COMMITMENT & INTEGRITY
DRIVE RESULTS

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Via Electronic Mail

July 15, 2019

Shauna Little
U.S. Environmental Protection Agency
5 Post Office Square – Suite 100 (OEP06-01)
Boston, MA 02109-3912

Re: University of New Hampshire Drinking Water Treatment Plant
Remediation General Permit – Notice of Intent Resubmission

Dear Ms. Little:

We have reviewed your comments from the initial submittal of a Notice of Intent (NOI) for the Remediation General Permit (RGP) that we submitted on behalf of the University of New Hampshire. We have addressed the comments and provided the requested information to our permit resubmittal for your review.

Please note that we have listed each response directly following the comment received.

1. (EPA Comment) Suggested NOI format, Part B.7. Please combine receiving water information with remainder of NOI. Revise response to this part.

   (W&C Response) See attachment C.

2. (EPA Comment) Suggested NOI format, Part D.4. Please fill in all columns for each parameter analyzed. Please provide an electronic copy of the WQBEL calculations (in excel format).

   (W&C Response) Part D.4 of the NOI has been updated with sampling results and calculated WQBELs for the influent/receiving water. The excel sheet with calculations is Attachment G.

3. (EPA Comment) Suggested NOI format, Part E.3. Please clarify proposed design flow and maximum flow. The RGP covers discharges up to 1.0 MGD, with very limited exception. You have indicated a design and max flow greater than 1 MGD, but a significantly lower avg flow. Will you be utilizing any flow control to ensure the flow remains less than 1 MGD? If a discharge flow greater than 1 MGD is necessary, please discuss further with EPA.

   (W&C Response) See Attachment H.

4. (EPA Comment) Suggested NOI format, Part F. Information regarding proposed use of pH conditioners is incomplete. For EPA to grant authorization to discharge a chemical/additive provided in a NOC, all information required in Part 2.5.3.d of the RGP is required.

   (W&C Response) See Attachment I, formerly Attachment F.

If you have any questions about the information provided or need more detail on the project, please do not hesitate to contact me at 978-482-7902.

Sincerely,

WOODARD & CURRAN

Rachel Gilbert, P.E.
Project Manager

cc: Hayley Franz, New Hampshire Department of Environmental Services (NHDES)
Mark Geuther, University of New Hampshire (UNH)

Attachments:
Attachment A: Notice of Intent Resubmittal
Attachment B: Location Map
Attachment C: Receiving Water Sampling Results
Attachment D: Permission for Use of Catch Basins
Attachment E: Site Plan
Attachment F: Schematic of Flow
Attachment G: WQBEL Calculations (Excel)
Attachment H: Water Usage and Discharge Rate
Attachment I: Chemical Additive Information and Explanation to the Authorization of Addition
Attachment J: Chemical SDS
Attachment K: ESA Eligibility Determination
Attachment L: NHPA Eligibility Determination
Attachment M: Notification of Discharge to Oyster River – Letter to the Town of Durham, NH

ATTACHMENT A: NOTICE OF INTENT – RESUBMITTAL

II. Suggested Format for the Remediation General Permit Notice of Intent (NOI)

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
University of New Hampshire Water Treatment Plant</td><td colspan="3">Site address: 28 Waterworks Road
Street:</td></tr>
<tr><td>City: Durham</td><td>State: NH</td><td>Zip: 03823</td></tr>
<tr><td rowspan="4">2. Site owner
University of New Hampshire

Owner is (check one): ☐ Federal ■ State/Tribal ☐ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Mark Geuther</td></tr>
<tr><td colspan="2">Telephone: (603) 862-1787</td><td>Email: mark.geuther@unh.edu</td></tr>
<tr><td colspan="3">Mailing address: 22 Colovos Road
Street:</td></tr>
<tr><td>City: Durham</td><td>State: NH</td><td>Zip: 03824</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Waterline Industries Corp</td><td colspan="3">Contact Person: Brendan Healey</td></tr>
<tr><td colspan="2">Telephone: (603) 235-2790</td><td>Email: bhealey@waterlineind.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 7 London Lane</td></tr>
<tr><td>City: Seabrook</td><td>State: NH</td><td>Zip: 03874</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:
NA

NPDES permit is (check all that apply: ☐ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="3">5. Other regulatory program(s) that apply to the site (check all that apply):
☐ MA Chapter 21e; list RTN(s):
☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:
☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Oyster River	NHRIV600030902	Class B

Receiving water is (check any that apply): ☐ Outstanding Resource Water ☐ Ocean Sanctuary ☐ territorial sea ☐ Wild and Scenic River

2. Has the operator attached a location map in accordance with the instructions in B, above? (check one): ■ Yes ☐ No

Are sensitive receptors present near the site? (check one): ■ Yes ☐ No

If yes, specify: The UNH Treatment Plant source water is located on the Oyster River, and is the source water and receiving water for this planned discharge.

3. Indicate if the receiving water(s) is listed in the State's Integrated List of Waters (i.e., CWA Section 303(d)). Include which designated uses are impaired, and any pollutants indicated. Also, indicate if a final TMDL is available for any of the indicated pollutants. For more information, contact the appropriate State as noted in Part 4.6 of the RGP. The receiving water is listed in the State's Integrated List of Waters. (See Answer Continued Below, at bottom of page)

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0.219 cfs
5. Indicate the requested dilution factor for the calculation of water quality-based effluent limitations (WQBELs) determined in accordance with the instructions in Appendix V for sites in Massachusetts and Appendix VI for sites in New Hampshire.	1

6. Has the operator received confirmation from the appropriate State for the 7Q10and dilution factor indicated? (check one): ■ Yes ☐ No

If yes, indicate date confirmation received: March 6, 2019

7. Has the operator attached a summary of receiving water sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No

C. Source water information:

1. Source water(s) is (check any that apply):

☐ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	■ Potable water; if so, indicate municipality or origin: University of New Hampshire ☐ Other; if so, specify:

B-3 (CONT.) The impaired uses include; Aquatic Life, Fish Consumption, and Shellfishing. The final TMDL include; DO saturation, Estuarine Bioassessments, Light Attenuation Coefficient, Nitrogen (Total), Oxygen (Dissolved), Polychlorinated biphenyls, and Dioxin, all are low priority.

2. Source water contaminants:	
a. For source waters that are contaminated groundwater or contaminated surface water, indicate are any contaminants present that are not included in the RGP? (check one): ☐ Yes ☐ No If yes, indicate the contaminant(s) and the maximum concentration present in accordance with the instructions in Appendix VIII.	b. For a source water that is a surface water other than the receiving water, potable water or other, indicate any contaminants present at the maximum concentration in accordance with the instructions in Appendix VIII? (check one): ☐ Yes ☐ No
3. Has the source water been previously chlorinated or otherwise contains residual chlorine? (check one): ■ Yes ☐ No	We acknowledge that dechlorination may be required.

D. Discharge information

1.The discharge(s) is a(n) (check any that apply): ☐ Existing discharge ■ New discharge ☐ New source	
Outfall(s): Outfall 001	Outfall location(s): (Latitude, Longitude) 43.132114, -70.940834

Discharges enter the receiving water(s) via (check any that apply): ☐ Direct discharge to the receiving water ■ Indirect discharge, if so, specify:

Storm sewer that discharges to the receiving water. Storm sewer system is owned by UNH.

■ A private storm sewer system ☐ A municipal storm sewer system

If the discharge enters the receiving water via a private or municipal storm sewer system:

Has notification been provided to the owner of this system? (check one): ■ Yes ☐ No

Has the operator has received permission from the owner to use such system for discharges? (check one): ■ Yes ☐ No, if so, explain, with an estimated timeframe for obtaining permission: The Owner of the storm sewer is the same as the Owner of the new Water Treatment Plant.

Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ■ No

There are no additional requirements.

Provide the expected start and end dates of discharge(s) (month/year): 08/2019 through 10/2019

Indicate if the discharge is expected to occur over a duration of: ■ less than 12 months ☐ 12 months or more ☐ is an emergency discharge

Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="5">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
☐ III – Contaminated Site Dewatering
■ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

☐ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td></tr>
<tr><td colspan="2">b. If Activity Category III, IV, V, VI, VII or VIII: (check either G or H)</td></tr>
<tr><td>■ G. Sites with Known Contamination</td><td>☐ H. Sites with Unknown Contamination</td></tr>
<tr><td>c. If Category III-G, IV-G, V-G, VI-G, VII-G or VIII-G: (check all that apply)

■ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td><td>d. If Category III-H, IV-H, V-H, VI-H, VII-H or VIII-H Contamination Type Categories A through F apply</td></tr>
</table>

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia	✔		1	NH3-001	50		ND	Report mg/L	---
Chloride		✔						Report µg/l	---
Total Residual Chlorine		✔						0.2 mg/L	11 µg/L
Total Suspended Solids		✔						30 mg/L	---
Antimony	✔		1	200.8	1		ND	206 µg/L	
Arsenic	✔		1	EPA 200.5	5		ND	104 µg/L	
Cadmium	✔							10.2 µg/L	
Chromium III	✔		1	200.8	10		ND	323 µg/L	
Chromium VI	✔		1	7196A	10		ND	323 µg/L	
Copper	✔		1	EPA 200.5	50		ND	242 µg/L	
Iron		✔	1	EPA 200.5			216	5,000 µg/L	
Lead	✔		1	EPA 200.5	5		ND	160 µg/L	
Mercury	✔		1	200.8	0.1		ND	0.739 µg/L	
Nickel	✔		1	200.8	1		ND	1,450 µg/L	
Selenium	✔		1	200.8	1		ND	235.8 µg/L	
Silver	✔		1	200.8	1		ND	35.1 µg/L	
Zinc	✔		1	200.8	5		ND	420 µg/L	
Cyanide	✔							178 mg/L	
B. Non-Halogenated VOCs									
Total BTEX	✔							100 µg/L	---
Benzene	✔							5.0 µg/L	---
1,4 Dioxane	✔							200 µg/L	---
Acetone	✔							7.97 mg/L	---
Phenol	✔							1,080 µg/L	

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✔							4.4 µg/L	
1,2 Dichlorobenzene	✔							600 µg/L	---
1,3 Dichlorobenzene	✔							320 µg/L	---
1,4 Dichlorobenzene	✔							5.0 µg/L	---
Total dichlorobenzene	✔							763 µg/L in NH	---
1,1 Dichloroethane	✔							70 µg/L	---
1,2 Dichloroethane	✔							5.0 µg/L	---
1,1 Dichloroethylene	✔							3.2 µg/L	---
Ethylene Dibromide	✔							0.05 µg/L	---
Methylene Chloride	✔							4.6 µg/L	---
1,1,1 Trichloroethane	✔							200 µg/L	---
1,1,2 Trichloroethane	✔							5.0 µg/L	---
Trichloroethylene	✔							5.0 µg/L	---
Tetrachloroethylene	✔							5.0 µg/L	
cis-1,2 Dichloroethylene	✔							70 µg/L	---
Vinyl Chloride	✔							2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔							190 µg/L	
Diethylhexyl phthalate	✔							101 µg/L	
Total Group I PAHs	✔							1.0 µg/L	---
Benzo(a)anthracene	✔							As Total PAHs	
Benzo(a)pyrene	✔								
Benzo(b)fluoranthene	✔								
Benzo(k)fluoranthene	✔								
Chrysene	✔								
Dibenzo(a,h)anthracene	✔								
Indeno(1,2,3-cd)pyrene	✔								

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs	✔							100 µg/L	---
Naphthalene	✔							20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✔							0.000064 µg/L	---
Pentachlorophenol	✔							1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔							5.0 mg/L	---
Ethanol	✔							Report mg/L	---
Methyl-tert-Butyl Ether	✔							70 µg/L	
tert-Butyl Alcohol	✔							120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔							90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
Hardness		✔	1	SB 2340B			30100		

E. Treatment system information

1. Indicate the type(s) of treatment that will be applied to effluent prior to discharge: (check all that apply)

☐ Adsorption/Absorption ☐ Advanced Oxidation Processes ☐ Air Stripping ☐ Granulated Activated Carbon ("GAC")/Liquid Phase Carbon Adsorption
☐ Ion Exchange ■ Precipitation/Coagulation/Flocculation ■ Separation/Filtration ☐ Other; if so, specify:

2. Provide a written description of all treatment system(s) or processes that will be applied to the effluent prior to discharge.

Potassium permanganate and PACL are added to precipitate manganese from the raw water and as a coagulant for floc formation respectively. Potassium permanganate is only added on an as needed (seasonal) basis dependent on the concentration of manganese in the raw water. The chemically dosed water enters a rapid mix chamber followed by two flocculation tanks in series allowing the suspended solids to aggregate. The floc is settled out of suspension in the clarification tank using a plate settler. Next the water travels through a dual media filter bed consisting of a layer of anthracite and a layer of sand to polish the water. The disinfectant sodium hypochlorite and fluoride are added to the water before it passes through the chlorine contact tank into the clear wells. Lastly, sodium hydroxide and ortho-phosphate are added for pH adjustment and corrosion control.

Identify each major treatment component (check any that apply):

☐ Fractionation tanks☐ Equalization tank ☐ Oil/water separator ☐ Mechanical filter ■ Media filter
■ Chemical feed tank ☐ Air stripping unit ☐ Bag filter ☐ Other; if so, specify:

Indicate if either of the following will occur (check any that apply):

■ Chlorination ■ De-chlorination We acknowledge that dechlorination may be required.

