (B)) to be discharged which you know or have reason to believe are present. Provide <u>maximum concentrations or range of concentrations</u>. If no constituent of the type indicated is added, enter "none added". If constituent is present in unknown or uncertain amount enter "present" and describe in an attachment of the circumstances relating to its presence, including amounts of known constituents.

**Biochemical and physical characteristics** 

Constituent	Amount	Unit	Constituent	Amount	Unit
BOD5		Mg/l	Total Dissolved Solids		Mg/l
COD		Mg/l	Total Phosporus AS P		Mg/l
TSS		Mg/l	Total Kjeldahl Nitrigen (TKN)		Mg/l
Turbidity		NTU	Color		
Settleable Solids		Mg/l	Materials affecting taste and Odor		
Oil and Grease		Mg/l	Temperature Range		°F
Floatable Solids		Mg/l	pH Range		SU
Chemical Constituents					
Constituent	Amount	Unit	Constituent	Amount	Unit
Arsenic		Mg/l	Mercury		Mg/I
Cadmium		Mg/l	Nickel		Mg/l
Chlorine (free)		Mg/l	Selenium		Mg/l
Chromium (+6)		Mg/l	Silver		Mg/l
Chromium (+3)		Mg/l	Zinc		Mg/l
Copper		Mg/I	OTHERS (including any other pollutant identified as a priority pollutant by EPA in the NRDC vs. Train consent decree of July 8, 1976).1		
Cyanide		Mg/l	<sup>Other:</sup> Aluminum-Alum	412,183	
Iron		Mg/I	Other: Aluminum-Sodium Alumina	206,092	
Lead		Mg/I	<sup>Other:</sup> note: units are gallons		
Maganese		Mg/l	Other:		

Existing discharges regulated by 40 CFR Part 413 or 40 CFR Part 433 are required to perform an analysis for Total Toxic Organics from a grab sample and submit the results as part of this application. Contact the Department for the list of Total Toxic Organics.

# Attach additional information relating to the presence and amounts of other known constituents (instructions attached below)

# Send completed application to:

VT Department of Environmental Conservation Watershed Management Division 1 National Life Drive, Davis 3 Montpelier VT 05620-3522



# **Safety Data Sheet**

# 1. Product Identifier and Company Identification

Product name HBCC SDS number Synonym Product use and Restrictions	<ul> <li>Aluminum Sulfate Solution</li> <li>CA06800</li> <li>Liquid Alum; Alum</li> <li>Refer to label or call</li> </ul>	
Manufacturer Contact Address	Corporate Headquarters Hill Brothers Chemical Company 3000 E Birch St, Suite 108 Brea, California 92821 714-998-8800 – Office 800-821-7234 – Office	Corporate Safety & Compliance Hill Brothers Chemical Company 7121 West Bell Road, Suite 250 Glendale, Arizona 85308 623-535-9955 - Office 623-535-9944 - Fax
Emergency telephone Number (Chemtrec) Website	800-424-9300 https://hillbrothers.com	

# 2. Hazard Identification

Classification	: Serious Eye Damage/Eye Irritant – Category 1
Signal Word	: Danger
Pictogram(s)	
Hazard Statements	: H318: Causes serious eye damage
Precautionary Statements	
Response	: P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. Immediately call a POISON CENTER or doctor.
Prevention	<ul> <li>P280: Wear eye or face protection</li> <li>P264: Wash hands thoroughly after handling</li> </ul>
Storage	: N/A
Disposal	: N/A

# 3. Composition/Information on Ingredients

CAS Number	Ingredient Name	Weight %
10043-01-3	Aluminum Sulfate, anhydrous	<50%
7732-18-5	Water	>50%

#### **First Aid Measures** 4. : Do Not Induce Vomiting - Dilute slowly with 1-2 glasses of water. SEEK Ingestion MEDICAL ATTENTION IMMEDIATELY. : If inhaled in large amounts, move exposed person to fresh air. Administer Inhalation artificial respiration if necessary. Have gualified medical personnel administer oxygen. Skin : Immediately remove contaminated clothing. Wash skin in flowing water or shower, then with soap and water. Contact a physician if irritation continues. Wash contaminated clothing separately before reuse. If irritation develops, get medical attention. : Immediate and continuous flushing with flowing water for at least 15 **Eyes** minutes. Prompt medical consultation is essential. **Medical Conditions** : N/A : Irritating to skin, eyes, and mucous membranes. Accidental ingestion may Effects of cause gastrointestinal irritation, nausea and vomiting. **Overexposure Summary of Acute Health** : N/A Hazards Ingestion : May cause abdominal pain, nausea, and or vomiting. Concentrated solutions (over 20%) can cause burns of the mouth, bleeding stomach, incoordination, muscle spasms, and/or kidney injury. Inhalation : Product mists may cause irritation to the respiratory tract. Skin : May cause irritation or burns if the product is wet or in the presence of perspiration. : May cause irritation and inflammation of the eye. Concentrated solutions **Eyes** (over 20%) may cause severe eye damage or burns. : All treatment should be based on observed signs and symptoms of distress Note to in the patient. Consideration should be given to the possibility that **Physicians** overexposure to materials other than this product may have occurred. Aluminum soluble salts may cause gastroenteritis if ingested. Treatment includes the use of demulcents.

Summary of Chronic Health : N/A

# 5. Fire Fighting Measures

Extinguishing	: Not combustible. Use appropriate extinguishing media for material that is supplying fuel. Use water spray to cool the surrounding area and to maintain fire temperature below decomposition temperature.
Special Exposure Hazards	: Under fire conditions greater than 650°C (1202°F), product decomposes to give off sulfur trioxide, an oxidizing agent which will support combustion. Sulfur trioxide will react with water to form sulfuric acid.
Special Protective Equipment for Firefighters	: Wear a NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Dike area to prevent runoff and contamination of water sources.
Fire Fighting Procedures	: N/A
NFPA Rating	: Health - 2 Flammability - 0 Instability - 1
	201

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

Uniform Fire	: N/A
Code Rating	

6. Accidental Release Measures			
Personal Precautions	<ul> <li>Adequate ventilation is required if soda ash or limestone is used, because of the consequent release of carbon dioxide gas.</li> </ul>		
Emergency Procedures	: Use positive pressure supplied air or self-contained breathing apparatus for emergency or other conditions where a higher level of protection is required.		
Methods of Containment And Clean-Up	<ul> <li>Dilute small spills or leaks cautiously with plenty of water. Neutralize any further residue with alkali such as soda ash, lime or limestone. Large spills: dike up with soda ash and neutralize as above. Collect liquid and/or residue and dispose of in accordance with applicable regulations.</li> </ul>		

