

Relocation of the RIDOT Stormwater Drainage Discharge DRAFT Remedial Action Work Plan

Centredale Manor Restoration Project Superfund Site North Providence, Rhode Island

June 2019

Prepared for

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Towson, MD 21286

and

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An Employee-Owned Company

Comm. No. 07MD8.13

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ACRONYMS

CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CMRP	Centredale Manor Restoration Project
CQA/QCP	Construction Quality Control Plan
ERP	Emergency Response Plan
HASP	Health and Safety Plan
IQAT	Independent Quality Assurance Team
O&M	Operations and Maintenance
PDI	Pre-Design Investigation
RA	Remedial Action
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RIDEM	Rhode Island Department of Environmental Management
RIDOT	Rhode Island Department of Transportation
ROD	Record of Decision
SD	Settling Defendants
SOW	Statement of Work

1. INTRODUCTION

This Remedial Action Work Plan (RAWP) has been prepared by Loureiro Engineering Associates, Inc. (Loureiro) on behalf of Emhart Industries, Inc. and Black & Decker, Inc. (collectively, “Settling Defendants” or “SD’s”) for the Centredale Manor Restoration Project (CMRP) Superfund Site (Site) located in North Providence, Rhode Island. This RAWP has been prepared in accordance with the Statement of Work (SOW) provided as Appendix A and describes all of the activities necessary to meet the requirements and objectives of relocating the Rhode Island Department of Transportation (RIDOT) drainage system from discharging to the tailrace, directly to the Woonasquatucket River (the River).

1.1 Background and Site Description

On July 9, 2018, the United States lodged a Consent Decree (CD) with the United States District Court for the District of Rhode Island (the Court). The Court entered the CD on April 8, 2019. The CD and its accompanying SOW describe the Remedial Design/Remedial Action (RD/RA) activities to be performed for the Site. The RD/RA activities are to be undertaken by the SDs.

The Site consists of the Source Area, the adjacent and downgradient River, two ponds, and a large predominantly wetland area referred to as “the Oxbow”. The Record of Decision (ROD) identifies a Resource Conservation and Recovery Act (RCRA) Subtitle C cap as the Selected Remedy for the Source Area (including the tailrace).

The Source Area is bordered by US Route 44 (Smith Street) to the north, the Woonasquatucket River to the west, Allendale Pond to the south, and both commercial and residential properties to the east of the tailrace. The Source Area is occupied by the Centredale Manor and Brook Village apartments which are home to approximately 335 elderly residents with varied levels of assisted living needs.

1.2 Purpose and Scope

The RCRA Subtitle C cap selected for the Source Area remedy extends to the eastern limit of the tailrace. The tailrace area, located along the eastern perimeter of the Source Area, is a low-lying area with a very flat slope which runs from the RIDOT drainage outlet at the north end, south to Allendale Pond. Previous studies have shown that the tailrace receives some amount of groundwater discharge throughout its length. During dry weather, the water in the tailrace is very slow moving and at times, stagnant. As such it is a breeding ground for nuisance insects which interfere with the resident’s enjoyment of the property.

By relocating the existing RIDOT drainage discharge from the tailrace, the RCRA C cap in the tailrace could be constructed above the water table by raising the surface elevation. This cap would be more effective than a cap installed to maintain the existing drainage over the top of it. RCRA C caps are typically designed to shed water. If the RIDOT drainage discharge is not relocated, the RCRA C cap would have to be submerged to accommodate storm flow from this discharge. Installing the RCRA C cap above the existing grade would also minimize the presence of nuisance insects thereby improving the resident's enjoyment of the property. Specifications on the proposed RIDOT drainage relocation and associated construction activities are included in the Remedial Design (RD) Report.

1.3 Roles and Responsibilities

A description of the responsibility and authority of all organizations involved with the design and construction of the proposed drainage system is provided in this section along with a table including contact information for the members of the SD's RA project team.

- J Emhart Industries, Inc. and Black & Decker, Inc. are the SDs and are ultimately responsible for the development of the RD and performance of the RA.
- J The United States Environmental Protection Agency (EPA) is the Regulatory Approval Authority that has final approval regarding all decisions.
- J The Rhode Island Department of Environmental Management (RIDEM) will have the opportunity to review and comment on the proposed RIDOT drainage relocation design.
- J RIDOT is the Owner of the drainage system and is responsible for all operations and maintenance (O&M) activities associated with the existing and proposed drainage system.
- J Loureiro is the Engineer responsible for the design of the relocation of the RIDOT drainage system outlined in the RD Report. This includes developing the design of the proposed drainage system, preparing the RD Report, monitoring the work, and documenting the completion of work. Loureiro is also responsible for the implementation of all the construction activities associated with the relocation of the RIDOT drainage system.
- J The Health and Safety personnel and responsibilities are identified in the Health and Safety Plan (HASP). The site-specific health and safety personnel include the Health and

Safety Manager and the Health and Safety Officer. The responsibilities of the Site workers are also identified in the HASP.

- J) GeoTesting Express, Inc. will be responsible for assuring that the construction activities are consistent with the engineered design procedures outlined in the RD report. GeoTesting Express, Inc. will monitor on-site during construction activities, conduct inspections and tests, verify certification of materials, and review as-built conditions, surveys, and documentation. A more in-depth list of all services provided by GeoTesting Express, Inc. is provided in the RD Report.

Organization	Role	Contact Information
United States Environmental Protection Agency (EPA) Region 1, Mail Code OSRR07-1 5 Post Square, Suite 100 Boston, MA 02109-3912	Regulatory Approval Authority	EPA Project Coordinator/Remedial Project Manager Anna Krasko (617) 918-1232 krasko.anna@epa.gov
Rhode Island Department of Environmental Management (RIDEM) 235 Promenade Street Providence, RI 02908	Reviewer	RIDEM Project Coordinator Gary Jablonski (401) 222-2797 Ext. 7148 gary.jablonski@dem.ri.gov
Rhode Island Department of Transportation Two Capitol Hill Providence, RI 02903	Owner of drainage system	Administrator of Stormwater Management Brian Moore, P.E. (401) 734-4829 brian.moore@dot.ri.gov
Loureiro Engineering Associates, Inc. 100 Northwest Drive Plainville, CT 06062	Engineer	Loureiro Project Coordinator Jeff Loureiro, P.E., L.E.P. (860) 410-2915 jjloureiro@loureiro.com
		Loureiro Project Manager David Payne, P.E. (860) 410-3007 (203) 947-9855 dwpayne@loureiro.com
	Health and Safety Personnel	Health and Safety Manager Jordan Coleman, C.S.P. (860) 410-3035 (203) 430-9016 jlcoleman@loureiro.com
		Health and Safety Officer Seth Travis (860) 410-2978 (203) 494-3985 sdtravis@loureiro.com
GeoTesting Express, Inc. 125 Nagog Park Acton, MA 01720	Independent Quality Assurance Team (IQAT)	Laboratory and Field Technician Christopher Donahue (978) 635-0424

1.4 Remedial Action Work Plan Format

This RAWP identifies the administrative and site management controls that will be established to facilitate the implementation of the relocation of the RIDOT drainage system. Also, this RAWP identifies the reporting requirements for the relocation of the RIDOT drainage system.

The RAWP is presented as follows:

- J A description of the implementation of the proposed RIDOT drainage system and schedule of construction activities is provided in Section 2.
- J The Construction Quality Assurance/Quality Control Plan (CQA/QCP) is presented in Section 3.
- J The Health and Safety Plan (HASP) is presented in Section 4.
- J A description of the plans for satisfying permitting requirements, including obtaining permits for off-site activity, if applicable, and for satisfying substantive requirements of permits for on-site activity, is presented in Section 5.
- J The O&M measures associated with the proposed drainage system are discussed in Section 6.

2. CONSTRUCTION IMPLEMENTATION AND SCHEDULE

2.1 Schedule

A detailed draft construction schedule, including completion dates for interim activities, is provided in Appendix B.

2.2 Meetings and Inspections

Meeting and inspection components are specified in Section 4.3 of the SOW and are summarized below.

- J **Preconstruction Conference** - SDs shall hold conferences with EPA, the State, and others, prior to performance of the Remedial Action (RA). SDs shall prepare minutes of these conferences and shall distribute the minutes to all Parties.
- J **Periodic Meetings** - During the construction portion of the RA, SDs shall meet at least monthly with EPA, the State, and others as directed or determined by EPA, to discuss progress and construction issues. SDs shall distribute an agenda and list of attendees to all Parties prior to each meeting. SDs shall prepare minutes of the meetings and shall distribute the minutes to all Parties.
- J **Inspections**

- EPA may conduct periodic inspections of or have an on-site presence during various phases of the Work. At EPA's request, the Supervising Contractor or other designee shall accompany EPA during inspections.
- SDs shall provide on-site office space for EPA personnel to perform their oversight duties.
- Upon notification by EPA of any deficiencies in the RA, SDs shall take all necessary steps to correct the deficiencies and/or bring the RA into compliance with any applicable document, including, the approved Final RD, any approved design changes, and/or the approved RAWP. If applicable, SDs shall comply with any schedule provided by EPA in its notice of deficiency.

3. CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PLAN

A CQA/QCP has been prepared and is presented in the RD Report.

4. HEALTH AND SAFETY PLAN

As required by the SOW, a Site-Specific HASP has been prepared for the on-site activities to be implemented in constructing the proposed drainage system and is included as Appendix C.

In addition, an Emergency Response Plan (ERP) and Spill Control Plan are included in the HASP. The ERP is designed to protect personnel, property, and the environment from hazardous releases as well as from accidents that occur during the implementation of the construction activities for the proposed drainage system. The ERP is also designed to protect the public health or welfare per Section 4.4(a) of the SOW. The plan describes the emergency response system and the procedures to respond to releases and emergencies. This plan also describes the countermeasures to minimize any adverse impact to the environment, and to reduce injuries from hazardous conditions resulting from accidents. The procedures outlined in this plan are to be carried out immediately whenever there is a fire, explosion, spill, or release of hazardous constituents that could threaten human health or the environment. This ERP applies to all spills, releases, fires, explosions, or other hazardous conditions regardless of size.

5. COMPLIANCE WITH PERMIT REQUIREMENTS

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) provides that no Federal, State, or local permit is required for the proposed RA but requires that substantive requirements that would be contained in a permit must be satisfied. The proposed

RIDOT drainage relocation is in substantive compliance with any permits that would otherwise apply.

6. OPERATIONS AND MAINTENANCE PLAN

The proposed drainage system will be operated and maintained by the owner, RIDOT. An O&M manual associated with the proposed hydrodynamic separator is included as Appendix D.

APPENDIX A

Statement of Work

APPENDIX B

REMEDIAL DESIGN/REMEDIAL ACTION

STATEMENT OF WORK

CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE

Town of North Providence, Providence County, State of Rhode Island

EPA Region 1

June 2018

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1. INTRODUCTION

1.1 Purpose of the SOW. This Statement of Work (SOW) sets forth the procedures and requirements for implementing the Work.

1.2 Structure of the SOW.

- Section 2 (Community Involvement) sets forth EPA's and Settling Defendants' (SDs') responsibilities for community involvement.
- Section 3 (Remedial Design) sets forth the process for developing the RD, which includes the submission of specified primary deliverables.
- Section 4 (Remedial Action) sets forth requirements regarding the completion of the RA, including primary deliverables related to completion of the RA.
- Section 5 (Reporting) sets forth SDs' reporting obligations.
- Section 6 (Deliverables) describes the content of the supporting deliverables and the general requirements regarding SDs' submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- Section 7 (Schedules) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the RA.
- Section 8 (State Participation) addresses State participation.
- Section 9 (References) provides a list of references, including URLs.

1.3 The Scope of the Remedy includes the actions described in Section L of the ROD, including, but not limited to, (i) conversion of existing surfaces in the Source Area (soil caps, parking lots, paved areas, tailrace, and landscape areas) into a Resource Conservation and Recovery Act (RCRA) C cap; (ii) excavation of the majority of contaminated Woonasquatucket River sediment and floodplain soil in the Allendale and Lyman Mill reaches of the River and placement into an upland confined disposal facility (CDF) with off-site treatment and/or disposal of dewatered sediment and floodplain soil that exceeds the Land Disposal Restrictions' (LDRs') alternative treatment standards; (iii) placement of a thin layer cover over remaining contaminated sediment in the River and remaining contamination in the Oxbow wetland; (iv) placement, monitoring and enforcement of institutional controls (ICs) to prevent exposure and preserve the integrity of components of the remedy; (v) long-term monitoring, including surface water and groundwater monitoring and monitoring downstream of Lyman Mill Dam, and maintenance to protect the integrity of the RCRA C cap, upland CDF, Allendale and

Lyman Mill dams and thin-layer wetland cover; and (vi) mitigation of wetlands and floodplains. This SOW does not include precautionary interim measures on residential properties as described in the ROD, which were completed by RIDEM and EPA in 2013/2014. Also, this SOW does not include pre-design data collection and analysis in Cap Area #1 of the Source Area which was performed in 2013 by a group of Potentially Responsible Parties under an Administrative Order on Consent.

- 1.4 Since issuing the ROD, EPA has endorsed the State of Rhode Island's Core Comprehensive State Ground Water Protection Program (CSGWPP).
- 1.5 The terms used in this SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the CD, have the meanings assigned to them in CERCLA, in such regulations, or in the CD, except that the term "Paragraph" or "¶" means a paragraph of the SOW, unless otherwise stated. In addition, "Action Area" means the areas set forth in the ROD into which the Site has been divided for cleanup purposes including Source Area Soil, Source Area Groundwater, Allendale Pond and Lyman Mill Pond Sediment, Allendale Floodplain Soil, and Lyman Mill Stream Sediment and Floodplain Soil (including the Oxbow wetland). "Disposal Sites" means the locations where contaminated sediment and floodplain soil will be disposed of, excluding contamination that exceeds the LDRs' alternative treatment standards.
- 1.6 Requirements of all SOW Sections (Sections 2 through 7), including RA Completion determinations, apply to each Action Area of the Remedy and can be done in phases, if approved by EPA.

2. COMMUNITY INVOLVEMENT

2.1 Community Involvement Responsibilities

- (a) EPA has the lead responsibility for developing and implementing community involvement activities at the Site. Previously during the RI/FS phase, EPA developed a Community Involvement Plan (CIP) for the Site. Pursuant to 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities during the Work that are not already addressed or provided for in the existing CIP, including, if applicable, any Technical Assistance Grant (TAG), any use of the Technical Assistance Services for Communities (TASC) contract, and/or any Technical Assistance Plan (TAP).
- (b) If requested by EPA, SDs shall support EPA's community involvement activities. This may include providing online access to initial submissions and updates of deliverables to (1) Community Advisory Groups, (2) Technical Assistance Grant recipients and their advisors, and (3) other entities to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP SDs' responsibilities for community involvement activities. All community

involvement activities conducted by SDs at EPA's request are subject to EPA's oversight.

- (c) **SDs' CI Coordinator.** If requested by EPA, SDs shall, within 15 days, designate and notify EPA of SDs' Community Involvement Coordinator (SDs' CI Coordinator). SDs may hire a contractor for this purpose. SDs' notice must include the name, title, and qualifications of the SDs' CI Coordinator. SDs' CI Coordinator is responsible for providing support regarding EPA's community involvement activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries about the Site.

3. REMEDIAL DESIGN

3.1 RD Work Plan. SDs shall submit a Remedial Design (RD) Work Plan (RDWP) for EPA approval. The RDWP must include:

- (a) Plans for implementing all RD activities identified in this SOW, in the RDWP, or required by EPA to be conducted to develop the RD;
- (b) A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction. The SDs may propose to have the RDWP, PDI Work Plans, Preliminary RD, Pre-Final RD, and Final RD for different components of the selected remedy proceed along separate timelines. If SDs wish to pursue such an alternative approach, SDs shall provide their phasing proposal to EPA for approval at the same time as their submission of notification of the Supervising Contractor;
- (c) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action (RA) as necessary to implement the Work. EPA will encourage the use of a local workforce including SDs' cooperation in the utilization of EPA's job readiness program (Superfund Job Training Initiative (SuperJTI));
- (d) A description of the steps to be taken to obtain access and to acquire and/or lease real property in connection with the Work;
- (e) A proposal for phasing of design and construction, including phasing of design and construction for each Action Area and for the waste Disposal Sites;
- (f) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;
- (g) Descriptions of any areas requiring clarification and/or anticipated problems (e.g., data gaps), including any cleanup level evaluations and updates as envisioned by the ROD;

- (h) A description of any required sampling and investigation activities and strategies, including background contamination evaluations, any contamination delineation, and determination of pre-construction baseline conditions;
- (i) A description of any required physical and ecological surveys, including physical surveys and drainage evaluations in the Source Area, and habitat evaluations, engineering analysis, and hydrodynamic analysis in the Oxbow area;
- (j) A description of any required Stage IB cultural resources survey to comply with the National Historic Preservation Act (NHPA) and a description of an approach to determine any required levels of mitigation of any adverse effects of the remedy on the cultural resources, which would be a basis of a Memorandum of Agreement with the Rhode Island State Historic Preservation Officer (SHPO), and/or Narragansett Indian Tribal Historic Preservation Officer (THPO);
- (k) Descriptions of any applicable permitting requirements and other regulatory requirements;
- (l) A description of the process for implementing ICs (to be finalized in the Institutional Controls Implementation and Assurance Plan (ICIAP));
- (m) All supporting deliverables required to accompany the RDWP as specified in the RD Schedule set forth in ¶ 7.2 (“RD Schedule”).

3.2 SDs shall meet regularly with EPA and the State to discuss design issues as necessary, as directed or determined by EPA.

3.3 Pre-Design Investigations. The purpose of the Pre-Design Investigations (PDIs) is to address data gaps by conducting additional field investigations, information gathering, studies, evaluations, and modeling and shall include but not be limited to all pre-design and design studies/investigations identified in the ROD or proposed by Settling Defendants and approved by EPA. SDs may propose that requirements set out below be included in the PDI.

- (a) **PDI Work Plans.** SDs shall submit PDI Work Plans (PDIWPs) to EPA for review and approval. Each PDIWP must include:
 - (1) An evaluation and summary of existing data and description of data gaps;
 - (2) Proposed investigations such as modeling, evaluations, and studies;
 - (3) A sampling plan including media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), and number of samples; and

- (4) Cross references to quality assurance/quality control (QA/QC) requirements set forth in the Quality Assurance Project Plan (QAPP) as described in ¶ 6.7(d).
- (b) Following the PDIs, SDs shall submit PDI Evaluation Reports to EPA for review and approval. These reports must include:
 - (1) Summary of the investigations performed;
 - (2) Summary of investigation results;
 - (3) Summary of validated data (i.e., tables and graphics);
 - (4) Data validation reports and laboratory data reports;
 - (5) Narrative interpretation of data and results;
 - (6) Results of statistical and modeling analyses;
 - (7) Photographs documenting the work conducted; and
 - (8) Conclusions and recommendations for RD, including design parameters and criteria.
- (c) EPA may require SDs to supplement the PDI Evaluation Reports and/or to perform additional pre-design studies.
- (d) Some of the various PDI Work Plans and related Evaluation Reports may include but are not limited to:
 - (1) A Source Area Cover System Design Report: SDs shall submit a Source Area Cover System Design Report. This deliverable shall include a qualitative and quantitative analysis demonstrating that the proposed cover system complies with the standards set forth in 40 C.F.R. § 264.310(a) (“RCRA Performance Standards”) and 40 C.F.R. § 761.61(c) (TSCA risk-based requirements for PCB Remediation Waste) and is equally protective when compared to the Revised Alternative Cap Design Guidance Proposed for Unlined, Hazardous Waste Landfills in the EPA Region 1 (February 5, 2001). Emhart may use results of PDIs, including leachability testing, a Brook Village/Centredale Manor construction phasing study, and a source area surface grading and drainage study, to support its design of the cap components. Based on the results of these studies, Emhart may propose a cap design that may not utilize an impermeable liner in certain areas of the Source Area. The cap design does not need to be uniform over the entire Source Area; however, the coverage extent of the impermeable liner shall be maximized (including but not limited to over any areas contaminated with PCBs at

concentrations of 50 mg/kg or greater). As part of the cap design, SDs may propose a plan for EPA approval that includes the excavation and consolidation of contaminated soil within the Source Area and takes into account the impact on the residents. The Design Report shall include justification for any areas not covered by an impermeable liner.

- (2) Background Floodplain Soil Characterization Report: SDs shall submit a Background Floodplain Soil Characterization Report. The purpose of this report shall be to confirm floodplain soil contaminant concentrations upstream from the Site. Background floodplain soil data will be used for both the Allendale Floodplain Soil and the Lyman Mill Floodplain Soil (including Oxbow) action areas. Floodplain soil cleanup levels which are based on background levels may be adjusted by EPA based on these data.
- (3) Residential Floodplain Soil Characterization Report: SDs shall submit a Residential Floodplain Soil Characterization Report. SDs may propose property-by-property determinations of appropriate exposure areas to determine the properties requiring excavation.
- (4) Background River Sediment Characterization Report: SDs shall submit a Background River Sediment Characterization Report. The purpose of this report shall be to confirm sediment and fish tissue contaminant concentrations upstream from the Site. Background sediment and fish tissue data will be used for both Allendale and Lyman Mill ponds. Sediment cleanup levels that are based on background levels may be adjusted by EPA based on these data.
- (5) Allendale and Lyman Mill Pond Sediment Pre-Characterization Report: SDs shall submit an Allendale and Lyman Mill Pond Sediment Pre-Characterization Report. This deliverable shall include a three-dimensional quantitative analysis of the sediments prior to excavation sufficient to allow for the selection of the limits of sediment removal without the need for further confirmational sampling and analyses. This deliverable shall also include the three-dimensional delineation of all areas of sediment contamination in excess of the applicable LDRs for use in determining the limits of removal for compliance with the LDRs. The data collected in developing this report shall be sufficient in all respects to allow EPA to support the use of the data in lieu of additional sampling and analyses prior to disposal. Should SDs propose a design with pre-determined depths for excavation of sediment in either or both ponds, they shall also propose a planned thin layer cover to be installed over all excavated areas with a goal of achieving unlimited recreational use of the Ponds without relying on maintenance and/or the implementation of ICs in the Ponds. The pre-design investigations will also include ecological surveys, as well as sampling of surface water, benthos, and fish tissue to establish pre-remediation baseline conditions.

- (6) Oxbow Investigation and Hydrodynamic Model Report: SDs shall submit an Oxbow Investigation and Hydrodynamic Model Report. Pre-design investigations will include physical and ecological surveys to further delineate wetlands functions and to identify any potential vernal pools and collection of benthic soil, sediment and surface water samples to establish pre-construction baseline conditions. A hydrodynamic model will be developed to characterize erosion potential of the thin layer sand cap and to aid in evaluating the effectiveness of engineered controls (e.g. flow baffles) intended to maximize sedimentation rates and reduce erosion potential in areas of the Oxbow slated to receive a thin layer cover. If the hydrodynamic modeling analysis along with engineering professional judgment does not result in a degree of certainty acceptable to EPA related to deposition (and length of time to achieve the desired level of risk reduction) and stability (and risks of downgradient migration), or other factors, an increase in the excavation footprint beyond the area identified (resulting in a reduction in the proportion of the remedial footprint receiving the thin layer cover) can be proposed by SDs for EPA approval or required by EPA. Increases in the excavation footprint will need to consider any additional information concerning the possible presence of sensitive species in the Oxbow (e.g., vernal pools).
- (7) Sediment Dewatering Treatability Study Report: SDs shall submit a Sediment Dewatering Treatability Study Report. The objective of this study is to select a preferred option for dewatering the excavated pond sediment prior to treatment or disposal. Pilot testing would be conducted for the most favorable technologies in order to develop design parameters for full-scale operation.
- (8) Sediment Dewatering Facility Siting Report: SDs shall submit a Sediment Dewatering Facility Siting Report. SDs will perform the necessary investigation and predesign work to identify potential locations for a Sediment Dewatering Facility adjacent to the ponds. The dewatering process and site requirements will be determined based on the results of the Sediment Dewatering Treatability Study.
- (9) Sediment Disposal Siting Study Report: For any disposal in an Upland CDF location, SDs will perform the necessary investigation and predesign work to identify potential locations for an upland CDF adjacent to the site, consistent with Paragraph 3.7(a)(3). The following investigations/ evaluations could be used in selecting an Upland CDF location: an assessment of existing environmental conditions (including field sampling as appropriate) associated with the potential CDF location; an evaluation of CDF parcel preparation requirements (such as structure demolition, utility relocation, etc.); development of a conceptualized CDF parcel development plan for construction, operation, and closure of the landfill; development and implementation of required

field studies (survey, traffic, geotechnical, etc.); and identification of CDF parcel specific permit requirements (federal, state and local).