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: Design Flow Capacity Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	Note: while the maximum design flow capacity of the system is 1350 gpm, flow will go to the lagoons for equalization and pumped to the catch basin at a constant rate of approximately 160 gpm	1,350
Provide the proposed maximum effluent flow in gpm.		160
Provide the average effluent flow in gpm.	See attachment for determination of average effluent flow GPM	160
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:		1,914,000

4. Has the operator attached a schematic of flow in accordance with the instructions in E, above? (check one): ■ Yes ☐ No

F. Chemical and additive information

1. Indicate the type(s) of chemical or additive that will be applied to effluent prior to discharge or that may otherwise be present in the discharge(s): (check all that apply)

☐ Algaecides/biocides ☐ Antifoams ■ Coagulants ■ Corrosion/scale inhibitors ■ Disinfectants ☐ Flocculants ☐ Neutralizing agents ☐ Oxidants ☐ Oxygen ☐ scavengers ■ pH conditioners ☐ Bioremedial agents, including microbes ■ Chlorine or chemicals containing chlorine ■ Other; if so, specify:
Potassium Permanganate for the precipitation of manganese.

2. Provide the following information for each chemical/additive, using attachments, if necessary:

See Attachment
a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

3. Has the operator attached an explanation which demonstrates that the addition of such chemicals/additives may be authorized under this general permit in accordance with the instructions in F, above? (check one): ■ Yes ☐ No; if no, has the operator attached data that demonstrates each of the 126 priority pollutants in CWA Section 307(a) and 40 CFR Part 423.15(j)(1) are non-detect in discharges with the addition of the proposed chemical/additive?
(check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **FWS Criterion A**: No endangered or threatened species or critical habitat are in proximity to the discharges or related activities or come in contact with the "action area".

☐ **FWS Criterion B**: Formal or informal consultation with the FWS under section 7 of the ESA resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by FWS on a finding that the discharges and related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation). Has the operator completed consultation with FWS? (check one): ☐ Yes ☐ No; if no, is consultation underway? (check one): ☐ Yes ☐ No

■ **FWS Criterion C**: Using the best scientific and commercial data available, the effect of the discharges and related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the operator and affirmed by EPA, that the discharges and related activities will have "no effect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the FWS. This determination was made by: (check one) ■ the operator ☐ EPA ☐ Other; if so, specify:

F3. (cont.) The addition of such chemicals will not add any pollutants that would justify the application of permit conditions that are different or absent in this permit as no chemical will be on site unless listed in the permit.

☐ **NMFS Criterion**: A determination made by EPA is affirmed by the operator that the discharges and related activities will have "no effect" or are "not likely to adversely affect" any federally threatened or endangered listed species or critical habitat under the jurisdiction of NMFS and will not result in any take of listed species. Has the operator previously completed consultation with NMFS? (check one): ☐ Yes ☐ No

2. Has the operator attached supporting documentation of ESA eligibility in accordance with the instructions in Appendix I, and G, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written concurrence or finding provided by the Services? (check one): ☐ Yes ■ No; if yes, attach.

H. National Historic Preservation Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

■ **Criterion A**: No historic properties are present. The discharges and discharge-related activities (e.g., BMPs) do not have the potential to cause effects on historic properties.

☐ **Criterion B**: Historic properties are present. Discharges and discharge related activities do not have the potential to cause effects on historic properties.

☐ **Criterion C**: Historic properties are present. The discharges and discharge-related activities have the potential to have an effect or will have an adverse effect on historic properties.

2. Has the operator attached supporting documentation of NHPA eligibility in accordance with the instructions in H, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the operator will carry out to mitigate or prevent any adverse effects on historic properties? (check one): ☐ Yes ■ No

I. Supplemental information

Describe any supplemental information being provided with the NOI. Include attachments if required or otherwise necessary.

Attachment B - Location Map, Attachment C - Receiving Water Sampling Results, Attachment D - Permission for Use of Catch Basins, Attachment E - Site Plan, Attachment F - Schematic of Flow, Attachment G - WQBEL Calculations (Excel), Attachment H - Water Usage and Discharge Rate, Attachment I - Chemical Additive Information and Explanation to Authorization of Addition, Attachment J - Chemical SDS, Attachment K - ESA Eligibility Determination, Attachment L - NHPA Eligibility Determination, Attachment M - Notification of Discharge to Oyster River - Letter to the Town of Durham, NH

Has the operator attached data, including any laboratory case narrative and chain of custody used to support the application? (check one): ■ Yes ☐ No

Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ■ Yes ☐ No

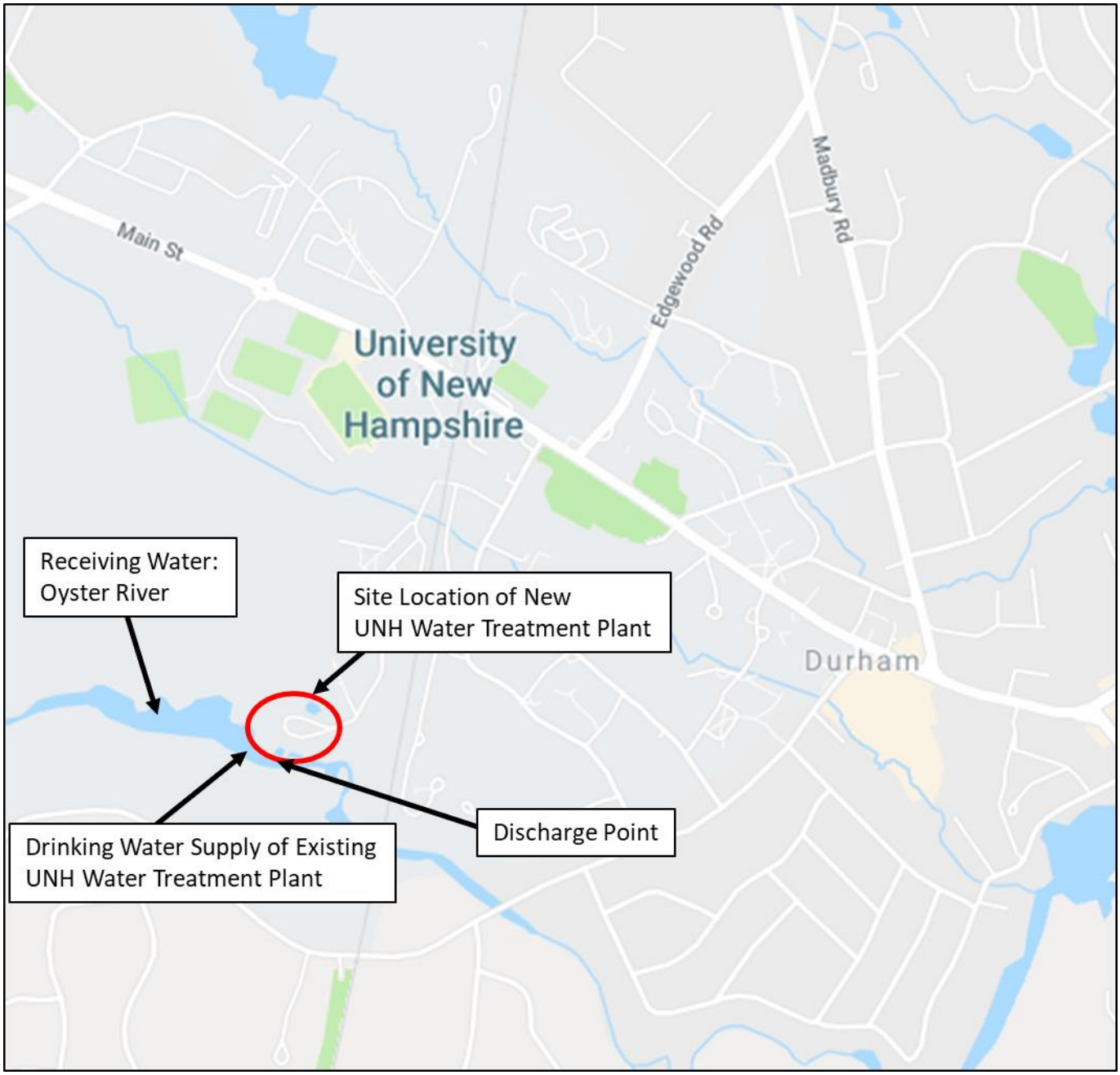
J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

BMPP certification statement:	I certify that a Best Management Practices Plan will be developed and implemented at the time of initial discharge.
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐ NA ☐
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ■ No ☐ NA ☐
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ☐ NA ■
Signature: 	Date: 7/12/19
Print Name and Title: Robert S. Little, P.E.	

ATTACHMENT B: LOCATION MAP

University of New Hampshire Water Treatment Plant
Receiving Water Information: Location Map



ATTACHMENT C: RECEIVING WATER SAMPLING RESULTS

Eastern Analytical, Inc.

professional laboratory and drilling services

Katy Anderson
Seacoast Analytical Services
PO Box 555
Barrington , NH 03825

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	195695
Client Identification:	Oyster River Raw | S05219C / 33 Waterworks Rd. Durham, NH
Date Received:	5/21/2019

Dear Ms. Anderson :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.easternanalytical.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw — Lorraine Olashaw, Lab Director

5.28.19 — Date

4 — # of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

EAI ID#: **195695**

Client: **Seacoast Analytical Services**

Client Designation: **Oyster River Raw | S05219C / 33 Waterworks Rd. Durham, NH**

Temperature upon receipt (°C): 5.2 **Received on ice or cold packs (Yes/No): Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
195695.01	S05219C2	5/21/19	5/21/19	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.
Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.
All results contained in this report relate only to the above listed samples.
References include:
1) EPA 600/4-79-020, 1983
2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
4) Hach Water Analysis Handbook, 4th edition, 1992

Eastern Analytical, Inc. www.easternanalytical.com | 800.287.0525 | customerservice@easternanalytical.com

LABORATORY REPORT

EAI ID#: **195695**

Client: **Seacoast Analytical Services**

Client Designation: **Oyster River Raw | S05219C / 33 Waterworks Rd. Durham, NH**

Sample ID: S05219C2

Lab Sample ID: 195695.01

Matrix: aqueous

Date Sampled: 5/21/19

Date Received: 5/21/19

		Analysis			
	Units	**Date**	**Time**	**Method**	**Analyst**
Ammonia-N < 0.05	mg/L	5/22/19	12:13	TM NH3-001	SEL

LABORATORY REPORT

EAI ID#: **195695**

Client: **Seacoast Analytical Services**

Client Designation: **Oyster River Raw | S05219C / 33 Waterworks Rd. Durham, NH**

Sample ID: S05219C2

Lab Sample ID: 195695.01
Matrix: aqueous
Date Sampled: 5/21/19
Date Received: 5/21/19

		Analytical Matrix	Units	Date of Analysis	Method	Analyst
Antimony	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Cadmium	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Chromium	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Chromium (III)	< 0.01	AqTot	mg/L	5/22/19	200.8	DS
Mercury	< 0.0001	AqTot	mg/L	5/22/19	200.8	DS
Nickel	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Selenium	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Silver	< 0.001	AqTot	mg/L	5/22/19	200.8	DS
Zinc	< 0.005	AqTot	mg/L	5/22/19	200.8	DS
Chromium (VI)	< 0.01	AqTot	mg/L	5/21/19	7196A	HEH

Chain-of-Custody Record

Page ____ of ____

195695

Bold Fields Required. Please Circle Requested Analysis.

Sample I.D.	Sampling Date/Time *If Composite, Indicate Both Start & Finish Date/Time	Matrix (see below)	Grab/Composite	VOC: 524.2 BTEX; 524.2 MTBE only; 8260B 624 BTEX; 624 VTICs; 1,4 Dioxane; EDB; DBCP; 8021B BTEX; Halos; 8015B GRO; MEGRO; NAVPH	SVOC: 8270D 625 ABN; A BN; PAH; TPHR100; L1; L2; 8015B DRO; MEDRO; HAEPH; PEST 608; PCB 608; PEST 8081A; PCB 8082; Oil & Grease 1664; TPH 1664	TCLP Metals: TCLP 1311; ABN; Metals; VOC; Pest; Herb	Dissolved Metals (List Below)	Total Metals (List Below)	Inorganics: TS; TSS; TDS; Spec. Cond.; Br; Cl; F; SO_4; NO_2; NO_2, NO_3; BOD; CBOD; T. Alk.; TKN; NH_3; T. Phos.; O. Phos.; pH; T. Res. Chlorine; COD; Phenols; TOC; DOC; Total Cyanide; Total Sulfide; Reactive Cyanide; Reactive Sulfide; Flashpoint; Ignitability	Micro: Total Coliform; E. Coli; Fecal Coliform; Enterococci; Heterotrophic Plate Count	Other	# of Containers	Notes MeOH Vial #
S052190-2	5/21/19 08:21	SW	G					✓		✓				3

T. Metals = Antimony, Cadmium, Chromium III, Chromium VI, Mercury, Nickel, Selenium, Silver, Zinc.

Matrix: A-Air; S-Soil; GW-Ground Water; SW-Surface Water; DW-Drinking Water; WW-Waste Water

Preservative: H-HCL; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

Project Manager: Anderson

Company: Seacoast Analytical Services

Address: ____

City: ____ State: ____ Zip: ____

Phone: ____ Ext.: ____

Fax: ____

E-Mail: ____

Site Name: Oyster River Raw

Project #: S052190 / 33 Waterworks Rd

State: NH MA ME VT Other: Durham, NH

Regulatory Program: NPDES: RGP POTW Stormwater or GWP, Oil Fund, Brownfield or Other: ____

Quote #: ____ PO #: ____

Date Needed: ____

QA/QC Reporting Level: A B C OR Presumptive Certainty

Reporting Options: Prelims: Yes or No; If Yes: Fax or PDF

Electronic Options: No Fax E-Mail PDF Equis

Temp. 5.0 °C ICE? (Yes) No

Metals: 8 RCRA 13 PP Fe, Mn Pb, Cu

Other Metals: ____

Dissolved Metals Field Filtered? Yes No

Notes: (ie: Special Detection Limits, Billing Info, If Different)

Please email to customerservice@seacoastanalytical.com

Thanks!