# 7. Handling and Storage

Safe Handling	: Do not swallow. Avoid contact with eyes, skin and clothing.
Storage	: Store in a cool area in tightly closed containers.
Work/Hygienic Practices	: Wash hands thoroughly with soap and water before eating, drinking, smoking, and using toilet facilities. Do NOT place food, coffee or other drinks in the area where dusting or splashing of solutions is possible.
Ventilation	<ul> <li>Provide adequate ventilation. Use local exhaust as needed to maintain airborne exposure below control limits.</li> </ul>

# 8. Exposure Controls/Personal Protection

Occupational Exposure	1 C							
Limits		Chemical Name: Aluminum Sulfate Solution						
		Exposure Limits (TWAs) in Air						
		CAS Number	IDLH	ACGIH TLV	OSHA PEL	STEL		
		10043-01-3	N/A	2 mg/m <sup>3</sup> (solid)	2 mg/m <sup>3</sup> (solid)	N/A		
Protective Equipment Eye Protection	: Long : Use	g-sleeved clothin chemical safety	ng, apron, <sup>,</sup> goggles. e limits are	rubber gloves and	boots.	мсна		
Protection	appr cont high	oved respirator ained breathing er level of prote	for acid di apparatus	usts. Use positive for emergency or quired.	pressure supplied a other conditions v	air or self where a		

# 9. Physical and Chemical Properties

Appearance: A clear, light green or amber liquid	Odor: Odorless
Odor Threshold: N/A	<b>pH:</b> <3 (1% solution)
Melting Point/Freezing Point: 16° C; 3.2° F	Initial Boiling Point/Range: 101° C; 214° F
Flash Point: N/A	Evaporation Rate (BuAc=1): N/A
Flammability: N/A	Lower/Upper Explosive Limit: N/A
Vapor Pressure (mmHg): N/A	Vapor Density (Air=1): N/A
Relative Density: 11.1 lbs./gal @15.5° C	Solubility in Water: 100%
Partition Coefficient: N/A	Autoignition Temperature: N/A
<b>Decomposition Temperature:</b> >770° C	Viscosity: 25 cps @20° C (68° F)
% Volatiles: N/A	Specific Gravity (Water=1): 1.3
Molecular Weight: N/A	VOC: N/A

# 10. Stability and Reactivity

Reactivity	: Alkalis and water reactive materials, such as oleum, cause exothermic reactions.
Chemical Stability	: Stable
Possibility of Hazardous Reactions or Polymerizations	: Hazardous polymerization will not occur
Conditions to Avoid	: If evaporated to dryness, residue should not be exposed to elevated temperatures (above 760° C), as this will yield toxic and corrosive gases.
Incompatible Materials	: Alkalis and water reactive materials such as oleum.
Hazardous Decomposition Products	: At elevated temperatures, sulfur oxides may be formed. These are toxic and corrosive and are oxidizers. Sulfur trioxide is also a fire hazard. The loss of these leaves a caustic residue.

# 11. Toxicological Information

Acute and Chronic Effects : See Section 4

## **Routes of Exposure**

Symptoms related to Physical, Chemical & Toxicological Characteristics Numerical Measures of	<ul> <li>cause irritation to the respiratory tract. May cause irritation or burns if th product is wet or in the presence of perspiration. May cause irritation and inflammation of the eye.</li> <li>Aluminum Sulfate:</li> </ul>
Symptoms related to Physical, Chemical & Toxicological Characteristics Numerical Measures of	<ul> <li>cause irritation to the respiratory tract. May cause irritation or burns if th product is wet or in the presence of perspiration. May cause irritation and inflammation of the eye.</li> <li>Aluminum Sulfate:</li> </ul>
Symptoms related to Physical, Chemical & Toxicological Characteristics	cause irritation to the respiratory tract. May cause irritation or burns if th product is wet or in the presence of perspiration. May cause irritation and inflammation of the eye.
Symptoms related to Physical, Chemical & Toxicological	cause irritation to the respiratory tract. May cause irritation or burns if th product is wet or in the presence of perspiration. May cause irritation and inflammation of the over
Symptoms related to Physical, Chemical &	cause irritation to the respiratory tract. May cause irritation or burns if th
	: May cause abdominal pain, nausea, and or vomiting. Product mists may
Eyes	: Yes
Skin	: Yes
Inhalation	: Yes

#### 12. **Ecological Information**

Ecotoxicity	: A 1 2 T L	luminum Sulfate: 4 ppm/ 36 hr/fundulus/fata 40 ppm/48 hr/mosquito fis Lm Mosquito fish, 235 ppm C50 Largemouth bass, 250	al/fresh water. h/TLm/water type n , 96 hours ppm, 96 hours	not specified.			
Persistence and Degradability	: N	: N/A					
		Product/Ingredient	Log Pow	BCF	Potential		
		-	-	-	-		
<b>Bioaccumulative Potential</b>	: N	lo potential for food chain c	concentration				
Mobility in Soil	: A a s	luminum sulfate (solid) is s s it hydrolyzes to form the ulfuric acid solution.	sometimes used to r aluminum hydroxid	reduce the pH e precipitate a	l of garden soil, and a dilute		

#### 13. **Disposal Considerations**

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

#### 14. **Transport Information**

### UN#

- **Proper Shipping Name Hazard Class/Division Packing Group Marine Pollutant Special Provisions Emergency Response** Guidebook **Placard Advisory**
- : UN3264
- : Corrosive liquid, acidic, inorganic, n.o.s. (Aluminum Sulfate)
- : 8
- : III
- : No
- : IB3, T7, TP1, TP28
- : 2012 ERG, Guide 154, pages 246-247