3.4 Preliminary (30%) RD. SDs shall submit a Preliminary (30%) RD for EPA's comment and approval. The Preliminary RD must include:

- (a) A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);
- (b) Design analysis, including assumptions and parameters, design restrictions, design calculations, process performance criteria, and appropriate unit processes for the treatment train (e.g., sediment dewatering);
- (c) Preliminary drawings and specifications;
- (d) Descriptions of permit requirements, if applicable;
- (e) Preliminary identification of the waste Disposal Sites and permit requirements, if needed;
- (f) Preliminary evaluations of measures to minimize impacts to the wetlands and floodplains;
- (g) Preliminary description of access requirements, acquisition of property interests, and proposed easements;
- (h) Preliminary Operation and Maintenance (O&M) Plan and O&M Manual;
- (i) A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, during the RA;
- (j) Any proposed revisions to the RA Schedule that is set forth in ¶ 7.3 (RA Schedule); and
- (k) All supporting deliverables required to accompany the Preliminary RD as specified in the RD Schedule.

3.5 Pre-Final (95%) RD. SDs shall submit the Pre-final (95%) RD for EPA's comment and approval. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Preliminary RD. The Pre-final RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD must include:

- (a) A complete set of construction drawings and specifications that are: (1) certified by a registered professional engineer; (2) suitable for procurement; and (3) follow the Construction Specifications Institute's MasterFormat 2012;

- (b) A survey and engineering drawings showing existing Site features, such as elements, property borders, easements, and Site conditions;
- (c) Pre-Final versions of the same elements and deliverables as are required for the Preliminary RD;
- (d) An RA sampling and monitoring plan, addressing all required construction monitoring, construction testing, and confirmatory sampling;
- (e) A wetland and habitat restoration and mitigation plan and lost floodplain storage capacity mitigation plan;
- (f) A description of plans for obtaining access agreements;
- (g) A description of plans for acquiring property interests;
- (h) A summary of spill control plan or other plans to eliminate or reduce incidence of emissions during construction, and to minimize the impacts of such potential releases to adjacent environments (e.g., wetlands, surface waters, groundwater);
- (i) A specification for photographic documentation of the RA; and
- (j) Supporting deliverables as specified in the RD Schedule.

3.6 Final (100%) RD. SDs shall submit the Final (100%) RD for EPA approval. The Final RD must address EPA's comments on the Pre-final RD and must include final versions of all Pre-final deliverables.

3.7 Potential Modifications to the Remedy.

- (a) Based on the PDIs, other possible proposals submitted during the RD, and EPA's approval of Rhode Island's CSGWPP as referenced in paragraph 1.4 above, EPA and the SDs anticipate further consideration of the following potential modifications to the remedy:
 - (1) Classification of the groundwater in accordance with the State groundwater classification system instead of the federal classification system.
 - (2) Prior to installation of the RCRA Subtitle C cap in the Source Area, possible excavation of a limited amount of contaminated soils with consolidation of these soils within the Source Area.
 - (3) Disposal of a portion of the contaminated soils and sediments at the Site (i.e., those below the LDRs' alternative treatment standards) at an existing Subtitle D landfill based on a determination by EPA that these wastes may be removed from regulation under Subtitle C of RCRA

consistent with EPA's "Contained-In" policy for contaminated media, in accordance with "Management of Remedial Waste Under RCRA," OSWER Directive EPA530-F-98-026 (October 1998).

- (b) EPA may document any such modifications as appropriate, including but not limited to, in design and construction documents or through issuance of an Explanation of Significant Differences (ESD), after entry of a consent decree, and may seek public comment on any such modifications.
- (c) If any of the above-changes to the remedy are adopted by EPA, they shall be considered to be "within the Scope of the Remedy" for purposes of ¶ 1.3 of this SOW. Emhart remains obligated to perform the Work regardless of whether or not EPA adopts any such changes.
- (d) In the event that any changes are made to the remedy, and if requested by EPA, SDs shall support related community involvement activities consistent with ¶ 2.1.
- (e) Except as provided in this paragraph, nothing herein alters or amends the requirement in the CD and SOW that SDs perform other modifications to the remedy.

4. REMEDIAL ACTION

4.1 RA Work Plan. SDs shall submit a RA Work Plan (RAWP) for EPA approval that includes:

- (a) A proposed RA Construction Schedule such as a Gantt chart or equivalent;
- (b) The identity of, contact information for, and description of the roles of, the members of SDs' RA project team, including the Project Coordinator and Supervising Contractor;
- (c) An updated health and safety plan that covers activities during the RA; and
- (d) Plans for satisfying permitting requirements, including obtaining permits for off-site activity, if applicable, and for satisfying substantive requirements of permits for on-site activity.

4.2 Independent Quality Assurance Team. SDs shall notify EPA of SDs' designated Independent Quality Assurance Team (IQAT). The IQAT will be independent of the Supervising Contractor. SDs may hire a third party for this purpose. SDs' notice must include the names, titles, contact information, and qualifications of the members of the IQAT. The IQAT will have the responsibility to determine whether Work is of expected quality and conforms to applicable plans and specifications. The IQAT will have the responsibilities as described in ¶ 2.1.3 of the *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties*, EPA/540/G-90/001 (Apr. 1990).

4.3 Meetings and Inspections

- (a) **Conferences to be held prior to performance of PDI field work, and Preconstruction.** SDs shall hold conferences with EPA, the State, and others, prior to performance of PDI field work, and prior to construction conference, as directed or approved by EPA. See *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995). SDs shall prepare minutes of these conferences and shall distribute the minutes to all Parties.
- (b) **Periodic Meetings.** During the construction portion of the RA (RA Construction), and PDI activities, SDs shall meet at least monthly with EPA, the State, and others as directed or determined by EPA, to discuss field studies and construction issues. SDs shall distribute an agenda and list of attendees to all Parties prior to each meeting. SDs shall prepare minutes of the meetings and shall distribute the minutes to all Parties.
- (c) **Inspections**
 - (1) EPA shall conduct periodic inspections of or have an on-site presence during various phases of the Work. At EPA's request, the Supervising Contractor or other designee shall accompany EPA during inspections.
 - (2) SDs shall provide on-site office space for EPA personnel to perform their oversight duties.
 - (3) Upon notification by EPA of any deficiencies in the RA Construction or PDIs, SDs shall take all necessary steps to correct the deficiencies and/or bring the RA Construction or PDIs into compliance with any applicable document, including, PDI Evaluation Reports, the approved Final RD, any approved design changes, and/or the approved RAWP. If applicable, SDs shall comply with any schedule provided by EPA in its notice of deficiency.

4.4 Emergency Response and Reporting

- (a) **Emergency Response and Reporting.** If any event occurs during performance of the Work that causes or threatens to cause a release of Waste Material on, at, or from the Site and that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, SDs shall: (1) immediately take all appropriate action to prevent, abate, or minimize such release or threat of release; (2) immediately notify the authorized EPA officer (as specified in ¶ 4.4(c)) orally; and (3) take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plan, the Emergency Response Plan, and any other deliverable approved by EPA under the SOW.

- (b) **Release Reporting.** Upon the occurrence of any event during performance of the Work that SDs are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, SDs shall immediately notify the authorized EPA officer orally.
- (c) The “authorized EPA officer” for purposes of immediate oral notifications and consultations under ¶ 4.4(a) and ¶ 4.4(b) is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the EPA Emergency Response Unit, Region 1 (if neither EPA Project Coordinator is available).
- (d) For any event covered by ¶ 4.4(a) and ¶ 4.4(b), SDs shall: (1) within 14 days after the onset of such event, submit a report to EPA describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and (2) within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.
- (e) The reporting requirements under ¶ 4.4 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

4.5 Off-Site Shipments

- (a) SDs may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. SDs will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if SDs obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b). SDs may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if they comply with EPA’s *Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992).
- (b) SDs may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility’s state and to the EPA Project Coordinator. This notice requirement will not apply to any off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. SDs also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. SDs shall provide the notice after the award of the contract for RA construction and before the Waste Material is shipped.

4.6 RA Construction Completion

- (a) For purposes of this ¶ 4.6, “RA Construction” comprises, for any RA that involves the construction and operation and/or monitoring of a system to achieve Performance Standards (for example, sediment removal to achieve biota targeted levels), the construction of such system and the performance of all activities necessary for the system to function properly and as designed.
- (b) **Inspection of Constructed Remedy.** SDs shall schedule an inspection to review the construction and operation and/or monitoring of the system and to review whether the system is functioning properly and as designed. The inspection must be attended by SDs and EPA and/or their representatives. A re-inspection must be conducted if requested by EPA.
- (c) **RA Report.** Following completion of all construction activities, SDs shall submit an “RA Report” requesting EPA’s determination that RA Construction has been completed. The RA Report must: (1) include statements by a registered professional engineer and by SDs’ Project Coordinator that construction of the system is complete and that the system is functioning properly and as designed; (2) include a demonstration, and supporting documentation, that construction of the system is complete and that the system is functioning properly and as designed; (3) include as-built drawings signed and stamped by a registered professional engineer; (4) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA’s *Close Out Procedures for NPL Sites* guidance (May 2011); and (5) be certified in accordance with ¶ 6.5 (Certification).
- (d) If EPA determines that RA Construction is not complete, EPA shall so notify SDs. EPA’s notice must include a description of, and schedule for, the activities that SDs must perform to complete RA Construction. EPA’s notice may include a schedule for completion of such activities or may require SDs to submit a proposed schedule for EPA approval. SDs shall perform all activities described in the EPA notice in accordance with the schedule.
- (e) If EPA determines, based on the initial or any subsequent RA Report, that RA Construction is complete, EPA shall so notify SDs.

4.7 Certification of RA Completion

- (a) **RA Completion Inspection.** The RA is “Complete” for purposes of this ¶ 4.7 when it has been fully performed and the Performance Standards have been achieved. SDs shall schedule an inspection for the purpose of obtaining EPA’s Certification of RA Completion. The inspection must be attended by SDs and EPA and/or their representatives.
- (b) **RA Report.** Following the inspection, SDs shall submit a RA Report to EPA requesting EPA’s Certification of RA Completion. The report must: (1) include

certifications by a registered professional engineer and by SD's Project Coordinator that the RA is complete; (2) include as-built drawings signed and stamped by a registered professional engineer; (3) be prepared in accordance with Chapter 2 (Remedial Action Completion) of EPA's *Close Out Procedures for NPL Sites* guidance (May 2011); (4) contain monitoring data to demonstrate that Performance Standards have been achieved; and (5) be certified in accordance with ¶ 6.5 (Certification).

- (c) If EPA concludes that the RA is not Complete, EPA shall so notify SDs. EPA's notice must include a description of any deficiencies. EPA's notice may include a schedule for addressing such deficiencies or may require SDs to submit a schedule for EPA approval. SDs shall perform all activities described in the notice in accordance with the schedule.
- (d) If EPA concludes, based on the initial or any subsequent RA Report requesting Certification of RA Completion, that the RA is Complete, EPA shall so certify to SDs. This certification will constitute the Certification of RA Completion for purposes of the CD, including Section XV of the CD (Covenants by Plaintiffs). Certification of RA Completion will not affect SDs' remaining obligations under the CD.

4.8 Certification of Work Completion

- (a) **Work Completion Inspection.** SDs shall schedule an inspection for the purpose of obtaining EPA's Certification of Work Completion. The inspection must be attended by SDs and EPA and/or their representatives.
- (b) **Work Completion Report.** Following the inspection, SDs shall submit a report to EPA requesting EPA's Certification of Work Completion. The report must: (1) include certifications by a registered professional engineer and by SDs' Project Coordinator that the Work, including all O&M activities, is complete; and (2) be certified in accordance with ¶ 6.5 (Certification). If the RA Report submitted under ¶ 4.7(b) includes all elements required under this ¶ 4.8(b), then the RA Report/ suffices to satisfy all requirements under this ¶ 4.8(b).
- (c) If EPA concludes that the Work is not complete, EPA shall so notify SDs. EPA's notice must include a description of the activities that SDs must perform to complete the Work. EPA's notice must include specifications and a schedule for such activities or must require SDs to submit specifications and a schedule for EPA approval. SDs shall perform all activities described in the notice or in the EPA-approved specifications and schedule.
- (d) If EPA concludes, based on the initial or any subsequent report requesting Certification of Work Completion, that the Work is complete, EPA shall so certify in writing to SDs. Issuance of the Certification of Work Completion does not affect the following continuing obligations: (1) activities under the Periodic

Review Support Plan; (2) obligations under Sections **VIII** (Property Requirements), **XIX** (Retention of Records), and **XVIII** (Access to Information) of the CD; (3) Institutional Controls obligations as provided in the ICIAP; and (4) reimbursement of EPA's Future Response Costs under Section **X** (Payments for Response Costs) of the CD.

5. REPORTING

5.1 Progress Reports. Commencing with the 1st month following lodging of the CD and until EPA approves the RA Completion, SDs shall submit progress reports to EPA on a monthly basis, or as otherwise requested by EPA. The reports must cover all activities in each Action Area, as applicable, that took place during the prior reporting period, including:

- (a) The actions that have been taken toward achieving compliance with the CD;
- (b) A summary of all results of sampling, tests, and all other data received or generated by SDs;
- (c) A description of all deliverables that SDs submitted to EPA;
- (d) A description of all activities relating to RA Construction that are scheduled for the next six weeks;
- (e) An updated RA Construction Schedule, together with information regarding percentage of completion, delays encountered or anticipated that may affect the future schedule for implementation of the Work, and a description of efforts made to mitigate those delays or anticipated delays;
- (f) A description of any modifications to the work plans or other schedules that SDs have proposed or that have been approved by EPA; and
- (g) A description of all activities undertaken in support of the Community Involvement Plan (CIP) during the reporting period and those to be undertaken in the next six weeks.

5.2 Notice of Progress Report Schedule Changes. If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 5.1(d), changes, SDs shall notify EPA of such change at least 7 days before performance of the activity.

6. DELIVERABLES

6.1 Applicability. SDs shall submit deliverables for EPA approval or for EPA comment as specified in the SOW. If neither is specified, the deliverable does not require EPA's approval or comment. Paragraphs 6.2 (In Writing) through 6.4 (Technical Specifications) apply to all deliverables. Paragraph 6.5 (Certification) applies to any deliverable that is

required to be certified. Paragraph 6.6 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

6.2 In Writing. As provided in ¶ 102 of the CD, all deliverables under this SOW must be in writing unless otherwise specified.

6.3 All deliverables must be submitted by the deadlines in the RD Schedule or RA Schedule, as applicable. SDs shall submit all deliverables to EPA in electronic form.

6.4 Technical Specifications

(a) Sampling and monitoring data should be submitted in standard regional Electronic Data Deliverable (EDD) format. (The format shall be compatible with the existing Site ACCESS database.)

(b) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (1) in the ESRI File Geodatabase format compatible with current Site GIS system. All of shapefiles are to be housed in separate folders as opposed to all being in a single geodatabase. SDs should keep the same naming structure that files/folders have in the current GIS file system; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at <https://edg.epa.gov/EME/>.

(c) Each file must include an attribute name for each site unit or sub-unit submitted. Consult <http://www.epa.gov/geospatial/policies.html> for any further available guidance on attribute identification and naming.

(d) Spatial data submitted by SDs does not, and is not intended to, define the boundaries of the Site.

6.5 Certification. All deliverables that require compliance with this ¶ 6.5 must be signed by the SDs' Project Coordinator, or other responsible official of SDs, and must contain the following statement:

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 gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system,

or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

6.6 Approval of Deliverables

(a) Initial Submissions

- (1) After review of any deliverable that is required to be submitted for EPA approval under the CD or the SOW, EPA shall: (i) approve, in whole or in part, the submission; (ii) approve the submission upon specified conditions; (iii) disapprove, in whole or in part, the submission; or (iv) any combination of the foregoing.
- (2) EPA also may modify the initial submission to cure deficiencies in the submission if: (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Work; or (ii) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

(b) **Resubmissions.** Upon receipt of a notice of disapproval under ¶ 6.6(a) (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 6.6(a), SDs shall, within 30 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may: (1) approve, in whole or in part, the resubmission; (2) approve the resubmission upon specified conditions; (3) modify the resubmission; (4) disapprove, in whole or in part, the resubmission, requiring SDs to correct the deficiencies; or (5) any combination of the foregoing.

(c) **Implementation.** Upon approval, approval upon conditions, or modification by EPA under ¶ 6.6(a) (Initial Submissions) or ¶ 6.6(b) (Resubmissions), of any deliverable, or any portion thereof: (1) such deliverable, or portion thereof, will be incorporated into and enforceable under the CD; and (2) SDs shall take any action required by such deliverable, or portion thereof. The implementation of any non-deficient portion of a deliverable submitted or resubmitted under ¶ 6.6(a) or ¶ 6.6(b) does not relieve SDs of any liability for stipulated penalties under Section XIV (Stipulated Penalties) of the CD.

6.7 **Supporting Deliverables.** SDs shall submit each of the following supporting deliverables for EPA approval, except as specifically provided. The deliverables must be submitted, for the first time, by the deadlines in the RD Schedule or the RA Schedule, or any other EPA-approved schedule, as applicable. SDs shall develop the deliverables in

accordance with all applicable regulations, guidances, and policies (see Section 9 (References)). SDs shall update each of these supporting deliverables as necessary or appropriate during the course of the Work, and/or as requested by EPA.

- (a) **Health and Safety Plan.** The Health and Safety Plan (HASP) describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by the Work. SDs shall develop the HASP in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP should cover RD activities and should be, as appropriate, updated to cover activities during the RA and updated to cover activities after RA completion. EPA does not approve the HASP, but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.

- (b) **Emergency Response Plan.** The Emergency Response Plan (ERP) must describe procedures to be used in the event of an accident or emergency at the Site (for example, power outages, water impoundment failure, treatment plant failure, slope failure, etc.). The ERP must include:
 - (1) Name of the person or entity responsible for responding in the event of an emergency incident;
 - (2) Plan and date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;
 - (3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;
 - (4) Notification activities in accordance with ¶ 4.4(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and
 - (5) A description of all necessary actions to ensure compliance with Paragraph 11 (Emergencies and Releases) of the CD in the event of an occurrence during the performance of the Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.

- (c) **Field Sampling Plan.** The Field Sampling Plan (FSP) supplements the QAPP and addresses all sample collection activities. The FSP must be written so that a field sampling team unfamiliar with the project would be able to gather the samples and field information required. SDs shall develop the FSP in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies*, EPA/540/G 89/004 (Oct. 1988).
- (d) **Quality Assurance Project Plan.** The Quality Assurance Project Plan (QAPP) addresses sample analysis and data handling regarding the Work. The QAPP must include a detailed explanation of SDs' quality assurance, quality control, and chain of custody procedures for all PDI, design, compliance, and monitoring samples. SDs shall develop the QAPP in accordance with *EPA Requirements for Quality Assurance Project Plans*, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006); *Guidance for Quality Assurance Project Plans*, QA/G-5, EPA/240/R 02/009 (Dec. 2002); and *Uniform Federal Policy for Quality Assurance Project Plans*, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005). The QAPP also must include procedures:
- (1) To ensure that EPA and the State and their authorized representatives have reasonable access to laboratories used by SDs in implementing the CD (SDs' Labs);
 - (2) To ensure that SDs' Labs analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring;
 - (3) To ensure that SDs' Labs perform all analyses using EPA-accepted methods (i.e., the methods documented in *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*, ILM05.4 (Dec. 2006); *USEPA Contract Laboratory Program Statement of Work for Organic Analysis*, SOM01.2 (amended Apr. 2007); and *USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration)*, ISM01.2 (Jan. 2010)) or other methods acceptable to EPA;
 - (4) To ensure that SDs' Labs participate in an EPA-accepted QA/QC program or other program QA/QC acceptable to EPA;
 - (5) For SDs to provide EPA and the State with notice at least 28 days prior to any sample collection activity;
 - (6) For SDs to provide split samples and/or duplicate samples to EPA and the State upon request;
 - (7) For EPA and the State to take any additional samples that they deem necessary;

- (8) For EPA and the State to provide to SDs, upon request, split samples and/or duplicate samples in connection with EPA's and the State's oversight sampling; and
 - (9) For SDs to submit to EPA and the State all sampling and tests results and other data in connection with the implementation of the CD.
- (e) **Site Wide Monitoring Plan.** The purpose of the Site Wide Monitoring Plan (SWMP) is to obtain baseline information regarding the extent of contamination in affected media at the Site; to obtain information, through short- and long- term monitoring, about the movement of and changes in contamination throughout the Site, before and during implementation of the RA; to obtain information regarding contamination levels to determine whether PS are achieved; and to obtain information to determine whether to perform additional actions, including further Site monitoring. The SWMP must include:
- (1) Description of the environmental media to be monitored;
 - (2) Description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, analytical parameters to be monitored, and analytical methods employed;
 - (3) Description of how performance data will be analyzed, interpreted, and reported, and/or other Site-related requirements;
 - (4) Description of verification sampling procedures;
 - (5) Description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, and monthly and annual reports to EPA and State agencies; and
 - (6) Description of proposed additional monitoring and data collection actions (such as increases in frequency of monitoring, and/or installation of additional monitoring devices in the affected areas) in the event that results from monitoring devices indicate changed conditions (such as higher than expected concentrations of the contaminants of concern).
- (f) **Construction Quality Assurance/Quality Control Plan (CQA/QCP).** The purpose of the Construction Quality Assurance Plan (CQAP) is to describe planned and systemic activities that provide confidence that the RA construction will satisfy all plans, specifications, and related requirements, including quality objectives. The purpose of the Construction Quality Control Plan (CQCP) is to describe the activities to verify that RA construction has satisfied all plans, specifications, and related requirements, including quality objectives. The CQA/QCP must:

- (1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQA/QCP;
 - (2) Describe the Performance Standards (PS) required to be met to achieve Completion of the RA;
 - (3) Describe the activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;
 - (4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/QCP;
 - (5) Describe industry standards and technical specifications used in implementing the CQA/QCP;
 - (6) Describe procedures for tracking construction deficiencies from identification through corrective action;
 - (7) Describe procedures for documenting all CQA/QCP activities; and
 - (8) Describe procedures for retention of documents and for final storage of documents.
- (g) **Transportation and Off-Site Disposal Plan.** The Transportation and Off-Site Disposal Plan (TODP) describes plans to ensure compliance with ¶ 4.5 (Off-Site Shipments). The TODP must include:
- (1) Proposed routes for off-site shipment of Waste Material;
 - (2) Identification of communities affected by shipment of Waste Material; and
 - (3) Description of plans to minimize impacts on affected communities.
- (h) **O&M Plan.** The O&M Plan describes the requirements for inspecting, operating, and maintaining the RA. SDs shall develop the O&M Plan in accordance with *Operation and Maintenance in the Superfund Program*, OSWER 9200.1 37FS, EPA/540/F-01/004 (May 2001). The O&M Plan must include the following additional requirements:
- (1) **Performance Standards (PS) reporting.** Description of PS required to be met to implement the ROD;
 - (2) Description of activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;

- (3) **O&M Reporting.** Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and monthly and annual reports to EPA and State agencies;
 - (4) Description of corrective action in case of systems failure, including:
 - (i) alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve PS; (ii) analysis of vulnerability and additional resource requirements should a failure occur; (iii) notification and reporting requirements should O&M systems fail or be in danger of imminent failure; and (iv) community notification requirements; and
 - (5) Description of corrective action to be implemented in the event that PS are not achieved; and a schedule for implementing these corrective actions.
- (i) **O&M Manual.** The O&M Manual serves as a guide to the purpose and function of the equipment and systems that make up the remedy. If such O&M Manual is required by EPA, SDs shall develop the O&M Manual in accordance with *Operation and Maintenance in the Superfund Program*, OSWER 9200.1 37FS, EPA/540/F-01/004 (May 2001).
 - (j) **Institutional Controls Implementation and Assurance Plan.** The Institutional Controls Implementation and Assurance Plan (ICIAP) describes plans to implement, maintain, and enforce the Institutional Controls (ICs) at the Site. SDs shall develop the ICIAP in accordance with *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites*, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012), and *Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites*, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012). The ICIAP must include the following additional requirements:
 - (1) Locations of recorded real property interests (e.g., easements, liens) and resource interests in the property that may affect ICs (e.g., surface, mineral, and water rights) including accurate mapping and geographic information system (GIS) coordinates of such interests; and
 - (2) Legal descriptions and survey maps that are prepared according to current American Land Title Association (ALTA) Survey guidelines and certified by a licensed surveyor.
 - (k) **Annual State of Compliance Reports.** Settling Defendants shall submit Annual State of Compliance Reports that include:

- (1) A comprehensive reporting on status of all investigations, construction, monitoring, ICs, and wetland and floodplain mitigation measures required by this SOW;
 - (2) An evaluation of compliance with Performance Standards for each Action Area, including assessment of the progress being made towards achieving the Performance Standards; and
 - (3) Recommendations for changes to any aspect of the construction, monitoring, ICs, or wetland and floodplain mitigation measures, including proposed schedule for activities to implement such recommendations.
- (1) **Periodic Review Support Plan.** The Periodic Review Support Plan addresses the studies and investigations that SDs shall conduct to support EPA's reviews of whether the RA is protective of human health and the environment in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c) (also known as "Five-year Reviews"). SD shall develop the plan in accordance with *Comprehensive Five-year Review Guidance*, OSWER 9355.7-03B-P (June 2001), and any other relevant five-year review guidance.