Sampler(s):				
Relinquished By:	Date:	Time:	Received By:	
Kate Sullivan	5/21/19	09:00	KRP	
KRP	5/21/19	1220	Michael Quad	
Relinquished By:	Date:	Time:	Received By:	

Site History: ____

Suspected Contamination: ____

Field Readings: ____

PA - 5/22/19 Cr needed to process III and VI

Eastern Analytical, Inc. professional laboratory services | 25 Chenell Drive | Concord, NH 03301 | Tel: 603.228.0525 | 1.800.287.0525 | Fax: 603.228.4591 | E-Mail: customer_service@eailabs.com | www.eailabs.com

(White: Original Green: Project Manager)

SEACOAST ANALYTICAL SERVICES
Route 125 & Pinkham Road
Lee, New Hampshire
603 868 1457
(Mail to: PO Box 555, Barrington, NH 03825)

SUPERIOR QUALITY & SERVICE SINCE 1989

WATER TEST RESULTS

Date: May 23, 2019

Reference #: S05219C1

Client: UNH Durham Water Supply

Water location: 33 Waterworks Road
Durham, NH
(Oyster River Raw)

Test Method	ANALYTE (mg/L) = milligrams per liter	EPA MAXIMUM recommended concentration	YOUR WATER'S VALUE < means less than	Exceeds Primary Standard	Exceeds Secondary Standard
SM 2340B	Hardness (mg/L)	No limit	30.1	-	-
EPA 200.5	Iron (mg/L)	0.300	0.216	-	-
EPA 200.5	Copper (mg/L)	1.300	< 0.050	-	-
EPA 200.5	Lead (mg/L)	0.015	< 0.005	-	-
EPA 200.5	Arsenic (mg/L)	0.010	< 0.005	-	-

THE TESTED PARAMETERS MEET FEDERAL PRIMARY DRINKING WATER STANDARDS. Secondary standards measure the aesthetic quality of the water and if exceeded should not affect healthy individuals. Analytes which exceed the recommended concentration or range are indicated with an X under the primary or secondary column above. Nitrate-N/nitrite-N should be analyzed within 48 hours of collection. Samples tested after this time period may not yield accurate results. pH should ideally be measured at the time of collection. Reported pH may differ from field measurement. This report relates only to the sample received.

http://des.nh.gov/organization/commissioner/pip/index.htm is the NHDES website where you can get information about water contaminants. Scroll down to 'Publications', and choose 'Fact Sheets', then Drinking Water/Ground Water.
Date/time sampled: 05/21/19 08:21
EPA 200.5 analysis: 05/22/19
*Turbidity above 1.0 NTU. Metals reported as dissolved.
Date rec'd: 05/21/19 Temp (°C) rec'd: 14 On Ice: Y

THIS REPORT IS CONFIDENTIAL. IF YOU RECEIVE THIS INFORMATION IN ERROR, PLEASE CALL 603-868-1457.

SEACOAST ANALYTICAL SERVICES is a NELAP Accredited Laboratory in NH #1733 and ME #NH00043 for the analysis of fluoride, chloride, nitrite-N, nitrate-N, pH, sodium, calcium, total hardness, iron, manganese, lead, arsenic, copper, total coliform bacteria and E. coli bacteria by Colilert and Colisure. This sample was received and analyzed in compliance with the National Environmental Laboratory Accreditation Conference (NELAC) requirements unless noted. Please call with questions regarding this analysis, or anytime that we might be of service.

Seacoast Analytical Services - TRUE COPY
Katy Anderson, Technical Director

ATTACHMENT D: PERMISSION FOR USE OF CATCH BASINS

May 9, 2019

Rachel Gilbert, P.E.
Woodard & Curran
40 Shattuck Road Suite 110
Andover, MA 01810

Re: New University of New Hampshire Water Treatment Plant
Permission to Utilize Catch Basin

Ms. Gilbert:

I am writing to notify you of approval for your request to utilize the catch basin located near the Oyster River Pump Station for the discharge of potable drinking water into the Oyster River during start-up and commissioning of the new Water Treatment Plant. We will not implement any additional requirements on the discharge beyond what is specified in the Remediation General Permit and any conditions of the permit.

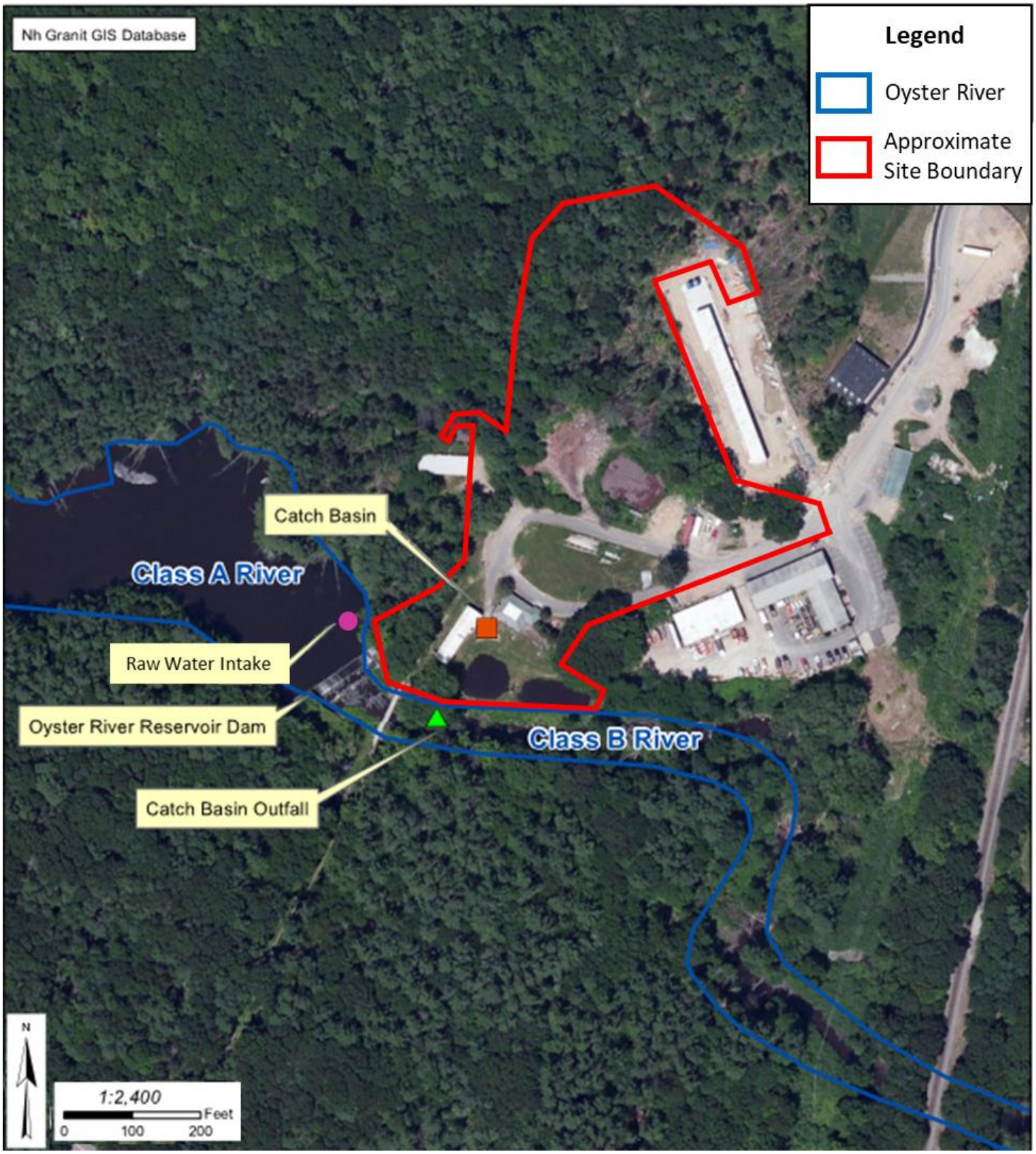
Please contact William Janelle at 603-862-1903 with questions regarding the catch basin utilization.

Sincerely,

William Janelle

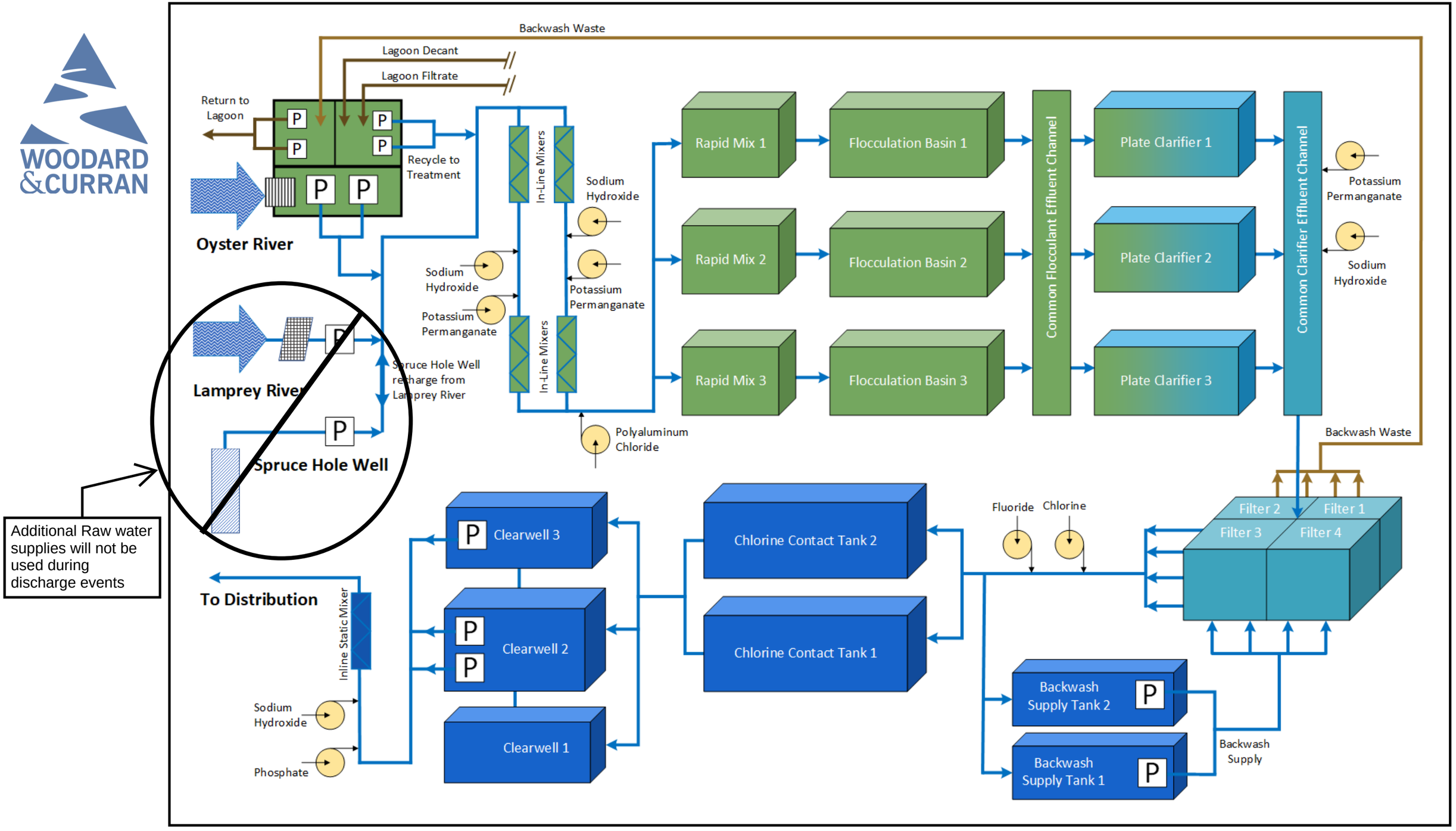
ATTACHMENT E: SITE PLAN

University Of New Hampshire Water Treatment Plant
Discharge Information: Site Plan



ATTACHMENT F: SCHEMATIC OF FLOW

UNH Water Treatment Plant



ATTACHMENT G: WQBEL CALCULATIONS (ELECTRONIC EXCEL DOCUMENT)