# 15. Regulatory Information

SARA 302 Extremely Hazardous Substances (EHS)	:	No chemical i Hazardous Su	n this produc Ibstance (EH	ct is listed as an Ex S) under Section 3	tremely 02 of EPCRA.	
SARA 304 Extremely Hazardous Substances (EHS) Release Notification	•	No chemical i Hazardous Su environment Reportable Qu SERC and LEF	n this produc Ibstance (EH in quantities Jantity (RQ), PC under Sec	ct is listed as an Ex S) which, if release at or above the su would require rep tion 304 of EPCRA.	tremely d to the bstance's orting to the	
SARA 311/312 Hazards	;					
				SARA 311/312 H	azards	
		Acute Ves	No	Flammability	No	No
SARA 313 Reportable Chemicals	:	No chemical i transfers, or v Community-R also known as Form R.	n this produc waste manag ight-to-Knov s the Toxic R	ct is subject to ann Jement reporting u v provisions of EPC elease Inventory ( <sup>-</sup>	ual emissions, nder the RA Section 313 TRI) Report or	,
CERCLA Hazardous Substances	:	This product of substance(s) reporting requ quantities gree Reportable Qu Aluminum Su	contains the subject to th uirements if ater than or uantity (RQ). Ifate, CAS 10	following CERCLA he National Response released to the enve equal to the substant 0043-01-3 CERCLA	nazardous se Center (NRC) vironment in ance's CERCLA RQ = 5000 lbs	) . (2268 kg.)
Clean Air Act (CAA) Section 112(r) Air Pollutants	:	No chemical i the U.S. Clear	n this produc n Air Act, Sec	tt is listed as an air ction 112(r) (40 CF	<sup>•</sup> pollutant unde R 61).	r
California Prop 65 Chemicals	:	This product of state of Califor reproductive	does not cont ornia to cause harm.	tain any chemicals e cancer and birth	known to the defects or other	-
Hazard Label Warning	•	This product i Corrosive, Cla	requires the f ass 8	following hazard la	bel warning:	
TSCA (Toxic Substances Control Act)	;	All chemical s TSCA Invento	ubstances in ry List.	this product are lis	sted on the U.S	
ACRONYMS:						

CAS # – Chemical Abstract Services Registry Number CFR – Code of Federal Regulations CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act EPCRA – Emergency Planning and Community Right-to-Know Act LEPC – Local Emergency Planning Committee SERC – State Emergency Response Commission

# 16. Other Information

Revision date	: 03/31/2021
Supersedes	: 05/13/2015
First Issue	: 09/12/2001
Chemical Family/Type	: Metal Salts
Section(s) changed since last revision	: MSDS to First Issue SDS Conversion

**IMPORTANT!** Read this SDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This SDS has been prepared in accordance with the Globally Harmonized System of Chemical and Labeling of Chemicals (GHS) Fifth Edition and the OSHA Hazard Communication Standard [29 CFR 1910.1200]. The SDS information is based on sources believed to be reliable. Available data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control; **Hill Brothers Chemical Company** makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks and exercise appropriate precautions for protection of employees and others prior to use.





Revision date 10-Oct-2023

1. Identification		
Product identifier		
Product Name	Sodium Aluminate 38% Solution	
Other means of identification		
Product Code(s)	3213M	
UN number or ID number	UN1819	
Synonyms	Liquid sodium aluminate	
Recommended use of the chemical	and restrictions on use	
Recommended use	No information available	
Restrictions on use	No information available None known	
Details of the supplier of the safety	data sheet	
Supplier Address G2O Technologies LLC 9213 Arch Street Pike Little Rock, AR 72206 +1-800-453-2586 Hours: Monday-Frid 9:00-5:00 CST (Central Standard Tim	Manufacturer Address USALCO, LLC 2601 Cannery Ave. Baltimore, MD 21226 day le)	
Contact Point	sds@usalco.com	
Emergency Telephone	CHEMTREC: (800) 424-9300 Outside USA - +1 (703) 527-3887 collect calls accepted	

# 2. Hazard(s) identification

## **Classification**

Skin corrosion/irritation	Category 1 Sub-category A
Serious eye damage/eye irritation	Category 1
Corrosive to metals	Category 1

#### Hazards not otherwise classified (HNOC)

Not applicable

#### Label elements

DANGER

#### Hazard statements

Causes severe skin burns and eye damage

Revision Number 7



#### **Precautionary Statements - Prevention**

Keep only in original packaging.

Do not breathe dust/fume/gas/mist/vapors/spray.

Wear protective gloves/protective clothing/eye protection/face protection.

Wash hands, face and any exposed skin thoroughly after handling. Do not touch eyes.

#### **Precautionary Statements - Response**

Get emergency medical help immediately.

IF IN EYES: Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.

Get medical help.

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Immediately rinse with water for several minutes. Wash contaminated clothing before reuse.

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting

#### **Precautionary Statements - Storage**

Store locked up. Store in corrosive resistant container with a resistant inner liner.

#### **Precautionary Statements - Disposal**

Dispose of contents/container to an approved waste disposal plant.

Unknown acute toxicity 32% of the mixture consists of ingredient(s) of unknown toxicity

#### Other information

May be harmful if swallowed.

# 3. Composition/information on ingredients

#### Substance

**Synonyms** 

Liquid sodium aluminate.

Chemical name	CAS No	Weight-%	Trade secret
Water	7732-18-5	60	*
Sodium aluminum oxide	1302-42-7	32	*
Sodium Hydroxide	1310-73-2	8	*

\*The exact percentage (concentration) of composition has been withheld as a trade secret. While some components are claimed as trade secret in accordance with the provision of OSHA 29 CFR 1910.1200(i), all known hazards are clearly communicated within this document.

#### 4. First-aid measures

#### **Description of first aid measures**

**General advice** 

Get medical attention if irritation or other symptoms occur. Show this safety data sheet to the doctor in attendance.

Inhalation

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult,

	(trained personnel should) give oxygen. Call physician immediately.
Eye contact	Remove contact lenses, if worn. Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Seek medical attention if irritation should develop.
Skin contact	Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and footwear. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical advice/attention.
Ingestion	Do not induce vomiting. Give large amounts of water followed by milk if available. If vomiting should occur spontaneously, keep airway clear. Get medical attention. Never give anything by mouth to an unconscious person.
Self-protection of the first aider	Wear personal protective clothing (see section 8).
Most important symptoms and eff	ects, both acute and delayed
Symptoms	Depending on the concentration, repeated ingestion may cause effects as with acute exposure. Effects depend on concentration and duration of exposure. Repeated or prolonged skin contact may result in dermatitis or effects similar to acute exposure. Repeated exposure by inhalation may cause inflammatory ulcerative changes to the mouth and possibly bronchial and gastrointestinal disturbances. Repeated or prolonged eye contact may result in conjunctivitis or effects similar to acute exposure. Inhalation of corrosive substances may cause irritation of the respiratory tract with coughing, choking, pain and possible burns of the mucus membrane. In some cases pulmonary edema may develop, either immediately or more often within a period of 5-72 hours. The symptoms may include tightness in the chest, frothy sputum cyanosis, and dizziness. Physical findings may include low blood pressure and high pulse. Severe cases may be fatal. Eye and skin contact may cause severe irritation, pain and burns. Ingestion may cause immediate pain and severe burns of the mucous membrane. There may be discoloration of the tissues. Swallowing and speech may be difficult at first and then almost impossible. The effects on

#### Indication of any immediate medical attention and special treatment needed

Note to physicians	Aluminum soluble salts may cause gastroenteritis if ingested. Treatment includes the use
	of demulcents. Note: Consideration should be given to the possibility that overexposure
	to materials other than this product may have occurred.