7. SCHEDULES

- 7.1 Applicability and Revisions.** All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the RD and RA Schedules set forth below. SDs may submit proposed revised RD Schedules or RA Schedules for EPA approval. Upon EPA's approval, the revised RD and/or RA Schedules supersede the RD and RA Schedules set forth below, and any previously approved RD and/or RA Schedules.

7.2 RD Schedule

	Description of Deliverable, Task	Included Supporting Deliverable	¶ Ref.	Deadline
1	Designate proposed Project Coordinator and proposed Supervising Contractor		9(c)(1)	10 days after lodging of the CD
2	RDWP	HASP, ERP, FSP, QAPP, SWMP, TSWP	3.1	60 days after EPA's Authorization to Proceed regarding Supervising Contractor under CD ¶ 9.c
3	PDIWPs	HASP, ERP, FSP, QAPP, SWMP, TSWP	3.3(a)	60 days after EPA's Authorization to Proceed regarding Supervising Contractor under CD ¶ 9.c
4	PDI Evaluation Reports		3.3(b)	TBD based on Approval of PDIWPs
5	Preliminary (30%) RD	CQA/QCP, TODP, O&M Plan, O&M Manual, ICIAP	3.4, 3.3(a)	TBD based on Approval of PDI Evaluation Reports, but no later than 180 days after Approval of all PDI Evaluation Reports
6	Pre-final (90/95%) RD	Same as above	3.5	120 days after EPA comments on Preliminary RD
7	Final (100%) RD	Same as above	3.5(j)	30 days after EPA comments on Pre-final RD

7.3 RA Schedule

	Description of Deliverable / Task	¶ Ref.	Deadline
1	Award RA contract		15 days after EPA Notice of Authorization to Proceed with RA
2	RAWP	4.1	60 days after EPA Notice of Authorization to Proceed with RA
3	Designate IQAT	4.2	21 days after Approval of RAWP
4	Pre-Construction Conference	4.3(a)	30 days after Approval of RAWP
5	Start of Construction		30 days after Approval of RAWP
6	Completion of Construction		
7	Pre-final Inspection	4.6(b)	15 days after completion of construction
8	Pre-final Inspection Punch List	4.6(c)	15 days after completion of Pre-final Inspection
9	Final Inspection		30 days after Completion of Work identified in Pre-final Inspection Report
10	RA Report	4.6(c)	120 days after PSs determined to be achieved
1		4.7(b)	
11	Annual State of Compliance Report	6.7(k)	Every year after Approval of RAWP
12	Work Completion Report	4.8(b)	
13	Periodic Review Support Plan	6.7(l)	Four years after Start of RA Construction

8. STATE PARTICIPATION

8.1 Copies. SDs shall, at any time they send a deliverable to EPA, send a copy of such deliverable to the State. EPA shall, at any time it sends a notice, authorization, approval, disapproval, or certification to SDs, send a copy of such document to the State.

8.2 Review and Comment. The State will have a reasonable opportunity for review and comment prior to:

- (a) Any EPA approval or disapproval under ¶ 6.6 (Approval of Deliverables) of any deliverables that are required to be submitted for EPA approval; and
- (b) Any approval or disapproval of the Construction Phase under ¶ 4.6 (RA Construction Completion), any disapproval of, or Certification of RA Completion under ¶ 4.7 (Certification of RA Completion), and any disapproval of, or Certification of Work Completion under ¶ 4.8 (Certification of Work Completion).

9. REFERENCES

- 9.1 The following regulations, guidance, and other documents, among others, apply to the Work. The regulations and guidance documents in the ROD Administrative Record, including the Compendium of Selected Key Guidance Documents also apply to the Work. Any item for which a specific URL is not provided below is available on one of the two EPA Web pages listed in ¶ 9.2:
- (a) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).
 - (b) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).
 - (c) Guidance for Conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, EPA/540/G-89/004 (Oct. 1988).
 - (d) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).
 - (e) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001 (Apr. 1990).
 - (f) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).
 - (g) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).
 - (h) Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).
 - (i) Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.3-10, EPA/540/R-92/071A (Nov. 1992).
 - (j) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).
 - (k) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).
 - (l) Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).
 - (m) Construction Quality Assurance (CQA) Plan Requirements for Hazardous Waste Landfills, EM 1110-1-4011 (1999).

- (n) USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review with Environmental Data Review Supplement, EPA/540/R 08-01 (June 2008). EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).
- (o) Operation and Maintenance in the Superfund Program, OSWER 9200.1-37FS, EPA/540/F-01/004 (May 2001).
- (p) Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, 540-R-01-007 (June 2001).
- (q) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).
- (r) Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).
- (s) Quality Systems for Environmental Data and Technology Programs -- Requirements with Guidance for Use, ANSI/ASQ E4-2004 (2004).
- (t) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A through 900C (Mar. 2005).
- (u) Superfund Community Involvement Handbook, EPA/540/K-05/003 (Apr. 2005).
- (v) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).
- (w) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006).
- (x) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).
- (y) USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4 (Dec. 2006).
- (z) USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2 (amended Apr. 2007).
- (aa) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), available at <http://www.epa.gov/geospatial/policies.html> and http://www.epa.gov/geospatial/docs/National_Geospatial_Data_Policy.pdf.
- (bb) Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, OSWER 9283.1-33 (June 2009).

- (cc) Principles for Greener Cleanups (Aug. 2009), available at <http://www.epa.gov/oswer/greenercleanups/>.
- (dd) USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM01.2 (Jan. 2010).
- (ee) Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22 (May 2011).
- (ff) Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites, OSWER 9283.1-34 (July 2011).
- (gg) Recommended Evaluation of Institutional Controls: Supplement to the “Comprehensive Five-Year Review Guidance,” OSWER 9355.7-18 (Sep. 2011).
- (hh) Construction Specifications Institute's MasterFormat 2012, available from the Construction Specifications Institute, www.csinet.org/masterformat.
- (ii) Occupational Health and Safety Administration, Standards for General Industry and for Construction Industry, 29 C.F.R. Parts 1910 and 1926.
- (jj) Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach , OSWER 9200.2-125 (Sep. 2012)
- (kk) Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012).
- (ll) Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012).
- (mm) EPA’s Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), http://www.epaosc.org/_HealthSafetyManual/manual-index.htm
- (nn) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).
- (oo) Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions, OSWER 9355.0-129 (Nov. 2013).
- (pp) Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).
- (qq) User Guide – Uniform Federal Policy QAPP Template for Soils Assessment of Dioxin Sites (September 2011).

(rr) Draft Final Quality Assurance Project Plan (QAPP) for Pre-Design Investigation for Oxbow Area (Nobis, Battelle, October 2015).

9.2 A more complete list may be found on the following EPA Web pages:

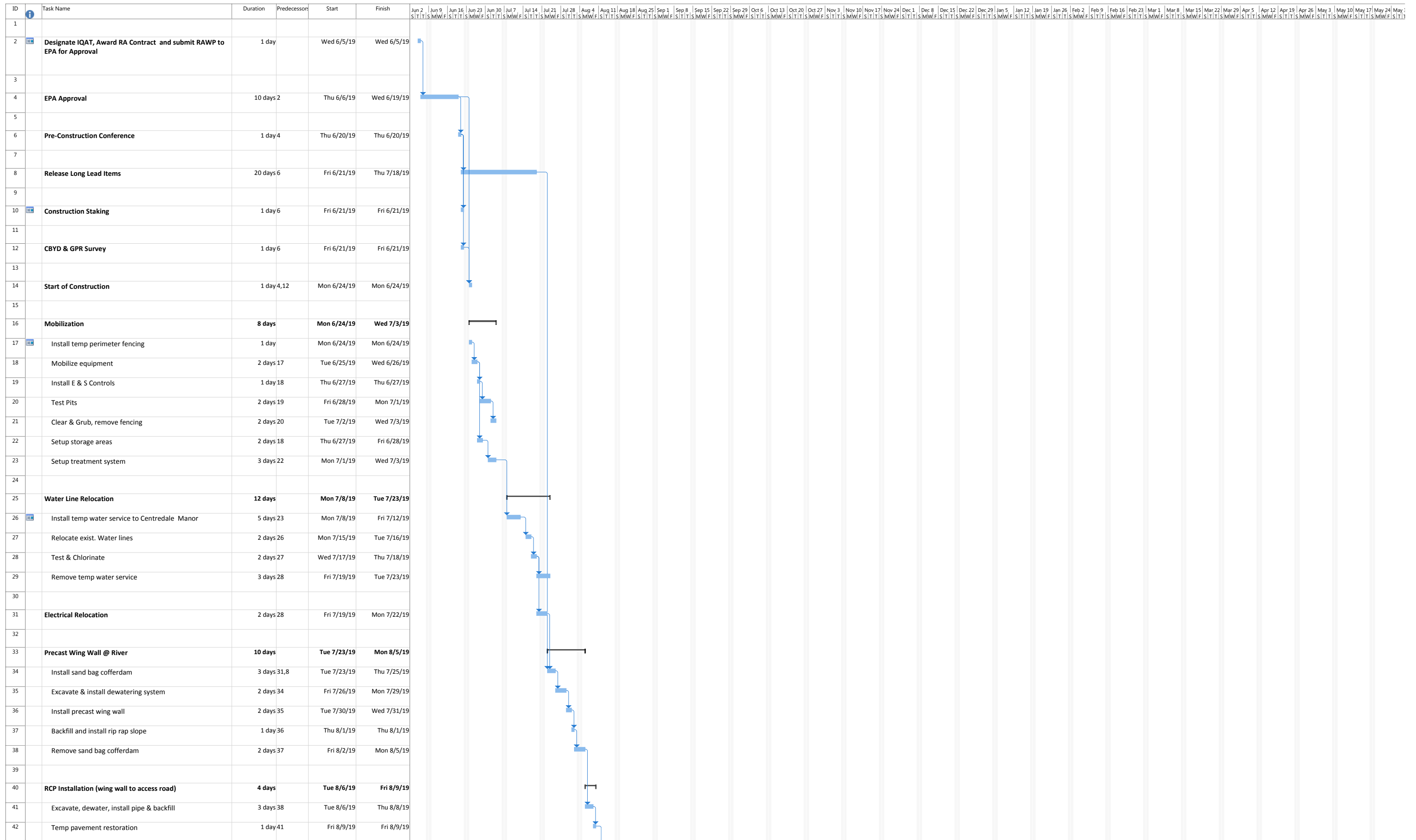
Laws, Policy, and Guidance <http://www.epa.gov/superfund/policy/index.htm>

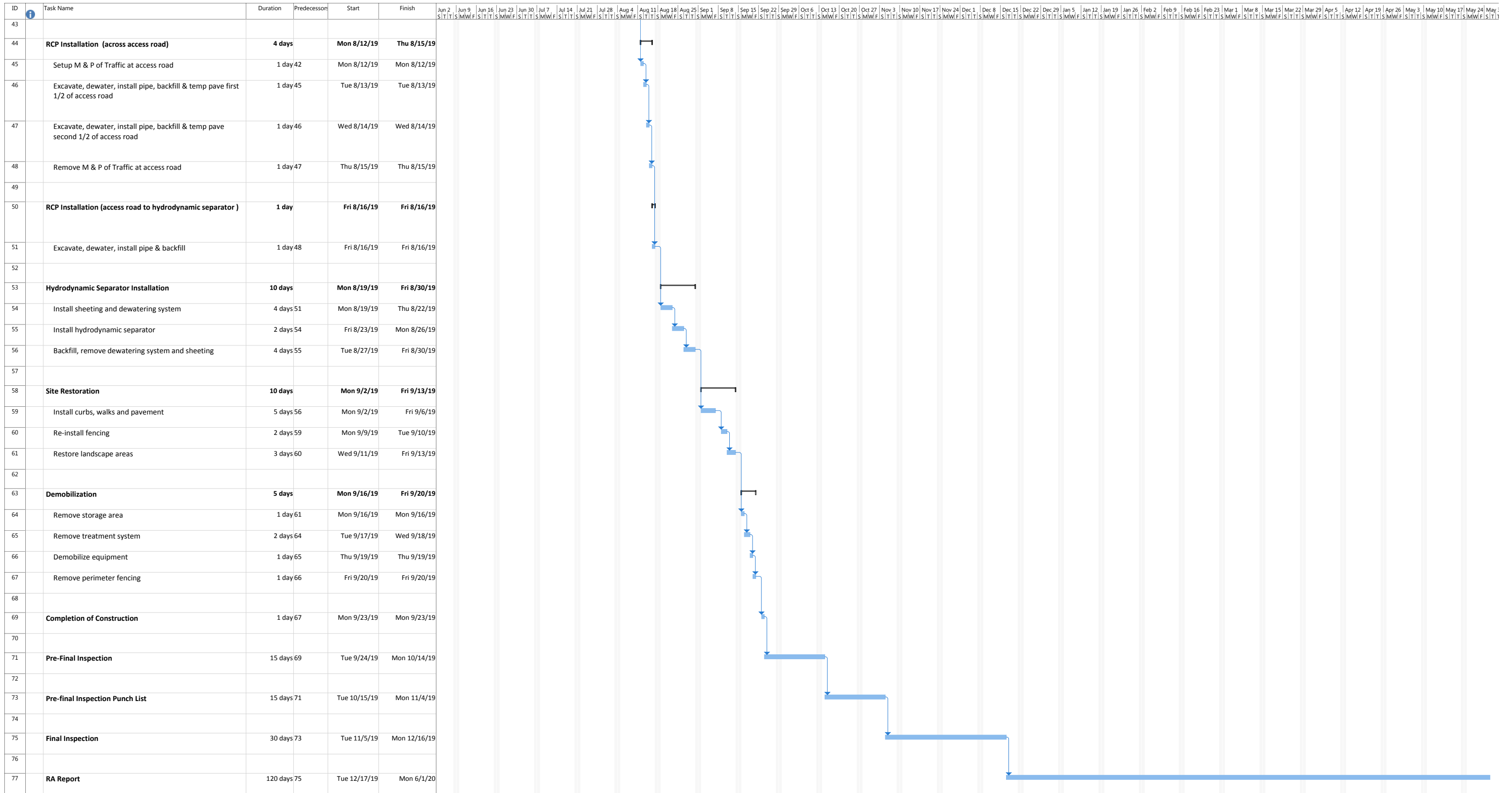
Test Methods Collections <http://www.epa.gov/fem/methcollectns.htm>

9.3 For any regulation or guidance referenced in the CD or SOW, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the Work only after SDs receive notification from EPA of the modification, amendment, or replacement.

APPENDIX B

Draft Construction Schedule





APPENDIX C

Health and Safety Plan

**DRAFT FINAL
SITE-SPECIFIC
HEALTH AND SAFETY PLAN**

**Centredale Manor Restoration Project Superfund Site
North Providence, Rhode Island**

June 2019

Prepared for

**Emhart Industries, Inc.
701 E. Joppa Road
Towson, Maryland 21286**

and

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Prepared by

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An Employee Owned Company

Comm. No. 07MD509

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APPENDICES

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ATV	All-Terrain Vehicle
BBP	Bloodborne Pathogens
BEI	Biological Exposure Indices
CFR	Code of Federal Regulations
CHSP	Contractor Health and Safety Plan
CMRP	Centredale Manor Restoration Project
COC	Constituent of Concern
COPD	Chronic Obstructive Pulmonary Disease
CSE	Confined Space Entry
CRZ	Contamination Reduction Zone
dB	decibel
dBA	A-weighted decibel
DEET	N,N-Diethyl-meta-toluamide
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
ERG	Emergency Response Guidebook
eV	Electron Volt
°F	Fahrenheit
FA/CPR	First Aid/Cardiopulmonary Resuscitation
FID	Flame Ionization Detector
FSP	Field Sampling Plan
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High-Efficiency Particulate Air
HPD	Hearing Protection Device
HSM	Health and Safety Manager
IDLH	Immediately Dangerous to Life and Health
IDW	Investigation Derived Waste
JHA	Job Hazard Analysis

LEA	Loureiro Engineering Associates, Inc.
mg/m ³	milligram per cubic meter
NIHL	Noise-Induced Hearing Loss
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
OPIM	Other Potentially Infectious Materials
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
PEL	Permissible Exposure Limit
PFD	Personal Flotation Device
PID	Photoionization Detector
PIW	Person in Water
PM	Project Manager
PPE	Personal Protective Equipment
ppm	Parts per Million
PRCS	Permit-Required Confined Space
QAPP	Quality Assurance Project Plan
RD	Remedial Design
REL	Recommended Exposure Limit
RIDEM	Rhode Island Department of Environmental Management
RQ	Reportable Quantity
SDS	Safety Data Sheet
SHSO	Site Health and Safety Officer
SIP	Shelter-In-Place
SOP	Standard Operating Procedure
SOW	Statement of Work
SVOC	Semivolatile Organic Compound
TCDD	2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin

TEQ	Toxicity Equivalence
TLV	Threshold Limit Value
$\mu\text{g}/\text{m}^3$	microgram per cubic meter
UV	Ultraviolet
USCG	United States Coast Guard
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature
4WD	Four-Wheel Drive

1. HEALTH AND SAFETY PLAN SUMMARY

PROJECT CONTACTS (See Section 2.4 for Project Roles and Responsibilities)	
LEA Project Manager: David Payne	Cell: 203-947-9855
LEA Health and Safety Manager: Jordan Coleman	Cell: 203-430-9016
LEA Site Health and Safety Officer: Seth Travis	Cell: 203-494-3985
Other LEA Personnel	
Jeremy Marcantonio (Background Task Manager)	Work: 860-410-3006
Jessica Tenzar (Source Area Investigation Task Manager)	Cell: 617-899-5577
Chris Winter (Source Area Cap Design)	Cell: 860-729-8428
Edwin Muniz (Sediment Dewatering Task Manager)	Work: 860-410-2940
Seth Travis (Field Operations Lead)	Cell: 203-494-3985
Sarah Burkhalter-Sweeney (Field Operations Lead)	Cell: 585-490-9428
Daniel Denyer	Cell: 860-819-9759
Jeremy Corcoran	Cell: 860-250-5910
Leila Shwayhat	Cell: 860-595-9681
John Pawlowski	Cell: 203-494-3985
Keith Volkert	Cell: 860-986-4386
Anthony Casasanta	Cell: 860-519-9323
Brian Cruz	Cell: 805-509-9028
Other Key Personnel:	
Jeff Loureiro (Project Coordinator)	Work: 860-410-2915
Anna Krasko (EPA Project Coordinator)	Work: 617-918-1232
Gary Jablonski (RIDEM Project Coordinator)	Work: 401-222-2797 Ext. 7148
Site Contact	T.B.D

EMERGENCY CONTACTS (See Section 9 for Emergency Procedures)	
Fire Department:	<u>911</u>
Police Department:	<u>911</u>
Ambulance:	<u>911</u>
Poison Control Center:	<u>1-800-222-1222</u>
MedCall:	MedCall Workcomp app or (855) 963-3225
State Police:	<u>(401) 444-1000</u>
Environmental Protection Agency:	<u>(401) 444-1000</u>
Health Department:	<u>(401) 222-5960</u>
Emergency Management Agency:	
North Providence	<u>(401) 231-1333</u>
Johnston	<u>(401) 757-3115</u>
Smithfield	<u>(401) 233-1033</u>
DigSafe:	<u>1-888-DIG-SAFE (344-7233)</u>

1.1 Objective

The purpose of this Site-Specific Health and Safety Plan (HASP) is to define personnel and remediation protection and monitoring protocols to be followed during remedial design and remedial action activities at the Centredale Manor Restoration Project (CMRP) Superfund Site (“the Site”) in North Providence, Rhode Island (“North Providence”). This HASP was prepared in general accordance with the requirements of 29 Code of Federal Regulations (CFR) 1910.120 and 1926. The requirements and protocols presented in this HASP were developed in order to protect workers and resident’s health and safety during investigation and remedial action activities. These requirements and protocols are applicable to Loureiro Engineering Associates, Inc. (LEA) (including Loureiro Contractors, Inc.) employees, subcontractors, and visitors. LEA personnel, subcontractors, and visitors will be informed of the Site emergency procedures and potential safety hazards involved with the anticipated activities. This HASP summarizes those hazards and identifies personal protective measures planned for this Site. This plan must be reviewed by personnel prior to entering the Site, and an agreement to comply with the requirements specified in the plan must be signed. Subcontractors will be solely responsible for the health and safety of their personnel and will prepare and enforce their own HASP, which will be, at a minimum, consistent with this HASP.