Dilution Factor	1.0			
	TBEL applies if bolded		WQBEL applies if bolded	
A. Inorganics				
Ammonia	**Report**	mg/L	---	
Chloride	**Report**	µg/L	---	
Total Residual Chlorine	0.2	mg/L	**11**	µg/L
Total Suspended Solids	**30**	mg/L	---	
Antimony	**206**	µg/L	4.4	mg/L
Arsenic	**104**	µg/L	10	µg/L
Cadmium	**10.2**	µg/L	0.1142	µg/L
Chromium III	**323**	µg/L	33.1	µg/L
Chromium VI	**323**	µg/L	11.7	µg/L
Copper	**242**	µg/L	3.4	µg/L
Iron	**5000**	µg/L	1000	µg/L
Lead	**160**	µg/L	0.71	µg/L
Mercury	**0.739**	µg/L	0.93	µg/L
Nickel	**1450**	µg/L	19.4	µg/L
Selenium	**235.8**	µg/L	5.1	µg/L
Silver	**35.1**	µg/L	0.5	µg/L
Zinc	**420**	µg/L	44.5	µg/L
Cyanide	**178**	mg/L	5.3	µg/L
B. Non-Halogenated VOCs				
Total BTEX	**100**	µg/L	---	
Benzene	**5.0**	µg/L	---	
1,4 Dioxane	**200**	µg/L	---	
Acetone	**7970**	µg/L	---	
Phenol	**1,080**	µg/L	308	µg/L
C. Halogenated VOCs				
Carbon Tetrachloride	**4.4**	µg/L	---	
1,2 Dichlorobenzene	**600**	µg/L	---	
1,3 Dichlorobenzene	**320**	µg/L	---	
1,4 Dichlorobenzene	**5.0**	µg/L	---	
Total dichlorobenzene	**---**	µg/L	---	
1,1 Dichloroethane	**70**	µg/L	---	
1,2 Dichloroethane	**5.0**	µg/L	---	
1,1 Dichloroethylene	**3.2**	µg/L	---	
Ethylene Dibromide	**0.05**	µg/L	---	
Methylene Chloride	**4.6**	µg/L	---	
1,1,1 Trichloroethane	**200**	µg/L	---	
1,1,2 Trichloroethane	**5.0**	µg/L	---	
Trichloroethylene	**5.0**	µg/L	---	
Tetrachloroethylene	**5.0**	µg/L	---	
cis-1,2 Dichloroethylene	**70**	µg/L	---	

Vinyl Chloride	**2.0**	µg/L	---	
D. Non-Halogenated SVOCs				
Total Phthalates	**190**	µg/L	3.1	µg/L
Diethylhexyl phthalate	**101**	µg/L	2.3	µg/L
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---	
Benzo(a)anthracene	**1.0**	µg/L	0.0039	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.0039	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.0039	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.0039	µg/L
Chrysene	**1.0**	µg/L	0.0039	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0039	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.0039	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---	
Naphthalene	**20**	µg/L	---	
E. Halogenated SVOCs				
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---	
Pentachlorophenol	**1.0**	µg/L	---	
F. Fuels Parameters				
Total Petroleum Hydrocarbons	**5.0**	mg/L	---	
Ethanol	**Report**	mg/L	---	
Methyl-tert-Butyl Ether	**70**	µg/L	---	
tert-Butyl Alcohol	**120**	µg/L	---	
tert-Amyl Methyl Ether	**90**	µg/L	---	

Compliance Level applies if shown		
50	µg/L	
---	µg/L	

---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L
---	µg/L

0.5	µg/L

ATTACHMENT H: WATER USAGE AND DISCHARGE RATE

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road | Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

MEMORANDUM TO FILE

PROJECT: University of New Hampshire Water Treatment Plant

DATE: July 12, 2019

SUBJECT: Water Usage and Discharge Rate

During startup and commissioning of the volume of water to be used exceeds the current storage capacity of the lagoons on site. To account for this difference a Remediation General Permit will be used to allow for the discharge of potable water into the Oyster River. The lagoons will be able to handle the water used for all the individual equipment and system startup. Performance testing and the disinfection of tanks will require discharge into the Oyster River.

Disinfection is necessary for the Chlorine Contact Tanks, the Backwash Tanks, and the Clearwells. To disinfect and flush the tanks approximately two tank volumes of water will be needed for each. The total volume of water anticipated to be used during disinfection is 677,000 gallons. Performance testing will occur over four days and the total water usage for each day is depicted in Figure 1 with a total anticipated water usage of 1,237,000 gallons.

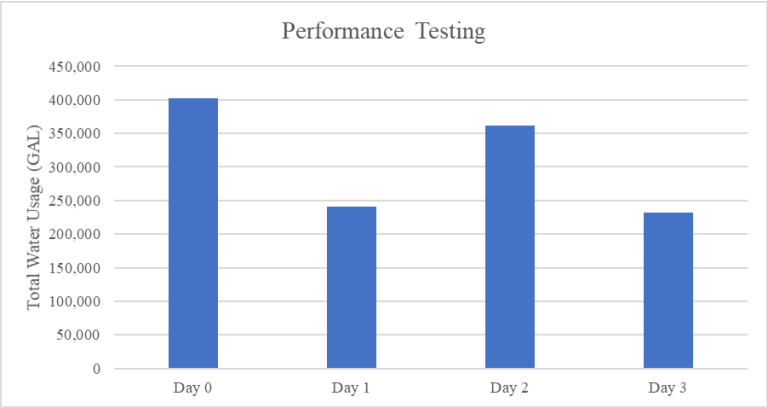


Figure 1: Water Usage during Stage 4 Performance Testing

During each process the lagoons will be used as equalization basins to control the discharge flow rate. Water from the Water Treatment Plant will enter the lagoons and the decant and filtrate will then be directed to the return wet well in the Oyster River pump house. Two temporary 2-inch sump pumps (Tsurini LB-800) each with a maximum pumping capacity of 82 GPM will be used to transfer the water from the wet well into the catch basin with direct discharge to the river. We anticipate these pumps to be used 24 hours a day during the disinfection and performance testing period to ensure adequate volume in the lagoon to accept water used in subsequent tests. No water will be directly discharged from the Water Treatment Plant to the Oyster River thus controlled the flow rate of discharge.

ATTACHMENT I: CHEMICAL ADDITIVE INFORMATION AND EXPLANATION TO THE AUTHORIZATION OF ADDITION

Attachment I: Chemical Additive Information and Explanation to the Authorization of Addition
University of New Hampshire Water Treatment Plant

Product Name		Potassium Permanganate	Sodium Hydroxide	PCH 180	Carus 8500	Sodium Hypochlorite	Sodium Fluoride
Chemical Formula		$KMnO_4$	NaOH			NaClO	NaF
Manufacturer		Carus Corporation	Harcros	Holland Company	Carus Corporation	Harcros	Univar
Purpose		Manganese Precipitation	pH Control	Coagulation	Corrosion Control	Disinfection	Dental Health
CAS Registry		7722-64-7	1310-73-2	14215-15-7	--	7681-52-9	7681-49-4
Frequency/Duration		Seasonally/Continuously during plant operation	Continuously during plant operation	Continuously during plant operation	Continuously during plant operation	Continuously during plant operation	Continuously during plant operation
Dose	Max (GPH)	3.35	5.15	6.38	0.16	2.23	2.80
	Avg (GPH)	1.22	2.01	2.32	0.06	0.83	1.09
Method of Application		Liquid Injection	Liquid Injection	Liquid Injection	Liquid Injection	Liquid Injection	Liquid Injection
Incompatible Materials		Acids, Peroxides, Reducing Agents, Combustible Material, Metals	Acids, Oxidizing Agents, Halogenated Materials, Alkali Sensitive Metals or Alloys	Sodium Hypochlorite, Chlorites, Sulfites, Strong Bases, Aqua Ammonia, Copper, Aluminum, Iron Steel, Low Grades of Stainless Steel	Black Iron, Mild Steel, Galvanized Metals, Aluminum, Zinc, Copper, Lead, Brass, Bronze, Tin, Other Base Metals	Acids, Oxidizing Agents, Combustible Material, Reducing agents, Metals, Bases, Alkalis	Strong Acids, Glass
Aquatic Toxicity LC50 (mg/L)		Bluegill – 1.8-5.6 Carp – 2.97-3.77 GoldFish – 3.3-3.93 Milkfish - >1.4 Rainbow Trout – 0.77-1.38 Donaldson Trout – 0.275-0.339	Fish – 500 Water flea – 34.59-47.13 Western Mosquitofish – 125	Danio rerio (OCED test guideline 203) - >1000 > 0.156 mg/L as Al	No data provided by vendor	Fish – 12.5131 Water flea – 34.59-47.13 Western Mosquitofish – 125 Chinook Salmon – 0.038-0.065	Lepomis macrochirus – 530 Salmo gairdneri – 112
Notes:		The addition of Potassium Permanganate is seasonal and may not be needed during the discharge event.	The addition of Sodium Hydroxide can be adjusted to provide a different target pH, if necessary, for discharge events.	--	--	Water will be dechlorinated prior to discharge to prevent the discharge of pollutants in excess of the permit and drinking water quality standards. There will be periodic field testing to confirm adequate dichlorination.	Fluoride will not be used during discharge events and thus will not be discharged in excess of the permit and water quality standards.
Additional Statements		1. The addition of Potassium Permanganate will not add any pollutants in concentrations which exceed permit effluent limitations*; 2. The addition of Potassium Permanganate will not exceed any applicable water quality standard; and 3. The addition of Potassium Permanganate will not add any pollutants that would justify the application of permit conditions that are different from or absent in this permit;	1. The addition of Sodium Hydroxide will not add any pollutants in concentrations which exceed permit effluent limitations*; 2. The addition of Sodium Hydroxide will not exceed any applicable water quality standard; and 3. The addition of Sodium Hydroxide will not add any pollutants that would justify the application of permit conditions that are different from or absent in this permit;	1. The addition of PCH 180 will not add any pollutants in concentrations which exceed permit effluent limitations*; 2. The addition of PCH 180 will not exceed any applicable water quality standard; and 3. The addition of PCH 180 will not add any pollutants that would justify the application of permit conditions that are different from or absent in this permit;	1. The addition of CARUS 8500 will not add any pollutants in concentrations which exceed permit effluent limitations*; 2. The addition of CARUS 8500 will not exceed any applicable water quality standard; and 3. The addition of CARUS 8500 will not add any pollutants that would justify the application of permit conditions that are different from or absent in this permit;	Refer to note above.	Refer to note above.

*No existing permit exists for the discharge, so this will refer to the pending Remediation General Permit

ATTACHMENT J: CHEMICAL SDS

SAFETY DATA SHEET

1. Identification

Product identifier **Potassium Permanganate**

Other means of identification Not available.

Recommended use Potassium Permanganate is an oxidant recommended for applications that require a strong oxidant.

Recommended restrictions Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Company name CARUS CORPORATION

Address 315 Fifth Street,
Peru, IL 61354, USA

Telephone 815 223-1500 - All other non-emergency inquiries about the product should be directed to the company

E-mail salesmkt@caruscorporation.com

Website www.caruscorporation.com

Contact person Dr. Chithambarathanu Pillai

Emergency Telephone For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at
CHEMTREC®, USA: 001 (800) 424-9300
CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531
CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards	Oxidizing solids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Specific target organ toxicity, single exposure	Category 1 (Respiratory System)
	Specific target organ toxicity, repeated exposure	Category 1 (Respiratory System, Central Nervous System)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. Causes damage to organs (Respiratory System). Causes damage to organs (Respiratory System, Central Nervous System) through prolonged or repeated exposure. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Keep away from heat. Keep/Store away from clothing//combustible materials. Wash thoroughly after handling. Do not breathe dust. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product. Take any precaution to avoid mixing with combustibles. Avoid release to the environment.

Response In case of fire: Use water for extinction. If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Collect spillage. Immediately call a poison center/doctor.

Storage Store locked up.

Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Potassium permanganate		7722-64-7	>97.5

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. For breathing difficulties, oxygen may be necessary. Get medical attention immediately.

Skin contact Remove contaminated clothing and shoes. Immediately flush skin with plenty of water. Get medical attention immediately. Wash contaminated clothing before reuse.

Contact with skin may leave a brown stain of insoluble manganese dioxide. This can be easily removed by washing with a mixture of equal volume of household vinegar and 3% hydrogen peroxide, followed by washing with soap and water.

Eye contact Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Continue rinsing. Get medical attention immediately.

Ingestion Immediately rinse mouth and drink plenty of water. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately.

Most important symptoms/effects, acute and delayed Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Decomposition products are alkaline. Brown stain is insoluble manganese dioxide.

General information In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media Flood with water from a distance, water spray or fog.

Unsuitable extinguishing media The following extinguishing media are ineffective: Dry chemical. Foam. Carbon dioxide (CO2). Halogenated materials.

Specific hazards arising from the chemical May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 ºC / 275 ºF) could result in violent exothermic chemical reaction. Oxidizing agent, may cause spontaneous ignition of combustible materials. By heating and fire, corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions Move container from fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Dike fire control water for later disposal. Water runoff can cause environmental damage.

General fire hazards The product is not flammable. May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Minimize dust generation and accumulation. Avoid inhalation of dust and contact with skin and eyes. Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wear protective clothing as described in Section 8 of this safety data sheet. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Should not be released into the environment. This product is miscible in water. Stop leak if possible without any risk. Dike the spilled material, where this is possible. Clean up spills immediately by sweeping or shoveling up the material. Do not return spilled material to the original container; transfer to a clean metal or plastic drum. To clean up potassium permanganate solutions, follow either of the following two options:

Option # 1: Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water.