Edema of the epiglottis and shock may occur.

the esophagus and gastrointestinal tract may range from irritation to severe corrosion.

# 5. Fire-fighting measures

Suitable Extinguishing Media	Not combustible. Use appropriate extinguishing media for material that is supplying fuel. Use water spray to cool the surrounding area and maintain fire temperature below decomposition temperature. Water Spray, Carbon Dioxide, Foam, Dry Chemical.	
Large Fire	CAUTION: Use of water spray when fighting fire may be inefficient.	
Unsuitable extinguishing media	No information available.	
Specific hazards arising from the chemical	May produce hazardous fumes or hazardous decomposition products.	
Explosion data Sensitivity to mechanical impact	t None.	
Sensitivity to static discharge	None.	
Special protective equipment for fire-fighters	Full protective clothing and approved self-contained breathing apparatus required for firefighting personnel.	

### Personal precautions, protective equipment and emergency procedures

- **Personal precautions** Wear suitable protective clothing and gloves.
- **Other information** Do not allow liquid to enter streams or waterways.

#### Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so. Build dikes as necessary to contain flow of large spills. Do not allow liquid to enter streams or waterways.
Methods for cleaning up	Clear spills immediately. For small spills, neutralize with weak acidic material such as vinegar, an inert material to absorb, or wash product to a chemical sewer. Place contaminated materials into containers and store in a safe place to await proper disposal.

## 7. Handling and storage

#### Precautions for safe handling

Advice on safe handling Keep container closed when not in use. Keep away from open fittines, not s sources of ignition. Avoid contact with eyes, skin and clothing. Wear chemic goggles, gloves, and protective clothing when handling. Wash thoroughly al not breathe mist or spray. Use with adequate ventilation and employ respirate where mist or spray may be generated. Do not take internally. FOR INDUS' ONLY.	cal splash after handling. Do atory protection STRIAL USE
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#### Conditions for safe storage, including any incompatibilities

**Storage Conditions** Keep container tightly closed when not in use. Store in a cool, dry place away from direct heat.

# 8. Exposure controls/personal protection

#### Control parameters

#### **Exposure Limits**

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
Sodium Hydroxide	Ceiling: 2 mg/m <sup>3</sup>	TWA: 2 mg/m <sup>3</sup>	IDLH: 10 mg/m <sup>3</sup>
1310-73-2		(vacated) Ceiling: 2 mg/m <sup>3</sup>	Ceiling: 2 mg/m <sup>3</sup>

#### **Biological occupational exposure limits**

This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.

#### Appropriate engineering controls

Engineering controls Local exhaust ventilation as necessary to maintain exposures to within applicable limits. Please refer to the ACGIH document, 'Industrial Ventilation, A Manual of Recommended Practices', most recent edition, for details. If there are no applicable or established exposure limit requirements or guidelines, general ventilation should be sufficient.

#### Individual protection measures, such as personal protective equipment

Eye/face protection	Wear chemical splash goggles and face shield (when eye and face contact is possible due
	to splashing or spraying of material).

## 3213M - Sodium Aluminate 38% Solution

Hand protection	Appropriate chemical resistant gloves should be worn.
Skin and body protection	Standard work clothing and work shoes.
Respiratory protection	If exposures exceed the PEL or TLV, use NIOSH/MSHA approved respirator in accordance with OSHA Respiratory Protection Requirements under 29 CFR 1910.134. If there are no applicable or established exposure limit requirements or guidelines, general ventilation should be sufficient.
Environmental exposure controls	Do not allow liquid to enter streams or waterways.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash it before reuse. Ensure that evewash stations and safety showers are close to the workstation location.

# 9. Physical and chemical properties

Information on basic physical and	chemical properties	
Physical state	Liquid	
Appearance	Clear to slightly hazy	
Color	Amber	
Odor	No appreciable odor	
Odor threshold	No information available	
Property	Values	Remarks • Method
pH	~ 14	No information available
Melting point / freezing point	< -32.2 °C (< -26 °F)	No information available
Boiling point / boiling range	116 °C (241 °F)	No information available
Flash point	Not applicable No data available	No information available
Evaporation rate	No information available No data	No information available
b	available	
Flammability (solid, gas)	Not applicable. No data available	No information available
Flammability I imit in Air		None known
Upper flammability or explosive	No data available	
limits		
l ower flammability or explosive	No data available	
limits		
Vapor pressure	No data available	No information available
Relative vanor density	No data available	No information available
Relative density	14 - 16	None known
Water solubility	No data available. Complete:	No information available
Solubility(ies)	No information available	None known
Partition coefficient	No data available	None known
Autoignition temperature	Not applicable. No data available	None known
Decomposition temperature	No information available -	None known
Kinematic viscosity	No data available	No information available
Dynamic viscosity	200 - 400  cps	Brookfield @ 25 °C
Dynamic viscosity	200 - 400 003	
Other information		
Explosive properties	No information available	
Oxidizing properties	No information available	
Softening point	No information available	
Molecular weight	No information available	
VOC Content (%)		
	No information available	
Liquid Density	No information available 11.6 - 13.3 lbs./gal.	

# 10. Stability and reactivity

Reactivity

No data available.

**Chemical stability** 

Stable under normal conditions of handling, use and transportation.

Possibility of hazardous reactions	None under normal processing.
Hazardous polymerization	Not anticipated under normal or recommended handling and storage conditions.
Conditions to avoid	None known based on information supplied.
Incompatible materials	Strong acids.

Hazardous decomposition products Thermal decomposition may release toxic and/or hazardous gases.