LEA is committed to create a safe working environment for not only on-site personnel, but the surrounding community as well. LEA is sensitive to the fact that sampling and remedial action activities will be conducted on residential properties and is committed to minimizing impact to residences. Any issues that could potentially affect residences will be handled with the utmost care and urgency.

It is anticipated that LEA's presence at the Site may range from brief visits of two hours or less to full-day-long visits over the period of several days. Anticipated activities will include advancement of soil borings to assess and sample subsurface soils, river sediment, and construction activities in support of remedial systems. A Site Plan of applicable work areas is presented in Appendix A.

2. EMERGENCY CONTACT INFORMATION

Emergency Medical Care:

Any incident that threatens life and/or limb and/or loss of consciousness of any on-site personnel will be considered an incident that requires emergency medical care. Emergency medical care will be provided by the North Providence Emergency Medical Services (EMS) or Ambulance (911) Fire Dept. (911), and Police Dept. (911). A full service hospital with an emergency room has also been identified below should the facility's medical services be required.

Non-Emergency Medical Care:

Any incidents that require non-emergency care (e.g. scrapes, bruises, sprain/strain, etc.), employees must follow LEA's Incident Reporting program:

1. Inform the Site Health and Safety Officer (SHSO) or designee of the injury
2. Contact MedCall for assessment of injury. The MedCall physician will instruct the injured employee to administer to first aid or will refer them to a walk-in clinic or emergency room.
 - a. An injury requiring first aid may be treated by the SHSO, or designee, with first aid training. A basic first aid kit is located in field vehicles and the field trailer and is maintained by the SHSO or designee on the Site.
3. Inform the Health & Safety Department regarding the incident.

2.1 Site Map with Directions to Hospital

Hospital: Our Lady of Fatima Hospital / North Providence / Rhode Island

General Phone: 401-456-3000

Emergency Phone: 401-456-3400

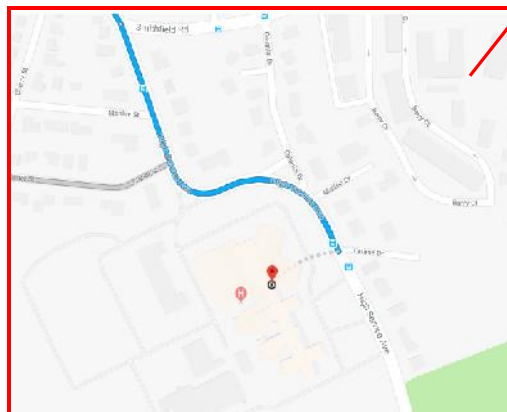
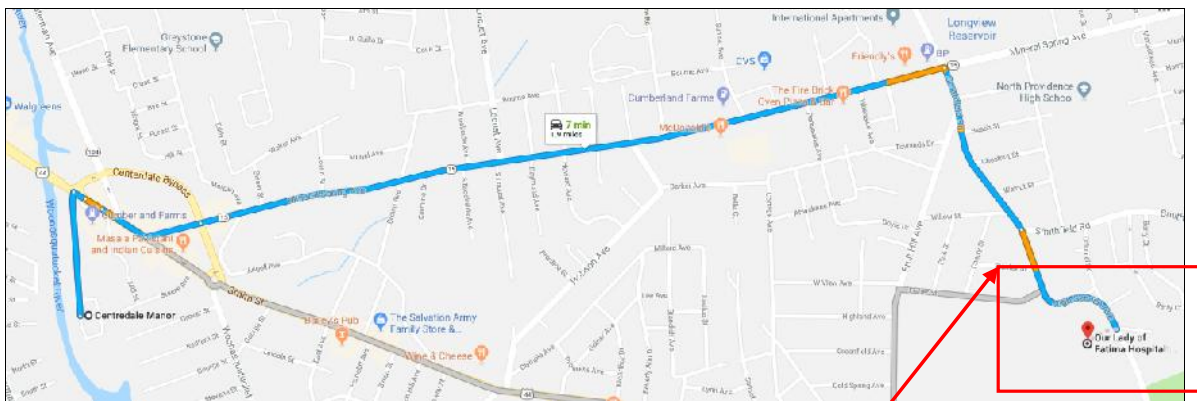
Total Driving Distance: 2.0 miles

From Centredale Manor (2072 Smith Street, North Providence, RI)

Estimated Driving Time: Approximately 7 minutes

1. Turn right onto Smith Street (0.15 miles)
2. Turn left onto Mineral Spring Ave. (1.2 miles)
3. Turn right onto Smithfield Road (0.3 miles)
4. Continue straight onto High Service Ave. (0.2 miles)

Arrive: 200 High Service Ave., North Providence, Rhode Island



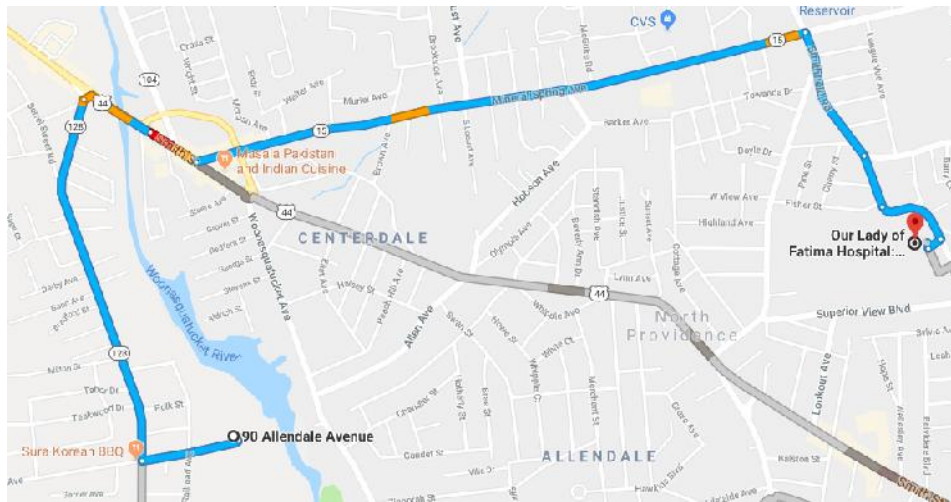
From Oxbow Area Parking Area (~90 Allendale Ave, Johnston, RI)

Estimated Driving Time: Approximately 9 minutes from Allendale Ave

1. Head southwest on Allendale Ave toward Railroad Ave
2. Turn right onto RI 128-N (0.7 miles)
3. Turn right onto US-44E (0.1 miles)

4. Continue onto Smith St (0.1 miles)
5. Turn left onto Mineral Spring Ave (1.1 miles)
6. Turn right onto Smithfield Rd (0.3 miles)
7. Continue straight onto High Service Ave (0.2 miles)

Arrive: 200 High Service Ave., North Providence, Rhode Island

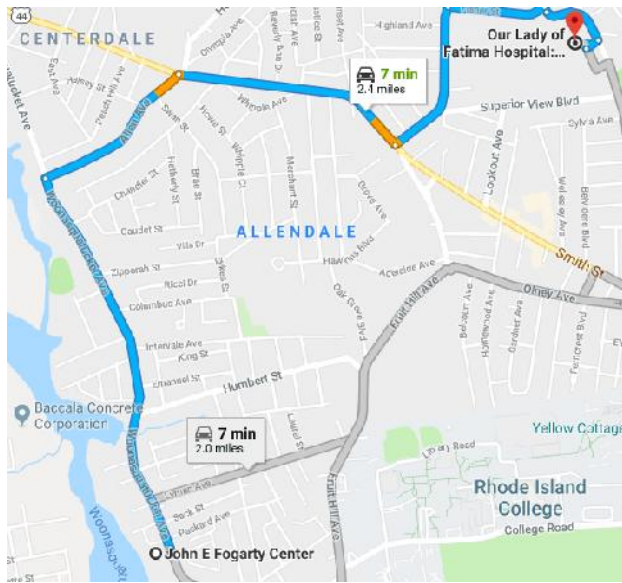


From Woonasquatucket Ave (Lyman Mill Dam or Allendale Dam)

Estimated Driving Time: Approximately 7 minutes from Allendale Ave

1. Head North on Woonasquatucket Ave (i.e. turn left)_____ (1.0-2.0 miles)
2. Turn right onto Fisher St (0.2 miles)
3. Turn right onto High Service Ave. (0.2 miles)

Arrive: 200 High Service Ave., North Providence, Rhode Island



3. SITE COMMUNICATION AND ORGANIZATIONAL STRUCTURE

The applicability of this HASP to each person or party is identified below. Discussion regarding the roles and responsibilities of each party is provided in Section 2.4 and a detailed project organizational chart is presented in Appendix B.

The Project Manager (PM), the SHSO, Construction Project Manager (CPM), and Superintendent work for and under the direction of LEA. All LEA personnel are subject to the requirements of this HASP. The LEA Health and Safety Manager (HSM) is responsible for the overall coordination of the Corporate Health and Safety Programs.

LEA Subcontractors are required to develop and operate under their own Contractor Health and Safety Plan (CHSP) as described herein, designate a SHSO as defined in project specifications, and are ultimately responsible for their own health and safety at the Site.

Visitors are subject to the requirements of this HASP.

The SHSO will be on-site while actively observing Site remedy and related construction activities and is responsible, as the PM's designee to validate and verify that the requirements of this HASP and all applicable CHSP's are being met. Additional information on the roles and responsibilities of each party is included in Section 2.4.

3.1 Stop Work Authority & Communication

All personnel maintain Stop Work Authority if conditions or actions are observed which the individual believes may not meet the requirements of this HASP or general safe work practices. Notification of the work stoppage shall be made immediately to the SHSO and communicated to the HSM, PM, or CPM as appropriate. LEA or the Subcontractor shall immediately modify the situation or action to maintain compliance with this HASP. Once such action is taken to the satisfaction of the SHSO, work may resume. Work shall not resume until unsafe act or condition is resolved.

Any person shall immediately communicate to the SHSO, PM, CPM or Superintendent any health and safety concerns as appropriate. The PM will make all necessary modifications to the HASP in consultation with the LEA HSM if any Site conditions change. Amendments to and reassessment of the HASP are to be conducted in accordance with Section 4.3 and recorded in Appendix C.

3.2 Signal for Emergencies

Three sustained blasts from an air horn. The emergency signal SHALL NOT be the same as other signals on the Site (e.g., blasting warning).

3.3 Routine Site Communication

Due to the relatively small size of the source area of the Site and the level of protection typically used, voice and hand signals will likely be sufficient for anticipated work activities. Hand signals are as follows:

<u>Signal</u>	<u>Definition</u>
Hands clutching the throat	Out of air/cannot breathe
Thumbs up	OK/I am all right/I understand
Thumbs down	No/Negative/I do not understand
Arms waving upright	Send backup support/need assistance
Grip buddy's wrist	Exit area immediately

Communication with off-site personnel will be conducted using mobile, hand-held telecommunication devices such as a cellular telephone or 2-way radios. Additional communication devices will be determined during the daily meeting depending on work task and location. Cellular telephone numbers for subcontractors or visitors will be provided to the SHSO or designee at the Site Safety Briefing.

3.4 Organizational Health & Safety Responsibilities

The organizational structure, responsibilities, and lines of communication for LEA personnel at the Site are as described below. A Project Organization Chart is provided in Appendix B. Subcontractors must provide their own specific organizational structure, responsibilities, and lines of communication within their CHSPs, which will be utilized in conjunction with this HASP. Subcontractors' organizational structure, responsibilities, and lines of communication will be reviewed with the SHSO or designee at the Site Safety Briefing.

Key project personnel and their responsibilities concerning Site activities are discussed below.

3.4.1 Engineer

Loureiro Engineering Associates is also referred to as “the Engineer” or “LEA” for the project. The PM, SHSO, CPM, Task Managers, Superintendents, LEA field sampling personnel, and the LEA HSM all work for the Engineer as presented below.

3.4.2 Project Manager

The PM represents the Engineer and has responsibility and authority to direct all LEA work operations, is directly responsible for the technical progress of project task elements, and the development of the overall Health and Safety program for the Site. The PM is David W. Payne. The PM, in consultation with the LEA HSM is responsible for approving modifications/addenda to this HASP. The PM also has final authority to suspend employees and subcontractors from field activities/site access for violation of provisions of this HASP. The responsibilities of the PM include, but are not limited to the following health and safety related items:

- J Development of the overall Health and Safety program for the Site with the PM and the HSM.
- J Coordinating development of HASP and required Addenda for new project tasks.
- J Overseeing and monitoring the performance of the SHSO, and bears ultimate responsibility for the proper implementation of this HASP.
- J Verification and validation that the requirements of this HASP are implemented and effective.
- J Review of subcontractors' CHSPs for compliance with the requirements of this HASP.
- J Verifying the availability, through the SHSO or designee, of emergency response personnel and medical support facilities.
- J Maintaining overall responsibility for response and corrective actions in the event of an emergency, an incident, or identification of a potentially unsafe condition.

3.4.3 LEA Health and Safety Manager (HSM)

The LEA HSM will review procedural changes and modifications to this HASP made by the PM and maintains final authority to resolve health and safety issues that are not resolved at the Site by project staff. The LEA HSM is Jordan Coleman. The LEA HSM will implement a system for regular recognition and reporting of job hazards, and will conduct periodic project hazard assessments as necessary and to support HASP or CHSP review activities. If an incident occurs at the Site that relates to staff health and safety, the LEA HSM will be notified of the incident within 24 hours.

3.5 Environmental Health & Safety Responsibilities

3.5.1 Site Health and Safety Officer

The SHSO is directly involved with the day-to-day activities at the Site. The SHSO works for and under the direction of the Engineer (LEA), and is subject to the requirements of this HASP. The primary SHSO is Seth D. Travis and the alternate SHSO is Jessica Tenzar. The SHSO's primary responsibility is to monitor personnel compliance with this HASP or the applicable CHSP, as appropriate. The SHSO or designee will assess the compliance of subcontractor operations with applicable health and safety requirements. If deficiencies are observed and the subcontractor does not correct them, the SHSO will notify the PM for resolution. All deficiencies and corrective actions will be recorded in the field log.

The SHSO will make recommendations for modifications to the HASP should any Site health and safety conditions change. These changes will be made by the PM and the LEA HSM. The SHSO reserves the right to stop work if a subcontractor's practices are deemed dangerous to human health, public welfare, safety, or the environment.

The responsibilities of the SHSO, as they pertain to work being performed by LEA, include the following:

-) Coordination of emergency response personnel and medical support resources.
-) Coordination of Site control and security.
-) Coordination of spill response measures.
-) Initiation of corrective actions in the event of an emergency, an incident, or identification of a potentially unsafe condition.
-) Implementation of corrective actions to control hazards that have been identified in the workplace.
-) Periodic inspection of general work conditions and implemented hazard controls.
-) Conduct or arrange for formal hazard assessments as necessary.

3.5.2 Task Manager

Responsible for allocation of resources for the implementation of the HASP; assignment of personnel who meet the medical and training requirements of the HASP; and allocation of resources to resolve health and safety issues identified during the performance of project tasks.

3.5.3 Field Sampling Personnel

LEA field sampling personnel are responsible for complying with this HASP, using the proper personal protective equipment (PPE), reporting unsafe acts and conditions, and following the work, safety, and health instructions of the SHSO.

3.5.4 LEA Subcontractor

A LEA Subcontractor is an individual, firm, or corporation that has entered into a contractual agreement with LEA to perform work at the Site. Some LEA subcontractors may be required to develop and operate under their own CHSP, at the discretion of LEA, if they are conducting work not covered in this HASP. All LEA subcontractor's CHSP are subject to the requirements of this HASP. A Site-specific orientation will be conducted by the PM or SHSO during the Site Safety Briefing prior to the onset of work.

LEA subcontractors shall comply with all applicable laws and regulations and shall take all necessary precautions for the safety of persons or property, or the protection of persons or property from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. LEA subcontractors shall provide competent persons, as needed whose duties and responsibilities shall be maintaining and supervising of safety precautions over their specific scope of work. LEA subcontractors must maintain documentation of employee training and participation in a medical surveillance program consistent with the requirements of their CHSP; copies of these documents must also be provided to the PM for project files upon request. Subcontractor personnel must participate in daily safety briefings coordinated by the SHSO or designee for their employees.

3.6 Construction Health & Safety Responsibilities

3.6.1 Construction Project Manager

The CPM provides management, oversight and coordination of remedial action operations. The CPM for this project is (TBD). The CPM will work closely with the PM to provide coordination of scheduling, technical, quality assurance and construction administration issues that may arise during the implementation of the work. The CPM will be responsible for validating and verifying that the Superintendent enforces the implementation of the HASP. In addition, the CPM responsibilities shall include the following:

-) Coordination of subcontractors

- J Ensure all established safety policies are administered and enforced in all areas through:
 - Reporting of near misses and incidents to Health & Safety .
 - Initiation of corrective actions in the event of an emergency, an incident, or identification of a potentially unsafe condition.
 - Implementation of corrective actions to control hazards that have been identified in the workplace.
 - Periodic inspection of general work conditions and implemented hazard controls.
 - Conducting or arrangement for formal hazard assessments as necessary.
 - Periodically assessing the compliance of subcontractor operations with applicable health and safety requirements.

3.6.2 Superintendent

Superintendents will work closely with the CPM during all phases of remedial action operations. Superintendents are responsible for coordinating subcontractors, material and equipment, ensuring that specifications are being strictly followed, and work is proceeding on schedule and within budget. Superintendents are responsible for enforcing the implementation of the HASP, which includes the following responsibilities:

- J Ensure that workplace safety practices are clearly communicated and understood by employees.
- J Ensure employees who fall under this program attend required safety training based on their role and/or the projects in which they are involved.
- J Work with Health & Safety during project pre-planning, as necessary, to ensure that all hazards are identified and addressed in the HASP or JHA.
- J Ensure work is conducted in a safe and responsible manner and in compliance with applicable regulations and site/project requirements.
- J Report near misses and incidents to Health & Safety.
- J Stop any work where unsafe and hazardous conditions exist. Refer to section 3.1 for complete information on the Stop Work Policy.

3.6.3 Foremen

A Foreman acts as a liaison between operators and laborers and Superintendents. A Foreman is the key person in charge of overseeing the completion of a certain remedial action operations, and must have a keen awareness of materials expenses, permits and other regulations, as well as employee safety. A foreman is responsible for the following:

-) Provide safe working conditions for all workers under their supervision.
-) Provide workers with instruction in safe work procedures. Foremen shall require employees to use personal protective equipment, as appropriate, as part of their routine duties, e.g., hard hats, goggles, masks, respirators, safety glasses or other items deemed necessary.
-) Correct work site conditions, which are liable to cause or have caused accidents.
-) Undertake the investigation of accidents, incidents, or near misses to determine the underlying causes. Report in detail to the Superintendent and complete the required report forms on a timely basis.
-) Provide a good example for employees by always directing and performing work in a safe manner.
-) Conduct regular inspections for unsafe practices and conditions and ensure prompt corrective action to eliminate causes of accidents.
-) Work in cooperation with other project supervisory personnel to determine safe practices, enforce their observance, develop procedures for dealing with violations and develop other general safety and accident prevention measures.
-) Provide each employee with information about the hazards of his/her job and how to avoid them.
-) Maintain housekeeping standards and assign definite cleaning and organizing responsibilities to individuals.

3.6.4 Operators and Laborers

Operators and laborers work under the supervision of a Foreman. Operators and Laborers are responsible for the following:

-) Carry out their work in a manner that will not create a hazard to their own safety and health or the safety and health of other employees.
-) Assist Foreman or Superintendent to reduce and control unsafe conditions and acts on the work site.
-) Report any incidents and / or injuries immediately to their Foreman.

3.7 **Visitors**

A visitor is a person or group of persons who must be accompanied at all times by the SHSO or designee. Visitors are subject to the requirements of this HASP.

All visitors must attend a Site Safety Briefing upon their first visit to the Site and daily safety briefings as described in Section 5. Visitors may include client/owner representatives, United States Environmental Protection Agency (EPA) officials or representatives, Rhode Island Department of Environmental Management (RIDEM) officials or representatives, Utility Workers, North Providence representatives, Johnston, Rhode Island (“Johnston”) representatives, or any other individual either directly or indirectly related to the objectives identified in Section 3 of this HASP. The SHSO or designee will accompany visitors at all times. If visitors intend to enter a designated exclusion zone, they must meet all of the training and medical surveillance requirements and have the personal protective equipment required by this HASP according to their task and level of exposure for that work zone. Applicable documentation of visitor training and medical surveillance will be provided by the escort and maintained by the SHSO or designee.

4. SITE DESCRIPTION AND SCOPE OF WORK

4.1 Site Background

The Site is located at 2072 and 2074 Smith Street (Route 44), North Providence, Providence County, Rhode Island (Figure 2-1). The Site encompasses parts of two Rhode Island towns, North Providence and Johnston, and free-flowing reaches and impoundments of the Woonasquatucket River (“the River”). The main part of the Site, which is referred to as the Source Area, consists of approximately nine acres on the eastern shore of the River, just south of Route 44 in a densely-populated area of downtown North Providence. The entire Site extends down the River from the Route 44 to Lyman Mill Dam with the River centerline being the North Providence/Johnston municipal boundary as shown in Drawing 2-1. The Site consists of all contaminated areas within the River, its impoundments, and floodplain, as well as any other location to which contamination from that area has come to be located, or from which that contamination came.

A chemical manufacturing plant and an incinerator-based drum reconditioning facility operated in the Source Area until early 1970s. High levels of contamination found at the Source Area are consistent with evidence of past disposal and releases. Chemicals were released directly to the ground and wetlands, buried, and discharged directly into the River. Direct infiltration of chemicals and leaching led to contamination of surface and subsurface soil and groundwater contamination. These discharges, along with erosion and transport of contaminated Source Area soil by surface runoff and during flooding, resulted in contaminant migration into surface water and sediment in the adjacent River and its floodplain downstream from the Source Area of the Site. Contaminated sediments have accumulated in fine-grained depositional impoundments, primarily the Allendale and Lyman Mill Ponds (collectively, “the Ponds”) and the Oxbow area.

A majority of the vadose zone soil (average thickness of vadose zone in the Source Area is about 5 feet) is impacted with dioxin, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), pesticides and metals. The contamination is spread throughout the Source Area with much of the contamination located in the central and southern portions of the Source Area that are paved or have interim caps.

The uppermost foot of the Allendale and Lyman Mill Pond sediments is most significantly impacted by dioxin and to various extents by PCBs, pesticides and other compounds. The investigations show that sediments scoured during the high-flow events are re-deposited within each pond and the Oxbow Area. Based on geophysical data, depth to water reaches a maximum

of approximately 8.5-feet in Allendale Pond and approximately 9-feet in Lyman Mill Pond, with maximum sediment thicknesses of approximately 8.5-feet in Allendale Pond, and 10-feet in Lyman Mill Pond.

4.2 Remedial Design Scope of Work

In accordance with the Statement of Work (SOW), a series of pre-design investigations (PDI) and design-related activities are to be undertaken to support the remedial design (RD). These investigations include field investigations, information gathering, studies, evaluations, and modeling. These investigations include fieldwork that requires a site-specific HASP in order to provide protection to on site personnel and area residents from physical, chemical, and all other hazards. Primary work tasks include:

-) Advancement of soil borings in the Sources Area.
-) Installation of temporary and permanent groundwater monitoring wells within the Source Area and collection of groundwater samples.
-) Advancement of soil borings in the floodplains surrounding River, Greystone Mill Pond, Allendale Pond, Lyman Mill Pond, and within the Oxbow Area.
-) Collection of sediment samples within the River, Greystone Mill Pond, Allendale Pond and Lyman Mill Pond.