Option # 2: Absorb with inert media like diatomaceous earth or inert floor dry, collect into a drum and dispose of properly. Do not use saw dust or other incompatible media. Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to permanganates.

To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as described above.

Never return spills in original containers for re-use.

Environmental precautions

Do not allow to enter drains, sewers or watercourses. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling

Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not get this material in your eyes, on your skin, or on your clothing. Do not breathe dust or mist or vapor of the solution. If clothing becomes contaminated, remove and wash off immediately. When using, do not eat, drink or smoke. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep container tightly closed and in a well-ventilated place. Store in a cool, dry place. Store away from incompatible materials (See Section 10). Follow applicable local/national/international recommendations on storage of oxidizers. Store in accordance with NFPA 430 requirements for Class II oxidizers.

8. Exposure controls/personal protection

Occupational exposure limits

No exposure limits noted for ingredient(s).

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

Components	Type	Value
Potassium permanganate (CAS 7722-64-7)	Ceiling	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Potassium permanganate (CAS 7722-64-7)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Potassium permanganate (CAS 7722-64-7)	STEL	3 mg/m3	Fume.
	TWA	1 mg/m3	Fume.

Biological limit values

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

Exposure guidelines

Follow standard monitoring procedures.

Appropriate engineering controls

Provide adequate general and local exhaust ventilation. An eye wash and safety shower must be available in the immediate work area.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.

Skin protection

Hand protection

Use protective gloves made of: Rubber or plastic. Suitable gloves can be recommended by the glove supplier.

Other

Wear chemical-resistant, impervious gloves.

Respiratory protection	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134. Measurement Element: Manganese (Mn) 10 mg/m3 Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100. Any supplied-air respirator. 25 mg/m3 Any supplied-air respirator operated in a continuous-flow mode. Any powered, air-purifying respirator with a high-efficiency particulate filter. 50 mg/m3 Any air-purifying, full-face piece respirator equipped with an N100, R100, or P100 filter. Any supplied-air respirator with a tight-fitting face piece that is operated in a continuous-flow mode. Any powered, air-purifying respirator with a tight-fitting face piece and a high-efficiency particulate filter. Any self-contained breathing apparatus with a full face piece. Any supplied-air respirator with a full face piece. 500 mg/m3 Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. Emergency or planned entry into unknown concentrations or IDLH conditions - Any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode. Escape Any air-purifying, full-face piece respirator equipped with an N100, R100, or P100 filter. Any appropriate escape-type, self-contained breathing apparatus.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using, do not eat, drink or smoke. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	Not available.
Physical state	Solid.
Form	Powder.
Color	Dark purple.
Odor	Odorless.
Odor threshold	Not applicable.
pH	Not applicable.
Melting point/freezing point	Starts to decompose with evolution of oxygen (O2) at temperatures above 150 °C. Once initiated, the decomposition is exothermic and self sustaining.
Initial boiling point and boiling range	Not applicable.
Flash point	Not applicable.
Evaporation rate	Not applicable.
Flammability (solid, gas)	Non flammable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not applicable.
Flammability limit - upper (%)	Not applicable.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	2.7 (20 °C) (Water = 1)

Solubility(ies)

Solubility (water)	64 g/l water (20 °C)
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not available.
Decomposition temperature	464 °F (240 °C)
Viscosity	Not applicable.

Other information

Explosive properties	Not explosive. Can explode in contact with sulfuric acid, peroxides and metal powders.
Granulometry	Mass median : 175.8 µm Particle size: D90 < 298 µm, D10 < 106.1 µm
Molecular formula	H-Mn-O4.K
Molecular weight	158.03 g/mol
Oxidizing properties	Strong oxidizing agent.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Contact with combustible material may cause fire. Can explode in contact with sulfuric acid, peroxides and metal powders. Starts to decompose with evolution of oxygen (O2) at temperatures above 150 °C. Once initiated, the decomposition is exothermic and self sustaining.
Conditions to avoid	Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.
Incompatible materials	Acids. Peroxides. Reducing agents. Combustible material. Metal powders. Contact with hydrochloric acid liberates chlorine gas.
Hazardous decomposition products	By heating and fire, corrosive vapors/gases may be formed.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Harmful if swallowed.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
Potassium permanganate (CAS 7722-64-7)		
Acute		
Dermal		
LD50	Rat	2000 mg/kg
Oral		
LD50	Rat	2000 mg/kg

Skin corrosion/irritation	Causes severe skin burns.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization	Test data conclusive but not sufficient for classification.
Skin sensitization	Test data conclusive but not sufficient for classification.
Germ cell mutagenicity	Test data conclusive but not sufficient for classification.
Carcinogenicity	Test data conclusive but not sufficient for classification.
Reproductive toxicity	Test data conclusive but not sufficient for classification.
Specific target organ toxicity - single exposure	Causes damage to organs (respiratory system).

Specific target organ toxicity - repeated exposure	Causes damage to organs (respiratory system, central nervous system) through prolonged or repeated exposure.
Aspiration hazard	Based on available data, the classification criteria are not met.
Chronic effects	May cause damage to respiratory system. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.
Further information	No other specific acute or chronic health impact noted.

12. Ecological information

Ecotoxicity Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Potassium permanganate (CAS 7722-64-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.7 mg/l, 96 hours, static
			2.3 mg/l, 96 hours, flow through
			2.3 mg/l, 96 hours
			1.8 - 5.6 mg/l
		Carp (Cyprinus carpio)	3.16 - 3.77 mg/l, 96 hours
			2.97 - 3.11 mg/l, 96 hours
		Goldfish (Carassius auratus)	3.3 - 3.93 mg/l, 96 hours, static
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours
		Rainbow trout (Oncorhynchus mykiss)	1.8 mg/l, 96 hours
			1.08 - 1.38 mg/l, 96 hours
			0.77 - 1.27 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.275 - 0.339 mg/l, 96 hours

Persistence and degradability	Expected to be readily converted by oxidizable materials to insoluble manganese oxide.
Bioaccumulative potential	Potential to bioaccumulate is low.
Mobility in soil	Not available.
Mobility in general	The product is water soluble and may spread in water systems.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	D001: Ignitable waste The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Do not allow this material to drain into sewers/water supplies. Dispose in accordance with all applicable regulations.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Rinse container at least three times to an absence of pink color before disposing. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN1490
UN proper shipping name	Potassium permanganate
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	Yes
Special precautions for user	Not available.
Special provisions	IB8, IP2, IP4, T3, TP33
Packaging exceptions	152
Packaging non bulk	212

Packaging bulk 240

IATA

UN number UN1490
UN proper shipping name Potassium permanganate
Transport hazard class(es)
Class 5.1
Subsidiary risk -
Label(s) 5.1
Packing group II
Environmental hazards Yes
ERG Code 5L
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number UN1490
UN proper shipping name POTASSIUM PERMANGANATE
Transport hazard class(es)
Class 5.1
Subsidiary risk -
Label(s) 5.1
Packing group II
Environmental hazards
Marine pollutant Yes
EmS F-H, S-Q
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not available.

15. Regulatory information

US federal regulations

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

CERCLA/SARA Hazardous Substances - Not applicable.

Drug Enforcement Administration (DEA) (21 CFR 1310.02 (b) 8: List II chemical.

Department of Homeland Security (DHS) Chemical Facility Anti-Terrorism Standards (6 CFR 27, Appendix A): Listed.

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

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Potassium permanganate (CAS 7722-64-7) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Potassium permanganate	7722-64-7	>97.5

Other federal regulations

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

Potassium permanganate (CAS 7722-64-7)

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Potassium permanganate (CAS 7722-64-7) 6579

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Potassium permanganate (CAS 7722-64-7) 15 % wt

DEA Exempt Chemical Mixtures Code Number

Potassium permanganate (CAS 7722-64-7) 6579

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

California OSH Hazardous Substance List: Listed.

US. Massachusetts RTK - Substance List

Potassium permanganate (CAS 7722-64-7)

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

Potassium permanganate (CAS 7722-64-7)

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

Potassium permanganate (CAS 7722-64-7)

US. Rhode Island RTK

Potassium permanganate (CAS 7722-64-7)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

Issue date 17-February-2014

Revision date -

Version # 01

NFPA Ratings

List of abbreviations LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.

References

Chemical safety report.
ECHA registered substances database

Disclaimer

This safety data sheet was prepared in accordance with the Safety Data Sheet for Chemical Products (JIS Z 7250:2005). The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CORPORATION DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CORPORATION MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

SAFETY DATA SHEET

1. Identification

Product identifier	**Caustic Soda 25%**
Other means of identification	
SDS number	320698-03
Recommended use	For industrial and manufacturing use only.
Recommended restrictions	None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name	Harcros Chemicals Inc
Address	5200 Speaker Rd. Kansas City, KS 66106 United States
Main Telephone Number	1-913-321-3131
Website	www.harcros.com
E-mail	custserv@harcros.com
Emergency #: CHEMTREC	1-800-424-9300
Emergency #: CHEMTREC	1-703-527-3887 (call collect)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Combustible dust	Not applicable
	Pyrophoric gas	Not applicable
	Simple asphyxiant	Not applicable

Label elements

Signal word	Danger
Hazard statement	Causes severe skin burns and eye damage. Causes serious eye damage. Harmful to aquatic life. Harmful to aquatic life with long lasting effects.

Precautionary statement

Prevention	Do not breathe mist or vapor. Wash thoroughly after handling. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Wash contaminated clothing before reuse.

Storage	Store away from incompatible materials. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in accordance with local/regional/national/international regulations.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Sodium Hydroxide		1310-73-2	20 - < 30
Other components below reportable levels			70 - < 80

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

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

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

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

This product is miscible in water. Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Provide adequate ventilation. Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Avoid prolonged exposure. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

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

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	PEL	2 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

Biological limit values

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

Appropriate engineering controls

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

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Other

Wear appropriate chemical resistant clothing.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

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

9. Physical and chemical properties

Appearance	Clear.
Physical state	Liquid.
Form	Liquid.
Color	Colorless.
Odor	Odorless.
Odor threshold	Not available.
pH	12 - 14
Melting point/freezing point	Not available.
Initial boiling point and boiling range	200 - 250 °F (93.33 - 121.11 °C)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Flash point class	Non-flammable
Oxidizing properties	Not oxidizing.
Specific gravity	1.272 - 1.277 @25°C

10. Stability and reactivity

Reactivity	Reacts violently with strong acids. This product may react with oxidizing agents.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Contact with incompatible materials. Do not mix with other chemicals.
Incompatible materials	Strong acids. Acids. Oxidizing agents. Halogenated materials. Prolonged contact with alkali sensitive metals or alloys.

Hazardous decomposition products Irritating and/or toxic fumes and gases may be emitted upon the products decomposition. Oxides of Sodium.

11. Toxicological information

Information on likely routes of exposure

Inhalation May cause irritation to the respiratory system. Prolonged inhalation may be harmful.

Skin contact Causes severe skin burns.

Eye contact Causes serious eye damage.

Ingestion Causes digestive tract burns.

Symptoms related to the physical, chemical and toxicological characteristics Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity Not available.

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

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

IARC Monographs. Overall Evaluation of Carcinogenicity

Not available.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

US. National Toxicology Program (NTP) Report on Carcinogens

Not available.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Product		Species	Test Results
Caustic Soda 25%			
Aquatic			
Crustacea	EC50	Daphnia	138.36 mg/l, 48 hours estimated
Fish	LC50	Fish	500 mg/l, 96 hours estimated

Components		Species	Test Results
Sodium Hydroxide (CAS 1310-73-2)			
Aquatic			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	34.59 - 47.13 mg/l, 48 hours

Components		Species	Test Results
Fish	LC50	Western mosquitofish (Gambusia affinis)	125 mg/l, 96 hours

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

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

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

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN1824

UN proper shipping name Sodium hydroxide solution

Transport hazard class(es)

Class 8

Subsidiary risk -

Label(s) 8

Packing group II

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Special provisions B2, IB2, N34, T7, TP2

Packaging exceptions 154

Packaging non bulk 202

Packaging bulk 242

Reportable Quantity for Sodium Hydroxide = 1000 lbs.

IATA

UN number UN1824

UN proper shipping name Sodium hydroxide solution

Transport hazard class(es)

Class 8

Subsidiary risk -

Packing group II

Environmental hazards No.

ERG Code 8L

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Other information

Passenger and cargo aircraft Allowed.

Cargo aircraft only Allowed.