# 11. Toxicological information

## Information on likely routes of exposure

Product Information	Specific test data for the	Specific test data for the substance or mixture is not available.				
Inhalation	Inhalation of mist or spra	Inhalation of mist or spray may irritate respiratory tract and may cause burns and difficulty breathing.				
Eye contact	Direct contact may cause permanent blindness. Th contact. The full extent of	Direct contact may cause severe irritation, pain and burns, possibly severe. May result in permanent blindness. The degree of injury depends on the concentration and duration of contact. The full extent of the injury may not be immediately apparent.				
Skin contact	Corrosive to skin. Direct	contact may cause severe irritation	n, pain and possibly burns.			
Ingestion	Causes burns of the mou of gastrointestinal tract, v	Causes burns of the mouth, throat and stomach. Will cause burns of mucous membreanes of gastrointestinal tract, with nausea, vomiting and diarrhea.				
Symptoms related to the physic	cal, chemical and toxicologic	al characteristics				
Symptoms	Burning. Itching. Rashes. breathing. Pain or irritatic Causes serious eye dam	Burning. Itching. Rashes. Redness. Blindness. Coughing and/ or wheezing. Difficulty in breathing. Pain or irritation. Blistering may occur. Abdominal pain. Nausea and vomiting. Causes serious eye damage.				
Acute toxicity						
Numerical measures of toxicity No information available	,					
The following values are calcul	lated based on chapter 3.1 of	the GHS document				
ATEmix (oral)	2,762.50 mg/kg					
ATEINIX (uernial)	ATEMIX (dermai) 11,475.00 mg/kg					
Unknown acute toxicity	<b>1known acute toxicity</b> 32% of the mixture consists of ingredient(s) of unknown toxicity					
Chemical name	Oral LD50	Dermal LD50	Inhalation LC50			
Water 7732-18-5	> 90 mL/kg (Rat)	-	-			
Sodium Hydroxide 1310-73-2	= 325 mg/kg (Rat)	= 1350 mg/kg (Rabbit)	-			
Delayed and immediate effects	as well as chronic effects fro	om short and long-term exposur	<u>e</u>			
Skin corrosion/irritation	Causes burns.					

Serious eye damage/eye irritation	Risk of serious damage to eyes.
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- Respiratory or skin sensitization No information available.
- Germ cell mutagenicity No information available.
- CarcinogenicityThis product does not contain any components in concentrations greater than or equal to<br/>0.1% that are listed as known or suspected carcinogens by NTP, IARC, ACGIH, or OSHA.

Reproductive toxicity	No information available.
Developmental toxicity	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Target organ effects	Eyes, Skin, Gastrointestinal tract (GI), Respiratory system.
Aspiration hazard	No information available.
Other adverse effects	No information available.
Interactive effects	No information available.

# 12. Ecological information

Ecotoxicity

The environmental impact of this product has not been fully investigated.

Chemical name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Sodium Hydroxide 1310-73-2		LC50 (96 h static) = 45.4 mg/L (Oncorhynchus mykiss)	-	-
Persistence and degradability Not deterr		ed. No information availabl	le.	
Bioaccumulation	No information	on available.		

Mobility	Not determined. No information available.

Other adverse effects	No information available
Other adverse effects	No information availab

# 13. Disposal considerations

# Waste treatment methods Waste from residues/unused products Disposal should be in accordance with applicable regional, national and local laws and regulations. Dispose of in accordance with federal, state and local regulations. Contaminated packaging Since empty containers retain product residue, follow label warnings even after container is emptied. US EPA Waste Number D002 (Corrosivity).

# 14. Transport information

#### DOT

DT	Regulated
UN number or ID number	UN1819
Proper shipping name	Sodium Aluminate Solution
Transport hazard class(es)	8
Packing group	II
Emergency Response Guide	154

Number	
<u>TDG</u> UN number or ID number UN proper shipping name Transport hazard class(es) Packing group Technical Name	Regulated UN1819 Sodium Aluminate Solution 8 II
IATA	Regulated
UN number or ID number	UN1819
UN proper shipping name	Sodium Aluminate Solution
Transport hazard class(es)	8
Packing group	II
ERG Code	8L
IMDG	Regulated
UN number or ID number	UN1819
UN proper shipping name	Sodium Aluminate Solution
Transport hazard class(es)	8
Packing group	II
EmS-No	F-A; S-B

# 15. Regulatory information

#### International Inventories

TSCA

All ingredients are on the inventory or exempt from listing.

Chemical name	CAS No	US TSCA Inventory listing	US TSCA inactive/active designation
Water	7732-18-5	Present	Active
Sodium aluminum oxide	1302-42-7	Present	Active
Sodium Hydroxide	1310-73-2	Present	Active

DSL/NDSL	All ingredients are on the DSL inventory or exempt from listing. None of the ingredients are on the NDSL inventory.
EINECS/ELINCS	All ingredients are on the EINECS inventory or are exempt from listing. None of the
	ingredients are on the ELINCS inventory.
ENCS	All ingredients are on the inventory or exempt from listing.
IECSC	All ingredients are on the inventory or exempt from listing.
KECL	All ingredients are on the inventory or exempt from listing.
PICCS	All ingredients are on the inventory or exempt from listing.
AICS	All ingredients are on the inventory or exempt from listing.

Legend:

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

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

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

**ENCS** - Japan Existing and New Chemical Substances

**IECSC** - China Inventory of Existing Chemical Substances

**KECL** - Korean Existing and Evaluated Chemical Substances

**PICCS** - Philippines Inventory of Chemicals and Chemical Substances

AICS - Australian Inventory of Chemical Substances

US Federal Regulations

#### <u>SARA 313</u>

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

#### SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

#### CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Sodium Hydroxide 1310-73-2	1000 lb	-	-	Х

# **CERCLA**

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Chemical name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	Reportable Quantity (RQ)
Sodium Hydroxide 1310-73-2	1000 lb	-	RQ 1000 lb final RQ RQ 454 kg final RQ

#### US State Regulations

#### California Proposition 65

This product does not contain any Proposition 65 chemicals.

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

Chemical name	New Jersey	Massachusetts	Pennsylvania
Sodium Hydroxide	X	X	Х
1310-73-2			

#### U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. Other information				
NFPA HMIS	Health hazards 3 Health hazards 3	Flammability 0 Flammability 0	Instability 0 Physical hazards 0	Special hazards Personal protection X
Key or legend to a	bbreviations and acronyms	used in the safety da	ata sheet	
Legend Section 8	: Exposure controls/persona	I protection		
TWA	TWA (time-weighted average)	STEL	STEL (Short T	erm Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation	on
(ey literature references and sources for data used to compile the SDS         Agency for Toxic Substances and Disease Registry (ATSDR)         J.S. Environmental Protection Agency ChemView Database         European Food Safety Authority (EFSA)         EPA (Environmental Protection Agency)         Acute Exposure Guideline Level(s) (AEGL(s))         J.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act         J.S. Environmental Protection Agency High Production Volume Chemicals				

Hazardous Substance Database International Uniform Chemical Information Database (IUCLID) Japan GHS Classification Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS) NIOSH (National Institute for Occupational Safety and Health) National Library of Medicine's ChemID Plus (NLM CIP) National Library of Medicine's PubMed database (NLM PUBMED) National Toxicology Program (NTP) New Zealand's Chemical Classification and Information Database (CCID) Organization for Economic Co-operation and Development Environment, Health, and Safety Publications Organization for Economic Co-operation and Development High Production Volume Chemicals Program Organization for Economic Co-operation and Development Screening Information Data Set World Health Organization