Soil borings and monitoring wells will be advances through direct push drilling methods and hand auguring. Sediment cores will be advances through vibracoring methods. Vibracore samples will be collected from floating barges where there is adequate draft and by hand methods in shallow areas where barges cannot access and are safely accessible.

4.3 Remedial Action Scope of Work

In accordance with the SOW, a series of remedial actions will be conducted following the PDI and design-related activities. Primary work tasks include:

-) Identification and relocation of existing utilities that may be in conflict with proposed remedial action locations.
-) Construction of a soil cap in source area
-) Development of a sediment treatment facility

-) Sediment remediation and reconstruction of the Woonasquatucket River, Greystone Mill Pond, Allendale Pond and Lyman Mill Pond.

4.4 **Surrounding Population**

The Brook Village and Centredale Manor apartments occupy the northern part of the Site (Source Area), bordered by the River. This area is currently occupied and covered by buildings, pavement, landscaping, and interim soil caps. The apartments are home to approximately 335 elderly residents with varied levels of assisted living needs. The land use on the east side of the River in North Providence is primarily residential, with some commercial and light industrial properties. The west side of the River in Johnston is characterized by mixed residential, commercial and industrial use. Reasonably anticipated future uses of adjacent land along the River are expected to remain the same but with increased recreational access and uses.

5. **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

When engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, PPE can be vitally important and useful. Occupational Safety and Health Administration (OSHA) has several regulations on PPE (29 CFR 1910.132-139 and 29 CFR 1926.95-102) that will be followed by personnel covered by this HASP. This section also doubles as the OSHA-required written certification of PPE hazard assessment. See the HASP approval page for required date and the name of certifier.

The following table outlines the PPE requirements and acceptable modifications to those requirements based on the applicable work activity being conducted.

Table 5- 1: PPE Requirements

PPE Level	
PPE Required	Applicable Work Activities
Level D Work Uniform:	
<ul style="list-style-type: none">) Sleeved shirts and long pants) Composite or Steel Toed Boots with socks) Hard Hats) Safety glasses) Type R Class II Rated Reflective safety/traffic vest 	All Site work activities
Level D Modifications:	
<ul style="list-style-type: none">) Disposable nitrile gloves) Tyvek® or equivalent coveralls if particulate hazards only are present 	Handling of contaminated sediment, soil, water, and other media sampling activities;
<ul style="list-style-type: none">) Hearing protection devices (HPDs) 	Conducting drilling, direct push, and any other work within near vicinity of excavation or other heavy equipment.
<ul style="list-style-type: none">) Rubber waders or boots 	Sediment or surface water sampling or gauging
<ul style="list-style-type: none">) U.S. Coast Guard Approved Personal flotation device (PFD) 	Sediment or surface water sampling or gauging on, over, or near water greater than 2 feet deep.
<ul style="list-style-type: none">) Tick prevention spray or clothing 	Conducting activities in overgrown areas of high vegetation or brush.
<ul style="list-style-type: none">) Cut-Resistant Gloves 	See Job Hazard Analysis's (JHA's) (Appendix H) for specific tasks that require the use of cut-resistant gloves
<ul style="list-style-type: none">) Work Gloves 	See JHA (Appendix H) for specific tasks including moving drums and brush clearing/handling
<p>The use of respirators is not anticipated at this Site. Any respirator work, required or voluntary, will not be done without prior approval of the SHSO and PM in consultation with the HSM. If Level C is determined to be required for work, a project specific respiratory protection program will be drafted and appended to this HASP. Any respirator work will be completed in accordance with OSHA regulations 29 CFR 1910.134.</p>	

6. ENGINEERING CONTROLS:

When accessing the river down steep embankments a ladder or equivalent mechanism will be used to allow personnel to safely enter and exit the river. The ladder shall be anchored into the river sediment and tied off at the top to a ballast to prevent it from sliding or dislodging.

7. MEDICAL MONITORING AND TRAINING REQUIREMENTS

7.1 Medical Monitoring Requirements

LEA personnel who perform on-site activities where there is potential for exposure to hazardous substances must have completed a medical monitoring examination no earlier than 12 months prior to commencing these Site activities. The examination must comply with requirements specified by 29 CFR 1910.120 (f). A certification, signed by a medical doctor, must indicate work limitations placed on the individual. The certification must also specify that the individual is capable of working while wearing respiratory protection equipment. The certification must be in the corporate health and safety file before the individual may begin on-site activities. Similar medical monitoring will be required for subcontractors who will be performing on-site activities.

7.2 Training Requirements

Personnel and subcontractors who perform activities where there is potential for exposure to hazardous substances must have completed an initial 40 hr. Hazardous Waste Operations and Emergency Response (HAZWOPER) course, three days of supervised field experience after initial training, and an annual refresher course, within 12 months prior to the beginning of Site activities. The HAZWOPER training must comply with requirements outlined in 29 CFR 1910.120 (e). A certificate indicating successful completion of this training must be in LEA's project file for LEA personnel and in the subcontractor's file their own personnel before the individual may begin on-site activities. Subcontractors will be responsible for their own employees and subcontractors adherence to OSHA requirements.

Other health and safety related training includes HAZWOPER 8-hour Supervisory Training for the PM, SHSO, HSM, or anyone with on-Site supervisory or management responsibility related to health and safety as specified in this HASP or a subcontractor's CHSP.

LEA personnel working on-Site may also have the following health and safety related training:

-) OSHA 10-hour Construction,
-) OSHA 30-hour Construction
-) Excavation and Trenching
-) Silica Awareness
-) Personal protective equipment (PPE),
-) Hazard communication,
-) First aid and cardiopulmonary resuscitation/ automated external defibrillator

- (FA/CPR/AED),
-) Use of fire extinguishers only by trained personnel,
 -) Use of site monitoring equipment,
 -) Drill rig and heavy equipment operation, and
 -) Watercraft operation licensing/certification (if applicable)

Documentation of LEA training for hazardous waste site work is kept at the Site and maintained by the PM or SHSO.

The SHSO will hold daily meetings with field personnel before work commences to discuss daily safety issues. During the meeting, personnel working on-site will be provided access to this HASP. The HASP will be reviewed and discussed and questions answered. Personnel who will work on-site will sign this HASP or their own HASP to indicate that they have reviewed and understand Site conditions and agree to comply with HASP requirements. The Site HSO will record the daily meetings on the attached form entitled Daily Safety Meeting Form in Appendix D.

8. AIR MONITORING

8.1 Monitoring Equipment

All instruments must be validated to calibration standards at least daily or more frequently if required by the manufacturer, and must be in good working order. The following direct measurement field monitoring instruments may be utilized at the Site for continual and periodic monitoring:

-) A photoionization detector (PID) equipped with a 10.6 or 11.7 electron volt (eV) lamp will be used to monitor VOC vapors in ambient air and headspace screening during work activities. A flame ionization detector (FID) may act as a substitute for a PID.
-) A multigas meter measuring for oxygen, lower explosive limit, hydrogen sulfide, and carbon monoxide should be used during certain work activities (drilling, etc.).
-) A dust meter (DustTrak or equivalent) should be used during certain intrusive and ground-disturbing project activities. Dust levels will be evaluated and dust mitigation procedures enacted if necessary.

8.2 Work Area and Personal Air Monitoring

Ambient air temperature will be monitored periodically and, if warranted based upon temperatures within the hazardous range as described in this HASP, work periods will be adjusted to provide adequate rest and cool down or warm up periods for personnel. Personnel will be checked periodically for symptoms of heat or cold-related problems. Along with air temperature, VOCs, multi-gas, and dust in ambient air will also be recorded using an air monitoring log presented in Appendix E.

Based on the level of known contaminants likely to be encountered during activities included in this HASP, personal air monitoring is not expected to be required for the protection of LEA employees. Task specific personal air monitoring may be required if the hazard analysis or results of work zone air sampling indicate that contaminants may be present at concentrations approaching the permissible exposure level.

8.2.1 VOCs

Ambient air will be monitored for VOCs during intrusive soil activities at the Site. Personal air monitoring, using a PID, will be taken in the breathing zone of employees while conducting certain Site activities (i.e. direct-push drilling, hand augering, sample collection). Note, monitoring will not be conducted during groundwater sampling.

8.2.2 Multi-Gas

Personnel doing intrusive work (e.g. direct-push drilling) or working in closed-in or low lying areas will utilize instruments that measure for oxygen deficiency and lower explosive limits on a continuous basis.

8.2.3 Dust/Airborne Particulates

Planned activities are not expected to cause off-Site migration of contamination or result in field personnel's exposure to significant concentrations of Site contaminants. The most likely route of exposure to hazardous chemicals on this Site is direct contact or inhalation of contaminated dust. EPA has established a National Ambient Air Quality Standard for PM-10 (particles less than 10 micrometers in diameter) of 0.150 milligrams per cubic meter (mg/m^3) over a 24-hour period. If dust generating activities are to occur in areas of known contaminant impacts, a more conservative action level will be established based on the OSHA permissible exposure limit (PEL) or other established threshold limits (e.g. National Institute for Occupational Safety and Health [NIOSH] recommended exposure limit [REL] or American Conference of Governmental Industrial Hygienists [ACGIH] threshold limit value [TLV]) for the primary contaminant of concern within that area.

Soil borings will be completed utilizing a direct push drilling rig and hand auger, which limits the potential for dust generation. A light water spray may be used to keep dust down (as weather conditions require) in certain sections of the Site, as determined by the SHSO. The spray will reduce the possibility of contaminated dust drifting off-Site. Weather and soil conditions will be evaluated daily by the SHSO.

Downwind readings will be taken and recorded during site operations at the Site boundary to ensure fugitive dust is not generated during mechanical disturbance of on-site soil. At least one monitoring device will be deployed in close proximity to the residential complex. If there are sustained levels of dust for 15-minutes or greater where the real-time particulate counter

measurements are 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or greater, dust suppression techniques will be employed.

8.3 Air Monitoring Action Levels

An action level of a sustained reading above background total VOCs will be used for ambient air screening during investigation and sampling activities. If sustained readings above 5 parts per million (ppm) total VOCs are identified in the breathing zone, workers are instructed to stop work and contact the task manager, PM, and the HSM to discuss options for continuing work. Likely remedies would include engineering controls or upgrade to Level C. See the Air Monitoring Action Levels table within this section for details on air monitoring requirements.

Oxygen levels measured lower than 19.5 percent shall be considered oxygen deficient and unsafe to breathe. A supplied air device will be required if O_2 levels fall below 19.5 percent on the multi-gas monitor. If the oxygen level remains at or below the 19.5 percent minimum, for a sustained period, personnel will be instructed to withdraw from the area to discuss options.

If particulates (such as dust) are present in the air, work will be stopped and dust control measures such as wet methods will be implemented. If action level cannot be met or if continuous visible dust is observed regardless of the reading, the work will cease and the PM or HSM will be contacted for direction.

If the presence of explosive gas is observed above 10 percent of the lower explosive limit, equipment capable of producing sparks or flames will not be used and workers will evacuate the area to allow the explosive conditions to dissipate before returning.

If noise levels from earth-moving equipment or other activities on-site (such as drilling equipment) are expected to be above 80 decibels (dB), hearing protection will be worn and work will be conducted in accordance with local town ordinances.

Air Monitoring Action Levels

Instrument	Concentration Expected	COC & Action Level	Action
PID (with 11.7 eV lamp)	Background readings below action level	PID > 5 ppm sustained for more than 2 minutes average	Back-off and ventilate until readings have reached background or zero.

Instrument	Concentration Expected	COC & Action Level	Action
		If > 5 ppm sustained average cannot be reduced.	Stop work and back off to an upwind location. Assess for implementation of controls (cover source, ventilate, remove source, etc.). Contact PM or HSM for direction.
Multi-gas Meter (O ₂ , LEL)	Background readings below action level	Oxygen < 19.5% ->23.5% LEL < 5 %	<p>Stop work and back off to a safe upwind location. Do not commence work until atmospheric levels are controlled to within safe limits. Assess for implementation of controls (cover source, ventilate, remove source, etc.).</p> <p>If action levels cannot be met, cease work and notify the PM or HSM for direction.</p>
Dust Level Meter	Background	> 0.150 mg/m ³ above background levels or as determined by the project work plan for areas of known contamination	<p>Stop work and implement dust control measures such as wet methods.</p> <p>If action level cannot be met or if continuous visible dust is observed regardless of the reading, the work will cease and the PM or HSM will be contacted for direction.</p>

9. SITE CONTROL

SHSO or designee will control access to the work areas. A Site Plan, provided in Appendix A, denotes those work areas which only authorized personnel will have access to for the purposes of performing remedial action work tasks.

The locations of work zones will be included as part of the daily safety briefings. Many typical small tasks will have minimally sized zones. However, larger project tasks, such as excavation of contaminated soils and sediment, may require larger delineated work zones. Additional figures depicting these work zones for new work scopes will be included in future addendums to this HASP or in the applicable project work plans (e.g. Quality Assurance Project Plan [QAPP], etc.). Decontamination lines (if necessary) for heavy equipment, small equipment and personnel will be established based on the location of the work activity and the potential to spread contamination. Refer to Table 9-1 below for estimated work zone sizes for each specified task.

Table 9- 1: Work Zone Sizes

Task	Total Estimated Work Zone Size
Groundwater Sampling	Approximately 3-foot radius around the well-head
Soil Boring Advancement / Monitoring Well Installation	Approximately 10-foot radius around heavy machinery (e.g. Direct-Push rig)
Sediment Sampling	No Radius if sediment sampling from a vessel
Surface Water Sampling	Approximately 10-foot radius around each sampling areas
Site Reconnaissance	Entire Site
Soil Sampling	Approximate 3-foot radius around each hand sampling equipment

9.1 Work Zones

9.1.1 Support Zone

Support activities, such as deliveries, preparation of Site activities and meetings with personnel unauthorized to enter work zones will be performed within the designated Support Zone. The Support Zone is located a safe distance away from work activities at the Site. The exact location of this zone will vary depending on where the work is being performed at the Site, but should remain at least 20 feet away from the Work Zone.

9.1.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) will be identified by the PM, SHSO, Task Manager or designee and will be adjacent to, but separate from, the Support Zone. The CRZ will be determined daily and will be located between the work zone and support zone. Final decontamination of personnel and equipment will take place within the CRZ, as necessary, to minimize the relocation or spreading of impacted materials. Certain initial decontamination activities, such as removal of large quantities of debris from equipment, will be performed within work zones to the extent practicable to minimize the amount of material brought into the CRZ. Site workers must enter and leave through the CRZ. Entry into and out of the CRZ will be tracked in field paperwork.

9.1.3 Exclusion Zone

The Exclusion Zone (work area) will depend on the type of work being performed. Localized Exclusion Zones will include the immediate vicinity of excavation activities. Persons not directly involved in the Site activities will be required to remain at a certain distance away from the perimeter of an established Exclusion Zone (see Table 9-1).

9.2 Use of Buddy System

The buddy-system ensures that no person works in or visits an area with high hazard conditions as established by the PM. “High hazard conditions” could include temperature extremes, higher chemical concentrations, dangerous wildlife, dangerous topography or walking conditions, working in, on or around water, and severe weather. When working in a “buddy-system required” area, persons are paired and must always be in close proximity of each other. If one person has to leave the high hazard work area for any reason, both persons must leave. The

SHSO or designee will coordinate the implementation of the buddy system at the Site. Tasks requiring the use of the buddy system are identified in the respective JHA.

9.3 **General Site Security**

All personnel entering the Site are required to use the sign in/out log located in the field office (See Appendix F). A sign posted with a contact name and number will be located in the field office so that all visitors will be able to inform the SHSO or designee of their arrival to the Site. The following site security measures may be employed for the site:

-) Cones, stakes, and flagging,
-) Barrier tape,
-) Orange “snow” fencing, and/or
-) A combination of above options.

Site security will vary with the type of work or task being conducted.

10. DECONTAMINATION MEASURES

Decontamination of non-disposable PPE and equipment will reduce or eliminate exposure to the community and personnel. Therefore, CRZs for each work area throughout the Site will be established by the SHSO or designee to limit the possibility of contamination outside the work area. If the work is mobile in nature, the decontamination zone will be determined and established by the SHSO or designee at the beginning of each workday.

A decontamination line for personnel and equipment shall be established if the work to be completed at the Site has the potential for contaminating equipment or clothing.

10.1 Disposable PPE

Disposable items (outer cover boots, gloves, etc.) that become contaminated will be segregated transported to the Staging Area for transfer into an open top 55-gallon steel drum.

10.2 Decontamination of Non-Disposable PPE and Equipment

PPE (boots, chemical resistant gloves, etc.) and equipment (heavy equipment, hand augers, etc.) that may have contacted affected media must be decontaminated. Actual decontamination procedures will ultimately depend upon the level of protection employed, field screening results, and the results of ambient air monitoring. General decontamination procedures are described in LEA Standard Operating Procedure (SOP) 10065 *Decontamination of Sampling Equipment* provided in the QAPP. Typical decontamination procedures for the anticipated work levels are summarized below.

Level D: segregated equipment drop and decontamination in the decontamination zone; boot and glove wash/rinse if in contact with impacted media.

Modified Level D: segregated equipment drop, boot and glove wash/rinse, boot removal, Tyvek suit removal, outer glove removal, field wash.

Cleaning Solution: mixture of Alconox or liquinox and potable water.

Rinse: potable water.

Other methods/additional requirements: Hexane for PCB contamination followed by potable water rinse.

10.3 **Personal Hygiene and Sanitation**

Hands and face will be thoroughly washed before eating, smoking, drinking, chewing gum or tobacco.

When possible, avoid contact with contaminated materials.

Temporary support facilities such as wash facilities, eating areas, changing areas, and portable toilets will be located in the Support Zone. This area will remain “clean” and free of contamination.

An adequate supply of potable water will be provided to the employees working at the Site. Bottled drinking water or clearly labeled potable containers will be used to dispense drinking water. Containers will be cleaned at the beginning of each day. The containers will be equipped with taps to access the water. Clean disposable cups will be provided daily.

Portable toilet facilities will be provided on-site for employees and will be located in the Support Zone.

Eating, drinking, smoking, chewing gum or tobacco, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited during construction activities except in designated eating or smoking areas outside the Exclusion and Contaminant Reduction Zones. LEA employees, subcontractor employees, and authorized visitors are required to thoroughly decontaminate themselves prior to entering the Support Zone.

11. EMERGENCY RESPONSE PLAN

LEA employees will only be able to respond to incidental releases at the Site. Incidental releases can be absorbed, neutralized or otherwise controlled at the time of release by employees in the immediate release area. MSDSs will be onsite and clearly labeled with a contact list posted in the trailer.

LEA employees are not permitted to assist in handling an “Emergency Response” of an uncontrolled release of a hazardous substance at the Site, nor are these types of incidents anticipated based on the Scope of Work for this phase of the project. Incidents involving the release of uncontrolled hazardous substances, which elicit an “emergency response”, include:

-) High concentrations of toxic substances,
-) Situation that is life or injury threatening,
-) Immediately Dangerous to Life and Health (IDLH) environments,
-) Oxygen deficient atmosphere,
-) Condition that poses a fire or explosion hazard,
-) Situation that required an evacuation of the area, and
-) Situation that requires immediate attention because of danger posed to employees in the area.

Since LEA employees are not permitted to assist in handling an emergency, this section will comply with 29 CFR 1910.38 and will serve as the Emergency Action Plan.

In the event of an exposure, incident, injury, or fire, the following general procedures are to be followed by all personnel.

If an emergency is immediately dangerous to life and/or limb, the SHSO or designee will call 911 immediately and provide information that describes the location of the emergency to assist local Johnston or North Providence Ambulance, Fire, and Police response. Following notification to emergency response personnel and implementation of the actions described below, the SHSO will notify the PM and HSM as soon as possible.

11.1 Evacuation and Emergency Response

In the event of an emergency, immediately notify the SHSO.

The signal to evacuate is three (3) sustained blasts on the air horn. The air horn is located in the site office. In the event that access to the air horn is not available, signal site workers using any methods available. Note that the emergency signal cannot be the same as other site signals, e.g., blasting warning.

The evacuation assembly point for the Site is located at the corner of the Centredale Manor driveway and Smith Street (See Appendix A).

If you are in the exclusion zone, proceed to the access corridor of the CRZ for further instructions.

Following evacuation, the SHSO will perform a head count, using the logbook, to account for all personnel who entered the site.

11.2 Fire or Explosion

In the event of fire or explosion, the incident will be immediately reported to the SHSO. The SHSO or designee will immediately notify the local Fire Department (911).

Incipient Fire Response: An incipient stage fire is generally defined as a fire in its beginning stage that can be controlled with portable fire extinguishers. Fire extinguishers may then be used for incipient stage fires by **trained personnel only**. Otherwise, evacuate!

11.3 Chemical Spills and Leaks

Personnel must report any chemical spills or leaks to the SHSO.

11.3.1 Incidental Spills

Should a spill or leak (e.g., gases, vapors, dusts, liquids, solids, or any other hazardous materials) be incidental in nature, the person observing the spill will:

-) Identify and stop the source of the leak; if safe to do so.
-) Notify the SHSO for assistance.

-)] Contain spill with oil absorbent pads or booms.
-)] Properly dispose of used or saturated absorbents.
-)] If the spill occurred on a waterbody, do not use soaps or detergents on a spill. Not only is it illegal, it makes the situation worse. While the oil seems to disappear, the soap allows it disperse throughout the entire water column, making it harder to remove, contaminating sediment and affecting organisms.

11.3.2 Emergency Spills

If a spill or leak that occurs is an emergency, which may threaten the environment or human health, the person observing the spill will:

-)] Evacuate or request evacuation of all people at risk or shelter-in-place (SIP).
-)] Inform the SHSO, who shall inform the PM.
-)] The PM shall follow all emergency response and reporting procedures in section 4.4 of the Statement of Work, dated June 2018, which requires LEA immediately inform the EPA Project Coordinator of the spill of waste material.

The decision as to whether to evacuate or SIP is an important one. Factors affecting the decision include the following (refer to the Department of Transportation's [DOT's] Emergency Response Guidebook [ERG] and the chemical Safety Data Sheets [SDSs] in Appendix I for more detailed information):

-)] Hazardous material(s) released (degree of hazard, amount, containment/control, and rate of vapor movement),
-)] Population Threatened (location, number of persons, available time, ability to control the process, building types and availability, and special institutions/populations [day cares, schools, hospitals, nursing homes, prisons, etc.]), and
-)] Weather conditions (effects on vapor and cloud movement, potential for change, and effect on the process).

The SHSO or designee will contact the appropriate Federal, State, or Local agencies in the event of a chemical emergency. These typically include the following:

-) Local police and fire departments,
-) State Police,
-) RIDEM,
-) Local Health Department,
-) National Response Center (NRC) (if reportable above the Reportable Quantity [RQ]), and/or
-) Others as applicable.

11.4 **Man Overboard – Person in Water (PIW)**

Employees walking or working on deck must wear a U.S. Coast Guard-approved life jacket or buoyant work vest, also called a life preserver or personal flotation device (PFD). These PFDs should be fully buckled, snapped, or zipped whenever there is a hazard of falling into the water, regardless of the size of the barge.

Barges should be inspected by employers on a regular basis and as necessary, to prevent problems related to missing equipment, hazardous working surface conditions, and mechanical failures that could contribute to falls overboard. For example, inspections should check for missing or damaged PFDs, missing lifelines, and burned-out lights.

The following are general man overboard procedures:

1. Prevention
 - a. Ensure lifelines are up and in good condition.
 - b. Keep decks clear of trip/slip hazards.
 - c. Ensure work is not done during inclement weather.
2. First Sighting
 - a. Spread the alarm in a loud voice by repeatedly calling out, “MAN OVERBOARD!” It is also very important to shout out the location the person fell overboard (port/starboard side, the bow, the stern).