IMDG

UN number	UN1824
UN proper shipping name	SODIUM HYDROXIDE SOLUTION
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

DOT

IATA; IMDG

15. Regulatory information

US federal regulations

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

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

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

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

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

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

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

Not listed.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Sodium Hydroxide (CAS 1310-73-2)

US. Massachusetts RTK - Substance List

Sodium Hydroxide (CAS 1310-73-2)

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

Sodium Hydroxide (CAS 1310-73-2)

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

Sodium Hydroxide (CAS 1310-73-2)

US. Rhode Island RTK

Sodium Hydroxide (CAS 1310-73-2)

US. California Proposition 65

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

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

Issue date 10-19-2015

Revision date	01-29-2016
Version #	02
HMIS® ratings	Health: 3 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 3 Flammability: 0 Instability: 0
Disclaimer	Harcros Chemicals Inc cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information provided in this Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc., provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration, and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc., knows of no medical condition, other than those noted on this Safety Data Sheet, which are generally recognized as being aggravated by exposure to this product.
Revision Information	Product and Company Identification: Product and Company Identification Physical & Chemical Properties: Multiple Properties Physical and chemical properties: Appearance Physical and chemical properties: Oxidizing properties Physical and chemical properties: Explosive properties Ecological information: Persistence / degradability

Holland Company

PCH 180, PCH 182

Safety Data Sheet

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product/Chemical Name: PCH 180, PCH 182
Chemical Family: Inorganic aluminum salt
General use: Water treatment and manufacturing applications

Company Information:
Holland Company, Inc.
153 Howland Avenue
Adams, MA 01220 U.S.A.
Phone: 413-743-1292 FAX: 413-743-1298

Emergency Phone:
1-800-424-9300 Chemtrac (USA)
1-613-996-6666 or Cell *666 CANTUTEC (Canada)

SECTION 2. HAZARDS IDENTIFICATION

WARNING - IRRITANT
AVOID CONTACT

WARNING - CORROSION
Corrosive to Some Metals

Hazard Statements
Harmful if ingested.
Irritating to skin and eyes.
Untreated contact with eyes may result in damage.
Mist is irritating to respiratory system.
Will corrode some metals.

Precautionary Statements
Avoid direct contact.
Use protective equipment if direct contact is possible.
Wash hands thoroughly after contact.
Use appropriate materials of construction for storage and handling.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Substance
Chemical name: Aluminum soluble salts (liquid)
Name: PCH 180, PCH 182 / Liquid Polyaluminum Chloride
CAS#: 14215-15-7
Impurities: NA. No impurities or additives which are themselves classified and which contribute to the classification of the substance.

SECTION 4. FIRST AID MEASURES

Inhalation of mist or liquid:
Remove from continued exposure.
Get medical attention if difficulty with breathing or uncontrolled coughing occurs.
Skin contact:
Remove contaminated clothing - footwear and wash skin with water.
If irritation develops get medical attention.
Eye contact:
A stinging - irritating sensation will occur.
Immediately rinse eyes with water for an extended period.
Get medical attention. Untreated exposure may result in damage to the eyes.
Ingestion:
Spontaneous vomiting may occur.
Do not actively induce vomiting.
Rinse mouth and drink water.
Get medical attention.

SECTION 5. FIRE FIGHTING MEASURES

Flammability:
Product is not flammable and will not burn.
Controls:
To maintain the integrity use water to keep containers cool.
If possible remove portable containers from areas under fire threat.
Hazards:
In a fire dried product can decompose at elevated temperatures resulting in the formation of hydrogen chloride fumes. Exposure to products of decomposition during a fire may be hazardous to health. Stay up wind and avoid low areas.
Special equipment:
In case of possible exposure to products of decomposition use appropriate self-contained or other approved respiratory protection. Consult engineers if necessary.
Mechanical impact:
Not sensitive.
Static discharge:
Not sensitive**.**

SECTION 6. ACCIDENTIAL RELEASE MEASURES

General:
Site specific procedures to address accidental spills are necessary as dictated by facility design, location, staffing, containment structures, and regulatory requirements. Consult engineers if necessary.

Personal protection:
In the event of a spill clear unnecessary staff from spill area.
If direct contact with spilled material is likely use protective equipment.

Small spills:
Manage spill using containment structures or inert materials and collect for reuse.
Product not reused can be neutralized and converted to aluminum hydroxide using a mild alkali such as soda ash, or calcium carbonate (agricultural lime). Neutralized residue can be swept up or rinsed down with water and captured using absorbent materials for disposal in accordance with local, state, province, and federal regulations. Consult engineers if necessary.

Large spills:
Manage spill using containment structures or inert materials and collect for reuse.
Product not reused can be neutralized and converted to aluminum hydroxide using a mild alkali such as soda ash, or calcium carbonate (agricultural lime). Neutralized residue can be swept up or rinsed down with water and captured using absorbent materials for disposal in accordance with local, state, province, and federal regulations. Caution: When neutralizing large spills CO_2 will be created and can be a breathing hazard. Take steps to provide adequate ventilation. Consult engineers if necessary.

SECTION 7. HANDLING AND STORAGE

Incompatible Chemicals:
Avoid contact with sodium hypochlorite (bleach), chlorites, sulfites, strong bases, aqua ammonia and other similar materials. Consult engineers if necessary.

Containment:
To minimize the possibility of a release into the environment and contact with other incompatible chemicals, storage tanks and containers should have a dedicated liquid tight secondary containment system. Consult engineers if necessary.

General hygiene:
Do not eat, drink, take medication or smoke when direct contact is possible.
Always thoroughly wash hands after leaving a work area where contact is possible or has occurred.

Storage: Use tanks, transfer lines, pumps valves and process instrumentation designed for this material using appropriate materials of construction. Some materials commonly used are FRP, plastic, PVC, CPVC, Teflon®, and Hastelloy® metal alloys. To prevent possible corrosion damage avoid the use of common metals such as copper, aluminum, iron, steel, and low grades of SS. Consult engineers if necessary.
Clean storage tanks on a regular schedule based on inspection and experience.
Have storage tanks, containers, and transfer systems properly labeled for contents.
Have procedures for determining product quantity in storage tanks and for accepting deliveries.

Temperature for storage: Preferred storage temperature range is 7C-35C (45F-95F).
Outside of these temperature ranges optimal product performance and shelf life may be affected.

Ventilation: No special requirements.

Personal protection:
If direct contact with material is likely use protective equipment.

SECTION 8. EXPOSURE CONTROL / PERSONNAL PROTECTION

Exposure Limits

Ingredient: aluminum soluble salts

OSHA PEL		ACGIH TLV		NIOSH
TWA	ST	TWA	STEL	IDLH
2mg/m^3 as Al	none est.	2mg/m^3 as Al	none est.	none est.

Respiratory - Ventilation: Local passive ventilation is typically used. Under normal conditions respiratory protective equipment is not needed. If work requires direct exposure to product mist use appropriate, approved respiratory protection. Consult engineers if necessary.
Eye wash: Have an appropriate eye wash bottle, fountain, or safety shower available in the work area.
Eyes: Use protective eye glasses-goggles and face shield protection to prevent direct contact.
Skin: Use impervious gloves and foot covering. Wear long sleeve shirts and full length trousers.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid clear to slight haze.
Flammability: Not flammable.
Upper/lower flammability limits: NA
Auto ignition: NA
Flash point: NA
Odor: Not significant. Free from organic or solvent odors.
Vapor density: NA
pH: 2.5-2.8 @ 25C (77F) as is basis
Density: 1.26 - 1.28 S.G. @ 21C (70F)
Melting/Freeze point: -10C (14F) + -
Boiling point-range: 105C-115C (221F-235F)
Water Solubility: Complete.
Evaporation rate: NA
Partial coefficient: n-octanol/water; NA, inorganic compound column 2 of REACH Annex VII.
Decomposition temperature: >200C (392F)
Viscosity: 20-35 centipoise/mPa.s @ 23C (73F)
VOC: 0.0

SECTION 10. STABILITY AND REACTIVITY

Chemical stability:
Product is chemically stable under normal ambient temperature and conditions while stored or used.
Conditions to avoid:
Do not exceed 200C (392F)
Materials to avoid:
Chlorite, hypochlorite (bleach), sulfites, strong bases, common metals.
Decomposition products:
Thermal decomposition of dried product can release irritating fumes.

SECTION 11. TOXICOLOGY INFORMATION

Toxicity:
Low order of acute toxicity
Oral (ingestion) estimate:
LD50/Oral Rat >2,000mg/kg (as aluminum)
Inhalation estimate:
LC50/Inhalation rat >5.6mg/l (as aluminum)
Dermal estimate:
LD50/dermal: >550mg/kg (as aluminum)
Effects of exposure:
Skin: Repeated contact may dry and irritate skin.
Eyes: Will cause irritation, untreated exposure may result in damage to the eye.
Respiratory: Inhalation of liquid or mist may cause bronchial irritation and coughing.
Mucous membranes: May cause irritation.
Ingestion: Can cause vomiting, pain and discomfort to mouth, throat, and stomach.
Sensitization: Not sensitizing
Carcinogenicity: NTP Not listed. IARC Not listed. OSHA Not listed.
Reproductive Toxicity, Mutagenic or teratogenic effects:
No known reproductive toxicity, mutagenic or teratogenic effects in animal experiments are known.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic toxicity:
With preapproval; Federal, State, Provincial, and EU regulators allow the direct application of aluminum salts into surface waters such as lakes, ponds, and streams for beneficial uses such as:
Phosphorus inactivation.
Cyanobacteria (Blue-Green Algae) control.
Turbidity reduction for improved water clarity.
Reported that at environmentally relevant pH range of 5.5-8.5 the solubility of aluminum is low. Aluminum salts dissociate with water resulting in rapid formation and precipitation of aluminum hydroxides. Aluminum salts must not be introduced into surface waters in an uncontrolled way. In aquatic environments at a pH <5.5 and >8.5 the direct addition of aluminum salts may result in soluble aluminum, and until a pH range of 5.5-8.8 is reached could demonstrate toxicity and be harmful to aquatic organisms.
For Polyaluminum chloride:
NOEC/Danio rerio/OECD test guideline 203: >1,000mg/l
LC50/96h/Danio rerio/OCED test guideline 203: >1,000mg/l
LC50: >0.156 mg/l as Al*. Maximum *soluble aluminum concentration under the test conditions
EC50/Daphnia magna (water flea) semi-static/OECD test guideline 202: 98mg/l
EC50: 24 mg/l as Al (aluminum)
Toxicity to other organisms: No data available.
Bioaccumulation potential: This product is not expected to bioaccumulate.
Octanol-water coefficient: NA, inorganic compound.
Biodegradability: Not applicable to inorganic substances.
Chemical degradability: In water at pH range of 5.5-8.8 precipitates of aluminum hydroxide are formed.
Mobility in Soil: No data available.

SECTION 13. DISPOSAL CONSIDERATIONS

RCRA Hazardous waste: Not listed.
Consult engineers if necessary.
Neutralization:
Product can be neutralized and converted to aluminum hydroxide using a mild alkali such as soda ash, calcium carbonate (agricultural lime). Neutralized residue can be swept up or rinsed down with water and captured using absorbent materials for reuse or disposal in accordance with local, state, province, and federal regulations. Consult engineers if necessary.
Special precautions:
None known
Container reuse:
Packaging and storage containers that cannot be thoroughly cleaned must be disposed of in accordance with local, state, province, and federal regulations. Consult engineers if necessary.

SECTION 14. TRANSPORTATION INFORMATION

Land (DOT), Sea (IMDG), Air (ICAO/IATA)
UN number: UN3082
Shipping name: environmentally hazardous substance inorganic N.O.S. (Polyaluminum Chloride)
Hazard class: 9
Packing group: III
Environmental hazards: Not a marine pollutant
Special precautions: None known

SECTION 15. REGULATORY INFORMATION

RCRA Hazardous waste: Not Listed. Consult engineers if necessary.
CERCLA Hazardous substance: Not listed CWA, Sec.311 (b) (4)
CERCLA Reportable Quantity (RQ): NA
SARA 311/312 Categories:
Acute (immediate) health effects: Yes
Chronic (delayed) health effects: No
Sudden release of pressure hazard: No
Reactivity hazard: No
SARA 313 Toxic Chemical listing: Not listed
SARA Extremely hazardous substance (EHS): Not listed
OSHA Air (29CFR 1910.10000, table Z-1, Z-1A): Not listed
OSHA Special Regulated Substance (29CFR 1910): Not listed
California prop 65 chemical: No
WHMIS: E corrosive
United States TSCA Section Inventory Status: Product exempt or listed on the TSCA Inventory.
Canada CEPA / Canadian Domestic Substances List (DSL):
All components of this product are included on the Domestic Substance List (DSL) or are not required to be listed (Canada ref. CAS# 1327-41-9).
State - Province regulations: State and Province specific regulations have not been determined by the Holland Company. Consult engineers if necessary.
Inventories: Chinese, Korean (ECL), Philippines (PICCS), Japanese (ENCS), European (EINECS), NZ.

SECTION 16. OTHER INFORMATION

NSF/ANSI 60 Drinking Water Treatment Chemicals:
Maximum use 325mg/L

Preparatory statement:
The information in this Safety Data Sheet (SDS) is correct to the best of our knowledge, information we have available, and belief as of the publication date. The information is designed solely as guidance for handling, storage, transportation, release, and disposal and is not to be considered a warranty or quality specification.