Revision date10-Oct-2023Revision NoteNo information available.Disclaimer

<u>Disclaimer</u>

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

**End of Safety Data Sheet** 



# **Technical Memorandum**

То:	Vermont Agency of Natural Resources
From:	Keith Pilgrim, Barr Engineering Co.
Subject:	NPDES Permit Application for Lake Carmi-Supplemental Information
Date:	January 20, 2025
Project:	Lake Carmi Alum Treatment
c:	City of Franklin, VT; Robert Evans and Peter Benevento

# **1** Sediment Inactivation Dosing Plan

Lake Carmi has been designated by the Vermont Agency of Natural Resources as a "Lake in Crisis." This designation led to the commissioning of a study to evaluate the feasibility of using alum to improve the water quality of Lake Carmi (see *Lake Carmi Feasibility Study on the Inactivation of Phosphorus in Lake Bottom Sediments* (Barr Engineering Co., 2024)). The study outcome was the development of a treatment plan designed to inactive phosphorus in Lake Carmi bottom sediments by applying alum and sodium aluminate (a buffer) via a treatment barge (Figure 1). The two chemicals are added together as a 2 to 1 ratio (2 parts alum and 1 part sodium aluminate by volume) to maintain the pH of the lake in a near-neutral pH condition (e.g., minimize the change in lake pH from existing conditions). Minimal pH change is expected given the large size of the lake and the fact that only approximately 56% of the lake area will be treated. The treatment plan includes treatment of approximately 775 acres of Lake Carmi with alum and sodium aluminate at normal water depth of 19.2 feet (approximately 6 meters) and greater. The proposed treatment area is shown in Figure 2 (which is included at the end of Section 1). Bathymetry shown on Figure 2 was collected when Lake Carmi water levels were approximately 0.8 feet above normal water level (NWL). As a result, a lake depth of 20 feet on Figure 2 corresponds to a depth of 19.2 feet when Lake Carmi is at NWL.

Table 1 identifies the proposed alum and sodium aluminate application quantities that were recommended in the study. The proposed treatment plan includes a daily a daily application rate of approximately 14,000 gallons/day for alum and approximately 7,000 gallons/day for sodium aluminate with application occurring over approximately 29.4 days. Actual rates and the number of treatment days may vary based on the proposed treatment plan from the selected alum treatment contractor following project bidding and lake/weather conditions at the time of treatment.

### Table 1 Lake Carmi Alum and Sodium Aluminate Estimated Dose

Dose	Alum <sup>1</sup>	Sodium Aluminate <sup>2</sup>	Mass of Aluminum	Treatment Days
(g Al/m²)	(gallons)	(gallons)	Applied (kg)	
66.6	412,183	206,092	208,877	29.4

1. Gallons of alum calculated using a product density of 11.2 pounds per gallon and 4.4% aluminum by weight.

2. Gallons of sodium aluminate calculated using a product density of 12.1 pounds per gallon and 10.4% aluminum by weight.

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Treatment is planned for fall of 2025 (approximately mid-September to October). Fall treatment has several key benefits:

- 1. Avoidance of fish spawning periods.
- 2. Unencumbered use of Lake Carmi State Park as a staging area as it is closed in mid-September. The staging area is where alum and sodium aluminate are delivered via tanker truck and where the treatment barge is filled with alum and sodium aluminate. Use of Lake Carmi State Park in the fall of 2025 will reduce exposure to State Park campers, fishermen, and other recreators that use the boat dock at the State Park.
- 3. Recreational boating is reduced in the fall and there will be significantly reduced potential for public interaction with the treatment barge when it is conducting treatment on Lake Carmi.
- 4. Treatment in fall after intense summer algal blooms have ceased improves treatment efficiency and allows for more even distribution of the alum and sodium aluminate.



Figure 1 Example of a barge used to apply alum and sodium aluminate.

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Spring treatment is not recommended to avoid conflicting with the fishing opener, to reduce potential adverse effects to spawning and newly hatched fish, and to avoid complications with other recreators. Summer treatment is also not recommended to avoid disrupting recreation and to avoid treating the lake during more intense algal blooms which can lead to treatment inefficiencies and uneven distribution of the alum and sodium aluminate. As a result, fall treatment is preferred. Fall treatment will mitigate logistical and safety issues while providing technical benefits as well.

As shown on Figure 2, the preferred access and staging location is at the public boat launch at Lake Carmi State Park because it provides clear access to Lake Carmi, has ample surface area for material storage and staging, and it is not in a high traffic area during the fall. An alternative location is on the north end of the Lake Carmi near the boat launch and Highway 120 (also shown on Figure 2). The location on the north end of the lake is less preferable because of its smaller footprint and it's located immediately adjacent to a 45-mph highway.

It will be the responsibility of the awarded contractor to:

- safely furnish, deliver, and store the liquid aluminum sulfate and sodium aluminate within the designated staging area;
- have a spill prevention and containment plan;
- follow all local and federal storage and spill prevention regulations;
- obtain any additional and necessary permits;
- maintain and protect access routes, the boat launch area, and any roads used for access, storage, or staging; and
- restore any areas impacted by the work to existing conditions.

Barr Engineering Co. (Barr) has entered into an Engineering Services Agreement with the Town of Franklin (Town) (the project owner) to provide design, permitting, and construction support for the alum treatment of Lake Carmi. Barr will develop bid documents, provide recommendations for contractor selection, and assist the Town with contracting with the awarded alum treatment contractor. Barr will also facilitate communication between the Town, the Lake Carmi Campers Association, the State, and the selected contractor during all stages of the treatment.



# 2 Effect of Treatment on In-Lake Aluminum Concentrations

The Environmental Protection Agency (EPA) <u>Aluminum Criteria Calculator</u> was used to estimate the aluminum criteria for Lake Carmi based on the pH, hardness, and dissolved organic carbon (DOC) measurements collected from the lake (US EPA, 2018). Table 2 summarizes the water quality data used in the calculator and the resulting acute (Criterion Maximum Concentration or CMC) and chronic (Criterion Continuous Concentration of CCC) aluminum criteria. pH data have been collected multiple times per year between 2016 and 2024 and is observed to have notable seasonality (e.g., higher pH during late summer and fall). As such, the average fall pH of 8.0 was used in the aluminum criteria calculator to align with planned timing for the treatment program. Hardness and DOC measurements were collected from multiple locations and depths in Lake Carmi in 2024. The average hardness observed was 46.7 mg/L as CaCO<sub>3</sub> and the average observed DOC was 6.5 mg/L. The resultant acute and chronic aluminum criteria from the calculator were 3.3 and 1.2 mg/L, respectively.