- b. Maintain sight of, and continuously point (open handed) to the individual in the water while carefully moving to a position in sight of the operator. Give clear, loud verbal directions as well as the condition of the PIW (conscious/unconscious, injured, etc.) to the operator.

3. Operator Actions

- a. Once the alarm has been sounded, the operator has several tasks to complete in order to successfully recover the PIW. Though a quick recovery is preferred, at times it is better to slow down, assess the situation, and ensure everything is done properly the first time. It is always better to make a correct approach slowly and recover the person on the first attempt rather than an incorrect fast approach resulting in the need for a second try.

4. Maneuvering boat to recover PIW

- a. If someone falls overboard, the boat may have to be maneuvered for a pickup. In most cases, it starts by turning in the same direction the person fell overboard. Turning towards the same side the person fell overboard will “kick” the stern away preventing the propellers from injuring the PIW.
 - i. The operator should carry out the turn at a safe speed to ensure a more stable platform for the recovery crew.
- b. In some cases, turning the boat is not possible due to vessel traffic or a narrow channel. In these cases, slowing down and stopping are other options.

5. Deploying floatation device

- a. If at any time the crew loses sight of the PIW, the operator should ensure a ring buoy with strobe light (or anything that floats) is thrown over the side. This flotation device will serve two purposes. First, the PIW may see the flotation device and be able to get to it increasing their chances of being located and providing additional flotation. Second, the ring buoy or any floating object thrown over the side (if a ring buoy is not available) serves as a reference point (datum) marking the general location of the incident and for maneuvering the boat during the search for the PIW. **Do not throw the floatable object(s) directly at the PIW. It could cause injury if it hits the individual.**

- b. Once a crew member is retrieved, have them get out of their wet clothes and into dry clothes. If it is during the colder months, have the individual placed in a warm area and examined by medical staff.

11.5 **Incident Reporting**

All personnel on this site must immediately report near misses, injuries, and illnesses to the SHSO. If the injury or illness is a result of, or could result in, a chemical exposure, the SHSO will report it and take appropriate action to prevent further exposure. The HSM must be contacted as soon as possible for any incident resulting in off-site medical treatment, hospitalization or fatality.

Following an incident, a First Report of Incident Form (found in Appendix G) will be completed by SHSO. The HSM will be notified of the incident and supplied with a copy of the Incident Report within 24 hours of the incident.

In the event of a hazardous material spill or chemical release above the reportable quantity, the appropriate federal and state agencies will be notified by the PM or SHSO.

12. SPILL CONTAINMENT MEASURES

Although anticipated activities should not warrant spill containment measures, incidental “spillable” quantities of chemicals may be present. Spillable quantities of chemicals such as acids and solvents are not anticipated to be utilized during decontamination activities. However, if such chemicals in quantities greater than one-gallon are stored at the Site, these chemicals will be stored within protective lockers based upon their specific chemical hazard and secondary containment will be implemented to avoid spills. Specific chemical handling and management procedures for Investigation Derived Waste (IDW) are described in the Field Sampling Plans (FSPs).

Gasoline, diesel fuel, hydraulic oils, and oil used in heavy equipment may constitute a “spillable” quantity. Spill containment equipment will be stored at the Site by LEA or the LEA subcontractor in order to immediately respond to a spill.

A minimum of spill containment equipment to be stored on-site will include the following:

- J Absorbent material (such as speedy dry): 5 gallon bucket volume,
- J Absorbent hazmat spill socks: 4 – 8 to 10 foot lengths,
- J Nonabsorbent booms (for use on water): 4 – 10 foot lengths,
- J Absorbent pads: 1 standard bundle/package of hazmat spill pads,
- J 1 - Long handled shovel, and
- J 1 - 55-gallon drum (removable top) for collection of contaminated spill material – drums retained shall be compatible with the wastes it is intended for (i.e. plastic drums shall be available for corrosive wastes etc.) this will be evaluated by the PM.

The party responsible for the equipment in the event of a gasoline and/or oil spill should follow the following containment procedure:

Carefully contain and stop the source of the spill, if safe to do so. Protect nearby bodies of water and drains by diking, use of absorbents, or absorbent boom. Do not flush down sewer or drainage systems. Prevent contact with ignition sources or areas/equipment that requires protection. Apply sand or absorbent materials to the spill to prevent continued spread of the liquids. Carefully shovel, scoop or sweep into a compatible waste container for reclamation or disposal -

caution, flammable vapors may accumulate in closed containers. Ensure contaminated spill materials are properly disposed per state and federal requirements.

13. **CONFINED SPACE ENTRY**

Confined Space Entry (CSE) can be very hazardous work and will be avoided whenever possible. LEA’s CSE Program complies with the U.S. OSHA standard, 29 CFR Part 1910.146, Permit-Required Confined Spaces (PRCSs). CSE is not anticipated at this site. LEA employees are trained to recognize and identify confined spaces, but shall not enter or work in a confined space without additional proper training, backups, and requisite supplies and equipment. If CSE is determined to be required, modifications to this HASP will be made by the PM in consultation with the HSM prior to initiating entry.

14. HAZARD ANALYSIS

Based on the scope of the project covered under this HASP, the probability and severity of loss from exposure to hazards at the Site is Moderate. The physical hazards and chemical hazards anticipated for this project are outlined in Section 14.1 and Section 14.2, respectively. Hazard Controls are detailed in Section 14.3.

Detailed JHAs for tasks anticipated to be conducted during this scope of work are presented in Appendix H.

14.1 Physical Hazards

-) Cold Stress
-) Driving
-) Ergonomics (twisting, static movement, repetitive motion)
-) Flora and Fauna
-) Heat stress
-) Heavy Equipment Operation and Handling
-) Inclement weather
-) Laboratory Glassware (chemical hazard)
-) Materials Handling and Storage (drums and coolers)
-) Power Tool Operation
-) Slips, Trips, Falls (Uneven walking surfaces)
-) Underground / overhead utilities
-) Vehicle Traffic
-) Working On or In Close Proximity to Water

14.2 Chemical Hazards

The primary constituent of concern (COCs) at the Site include:

-) Dioxins/Furans PCBs

Other COCs at the Site include:

-) VOCs
-) SVOCs
-) Pesticides
-) Metals

The COCs are present at varying concentrations in one or more of the following media: sediment, surface soil, subsurface soil, and groundwater. The hazards associated with these COCs include potential human exposure through inhalation, ingestion, and/or skin absorption. These hazards also include potential exposure to the environment through contaminant transport and dispersion including transport by fugitive dust.

The physical characteristics of the detected constituents and impacted media expected to be encountered at the Site suggest that the potential exposure routes for workers on Site are eye and/or skin absorption, particulate inhalation and to a lesser degree, ingestion of affected media. Exposure potential is likely to be greatest when exposing impacted media during subsurface intrusive activities (i.e., excavation). Media potentially impacted at the Site includes sediment, subsurface soil, and to a lesser degree, near-surface soil.

The following Table 14-1 provides the highest COC concentration compared against current exposure standards established by OSHA.

**TABLE 14-1
CONSTITUENTS OF CONCERN**

Contaminant	Concentrations				OSHA Limits		IDLH or Ceiling Limit (ppmv)	Primary Hazard
	Max Source Area Soil	Max Sediment	Max Floodplain ²	Unit	PEL (ppm)	STEL (ppm)		
VOCs								
1,2,3-Trichlorobenzene	180	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	340	--	--	--	--	--	--	Inh, Abs, Ing, Con
Benzene	480	--	--	--	1	5	500	Inh, Abs, Ing, Con
Cis-1,2-dichloroethene	500	--	0.002	mg/kg	200		1000	Inh, Ing, Con
Tetrachloroethene	1700	--	--	--	100	300	150	Inh, Abs, Ing, Con
Trichloroethene	2,400	--	--	--	100	300	1000	Inh, Abs, Ing, Con
Chlorobenzene	1000	--	--	--	75	--	1000	Inh, Ing, Con
Dichloroethane (1,2-)	1.7	--	--	--	50	200	50	Inh, Abs, Ing, Con
Ethyl benzene	3600	--	--	--	100		800	Inh, Ing, Con
Toluene	430	--	--	--	200	500	500	Inh, Abs, Ing, Con
Vinyl chloride	2.3	--	--	--	1	--	--	Inh, Con (liquid)
Xylenes (Total)	13100	--	--	--	100	--	900	Inh, Abs, Ing, Con
Trichloroethane (1,1,1-)	110	--	--	--	350	--	700	Inh, Ing, Con
Trichloroethane (1,1,2-)	0.12	--	--	--	10	--	100	Inh, Abs, Ing, Con
Dichlorobenzene (1,2-)	2800	--	--	--		--	200	Inh, Abs, Ing, Con
Styrene	10	--	--	--	100	200	700	Inh, Abs, Ing, Con
Dichloroethene (trans-1,2)	8.4	--	--	--	200	--	1000	Inh, Ing, Con

Contaminant	Concentrations				OSHA Limits		IDLH or Ceiling Limit (ppmv)	Primary Hazard
	Max Source Area Soil	Max Sediment	Max Floodplain ²	Unit	PEL (ppm)	STEL (ppm)		
Metals								
Arsenic	49.3	18	55.6	mg/kg	0.01	--	5	Inh, Abs, Ing, Con
Antimony	2590	13.7	38.2	mg/kg	0.5	--	50	Inh, Ing, Con
Beryllium	3.9	5.4	7.9	mg/kg	0.002	0.025	4	Inh, Con
Cadmium	201	95.1	8.25	mg/kg	0.005	--	9	Inh, Ing
Chromium	1410	536	404	mg/kg	1	--	250	Inh, Ing, Con
Lead	39700	1230	2460	mg/kg	0.05	--	100	Inh, Ing, Con
Manganese	6420	4126	2880	mg/kg	--	--	500	Inh, Ing
Thallium	13.4	4.9	1.036	mg/kg	0.1	--	15	Inh, Abs, Ing, Con
SVOCs								
4-Chloroaniline	280	0.12	--	--	--	--	--	--
Benzo(a)anthracene	8.5	8.4	140	mg/kg	--	--	--	--
Benzo(a)pyrene	8.9	9.2	110	mg/kg	0.2	--	80	Inh, Con
Benzo(b)fluoranthene	10	11.38	120	mg/kg	--	--	--	--
Bis(2-ethylhexyl)phthalate	460	12	4.2	mg/kg	5	--	5000	Inh, Ing, Con
Dibenzo(a,h)anthracene	2.2	2.6	26	mg/kg	--	--	--	--
Indeno(1,2,3-cd)pyrene	5.3	8.17	56	mg/kg	--	--	--	--
n-Nitrosodi-n-propylamine	--	1.4	--	--	--	--	--	--
Benzo(g,h,i)perylene	5.3	7.47	58	mg/kg	--	--	--	--
Benzo(k)fluoranthene	8.8	10.52	100	mg/kg	--	--	--	--
Biphenyl, 1,1-	1.61	0.18	0.5028	mg/kg	--	--	--	--
Chrysene	11	11.72	150	mg/kg	0.2	--	80	Inh, Con
Fluoranthene	17.91	22.28	300	mg/kg	--	--	--	--
Naphthalene	84	0.93	4.39	mg/kg	10	--	250	Inh, Abs, Ing, Con
Pentachlorophenol	18	1.4	--	--	0.5	--	2.5	Inh, Abs, Ing, Con
Pyrene	16.73	17.22	280	mg/kg	0.2	--	80	Inh, Con
Concentrations					OSHA Limits		IDLH or	Primary Hazard

Contaminant	Max Source Area Soil	Max Sediment	Max Floodplain ²	Unit	PEL (ppm)	STEL (ppm)	Ceiling Limit (ppmv)	
Pesticides/PCBs								
Aldrin	1.2	0.0024	0.0034	mg/kg	0.25	--	25	Inh, Abs, Ing, Con
Aroclor-1232	250	0.046	0.025	mg/kg	--	--	--	--
Aroclor-1242	230	0.25	0.14	mg/kg	--	--	5	Inh, Abs, Ing, Con
Aroclor-1248	420	0.14	0.025	mg/kg	--	--	--	--
Aroclor-1254	1,300	28	3.58	mg/kg	--	--	5	Inh, Abs, Ing, Con
Aroclor-1268	4.3	0.31	0.1131	mg/kg	--	--	--	--
Dieldrin	9.9	0.17	0.063	mg/kg	0.25	--	50	Inh, Abs, Ing, Con
Heptachlor	5.1	0.0044	0.0062	mg/kg	0.5	--	35	Inh, Abs, Ing, Con
Total Aroclors (total PCB)	1300	28	3.5833	mg/kg	--	--	--	--
Technical Chlordane	10.60	2.21	1.22	mg/kg	0.5	--	100	Inh, Abs, Ing, Con
Dioxins								
2,3,7,8-TCDD	0.895	0.11	0.0146	mg/kg	--	--	--	Inh, Abs, Ing, Con
Dioxins/Furans TEQ								
Dioxin TEQ	0.909	0.11	0.0032	--	--	--	--	--

NOTES:

PEL - Permissible Exposure Limit for an 8-hour work shift in a 40-hour workweek
 STEL - Short Term Exposure Limit, a 15 minute TWA
 TWA - Time Weighted Average for an 8 hour day
 IDLH - Immediately Dangerous to Life and Health
 Ceiling Limit - An STEL that cannot be exceeded at any point in the work day
 Ppmv - parts per million by volume
 "--" - No exposure limit established by OSHA or NIOSH
 TEQ - Toxicity Equivalence

BDL - Chemical concentration below detection limit
 Inh. - Inhalation hazard
 Ing. - Ingestion hazard
 Abs. - Skin absorption hazard
 Con. - Skin and/or eye contact hazard
 CA - Known carcinogen
 TCDD - 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin

- 1 Constituent concentrations in table are were obtained electronically from the EPA database for the Centredale Manor Project Superfund Site.
- 2 This data includes Oxbow soil as part of the floodplain soils.
- 3 Metals, SVOCs and Pesticides/PCBs OSHA limits and IDLH have units of mg/m³ with the exception of Naphthalene, which has units of ppm.

14.2.1 Potential Health Effects

Dioxins/Furans Hazards – Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones, and are a known carcinogen. Furans can cause skin, eye, nose and throat irritation on contact. Skin contact may result in a skin allergy causing an itchy rash. Furans may damage the kidneys, liver, and may be a human carcinogen.

VOC Hazards – VOCs encompass many different types of chemicals. General effects are headache, dizziness, nausea, tiredness, lack of concentration, and eye, nose, throat, and irritation.

SVOC Hazards – SVOCs such as Polycyclic Aromatic Hydrocarbons (PAHs) are a known carcinogen. PAHs primary route of exposure is from breathing in contaminated dust generated from the disturbance of impacted soils. Prolonged skin contact and breathing fumes have been shown to cause blood and liver abnormalities.

PCB Hazards - PCBs are a known carcinogen and cause damage to the adult reproductive systems. High exposures can damage the nervous system and cause liver damage. Early exposure symptoms may include eye, nose, and throat irritation, headache, and dizziness. When present as a vapor, PCBs can cause difficulty breathing.

Metal Hazards – Metals such as arsenic, barium, chromium, and lead have been linked to heavy metal poisoning. Long-term exposures to low levels of heavy metals have symptoms that include headache, weakness, muscle, joint pains, and feeling tired. Exposure to high levels of lead can lead to abdominal pain, loss of appetite, memory loss, pain or tingling in the hands and/or feet.

Pesticide Hazards – Pesticides such as aldrin, dieldrin, heptachlor and chlordane are known to be toxic. Acute health problems may occur in workers that handle pesticides, such as abdominal pain, dizziness, headaches, nausea, vomiting, as well as skin and eye problems.

14.2.1.1 First Aid

If these constituents get into the eyes, remove contacts if applicable and immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids, and seek medical attention immediately. If these constituents come in contact with the skin, immediately wash the

affected skin with soap and water. If these constituents are ingested, seek immediate medical attention.

14.3 **Hazard Control Information**

14.3.1 Warm and Cold Environments

Weather-related problems anticipated during operations include cold and heat stress. Cold stress will most likely occur during colder temperatures in the winter or early fall (however, hypothermia has been known to occur in the summer), if personnel or clothing gets wet during wind chill conditions. Heat stress will most likely occur when wearing protective clothing that decreases natural body ventilation. Workers should be aware of signs of cold or heat stress in themselves and other workers as described below. Cold-related symptoms range from a “chill” and “trench foot” to more serious conditions such as frostbite or hypothermia. Heat-related symptoms range from heat rash and heat cramps to more serious conditions such as heat exhaustion and heat stroke.

Workers will be required to use the “buddy system” to monitor for signs of chemical exposure, weather-related stress, and other health and safety hazards. Personnel will work in pairs and will maintain constant line of sight with each other. If a “buddied” person has to leave the work area, then his or her buddy must accompany them. First aid equipment and trained personnel will be available on-site.

Hot Environments

To reduce the risk of heat-related illness, the following measures will be taken:

-) Employees will be trained prior to working outdoors.
-) Working hours will be modified to work during the cooler hours of the day, when possible. When a modified or shorter work-shift is not possible, more water and rest breaks will be provided.
-) Employees will have access to air conditioning in a vehicle, nearby building, etc. Shade/Cooling areas will be set up in areas with no shade. The SHSO will regularly remind employees about the importance of rest breaks in hot weather and will encourage employees to drink water throughout the day. Water will be available to employees

As a recommended practice, the ACGIH TLVs for heat exposure (Table 14-2) will be used as a screening tool on this project to evaluate if a heat stress situation may exist. This table is not intended to provide work/rest recovery periods.

Table 14-2: ACGIH® TLVs® for Heat Exposure – Wet-Bulb Globe Temperature Readings in °F

<u>Work Demands</u>	TLV				Action Limit			
	<u>Light</u>	<u>Mod</u>	<u>Heavy</u>	<u>Very Heavy</u>	<u>Light</u>	<u>Mod</u>	<u>Heavy</u>	<u>Very Heavy</u>
75% - 100% work	87.8	82.4	N/A	N/A	82.4	77.0	N/A	N/A
75% work/25% rest	87.8	84.2	81.5	N/A	83.3	78.8	75.2	N/A
50% work/50% rest	89.6	86.0	84.2	82.4	85.1	80.6	77.9	76.1
25% work/75% rest	90.5	88.7	86.9	86.0	86.0	84.2	82.4	80.6

* Consult the ACGIH TLVs and Biological Exposure Indices (BEIs) current edition for additional notes and instructions on implementing Wet Bulb Globe Temperatures (WBGTs). Only applicable for Level D PPE ensemble.

If a WBGT meter is not available onsite, the WBGT can be referenced using a weather application on a cellular phone (weather channel, National Oceanic Atmospheric Administration [NOAA], etc.)

Personnel should be aware of the effects of extreme temperature environments, provided with adequate liquids, and instructed to observe each other for signs of heat or cold related stress. Medical conditions associated with heat include: heat stress, heat stroke, heat exhaustion, heat cramps, and heat rash. Table 14-3 describes heat-related illness symptoms and what to do if these medical conditions occur.

Table 14-3: Heat-Related Illness Symptoms and Controls

Heat Illness	Symptoms	What to Do
Heat stroke	<ul style="list-style-type: none"> J Muscle twitching/convulsions J Dry hot skin J Flushed skin J High body temperature J Loss of consciousness or confusion J Deep breathing, then shallow or absent J Dilated pupils J Rapid pulse J Coma 	<ol style="list-style-type: none"> 1. Call medical help immediately. 2. Get the victim to a cool, shady area. 3. Cool them off with a cool shower, garden hose, wet cloths, ice packs, etc. 4. Do not give the victim fluids to drink. 5. If emergency medical services are delayed, call the hospital for further instructions.
Heat Exhaustion	<ul style="list-style-type: none"> J General weakness J Excessive perspiration J Dizziness J Pale and clammy skin J Weak pulse J Rapid and shallow breathing J Near normal body temperatures 	<ol style="list-style-type: none"> 1. Get the victim to a cool, shady area to rest. 2. Loosen and remove any heavy clothing. 3. Give them cool water to drink unless they are sick to the stomach. 4. Cool the body by spraying with cool water or apply a wet cloth to skin, preferably the back of the neck.

Heat Illness	Symptoms	What to Do
Heat Cramps	<ul style="list-style-type: none">) Pain in legs or abdomen) Faintness) Profuse perspiration 	<ol style="list-style-type: none"> 1. Get the victim to a cool area and have them sit quietly. 2. Give them clear juice or a sports beverage. 3. Have them rest for a few hours. 4. Seek medical attention for heat cramps if they do not subside in 1 hour.
Heat Rash	<ul style="list-style-type: none">) Skin irritation looking like a red cluster of pimples or blisters 	<ol style="list-style-type: none"> 1. Move employee to a cool, less humid area. 2. Keep the affected area dry.

These signs can be distinguished from those associated with chemical hazards as chemical hazards usually do not cause changes in skin temperature and/ or color, or the ability to sweat.

Cold Environments

If working in cold environments are unavoidable, proper PPE is important to preventing cold stress. Proper PPE may include:

-) Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing.
 - o An inner layer of wool, silk or synthetic to keep moisture away from the body.
 - o A middle layer of wool or synthetic to provide insulation even when wet.
 - o An outer wind and rain protection layer that allows some ventilation to prevent overheating.
-) Wear a hat or hood to help keep your whole body warmer. Hats reduce the amount of body heat that escapes from your head.
-) Use a knit mask to cover the face and mouth (if needed).

-) Use insulated gloves to protect the hands (water resistant if necessary).
-) Wear insulated and waterproof boots (or other footwear).
-) A heated locations (car or building) will be available to employees throughout the work day.

Depending on the severity of environmental exposure, the frequency of breaks relies on air temperature and wind speed. If an employee experiences heavy shivering, minor frostbite, excessive fatigue, drowsiness, irritability or euphoria, return to a heated shelter immediately (i.e., heated field vehicle, field trailer, etc.).

Signs of cold stress are summarized as follows:

Hypothermia: shivering, apathy, sleepiness, rapid body cooling, unconsciousness, slow pulse, or freezing of extremities.

Frostbite: progressive numbness or loss of sensitivity, tingling or burning feeling, color change (white or purple), most common in ears, nose, hands/fingers, and toes.

Trench foot: red skin, inflammation, blisters, and extreme pain after warming.