Date Sources for the SDS:
Literature, databases, practice, experience, publications, own tests, regulations

Revision:
June 2015 replaces all earlier
SDS ID: PCH180182906080015

Holland Company, Inc.
153 Howland Avenue
Adams, Massachusetts 01220
U.S.A.
800-639-9602

Canada Colors and Chemicals Limited

152 Kennedy Road South
Brampton, Ontario
Canada
L6W 3G4

General Inquiry Number: (905) 459-1232

Material Safety Data Sheet Attached

SAFETY DATA SHEET

This product is distributed by
Canada Colors and Chemicals Limited
General Inquiry: (905) 459-1232
24 Hour Emergency: (416) 444-2112
CCC: Product Code: 191955
CCC: Product Name: CARUS 8500

1. Identification

Product identifier **CARUS™ 8500 Water Treatment Chemical**

Other means of identification

SDS number -

Recommended use CARUS™ 8500 water treatment chemical is an effective corrosion inhibitor and sequesterant for use in potable and industrial water systems.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company name CARUS CORPORATION
Address 315 Fifth Street,
Peru, IL 61354, USA
Telephone 815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
E-mail salesmkt@caruscorporation.com
Website www.caruscorporation.com
Contact person Dr. Chithambarathanu Pillai
Emergency Telephone For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at
CHEMTREC®, USA: 001 (800) 424-9300
CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531
CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The mixture does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Mixtures

Composition comments The components are not hazardous or are below required disclosure limits.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.
Fire-fighting equipment/instructions	Move containers from fire area if you can do so without risk.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills in original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling	Avoid inhalation and contact with skin and eyes. Wear appropriate personal protective equipment (See Section 8). Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	General ventilation normally adequate.
Individual protection measures, such as personal protective equipment	
Eye/face protection	If contact is likely, safety glasses with side shields are recommended.
Skin protection	
Hand protection	For prolonged or repeated skin contact use suitable protective gloves.
Other	Wear suitable protective clothing.
Respiratory protection	In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	Colorless solution.
Physical state	Liquid.

Form	Liquid.
Color	Colorless.
Odor	None.
Odor threshold	Not available.
pH	5.7±0.5
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	1.38±0.03 at 25°C
Solubility(ies)	
Solubility (water)	Completely soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization will not occur.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Strong acids. Strong bases.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	May cause discomfort if swallowed.
Inhalation	In high concentrations, vapors may be irritating to the respiratory system.
Skin contact	Prolonged or repeated skin contact may cause irritation.
Eye contact	May cause eye irritation on direct contact.
Symptoms related to the physical, chemical and toxicological characteristics	Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity	May cause discomfort if swallowed.
Skin corrosion/irritation	Prolonged contact may cause dryness of the skin.
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization No data available.

Skin sensitization Not a skin sensitizer.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

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

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity No data available.

Specific target organ toxicity - single exposure No data available.

Specific target organ toxicity - repeated exposure No data available.

Aspiration hazard Not classified.

12. Ecological information

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

Persistence and degradability The product is not expected to be readily biodegradable.

Bioaccumulative potential No data available for this product.

Mobility in soil Not available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

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

Local disposal regulations Dispose in accordance with all applicable regulations.

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

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

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

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

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

Not listed.

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

Not listed.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

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

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

Issue date 24-July-2014

Revision date -

Version # 01

HMIS® ratings

Health: 0
Flammability: 0
Physical hazard: 0

NFPA ratings

References

HSDB® - Hazardous Substances Data Bank

Disclaimer

The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CORPORATION DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CORPORATION MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

SAFETY DATA SHEET

1. Identification

Product identifier **Sodium Hypochlorite 12.5%**

Other means of identification

SDS number 320222-05

Product registration number EPA 148-1288

Recommended use Bleaching agent; detergent; cleaning agent.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company name Harcros Chemicals Inc

Address 5200 Speaker Rd.
Kansas City, KS 66106
United States

Main Telephone Number 1-913-321-3131

Website www.harcros.com

E-mail custserv@harcros.com

Emergency #: CHEMTREC 1-800-424-9300

Emergency #: CHEMTREC 1-703-527-3887 (call collect)

2. Hazard(s) identification

Physical hazards	Oxidizing liquids	Category 2
	Corrosive to metals	Category 1
Health hazards	Skin corrosion/irritation	Category 1A
	Serious eye damage/eye irritation	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement May intensify fire; oxidizer. May be corrosive to metals. Causes severe skin burns and eye damage. Causes severe skin burns and eye damage. Causes serious eye damage. Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Keep only in original container. Do not breathe mist or vapor. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Wash contaminated clothing before reuse. In case of fire: Use appropriate media to extinguish. Absorb spillage to prevent material damage.
Storage	Store away from incompatible materials. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in accordance with local/regional/national/international regulations.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	9.9% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment. 1% of the mixture consists of component(s) of unknown acute oral toxicity. 12.5% of the mixture consists of component(s) of unknown acute inhalation toxicity. 9.9% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 22.4% of the mixture consists of component(s) of unknown acute dermal toxicity.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Sodium Hypochlorite		7681-52-9	11.9 - < 15.6
Sodium Hydroxide		1310-73-2	0.1 - < 2
Other components below reportable levels			86.5

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

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Foam. Powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. In case of fire: Stop leak if safe to do so. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	May intensify fire; oxidizer. Contact with combustible material may cause fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Use water spray to reduce vapors or divert vapor cloud drift. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate the contaminated area. Wear appropriate protective equipment and clothing during clean-up. This product is miscible in water. This material is classified as a water pollutant under the Clean Water Act and should be prevented from contaminating soil or from entering sewage and drainage systems which lead to waterways. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb spillage to prevent material damage. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Keep away from heat. Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Keep away from heat. Store in a cool, dry place out of direct sunlight. Store in corrosive resistant container with a resistant inner liner. Keep only in the original container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

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

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	PEL	2 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Sodium Hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

US. AIHA Workplace Environmental Exposure Level (WEEL) Guides

Components	Type	Value
Sodium Hypochlorite (CAS 7681-52-9)	STEL	2 mg/m3

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

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

Individual protection measures, such as personal protective equipment

Eye/face protection Wear chemical goggles and face shield. Do not get in eyes. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Other Wear appropriate chemical resistant clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance Clear.

Physical state Liquid.

Form Liquid.

Color Clear to pale yellow.

Odor Chlorine.

Odor threshold Not available.

pH Not available.

Melting point/freezing point -4 - 3 °F (-20 - -16.11 °C)

Initial boiling point and boiling range > 230 °F (> 110 °C)

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not available.

Flammability limit - upper (%) Not available.

Explosive limit - lower (%) Not available.

Explosive limit - upper (%)	Not available.
Vapor pressure	12 mm Hg @20°C
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Explosive properties	Not explosive.
Oxidizing properties	May intensify fire; oxidizer.
pH in aqueous solution	12 - 14 (1% in DI Water)
Specific gravity	1.209 @20°C

10. Stability and reactivity

Reactivity	Greatly increases the burning rate of combustible materials. Reacts violently with strong acids. This product may react with oxidizing agents. May be corrosive to metals.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Reacts violently with strong acids. This product may react with oxidizing agents. Hazardous polymerization does not occur.
Conditions to avoid	Heat. Contact with incompatible materials. Do not mix with other chemicals.
Incompatible materials	Strong acids. Acids. Strong oxidizing agents. Oxidizing agents. Combustible material. Reducing agents. Metals. Bases, alkalis (organic).
Hazardous decomposition products	Chlorine. Hydrogen chloride.

11. Toxicological information

Information on likely routes of exposure

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

Information on toxicological effects

Acute toxicity Not known.

Components	Species	Test Results
Sodium Hypochlorite (CAS 7681-52-9)		
Acute		
Oral		
LD50	Rat	8.91 g/kg

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

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

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

IARC Monographs. Overall Evaluation of Carcinogenicity

Sodium Hypochlorite (CAS 7681-52-9) 3 Not classifiable as to carcinogenicity to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Very toxic to aquatic life with long lasting effects.

Product		Species	Test Results
Sodium Hypochlorite 12.5%			
	EC50		40 mg/l, 96 hours Nittocra Spinipes Fasciatus
			4 mg/l, 96 hours Gammarus Fasciatus
Aquatic			
Crustacea	EC50	Daphnia	2519.1724 mg/l, 48 hours estimated
			0.07 - 0.7 mg/l, 24 hours magnia
			0.006 mg/l, 24 hours Ceriodaphina sp.
Fish	LC50	Fish	12.5131 mg/l, 96 hours estimated

Components		Species	Test Results
Sodium Hydroxide (CAS 1310-73-2)			
Aquatic			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	34.59 - 47.13 mg/l, 48 hours
Fish	LC50	Western mosquitofish (Gambusia affinis)	125 mg/l, 96 hours
Sodium Hypochlorite (CAS 7681-52-9)			
Aquatic			
Fish	LC50	Chinook salmon (Oncorhynchus tshawytscha)	0.038 - 0.065 mg/l, 96 hours

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

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	D002: Waste Corrosive material [pH <=2 or =>12.5, or corrosive to steel] The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN1791
UN proper shipping name	Hypochlorite solutions, MARINE POLLUTANT
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	III
Environmental hazards	
Marine pollutant	Yes
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB3, N34, T4, TP2, TP24
Packaging exceptions	154
Packaging non bulk	203
Packaging bulk	241

Reportable Quantity for Sodium Hypochlorite = 500 lbs.

Not a Marine Pollutant by DOT in containers of 119 gallons or less.

IATA

UN number	UN1791
UN proper shipping name	Hypochlorite solution
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	III
Environmental hazards	Yes
ERG Code	8L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Allowed with restrictions.
Cargo aircraft only	Allowed with restrictions.

IMDG

UN number	UN1791
UN proper shipping name	Hypochlorite solution, MARINE POLLUTANT

Transport hazard class(es)

Class	8
Subsidiary risk	-
Label(s)	8
Packing group	III
Environmental hazards	
Marine pollutant	Yes
EmS	Not available.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

DOT

IATA; IMDG

Marine pollutant

General information IMDG Regulated Marine Pollutant.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium Hydroxide (CAS 1310-73-2)	Listed.
Sodium Hypochlorite (CAS 7681-52-9)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

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

Not regulated.

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Sodium Hydroxide (CAS 1310-73-2)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

Issue date 05-05-2014

Revision date 11-28-2016

Version # 10

HMIS® ratings Health: 3
Flammability: 0
Physical hazard: 0

NFPA ratings	Health: 3 Flammability: 0 Instability: 1 Special hazards: OX
Disclaimer	Harcros Chemicals Inc cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information provided in this Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc., provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration, and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc., knows of no medical condition, other than those noted on this Safety Data Sheet, which are generally recognized as being aggravated by exposure to this product.
Revision information	Physical & Chemical Properties: Multiple Properties Physical and chemical properties: Appearance

Material Safety Data Sheet

LA9221
SODIUM FLUORIDE POWDER DRY CRYSTAL

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Id: LA9221
Product Name: SODIUM FLUORIDE POWDER DRY CRYSTAL
Synonyms: None.
Chemical Family: None Known.
Application: Welding and fluxing agents, metallurgy, glass industry, dental application, water fluordation.

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

Prepared By: The Safety, Health and Environment Department of Univar Canada Ltd.
Preparation date of MSDS: 11 June 2007
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:
Sodium Fluoride 7681-49-4.	60-100	Dermal LD50 (Rat) 175 mg/kg Oral LD50 (Rat) 52 mg/kg
Sodium Fluorosilicate 16893-85-9.	1-5	Oral LD50 (Rat) 125 mg/kg
Water 7732-18-5.	0.1-1	Oral LD50 (Rat) >90 mL/kg

Note: No additional remark.

3. HAZARDS IDENTIFICATION

Potential Acute Health Effects:
Eye Contact: Severe eye irritation, watering and redness. Risk of temporary eye lesions.
Skin Contact: Skin contact may cause irritation or burns.
Inhalation: Causes irritation of the mouth, nose and throat. May cause coughing. At high concentrations risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia. In case of repeated or prolonged exposure: risk of sore throat, nose bleeds, chronic bronchitis.

3. HAZARDS IDENTIFICATION

Ingestion: Severe irritation of the mouth, throat and stomach. May cause excess salivation and thirst. Causes vomiting, nausea, and diarrhea. May cause life threatening hypocalcemia. May cause cardiac irregularities. May cause convulsions, shock, organ failure, coma and/or death. May cause cardiopulmonary arrest. Risk of general symptoms having a severe prognosis.

4. FIRST AID MEASURES

Eye Contact: Obtain medical attention without delay, preferably from an ophthalmologist. Flush eyes with running water for 5 minutes, while keeping the eyelids wide open. Rinse the eyes with a calcium gluconate 1% solution in saline solution (10 ml of calcium gluconate 10% in 90 ml of saline solution) for 10 minutes. If 1% calcium gluconate is not available continue flushing with water. In the case of difficulty opening the lids, administer an analgesiceye wash. Do not use oily drops, ointment or HF skin burn treatments. Consult an ophthalmologist or eye specialist and physician immediately in all cases. Take to hospital immediately.
Skin Contact: Remove contaminated clothing and shoes while washing. Immediately wash with plenty of soap and water for at least 5 minutes. Immediately apply calcium gluconate gel (2.5%) and massage into the affected area using rubber gloves; continue to massage while repeatedly applying gel until 15 minutes after pain is relieved. If fingers/finger nails are touched, even if there is no pain, dip them in a bath of 5% calcium gluconate for 15 to 20 minutes. Thoroughly clean contaminated clothing and shoes before reuse or discard. Consult a physician in cases of persistent pain or redness.
Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.
Ingestion: If conscious rinse mouth with fresh water, give a 1% aqueous calcium gluconate solution to drink, if subject presents nervouse, respiratory or cardiovascular disorders administer oxygen and administer classical resuscitation measures. 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.