## Table 2 EPA Aluminum Criteria Calculator Water Quality Parameters and Criteria

рН	Hardness	DOC	CMC Acute	CCC Chronic
	(mg/L as CaCO₃)	(mg/L)	Criterion (mg/L)	Criterion (mg/L)
8.0	46.7	6.5	3.3	1.2

Calculations were performed to estimate the Lake Carmi aluminum concentrations during alum application as compared to the acute and chronic criteria obtained from the EPA calculator. For this analysis, the area and volume of lake water treated in one day is considered to be the "treatment zone" for that day. Since the alum application of 67 g/m<sup>2</sup> will be split over 29.4 days, the average treatment conditions per treatment zone are as follows:

- Average daily treated area: 26.3 acres (106,432 m<sup>2</sup>)
- Average treated volume per day: 826,950 m<sup>3</sup>
- Average mass of aluminum applied daily: 7,094 kg
- Assumed duration alum will be applied: 8 hours/day

Conceptually, as the treatment barge travels across the daily treatment zone and delivers liquid alum and sodium aluminate below the lake surface (tubes from the barge deliver the chemicals subsurface), floc will form instantaneously and start to settle as soon as the alum and sodium aluminate contact the lake water. Because treatment is planned for fall, Lake Carmi will be completely mixed (see Figure 3 at the end of this section for a plot showing a temperature profile from September 18, 2018) and it may be expected that the floc will readily mix and distribute throughout the water column. During an 8-hour treatment day, the floc will be at different stages of settling within the treatment zone. Based on a literature-reported aluminum floc settling rate (Gorczyca, B. and J. Ganczarczyk, 2001), it can be expected that the aluminum floc (Al(OH)<sub>3</sub>) will settle to the bottom of Lake Carmi at a rate of approximately 8.2 feet/hour (2.5 meters/hour).

Using the above application and settling rates, the lake volume for the treatment zone, and the proposed alum dose of 67 g/m<sup>2</sup>, the average concentration in the treatment zone water column was calculated for each hour of a 24-hour period as shown in Figure 4 at the end of this section. Over a 24-hour period, the average and maximum aluminum concentrations in the treatment zone are approximately 1.1 and 3.2 mg/L, respectively (Table 3). The aluminum concentration within the treatment zone 24 hours after the

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start of application is estimated to be less than 0.01 mg/L. In essence, the treatment zone, and correspondingly the entire lake, should "reset" after each treatment day with respect to in-lake total aluminum concentration.

It is also possible to conceptualize the floc settling as a slug, where it mixes with the top one meter of the lake water column and then settles. In this case, it takes approximately 3.1 hours for the floc to settle to the bottom after application. Hence, during a 24-hour treatment day, the average concentration of aluminum in the treatment zone can be calculated. The estimated average concentration of aluminum expected in the treatment zone for each day of treatment is provided in Table 3 using the fully mixed and slug-settling assumptions.

Table 3	Calculated concentration of aluminum in the daily treatment zone.
---------	---

		Aluminum Concentration (mg/L)	
Condition	Assumption	Treatment Zone on Day of Application	Full Lake
Maximum 24-Hour Concentration	Fully Mixed	3.2	0.1
Average 24-Hour Concentration	Fully Mixed	1.1	0.03
Average 24-Hour Concentration	Slug	1.3	0.03





Figure 3 Temperature Profile for Lake Carmi measured at mid-lake monitoring location on September 18, 2018



Figure 4 Estimated treatment zone aluminum concentrations as compared to acute and chronic criterion

# 3 Monitoring Plan

An example of in-lake water quality monitoring to be completed by the selected Contractor (or Owner's representatives) may include the parameters at the frequencies and locations summarized in Table 4. Barr will review monitoring reports provided by the Contractor for compliance with the final NPDES permit monitoring requirements. It's anticipated that the Contractor will be required to provide daily monitoring reports including pH measurements while monitoring data that requires laboratory analysis will be provided once results are published by the laboratory (note, turn-around time for aluminum analysis is subject to vary but anticipated to be approximately 2 weeks). The Contractor will be required to provide immediate (same day) notification to the Owner and Barr for any exceedances. This includes notification if the pH violates permit conditions for the averaging period specified in the NPDES permit. If the pH falls outside specified permit conditions the contractor will be required to stop the treatment. Resumption of treatment would occur after collection of pH measurements and a determination that it is safe to continue treatment.

Periodic third-party construction observation and water quality monitoring during alum treatment application will be completed by Barr and possibly volunteers of the Lake Carmi Campers Association. It is assumed that the DEC will also be engaged in monitoring as determined appropriate by the DEC. Barr staff will be onsite for the following stages of construction: pre-construction/start-up, mid-treatment, end of treatment, and for problem solving as needed.

#### Table 4 Example Monitoring Plan

Parameter	Location	Minimum Frequency <sup>1, 2</sup>	Depths <sup>3</sup>
	Mid-Point of Treatment Zone	<ul> <li>Pre-treatment</li> <li>2 times per day (at least 2 hours between measurements)</li> </ul>	Surface, mid-depth, near-bottom
In-situ pH	Reference Area Outside Treatment Zone	<ul> <li>Pre-treatment</li> <li>2 times per day (at least 2 hours between measurement)</li> </ul>	Surface, mid-depth, near-bottom
	Behind Treatment Barge⁴	• 2 times per day (at least 2 hours between measurements)	Surface, mid-depth, near-bottom
Total Aluminum	Mid-Point of Treatment Zone	<ul> <li>2 times per week:</li> <li>Pre-treatment before start of a zone</li> <li>Approximately 24-hours after start of zone treatment</li> </ul>	0 – 13.1 feet (4m) composite 13.1 feet (4m) – bottom composite
Floc Formation (Visual)	Throughout treatment zone	<ul> <li>At end of treatment each day in the treatment zone</li> <li>Following morning in the treatment zone completed the previous day</li> </ul>	Qualitative observation from surface
Adverse Aquatic	Throughout Treatment Zone	Following morning prior to start of next treatment zone	Qualitative observation from surface
Impacts (Visual)	Windward side of treatment area	Following morning prior to start of next treatment zone	Qualitative observation from surface

<sup>1</sup> Pre- and post-treatment refer to daily measurements at the treatment zone unless otherwise noted

<sup>2</sup> Monitoring to be performed by Contractor (or Owner's representatives)

<sup>3</sup> Composite is a composite sample of samples collected at approximate 1m intervals

<sup>4</sup> Monitoring will be conducted at a safe distance behind the barge and should not interfere with the barge operator.