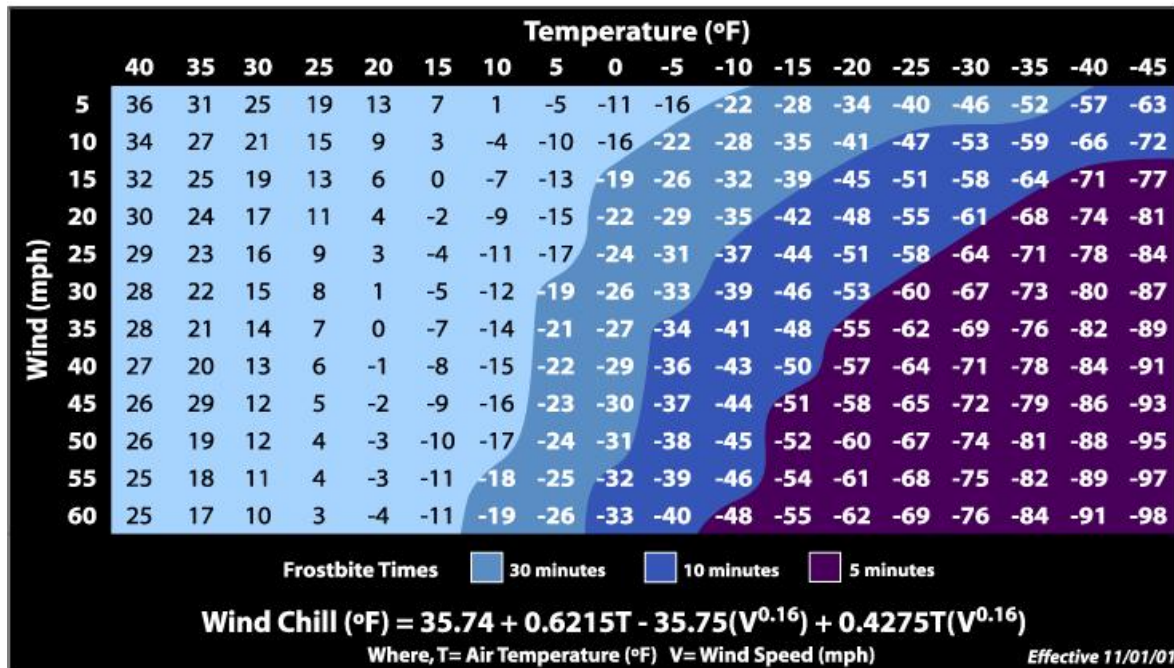
Should signs of cold stress be detected, appropriate first aid measures will be taken to protect workers. Appropriate first aid measures are summarized below.

Cold Stress Treatment

1. Get the victim out of the cold.
2. Loosen tight clothing.
3. Remove perspiration soaked or wet clothing.
4. Apply warm blankets to the skin.
5. If conscious, give the victim cool water to drink.
6. Seek medical attention and call 911.



Wind Chill Chart



Source: NOAA

14.3.2 Noise Exposure/Hearing Conservation

Hazardous noise levels are ubiquitous on construction sites. Noise sources typically include the engines and/or motors of the equipment, the operating parts of the equipment, compressed air, and others. Noise-induced hearing loss (NIHL) is insidious and often occurs before one can notice it. HPDs including ear plugs and/or muffs as appropriate will be provided to personnel and will be used in areas with noise levels perceived as loud at or above 85 decibels by the SHSO or designee. Such activities may include drilling, heavy equipment use, and other activities observed to need HPDs for work at the Site. If necessary, a sound meter may be used by the SHSO or designee to survey work area sound levels.

OSHA PEL for Noise

ACGIH ® TLV ® and NIOSH REL for Noise

<u>Noise limit</u>	<u>Time (hrs.)</u>
90 dBA	8 hours
95	4
100	2
105	1
110	½
115	¼

<u>Noise limit</u>	<u>Time (hrs.)</u>
85 dBA	8 hours
88	4
91	2
94	1
97	½
100	¼

Some examples of typical approximate sound levels include the following:

<u>Sound Pressure Level</u>	<u>Activity/ies or Settings (varies depending on distance)</u>
180 dB	Rocket launch from pad
150 dB	Artillery at 500 feet, firecracker
140 dB	Pain threshold and airplane taking off
130 dB	Jackhammer, power drill
125 dB	Jet taking off at 100 meters distance, car stereo, chain saw
120 dB	Thunderclap, ambulance siren, hammering
110 dB	Rock concert, power saw, leaf blower
100 dB	Pneumatic chipper, factory machinery
90 dB	Heavy truck, tractor, blender, mixer
85 dB	Average street traffic, handsaw, noisy restaurant (Beginning of OSHA regulations)
30 dB	Faint sound (whisper)

14.3.3 Drilling and Other Heavy Equipment

This project will have heavy equipment (such as drill rigs, backhoes, excavators, etc.) on Site presenting significant hazards to workers. Most incidents involving heavy equipment are due to a lack of awareness of the victim by the operator and/or of the impending motion by the victim.

Communication, eye contact, hand signals, and awareness of personnel locations and movements and equipment motions are critical to avoid incidents. The following is expected in order to avoid incidents:

-) Personnel will not “take breaks” under or behind heavy equipment.
-) All heavy equipment will have back-up alarms.
-) Personnel on the ground will not approach equipment (such as excavators or

backhoes) from the operator's "blind side" (the side with the arm and bucket).

- J Personnel near moving, heavy equipment will maintain a minimum safe distance of 25 feet. Personnel may only approach heavy equipment when the equipment is stopped, buckets or other hydraulic arms lowered to the ground and visual contact with the operator is maintained.
- J If operations require personnel to be in closer vicinity of operating heavy equipment, then a spotter and job pre-briefing must be employed so that the team is aware of the operational hazards.

Site personnel will comply with OSHA regulations 29 CFR Part 1926, Subpart O – Motor Vehicles, Mechanized Equipment, and Marine Operations 1926.600 – 1926.606. Personnel will not repair, fix, service, or maintain heavy equipment without first locking out and tagging out all hazardous energy sources that the worker(s) may be exposed to during the repair. This includes "blocking" sources of gravitational energy (e.g., a falling bucket).

The installation of groundwater monitoring wells and the advancement of soil borings for site investigation purposes does not require registration with the Rhode Island Contractors' Registration and Licensing Board.

14.3.4 Hazard Communication

All employers on Site must comply with 29 CFR Part 1926.59 – Hazard Communication. Employers will maintain copies of SDSs on Site for all chemicals on-site and personnel will have appropriate hazard communication training. SDSs for chemicals and products used on-site will be made available for review in Appendix I.

14.3.5 Hand and Power Tools

All Site workers will comply with OSHA regulations 29 CFR Part 1926, Subpart I – Tools – Hand and Power 1926.300 – 1926.307. All tools shall be maintained in a safe condition. Tools shall be used only for their intended purpose. Employers are responsible for tools their employees use even if the tool is the property of the employee. Power tools will be appropriately guarded and guards will not be removed. Chain saws and weed whackers will be operated using appropriate PPE including safety glasses, face shield, hardhat, hearing protection devices, work gloves, steel toe boots, safety orange vest, and protective leggings (chaps). For additional information regarding chain saws and weed whackers, see Brush Clearing JHA in Appendix H.

14.3.6 Slips, Trips, and Falls

Slips, trips, and falls are responsible for most workplace incidents and hazards from falls are one part of an OSHA “focused inspection” for construction. There are likely to be many slip and trip hazards on-site due to topography and remediation activities. These include steep slopes, vegetation, rocks, rough terrain, air and water hoses, power cords, equipment and supplies, tools and materials, and potentially wet polyethylene sheeting for decontamination and/or erosion control. Site workers will exercise due care in traversing the Site. Footwear must be of adequate traction. Workers will not carry hazardous equipment or other materials that could contribute to an incident or fall while ascending or descending steep slopes or other dangerous terrain.

14.3.7 Concrete and Masonry Work

Concrete is one of the most widely used construction materials, and with that comes many safety concerns and hazards. Working with concrete is more than just pouring slab on grade systems and flatwork. Countless hazards can result from premature removal of formwork, improper set-up of forms and shoring, inadvertent operation of equipment, failure to support pre-cast panels, failure to guard reinforcing steel, failure to use appropriate fall protection and exposure to crystalline silica.

The general hazards associated with concrete and masonry construction include:

1. Exposure to crystalline silica.
2. Impalement from rebar or other sharp protrusions.
3. Struck-by flying and/or falling debris (e.g., falling concrete blocks, flying debris during concrete cutting and jackhammering, and wall collapse during demolition).
4. Working around suspended loads.
5. Masonry wall collapse
6. Respirable Crystalline Silica Exposure

Additional information regarding exposure to Respirable crystalline silica and control methods are outline in section 14.3.16.

14.3.8 Crane Operation

Hazards exist with all types of cranes and in all facets of crane operation. The following are the most common hazards involved with overhead cranes:

1. Electrical
2. Overloading (e.g., swinging or sudden dropping of load, using defective components, hoisting a load beyond capacity, dragging a load and side-loading a boom)
3. Struck-by falling material (e.g., material falling/slipping from overhead hoists).
4. Working around suspended loads.

Employees shall understand the requirements for safely working around cranes and hoists and comply with OSHA regulations regarding the use of cranes and hoists. For complete requirements on crane operations and hoisting, see OSHA 29 C.F.R. 1926 Subpart N & 29 C.F.R. 1926 Subpart CC.

14.3.9 Excavation and Trenching

An excavation is a cut, cavity, trench or depression formed by the removal of earth. A trench is an excavation that is deeper than it is wide, but no wider than 15 feet. The primary hazard of excavating and trenching is injury from collapse. During excavation or trenching activities, there are several types of protective systems that could be used to prevent a cave-in or collapse. Based upon soil classification (Type A through C), the following protective systems shall be implemented:

- a) Benching / Sloping – Benching refers to excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels. Sloping involves cutting back the trench wall at an angle inclined away from the excavation.
- b) Shoring – Shoring systems may consist of poles, wales, struts, and sheeting.
- c) Shielding – Trench boxes or other types of support.

Below are general safety guidelines when working around excavations and trenches.

- a) Keep heavy equipment away from trench edges.
- b) Keep soil piles at least 2 feet (0.6 meters) from trench edges.
- c) Know where underground utilities are located.

- d) Test for low oxygen, hazardous fumes and toxic gases.
- e) Have a competent person inspect trenches at the start of each shift.
- f) Inspect trenches following a rainstorm.
- g) Do not work under raised loads.

For additional information regarding exposure to excavations and trenches, soil classifications and protective systems, refer to the Excavation and Trenching Program in LEA's Corporate Health & Safety Program Manual.

14.3.10 Hot Work

Hot work is any work that involves burning, welding, using fire- or spark-producing tools, or that produces a source of ignition. Employees performing hot work operations shall have a Hot Work Permit (available in Appendix E of Loureiro's Construction Safety Program) and be aware of the need for fire prevention equipment, PPE, safe handling and storage of compressed gas cylinders as well as other key elements associated with hot work.

14.3.11 Housekeeping

Construction sites can present many hazards to employees when they are performing construction-related activities. Keeping a construction site clean of debris can further reduce hazards. Workplaces are to be maintained in a clean and orderly manner as it relates to materials, equipment, and the elimination of nonessential materials and hazardous conditions. Housekeeping is not an additional duty – it is part of every employees job and it is mandatory.

Key elements to good housekeeping include:

1. Daily cleanup of work areas are required.
2. Orderly placements of tools and materials.
3. Aisles, stairways, and exits shall be kept clear of debris and equipment.
4. Remove cords and hoses from high traffic areas.
5. Work shall be done in a manner that will minimize and control the production and migration of noise, dust and debris outside of the work area.

14.3.12 Ladders

Portable ladders are one of the handiest, simplest tools we use. Portable ladders include stepladders, straight ladders and extension ladders. Falls from portable ladders are a major source of serious injury. Be aware of the hazards and take proper precautions to prevent falling. Read and follow all labels/markings on the ladder. If the ladder does not have the basic labels/markings (such as the Duty Rating label) the ladder should be removed from service and red tagged.

14.3.13 Working On, Over or Near Water

In the event of any work over or near water, it is important to exercise due care around water hazards. Work on or near water for this project may occur along the river and on the ponds for surface water sampling, stream gauging, sediment sampling, and general site inspections. If Site Workers will be working over or near water where a risk of drowning could occur (2 feet deep) the following general precautions must be taken:

-) A ring buoy with at least 90 feet of line and a lifesaving skiff will be immediately available for emergency rescue.
-) Personnel must be provided with and use United States Coast Guard (USCG) approved PFDs (i.e., life jackets).
-) Before and after each use, inspect the PFDs for defects.
-) Do not use defective PFDs.
-) The buddy system must be utilized when working on or near water.

If work will be taking place on a vessel (i.e. barge), then the following additional steps must be taken:

-) Operator of the vessel must comply with all watercraft laws and have all appropriate licenses and certifications.
-) A pre-departure check of the vessel, outlined in the Sampling from a Vessel JHA, will be conducted prior to commencing work.
-) Although the U. S. Coast Guard does not require one, LEA personnel will generate a float

plan and give it to the SHSO or designee prior to each departure. This plan should outline your boating itinerary including:

- Where you are going, the detailed route, your planned departure time, and your expected return time.
- Description of the vessel, including its registration number, length, make, horsepower, and engine type.
- Give the name, address, and telephone number of each person on board and an emergency contact.
- List of necessary survival equipment on board (PFDs, flares, anchor, horn, paddles, etc.)

See the *Sampling from a Vessel* JHA in Appendix H for more detailed hazard control information.

14.3.14 Weather-Related Hazards

In addition to heat and cold temperatures, weather-related hazards should be anticipated and appropriate protective measures taken. Given the multi-season work schedule and unpredictable New England weather, multiple seasons' adverse weather should be anticipated. Always check the weather forecast for the Site locale before heading out! The following are some possible weather-related hazards and protective measures:

-) Lightning: Do not work during electrical storms. If you hear distant thunder, or see a storm approaching, the occurrence of lightning may be imminent. Stay off high areas and hazardous areas (e.g., on water) that attract lightning.
-) Snow squalls, whiteouts, blizzards, northeasters, freezing rain, sleet, or ice: Do not schedule work when weather reports indicate potential storm or snowstorm watches or warnings. Send personnel home early in advance of an approaching storm. Alternatively, shelter workers if conditions are too hazardous to risk travel.
-) Hurricane or tornado: Take appropriate shelter. Do not schedule work when weather reports indicate potential hurricane or tornado watches or warnings. Send personnel home early in advance of an approaching storm.

-) Hail: Take appropriate shelter. Do not schedule work when weather reports indicate potential hail watches or warnings.
-) Flash flooding: Take appropriate shelter. Do not schedule work when weather reports indicate potential flash flooding watches or warnings. Have workers vacate low-lying areas and seek high ground. Do not attempt to navigate across flooded areas or waterways.

14.3.15 Fauna and Flora Hazards

During the course of fieldwork, personnel are at risk of being exposed to poisonous plants, insects, spiders and snakes. Of these the most prevalent biological hazards include poison ivy, mosquitoes, ticks, and bees or wasps. For additional information regarding Flora and Fauna hazards, see Flora and Fauna JHA in **Appendix H**.

14.3.16 Poison Ivy

Poison ivy is a common cause of a skin irritation called contact dermatitis that may result in a red, itchy rash consisting of small bumps, blisters or swelling. Typically, it grows as a vine or shrub, and it can be found throughout much of North America. It grows in open fields, wooded areas, on the roadside, and along riverbanks. It can also be found in urban areas, such as parks or backyards. Poison ivy plants typically have leaf arrangements that are clustered in groups of three leaflets (trifoliate), though this can vary. The color and shape of the leaves may also vary depending upon the exact species, the local environment, and the time of year. The plant may have yellow or green flowers, and white to green-yellow berries, depending on the season. Eastern poison ivy typically grows as a hairy ropelike vine, whereas western poison ivy tends to grow as a low shrub.

The best way to protect against poison ivy is to avoid poison ivy. The best defense against contracting poison ivy is to recognize the plants. “Leaves of three, let it be” refers to the groupings of three leaflets connected to a common stem that characterize most of these plants. However, if you cannot avoid poison ivy (and poison oak or poison sumac), follow these precautions to help prevent contact:

-) Ensure Level D protective clothing is adequately donned such as long-sleeved shirts, long trousers, boots or sturdy shoes with socks and gloves.
-) Use a pre-contact skin protectant such as CoreTex IvyX™ Pre-Contact towelettes

or barrier cream.

-) If heat stress will not be a problem the use of a Tyvek™ coveralls and nitrile gloves is recommended for areas with heavy poison ivy infestation.
-) If contact with poison ivy has been made or is suspected, follow these guidelines:
 - As soon as possible (within 5–10 minutes of contact), wash all exposed skin with strong soap (i.e. Dawn) and water to remove the oil. If this is not possible, rinse thoroughly with water.
 - Use a post-contact skin cleanser such as Tecnu® skin cleanser or CoreTex IvyX™ cleanser towelettes.
 - Put on gloves to remove clothes and shoes, and wash clothing in hot water and detergent to remove any plant oil that may be on them.
 - Notify the SHSO or Task Manager if contact or suspected contact is made with poison ivy.
 - If a severe allergic reaction develops, seek medical attention.

14.3.16.1 Ticks

Ticks transmit bacteria that cause illnesses such as Lyme disease or Rocky Mountain spotted fever. Ticks wait for host from the tips of grasses and shrubs (not from trees). When brushed by a moving person, they quickly let go of the vegetation and climb onto the host. Ticks can only crawl; they cannot fly or jump. Tick season typically lasts from April through October; peak season is May through July; seasons can vary depending on climate. Ticks can be active on winter days when the ground temperatures are about 45° F.

The best way to protect against tick borne illness is to avoid tick bites. This includes avoiding known tick- infested areas. However, if you visit wooded areas or areas with tall grass and weeds, follow these precautions to help prevent tick bites and decrease the risk of disease:

-) Ensure Level D protective clothing such as long-sleeved shirts, long trousers, ankle gaiters, boots or sturdy shoes and a head covering is worn (Ticks are easier to detect on light-colored clothing.).

- J Use ankle gaiters treated with insect repellent or tuck trouser cuffs in socks. Tape the area where pants and socks meet so ticks cannot crawl under clothing.
- J Apply insect repellent containing 10 percent to 30 percent N,N-Diethyl-meta-toluamide (DEET) to skin and/or permethrin spray to treat clothes (pants, socks, shoes, etc.). Apply sparingly to exposed skin. Do not spray directly to the face; spray the repellent onto hands and then apply to face. Avoid sensitive areas like the eyes, mouth and nasal membranes. Be sure to wash treated skin after coming indoors.
- J Personnel should carefully inspect themselves each day for the presence of ticks or any rashes. This is important since prompt removal of the tick can prevent disease transmission. Removal of the tick is important in that the tick should not be crushed and care must be taken so that the head is also removed. A tick removal tool or pointed tweezers should be used for extraction.
- J Report tick exposure and bites to the SHSO or Task Manager.

14.3.16.2 Mosquitoes

Mosquitoes, carriers of the West Nile Virus, Yellow Fever and other diseases, are indigenous to the area. DEET is an effective mosquito repellent and is recommended. Although concentrated DEET formulations protect longer than those that are more dilute, little improvement is offered by concentrations of the active ingredient higher than 50 percent. Adverse effects, though documented, are infrequent and are generally associated with gross overuse of the product. Users should avoid the temptation to apply the most concentrated product available. The transient protection offered by more dilute preparations can be extended by reapplication. When using DEET care should be taken to reapply the repellent when its effectiveness wears off.

14.3.16.3 Wasps and Bees

Wasps (hornets and yellow jackets) and bees (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paper-like nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery. Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once while wasps sting multiple times

because their stinger is barbless. Wasps sting when they feel threatened. By remaining calm and not annoying wasps by swatting, you lessen the chance of being stung. Wasps and bees inject a venomous fluid under the skin when they sting. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers or scraping a credit card or other blunt object against the sting site in the opposite direction in which the stinger is embedded.

Some people may develop an allergic reaction, i.e. anaphylaxis, to a wasp or bee sting. If such a reaction develops, seek medical attention at once. Persons who are allergic to bee and wasp stings should carry an epinephrine pen, e.g. epi-pen, with them that is prescribed by a doctor and used to help abate swelling that occurs due to their allergy. Even if a person utilizes their epi-pen, they still need to seek medical attention for follow-up care and observation.

14.3.17 Silica Hazards

Respirable crystalline silica is a common mineral found in many naturally occurring materials, such as sand and stone. Silica is used in the manufacturing of building products such as concrete, brick, and mortar. Routine, long-term exposure and inhalation of respirable crystalline silica can lead to silicosis, chronic obstructive pulmonary disease (COPD), lung cancer, kidney disease, autoimmune disorders, and cardiovascular disease.

14.3.17.1 Tasks with Silica Exposure

The following materials may be cut, sanded, drilled, jackhammered, sawed, mixed, or otherwise disturbed and may generate respirable crystalline silica at this project:

Asphalt

Cement

Concrete

Sand

Stone (Including granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.)

14.3.17.2 Silica Controls

Employees and subcontractors generating respirable silica dust will follow all controls in OSHA Silica Table 1 (see Appendix J). If not all controls in Table 1 can be followed, then an exposure determination will be performed to evaluate employee exposure. The exposure determination may be performed using personal air monitoring data, objective data, or both to evaluate if employee exposure is at or above the action level.

Areas where airborne exposure to respirable crystalline silica is above the PEL will be labeled as a “Regulated Area.” These areas must be demarcated and signs must be posted at entrances to all regulated areas. Only those authorized people with appropriate respiratory protection will be allowed to enter regulated areas.

Proper housekeeping is important to reducing airborne silica dust. The following housekeeping measures will be instituted onsite:

-) Maintain all surfaces as free as possible from silica dust.
-) Dry sweeping of silica dust is prohibited. Instead, wet sweeping methods or High-Efficiency Particulate Air (HEPA) vacuums will be used to clean-up silica dust.
-) Compressed air will NOT be used to remove silica from any surface unless it is used with a ventilation system designed to capture airborne dust created while using compressed air.
-) Workers may not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.

Respiratory protection will be selected based on Table 1 (Appendix J) or, if Table 1 controls cannot be followed, based on an assessment of the potential airborne respirable crystalline silica exposure. Any employee required to wear a respirator for protection against respirable crystalline silica inhalation must be medically cleared to wear a respirator, have a current fit test, and have respirator training. If employees are required to wear respiratory protection, a site-specific respiratory protection plan will be created and attached to this HASP.

14.3.17.3 Silica Competent Person

Any project falling under OSHA’s Silica construction regulation (29 CFR 1926.1153) must have a competent person who performs routine observations of silica dust generating tasks. If visible dust increases, the competent person must take prompt, corrective action. The competent person must be capable of identifying existing and foreseeable silica hazards in the workplace and must

have authorization to take corrective measures. The competent person for this project is the SHSO.

14.3.18 Bloodborne Pathogens

14.3.18.1 Scope and Application

This Bloodborne Pathogens (BBP) Exposure Control Plan has been developed as a supplement to the LEA Corporate Exposure Control Plan. The intent of this document is to describe the specific procedures used to protect employees from occupational exposure to bloodborne pathogens at the Site.

This plan applies to all employees with occupational exposure to blood or other potentially infectious materials (OPIM).

14.3.18.2 Responsibilities

Project Manager

-) Delegate responsibilities and provide the appropriate resources to implement the provisions of this exposure control plan for all projects they manage where employees have occupational exposure to BBP.
-) Evaluate tasks that will be performed to determine if work involves occupational exposure to blood or OPIM, with technical assistance from Health and Safety as needed.
-) Ensure that all personnel understand the potential hazards associated with exposure to blood or OPIM.
-) Maintain this BBP Exposure Control plan meeting the requirements outlined in the LEA Corporate Health and Safety Program.
-) Provide management support and resources for the BBP program.
-) Enforcing compliance with the policies and procedures outlined in this plan.
-) Helping ensure that exposure incidents are reported and investigated, and recommended corrective actions are implemented.

-) Checking that all employees with occupational exposure are provided with initial and annual refresher training and the opportunity to receive the Hepatitis B vaccination.
-) Ensuring that the project program is reviewed and updated as needed or at least annually.
-) Ensure employees with occupational exposure participate in BBP training.
-) Complete an Incident Report following any exposure incidents.

Health and Safety

-) Develop the corporate written BBP Exposure Control Plan and coordinate a review of the program.
-) Assist with the development of site-specific Exposure Control Plans.
-) Provide guidance and technical support related to BBP.
-) Work with Management to arrange for initial and annual refresher training for those employees with occupational exposure to blood or OPIM.
-) Maintain Hepatitis B Declination Forms.
-) Provide guidance on proper disposal of regulated waste.