5. FIRE FIGHTING MEASURES

Flash Point: None.
Flash Point Method: Not applicable.
Autoignition Temperature: Not Available.
Flammable Limits in Air (%): Not Available.
Extinguishing Media: Use DRY chemicals, CO2, alcohol foam or water spray.
Special Exposure Hazards: Not Available.
Hazardous Decomposition/Combustion Materials (under fire conditions): Formation of dangerous gas/vapors in case of decomposition.
Special Protective Equipment: Fire fighters should wear full protective clothing, including self-contained breathing equipment.
NFPA RATINGS FOR THIS PRODUCT ARE: HEALTH 3, FLAMMABILITY 0, INSTABILITY 0
HMIS RATINGS FOR THIS PRODUCT ARE: HEALTH 3, FLAMMABILITY 0, REACTIVITY 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures: Avoid dispersing the dust into a cloud. Wear appropriate protective equipment.
Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Consult local authorities.
Procedure for Clean Up: Collect the product with suitable means avoiding dust formation. Place everything into a closed, labelled container compatible with the product. Clean the area with large quantities of water.

7. HANDLING AND STORAGE

Handling: For industrial use only. Handle and open containers with care. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid inhalation of chemical. Empty containers may contain hazardous product residues. Keep the containers closed when not in use. Protect against physical damage. Use appropriate personnel protective equipment.
Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Place away from incompatible materials. Store in accordance with good industrial practices.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

Localized ventilation should be used to control dust levels.
Respiratory Protection: Self-contained breathing apparatus in medium confinement/insufficient oxygen/ in case of large uncontrolled emissions/ in all circumstances when the mask and cartridge do not give adequate protection. Use only respirator that conforms to international/national standards. Use only NIOSH approved respirators. Comply with OSHA respiratory protection requirements.
Gloves:

Appropriate chemical resistant gloves should be worn.
Skin Protection: Overalls. Apron/boots of PVC, neoprene, rubber in case of dust.
Eyes: Dust proof goggles.
Other Personal Protection Data: It is recommended that a shower be taken after completion of workshift especially if significant contact has occurred. Work clothing should than be laundered prior to use. Street clothing should be stored separately from work clothing and protective equipment. Work clothing and shoes should not be taken home. Consult industrial hygienist or the safety manager for the slection of personal protective equipment suitable for the working conditions. Maintain adequate supply of antidote gel, calcium gluconate.

Ingredients	Exposure Limit - ACGIH	Exposure Limit - OSHA	Immediately Dangerous to Life or Health - IDLH
Sodium Fluoride .	2.5 mg/m^3 TLV-TWA	Not available.	250 mg/m^3
Sodium Fluorosilicate .	2.5 mg/m^3 TLV-TWA	Not available.	Not Available.
Water .	Not available.	Not available.	Not Available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Crystalline Powder
Colour: White.
Odour: Odourless
pH 9.2 at 20°C (68°F) 1% solution
Specific Gravity: 2.5-2.6
Boiling Point: 1695 °C / 3083 °F
Freezing/Melting Point: 995 °C / 1823 °F
Vapour Pressure: 1.33hPa
Vapour Density: Not Available.
% Volatile by Volume: Not Available.
Evaporation Rate: Not Available.
Solubility: 42g/1000ml water @ 20°C
VOCs: Not Available.
Viscosity: Not Available.
Molecular Weight: Not Available.
Other: Not Available.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under recommended storage conditions.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Moisture.
Materials to Avoid: Strong acids. Glass.
Hazardous Decomposition Products: Hydrogen fluoride.
Additional Information:

No additional remark.

11. TOXICOLOGICAL INFORMATION

Principle Routes of Exposure

Ingestion: Severe irritation of the mouth, throat and stomach. May cause excess salivation and thirst. Causes vomiting, nausea, and diarrhea. May cause life threatening hypocalcemia. May cause cardiac irregularities. May cause convulsions, shock, organ failure, coma and/or death. May cause cardiopulmonary arrest. Risk of general symptoms having a severe prognosis.

11. TOXICOLOGICAL INFORMATION

Skin Contact: Skin contact may cause irritation or burns.
Inhalation: Causes irritation of the mouth, nose and throat. May cause coughing. At high concentrations risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia. In case of repeated or prolonged exposure: risk of sore throat, nose bleeds, chronic bronchitis.
Eye Contact: Severe eye irritation, watering and redness. Risk of temporary eye lesions.

Additional Information: Target organ: skeleton / thyroid / testes / kidney, liver, ca. 1mg/kg, observed effect. Ambiguous carcinogenic effect. Ambiguous mutagenic effect. Chronic exposure may entail dental or skeletal fluorosis. The carcinogenic effect found in animals is not demonstrated in humans. Risk of toxic effect on reproduction.

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
Sodium Fluoride .	Group 3	Listed
Sodium Fluorosilicate .	Group 3	Listed
Water .	Not listed.	Not listed.

Carcinogenicity Comment: No additional information available.

Reproductive Toxicity/ Teratogenicity/ Embryotoxicity/ Mutagenicity: May cause birth defects and impair fertility based on data from animal studies. Laboratory experiments have shown mutagenic effects.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Sodium Fluoride .	LC50 (Lepomis macrochirus) 530 mg/L	Not Available.	EC50 (Selenastrum capricornutum) 272 mg/L
Sodium Fluorosilicate .	LC50 (Poecilia reticulata) 65 mg/L	Not Available.	Not Available.
Water .	Not Available.	Not Available.	Not Available.

Other Information: Fishes, Salmo gairdneri, LC 50, 96 h, 112 mg/l, Crustaceans, Daphnia magna EC 50, 48 h, 213 mg/l conditions: fresh water, Crustaceans, Mysidopsis bahia, EC 50, 96, 23 mg/l conditions: salt water, Algae, Scenedesmus sp., EC 50/ 96 h, 95 mg/l

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: SODIUM FLUORIDE
DOT Hazardous Class 6.1
DOT UN Number: UN1690
DOT Packing Group: III
DOT Reportable Quantity (lbs): Not Available.
Note: No additional remark.

14. TRANSPORT INFORMATION

Marine Pollutant: No.

TDG (Canada):
TDG Proper Shipping Name: SODIUM FLUORIDE
Hazard Class: 6.1
UN Number: UN1690
Packing Group: III
Note: No additional remark.
Marine Pollutant: No.

15. 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:
Sodium Fluoride .	Not Listed.	Listed	Not Listed.
Sodium Fluorosilicate .	Not Listed.	Not Listed.	Not Listed.
Water .	Not Listed.	Not Listed.	Not Listed.

California Proposition 65: Not Listed.
MA Right to Know List: Listed.
New Jersey Right-to-Know List: Listed.
Pennsylvania Right to Know List: Listed.

WHMIS Hazardous Class:
D1B TOXIC MATERIALS
D2A VERY TOXIC MATERIALS
D2B TOXIC MATERIALS

16. OTHER 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.

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

ATTACHMENT K: ESA ELIGIBILITY DETERMINATION

Attachment K: Endangered Species Act Eligibility Determination
University of New Hampshire Water Treatment Plant

A review of the action area of the discharge was conducted to identify federally listed endangered and threatened species and critical habitats. The review, done utilizing the Fish and Wildlife Services' (FWS) Information, Planning, and Conservation (IPaC) online system, identified two threatened species and no critical habitats. The two threatened species are: northern long-eared bat (mammal) and the small whorled pogonia (flowering plant). A copy of the IPaC generated preliminary determination is provided below. In our assessment of our proposed discharge, it was determined the activity would have no effect on the listed species. This determination was reached with the understanding that the activity involves discharging treated drinking water into the Oyster River, and neither of the species' habitat would extend into a marine environment. It was therefore determined that the activity would have no effect on these species, and the proposed discharge would fall under FWS Criterion C of the Endangered Species Act eligibility determination.

Endangered species

Listed species and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

Additional information on endangered species data is provided below.

The following species are potentially affected by activities in this location:

THUMBNAILS LIST

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis	Threatened

Flowering Plants

NAME	STATUS
Small Whorled Pogonia Isotria medeoloides	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

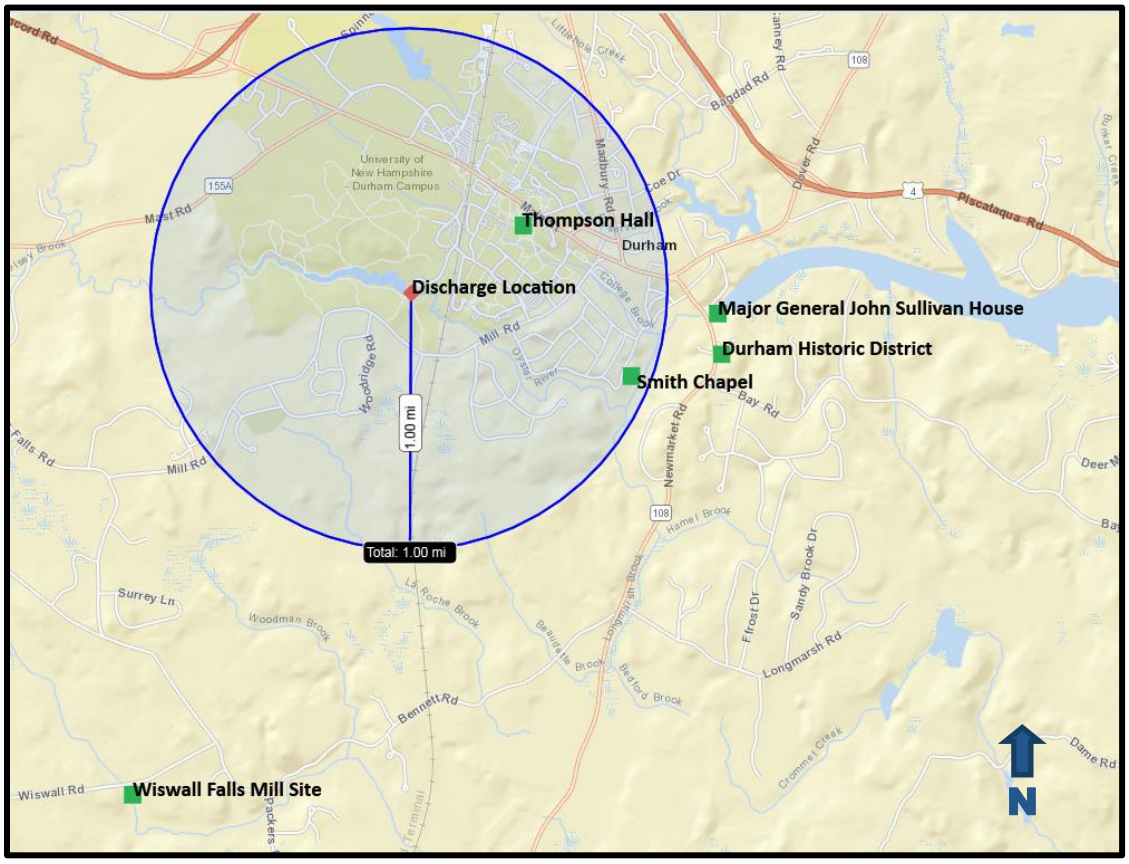
THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

ATTACHMENT L: NHPA ELEGIBILITY DETERMINATION

Attachment L: National Historic Preservation Act Eligibility Determination
University of New Hampshire Water Treatment Plant

A list of locations on the National Register of Historic Places was downloaded from the National Archives (NARA) on Feburary 20, 2019. Five locations were identified in the Town of Durham, NH. None of the locations were in the immediate vicinity of the discharge location. Two locations are within one-mile of the discharge location: Thompson Hall and Smith Chapel. Since the proposed activity does not involve any construction, and this is a one-time discharge of treated drinking water, the discharge does not have the potential to affect any place considered eligible to be listed on the National Registrar of Historic Places.

The proposed discharge meets the requirements under Criterion A: No historic properties are present. The discharge and discharge related activites do not have the potential to affect historic properties.



ATTACHMENT M: NOTIFICATION OF DISCHARGE TO OYSTER RIVER – LETTER TO THE TOWN OF DURHAM, NH

COMMITMENT & INTEGRITY
DRIVE RESULTS

40 Shattuck Road | Suite 110
Andover, Massachusetts 01810
www.woodardcurran.com

T 866.702.6371
T 978.557.8150
F 978.557.7948

Via Electronic Mail and US Mail

May 7, 2019

April Talon
City of Durham
8 Newmarket Rd
Durham, NH 03824

Re: New University of New Hampshire Water Treatment Plant
Notification of Discharge to Oyster River

To Ms. Talon:

I am writing to notify you of the request for a Remediation General Permit for the start-up of the new drinking water treatment plant for the University of New Hampshire (UNH), in Durham, New Hampshire. The proposed discharge activity will consist of taking source water from the Oyster River, treating the water to potable drinking water standards, and returning the water to the Oyster River downstream of the Oyster River Dam in a portion of the river designated Class B during the startup phases of the facility, prior to NHDES approval for sending water to the distribution system.

The discharges will occur periodically between May 2019 and August 2019. The potable water will be sent to a catch basin with a direct outlet, designed with erosion prevention, into the Oyster River located approximately 175-200 feet downstream of the dam.

Please contact Rachel Gilbert at 978-482-7902 with questions regarding this planned potable water discharge.

Sincerely,

WOODARD & CURRAN

Rachel Gilbert, P.E.
Project Manager

cc: Mark Geuther, University of New Hampshire

PN: 0230340.01