During periodic field visits by Barr staff to review construction status, Barr will also perform spot checks of the above monitoring parameters.

# 4 Conclusions

The supplemental data provided in this technical memorandum supports the conclusion that treatment of Lake Carmi with alum and sodium aluminate can be conducted safely without impacts to aquatic life. The use of alum (an acid) and sodium aluminate (a base) together is expected to maintain pH in the nearneutral range in the localized treatment zone (pH can be expected to rapidly equilibrate with the greater Lake Carmi area and pH is expected to be largely unchanged compared to pre-treatment conditions) and monitoring will be used to confirm this expectation.

Lake Carmi is a large lake. As a result, the treatment area addressed each day will be a relatively small fraction of the entire lake. The proposed treatment will be conducted at lake depths of 19.1 feet (6.0 m) or greater. As a result, fish in deeper water will be able to readily avoid the treatment zone and small and young-of-the-year fish that frequent the littoral zone will not be directly exposed to the treatment floc. Further, it is expected that within three hours of completing treatment during a given day, all aluminum

floc will have settled. Hence, there will be a reset to near zero with respect to aluminum concentrations with each day of treatment (aluminum solubility is less than 0.1 mg/L in natural lake water near pH 7—see Pilgrim and Brezonik, 2005).

On average, for a given treatment day and within the daily treatment zone, it can be expected that the aluminum concentration will average between 1.1 and 1.3 mg/L. This concentration is below the acute criteria and just below or just above the chronic criteria of 1.2 mg/L, depending upon the settling assumption used. The average and maximum lake-wide aluminum concentration is expected to be approximately 0.03 mg/L and 0.1 mg/L during the treatment, respectively.

The treatment will be managed through a combination of pre-treatment communication to adjacent property owners, on-site management of staging and work areas by the selected alum contractor, performance monitoring and reporting by the contractor during monitoring, and review of monitoring data plus monitoring checks by Barr during field visits.

Expedited review and approval of this permit application will facilitate the execution of the treatment during the fall of 2025. Fall is the preferred treatment period as there will be greatly reduced complications with respect to the public use of Lake Carmi as well as reduced potential to impact fisheries. In addition, treatment in fall of 2025 is preferred to mitigate water quality impacts prior to summer 2026.

# **5** References

- Barr Engineering Co. (2024). *Lake Carmi Feasibility Study on the Inactivation of Phosphorus in Lake Bottom Sediments.* Prepared for the Vermont Department of Environmental Conservation.
- Gorczyca, B. and J. Ganczarczyk. (2001). Fractal Analysis of Pore Distributions in Alum Coagulation and Activated Sludge Flocs. *Water Quality Research Journal of Canada, 36*(10.2166/wqrj.2001.036.).
- Pilgrim, K. and P. Brezonik. 2005. Evaluation of the Potential Adverse Effects of Lake Inflow Treatment with Alum. Lake and Reservoir Management 21(1):78-88, 2005
- US EPA. (2018). *Aluminum Criteria Calculator*. Retrieved from Aquatic Life Criteria Aluminum: https://www.epa.gov/wqc/aquatic-life-criteria-aluminum

# Watershed Management Division Generic Application/Report Submission and Fee Payment Form

version 1.23

(Submission #: HQ9-Z3GH-6CSZ8, version 1)

# Details

1/27/2025 (0 days ago) by Lisa Larivee
Lisa Larivee
HQ9-Z3GH-6CSZ8
Deemed Complete
Administrative Review

# Fees

Fee	\$2,094.83
Payments/Adjustments	(\$2,094.83)
Balance Due	\$0.00 (Paid)

# **Form Input**

# **General Information**

# **Contact Person** Lisa Larivee

Contact Phone (Format: 123-456-7890 Ext 123) 802-285-2101

# Contact Email townoff@franklinvt.net

Select the Watershed Management Division Program that this submission is for: Wastewater Direct Discharge

Please select the type of submission you would like to make:

Permit application

# **Attach Forms/Supporting Materials**

# **IMPORTANT:**

The attachment control below will allow you to select and upload multiple files at one time. However, if the files you are uploading are relatively large (greater than 2 MB each), if you are uploading a large number of files, or if you are accessing this site over a relatively slow Internet connection, you should upload your files one at a time.

# **Permit Application Attachment(s)**

SKM\_C360i25012716490.pdf - 01/27/2025 04:54 PM SCHEDULE-B-INDUSTRIALCOMMERCIAL-WR82B.pdf - 01/27/2025 04:55 PM SDS\_Sodium Aluminate.pdf - 01/27/2025 04:56 PM SDS\_Aluminum Sulfate.pdf - 01/27/2025 04:56 PM Permit Attachment\_Treatment Plan 2025-01-20.pdf - 01/27/2025 04:56 PM Comment first file - permit application form WR-82

# **Fee Payment**

# **FEE INSTRUCTIONS:**

Enter the dollar amount (without a dollar sign or comma) of the fee you need to pay with this submission. If the submission is for a permit application and the application has no associated fee, the applicant is exempt from the fee, or the submission is for a state agency where the fee will be paid via inter-agency transfer, please enter a Fee Amount of 0.

# Please enter the amount of the payment you need to make with this submission (do not enter a \$ or commas):

2094.83

# Attachments

Date	Attachment Name	Context	User
1/27/2025 4:56 PM	Permit Attachment_Treatment Plan 2025-01-20.pdf	Attachment	Lisa Larivee
1/27/2025 4:56 PM	SDS_Aluminum Sulfate.pdf	Attachment	Lisa Larivee
1/27/2025 4:56 PM	SDS_Sodium Aluminate.pdf	Attachment	Lisa Larivee
1/27/2025 4:55 PM	SCHEDULE-B- INDUSTRIALCOMMERCIAL- WR82B.pdf	Attachment	Lisa Larivee
1/27/2025 4:54 PM	SKM_C360i25012716490.pdf	Attachment	Lisa Larivee

# Status History

	User	Processing Status
1/27/2025 4:47:02 PM	Lisa Larivee	Draft
1/27/2025 4:59:06 PM	Lisa Larivee	Submitted
1/28/2025 8:05:23 AM	Jill Draper	Deemed Complete

# **Processing Steps**

Step Name	Assigned To/Completed By	Date Completed
Form Submitted	Lisa Larivee	1/27/2025 4:59:06 PM
Administrative Review	Jasmine White	