Employees with Occupational Exposure

-) Conduct work activities involving potential exposure to blood or OPIM in accordance with the requirements of the OSHA standard and the LEA Exposure Control Plan.
-) Immediately report all incidents involving potential exposure to blood and OPIM to your Manager.
-) Participate in initial and annual refresher training.
-) Receive the Hepatitis B vaccination series or sign the declination form. Notify your Manager if the vaccination was originally declined but is later desired.

-) Provide feedback on opportunities for program improvement, including any known new technology. Participate in the annual program review upon request.

14.3.18.3 Methods of Compliance

Universal Precautions

Universal precautions stress that all blood and certain body fluids should be assumed infectious for bloodborne pathogens regardless of the perceived status of the source individual. OPIM includes any bodily fluid visibly contaminated with blood, as well as a number of body fluids (e.g., amniotic, pericardial, peritoneal, pleural, synovial, cerebrospinal).

In most occupational settings, universal precautions do not apply to fluids such as saliva, feces, vomit, urine, sweat, tears, and nasal secretions, unless these fluids are visibly contaminated by blood.

Engineering Controls

Engineering controls are used to eliminate or minimize the risk of employee exposure to BBP, and include methods that either remove the hazard or isolate the worker from the hazard.

Sharps Containers

In the event of a workplace accident, broken glass, tools, or damaged equipment with sharp edges may become potentially contaminated with blood or body fluids. All potentially contaminated sharps will either be properly decontaminated, or be discarded as soon as feasible in specified sharps containers that are:

-) Puncture resistant,
-) Color-coded or labeled with a universal biohazard warning sign,
-) Leak-proof on the sides and bottoms, and
-) Closable.

In addition, these containers will remain upright during use and will not be allowed to overfill; this will minimize the risk of injury to personnel handling the containers.

Work Practice Controls

Work practice controls are modifications in procedures and practices that, if executed properly, will reduce the risk of worker exposure to blood or OPIM.

Hand Washing

-) Employees will wash their hands with a non-abrasive soap as soon as possible, if not immediately after, removing gloves or coming in contact with potentially contaminated objects.
-) At field sites or other locations where non-abrasive soap and running water are not provided, alternate arrangements will be made to provide hand-washing capabilities. This will include either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands will be washed with soap and running water as soon as feasible afterwards.
-) Eating, drinking, and smoking are prohibited in any area where contamination of blood or OPIM exist and prior to hand washing following a potential exposure.

Sharps Handling

-) Since contaminated sharps are capable of inflicting injury and direct inoculation of bloodborne pathogens into the bloodstream, potentially contaminated sharps (e.g., broken glass, tools, damaged equipment with sharp edges, or syringes) will not be directly handled.
-) Instead, employees will use mechanical means, such as a scoop or dustpan to clean-up and dispose of sharps. A damp paper or cloth towel in combination with heavy gloves will be used to collect small pieces that cannot be swept up.
-) To avoid injury, employees will not reach by hand into containers of contaminated sharps, or transfer contaminated sharps by hand to another container.

Aerosol and Splash Control

-) All procedures involving blood or other potentially infectious materials will be

performed in such a manner as to minimize splashing, spraying, splattering, or generation of droplets of these substances.

14.3.18.4 Personal Protective Equipment

All employees will be trained to use the appropriate PPE whenever there is a potential for exposure to blood or OPIM. The following table provides details on the use of specific PPE for tasks that present an opportunity for exposure to bloodborne pathogens:

TASK	HAZARD	MINIMUM PPE REQUIRED
Providing first aid to treat a minor laceration, puncture or other similar wound	<ul style="list-style-type: none"> J Hand contact with blood J General eye hazards 	<ul style="list-style-type: none"> J Impervious gloves J Safety glasses with side shields
Handling contaminated items/equipment or decontaminating surfaces/equipment (for blood or OPIM amounts limited to a few small drops; otherwise see below)	<ul style="list-style-type: none"> J Hand contact with blood or OPIM J Eye contact with disinfectant; general eye hazards 	<ul style="list-style-type: none"> J Impervious gloves (e.g., disposable nitrile)- double gloves recommended J Safety glasses with side shields
Cleaning up spill of blood or OPIM (for amounts greater than a few small drops)	<ul style="list-style-type: none"> J Hand, eye, mucous membrane, and body contact with blood or OPIM 	<ul style="list-style-type: none"> J Impervious gloves – double gloves recommended J Safety glasses with side shields J Mask with eye shield J Tyvek coat, coveralls or similar

TASK	HAZARD	MINIMUM PPE REQUIRED
Providing first aid to treat a severe laceration or other injury with large amounts or spurting blood	<ul style="list-style-type: none"> J Hand, eye, mucous membrane, and body contact with blood or OPIM 	<ul style="list-style-type: none"> J Impervious gloves – double gloves recommended J Safety glasses with side shields J Mask with eye shield J Tyvek coat, coveralls or similar
Providing CPR	<ul style="list-style-type: none"> J Mouth-to-mouth transmission of saliva that may be contaminated with blood 	<ul style="list-style-type: none"> J Mouth barrier
Walking on open waste piles at active, or recently active, landfills	<ul style="list-style-type: none"> J Improper disposal of syringes at landfill. J Direct inoculation of blood or OPIM into bloodstream through needle stick in foot. 	<ul style="list-style-type: none"> J Puncture-resistant safety shoes

14.3.18.5 Decontamination

All equipment and surfaces contaminated with blood or OPIM as a result of a personal injury will be cleaned and disinfected immediately after the initial response to stabilize the victim. The following disinfectant(s) can be found at the Site.

Disinfectant Name	Contact Time	Precautions
Bleach, 5.25%	10 minutes	Avoid contact with skin, eyes, and clothing. Do not ingest. Do not inhale. Follow first aid instructions on label.

Procedure for Clean-up and Surface Disinfection

The following general guidelines apply, in addition to using professional judgment and prudence:

1. Put on appropriate protective equipment.
2. Control access to the affected area. Prevent people from walking through affected area and tracking blood or OPIM to other areas.

3. Use plastic scoops or other mechanical means to remove any broken glass or other sharp objects from the area. Take care to avoid generation of aerosols.
4. Place any contaminated sharps involved into a sharps container. If a sharps container is not available, place contaminated sharps into a small, lined cardboard box, or other container that will prevent the sharps from puncturing individuals' hands or the primary regulated medical waste container. Securely tape the box closed, label it as "contaminated sharps" or similar, and place it into the primary regulated medical waste container.
5. For larger volumes of blood, apply a thin layer of paper towels or wipes over the surface to contain any splattering when the disinfectant is applied. To minimize creation of aerosols, avoid spraying disinfectant directly onto spilled material.
6. Pour or spray disinfectant over the towels and allow it to remain wet for at least 10 minutes, or other contact time specified for the particular disinfectant, before wiping up with clean absorbent pads or towels.
7. After the specified contact time, bag the used clean-up material and place it in the red bag or regulated medical waste bin for disposal.
8. Wipe all potentially affected surfaces with disinfectant.
9. Remove and properly dispose of protective equipment, then wash hands.
 - a. Remove PPE in the following order (to the extent that such PPE was required and worn for the specific clean-up scenario): disposable coat/coverall, outer pair of gloves if double gloves were worn, mask and safety glasses with side shields, and then inner gloves.
 - b. Do not remove PPE from the face with potentially contaminated gloves. If only one pair of gloves were worn, they should be removed before touching the face and taking off safety glasses (or before touching other clean and uncontaminated items).

14.3.18.6 Regulated Waste

Regulated waste includes the following:

-) Liquid or semi-liquid blood or OPIM,

-) Contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed,
-) Items caked with dried blood or OPIM that are capable of releasing these materials during handling,
-) Contaminated sharps, and
-) Pathological and biological waste containing blood or OPIM.

Labeling & Containers for Regulated Waste

-) Labels affixed to containers of regulated waste at the worksite contain the biohazard symbol and the legend, “BIOHAZARD”. The labels are fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color. Red bags or red containers may be substituted for labels.
-) Regulated waste is placed in containers that are closable, constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping, and color-coded or labeled with the universal biohazard symbol that is readily visible from all approaches.
-) These containers will be closed prior to removal to prevent spillage or protrusion of contents.
-) Biohazard bags at the Site are located in the field trailer.
-) If a primary regulated waste container is damaged, or its exterior contaminated beyond decontamination, then its contents will be placed into a secondary container which meets the requirements outlined above. In these cases, the original container will be placed entirely in the secondary one, instead of transferring the contents by hand. All regulated waste containers (primary and secondary) will be closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

Disposal of Regulated Waste

-) Disposal of all regulated waste will be in accordance with applicable federal, state, and local regulations.

- J When a regulated waste container is full, contact Health and Safety for guidance on proper disposal.

14.3.18.7 Hepatitis B Immunization

- J LEA provides the opportunity for immunization against hepatitis B to employees with occupational exposure to bloodborne pathogens at no cost and at a reasonable place and time.
- J The Hepatitis B vaccination will be made available after the employee has received the initial training and within 10 working days of initial assignment to a job duty with occupational exposure, unless:
 - J The employee has documentation of previous receipt of the complete hepatitis B vaccination series.
 - J Antibody testing has revealed that the employee is immune.
 - J The vaccine is contraindicated for medical reasons.
 - J Records for the vaccinations are maintained by LEA medical monitoring provider.
 - J Employees who choose to decline the vaccine will sign a declination form. These forms will be maintained in the Corporate Health and Safety files in Portland, Maine.
 - J If an employee who declined the Hepatitis B vaccination later wishes to receive it, it will be provided at no cost and at a reasonable time and place if the employee still has occupational exposure.

14.3.18.8 Exposure Incident

An exposure incident is defined as a specific eye, mouth, mucous membrane, non-intact skin, or parenteral contact with blood or OPIM that results from the performance of an employee's duties. All LEA employees covered under this program will be provided with post-evaluation and follow-up treatment in the event of occupational exposure to blood or OPIM.

Initial Response

1. Provide immediate care to the exposure site:
 - a. Wash wounds and skin with non-abrasive soap and water.
 - b. Flush mucous membranes with water.
2. Report the incident to Health and Safety.
3. Contact the designated occupational health clinic for post exposure evaluation direction.

Post-Exposure Evaluation and Treatment

1. The medical evaluation will be provided to the affected employee at no cost and at a reasonable time and place.

The post-exposure evaluation and treatment protocol is provided in section 2.3 of the corporate program.

Incident Evaluation

1. The exposed employee's Manager will work with the involved employee(s) to perform the incident evaluation. Where appropriate based on the nature of the incident, Health and Safety or the occupational health professional will be asked to participate in the investigation.

In addition to the standard information required on an Incident Report, documentation for a BBP exposure incident must also include the following:

- a. What potentially infectious materials were involved
- b. Source of the material

14.3.18.9 Information and Training

) All employees with occupational exposure to BBP will be provided with initial and annual refresher training, at no cost to the employee and during working hours. Training will be provided prior to the employee's initial assignment which required inclusion in this program.

) Details on required training content and documentation requirements are provided

in Bloodborne Pathogens Program of the Corporate Health and Safety Program Manual. Health and Safety will arrange for training that meets these minimum requirements.

14.3.18.10 Recordkeeping

As described in Section 2.6 of the corporate program, the following records related to this BBP exposure control plan will be maintained:

-) Hepatitis B vaccination status,
-) Medical records for each employee with occupational exposure,
-) Sharps injury log,
-) Training, and
-) Program review.

14.3.19 Additional Hazards

There are many not so obvious hazards that are often forgotten or overlooked. Here is a partial list that should be considered and controlled as applicable to the scope of work.

-) Allergies or medical conditions,
-) Lack of food and drink,
-) Repetitive motion (musculoskeletal disorders, ergonomics, lifting),
-) Sun blindness (sunset, water or building reflection, snow blindness, etc.),
-) Thin ice conditions,
-) Ultraviolet radiation (UV) – eyes and sunburns,
-) Other vehicles (snowmobiles, All-Terrain Vehicles [ATVs], trucks, boats, etc.),
-) Dangerous neighborhoods,

-) Driving (routine driving – on/off-site, Four-wheel drive[4WD] limitations, moving water, locking keys in vehicle), and
-) Lack of needed supplies – change of clothes, flashlights and batteries.

15. HASP APPROVALS

Below are the approvals and signatures for this HASP. This HASP has been written for the use of LEA, its employees, and subcontractors. This plan is written for specified site conditions, scope of work, and personnel and must be amended if these conditions change. This HASP also serves as the OSHA-required PPE assessment certification.

Project Coordinator Jeffrey J. Loureiro, P.E., L.E.P.	Date
--	------

Project Manager David W. Payne, P.E.	Date
---	------

LEA Health and Safety Manager Jordan L. Coleman	Date
--	------

APPENDIX C

SITE HEALTH AND SAFETY PLAN REVISIONS

HASP Review and Acknowledgment Form

By signing below, the undersigned acknowledges that he/she has read and reviewed this HASP for the Centredale Manor Restoration Project Superfund Site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

Print Name	Signature	Organization	Date

HASP Review and Acknowledgment Form



By signing below, the undersigned acknowledges that he/she has read and reviewed this HASP for the Centredale Manor Restoration Project Superfund Site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

Print Name	Signature	Organization	Date

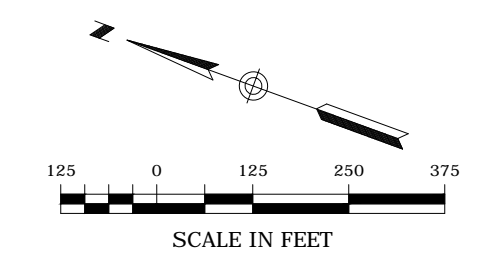


APPENDIX A

SITE PLAN



- LEGEND**
- APPROXIMATE PROPERTY BOUNDARY AND PARCEL PLAT NUMBER (ASSESSOR)
 - EDGE OF PAVED AREA
 - BUILDING
 - TOPOGRAPHIC CONTOUR
 - EDGE OF WATER COURSE/WATERBODY
 - ○ ○ VEGETATION



MAP REFERENCES:

1. JOHNSTON, RHODE ISLAND PARCELS WERE PROVIDED BY APPLIED GEOGRAPHICS INC. LAST UPDATED ON 12/08/17.
2. NORTH PROVIDENCE, RHODE ISLAND PARCELS WERE PROVIDED BY THE TOWN OF NORTH PROVIDENCE GIS DEPARTMENT.

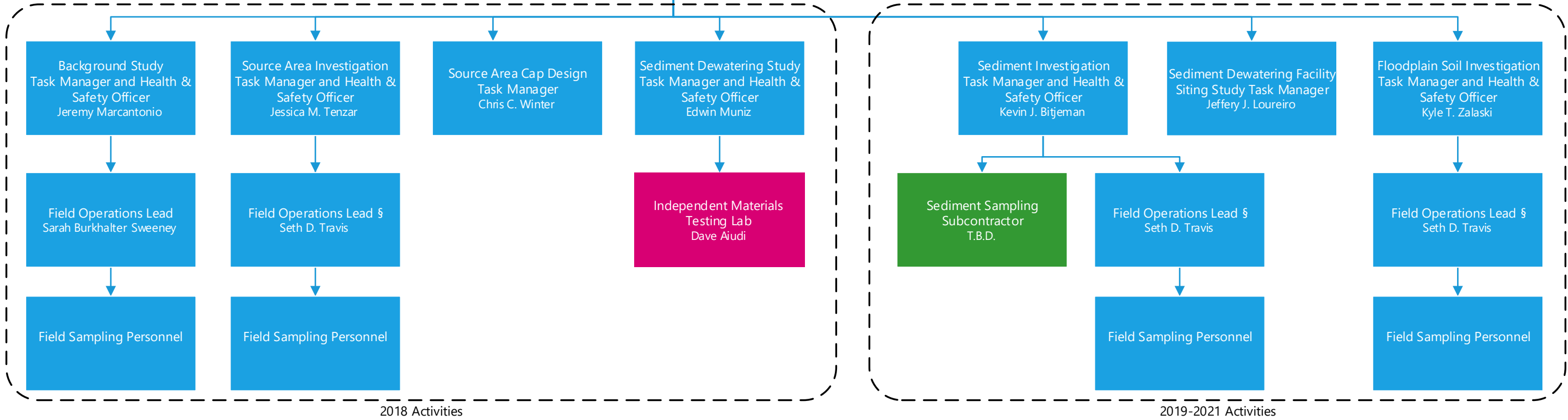
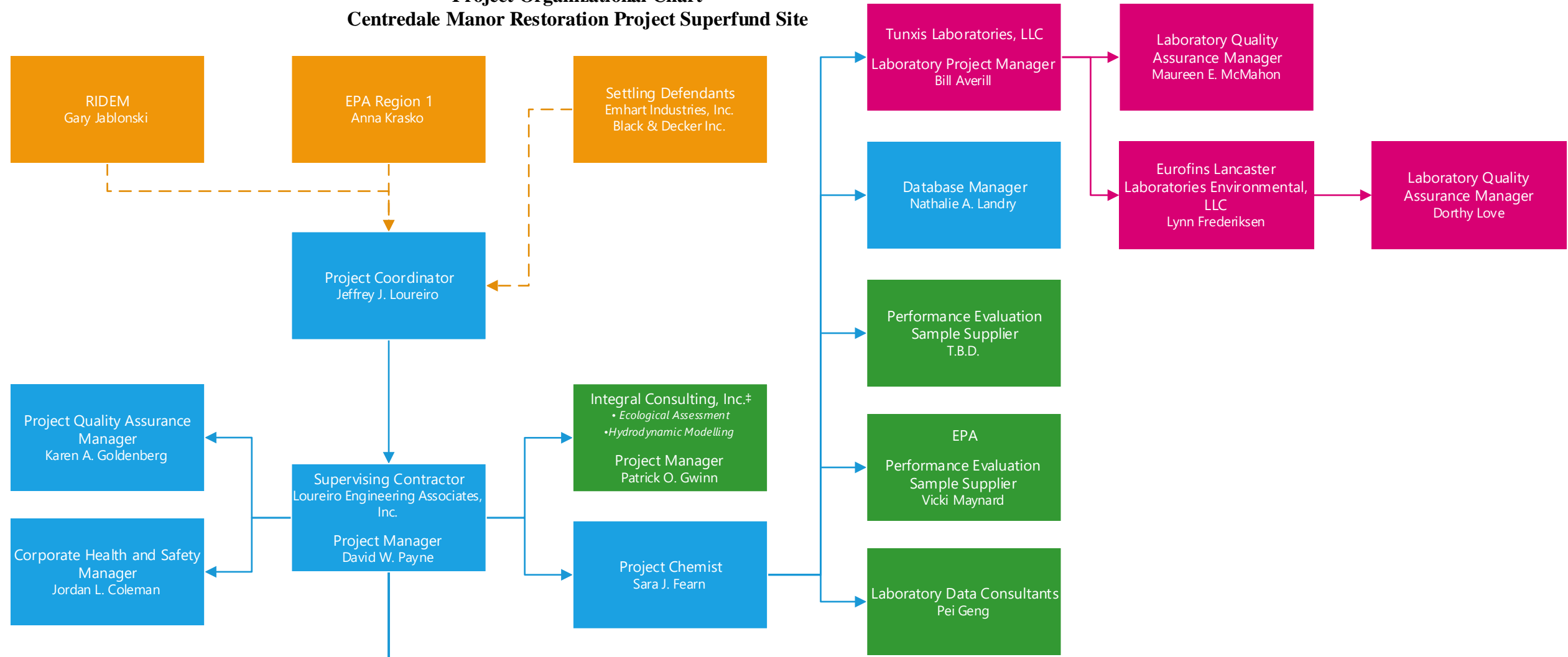
SITE PLAN CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE PREPARED FOR: EMHART INDUSTRIES, INC. AND BLACK & DECKER INC.		SCALE 1" = 250' CORN. NO. 07MD609	DATE 07/24/2018
		DRAWN BY PJA	DATE 07/24/2018
APPENDIX A		SHEET NO. 1	NO. OF SHEETS 1
Loureiro Engineers • Architects • Interiors • Energy 100 North Providence Street, Suite 200, North Providence, RI 02871 Phone: 800-747-6181 • Fax: 800-747-8822 www.loureiro.com © Loureiro Engineers, Architects, Inc. All rights reserved 2018.		STAMP	REV.
		DATE	DESCRIPTION OF REVISION
		DATE	DESCRIPTION OF REVISION

APPENDIX B

PROJECT ORGANIZATIONAL CHART

Appendix B
Project Organizational Chart
Centredale Manor Restoration Project Superfund Site

- Approval Authority
- Loureiro Engineering Associates, Inc.
- External Subcontractor/Supplier
- External Laboratory



‡ Baseline Physical and Ecological Assessment and Hydrodynamic Modeling to be performed under separate QAPP and mQAPP prepared by Integral.
 § Health and Safety Supervisor

APPENDIX C

SITE HEALTH AND SAFETY PLAN REVISIONS

APPENDIX D

DAILY SAFETY MEETING & ATTENDANCE SHEET

Daily Safety Meeting

Centredale Manor Restoration Project

List or Description of Topics Reviewed		
Briefing Date & Time:		
Site Health & Safety Officer / Designee Name:		
Name	Signature	Employer

APPENDIX E
AIR MONITORING LOG

Daily Air Monitoring Log

DATE	TIME	WEATHER	LOCATION	UPWIND/DOWNWIND	INSTRUMENT	READING

APPENDIX F

SITE SIGN-IN / SIGN-OUT

Daily Sign-In / Sign-Out Log

Centredale Manor Restoration Project

Name	Date	Time In	Time Out

APPENDIX G

FIRST REPORT OF INCIDENT

LOUREIRO INCIDENT MANAGEMENT GUIDELINES

It is the responsibility of every employee to immediately report all incidents to their immediate supervisor, Project Manager and/or Project Superintendent. It is ultimately the responsibility of the Project Manager or Project Superintendent to report all incidents to the Administrative Staff within 24 hours of the incident occurring.

1. PROVIDE MEDICAL TREATMENT

- Incidents involving life-threatening injury - contact Emergency Medical Services (911) **first**. Do not waste valuable time. Do not attempt to transport a seriously injured employee to the hospital in a private vehicle. A company representative must follow the ambulance to the hospital and must represent the injured employee and the company until a family member or alternative company representative arrives at the hospital.
- Incidents involving non-life-threatening injury (but beyond on-site first aid capabilities) - seek medical treatment at the closest Concentra Medical Center (see below). A company representative must accompany the injured employee to the medical center and must represent the injured worker and the company until the injured employee is released from the care of the medical center.
- Incidents involving outside parties (non-Loureiro employees, such as a motor vehicle accident) – provide medical treatment if necessary as outlined above. Contact the police. Attempt to obtain personal contact information and insurance information from all involved parties. Keep conversation with the outside parties to a minimum and do not comment on fault or liability.

In all incidents preserve evidence and document the incident scene with photographs when possible. Forward this type of information along with the incident report directly to the company as noted below for processing.

Note: In all incident cases it is crucial that the company be made aware of the incident as soon as is feasible. It is preferred that direct contact be made with the Manager of Safety **and** the Office Manager or a member of the Administrative Staff. All can be reached by calling 860-747-6181 or by calling their direct lines. The Administrative Staff in turn will notify the appropriate members of senior management.

2. FORMALLY REPORT THE INCIDENT

A Loureiro First Report of Incident form must be submitted to the Administrative Staff within 24 hours of the incident occurring. A Loureiro Root Cause Analysis form must be submitted to the Administrative Staff within 5 working days of the incident occurring. Submit all required forms to the Office Manager or a member of the Administrative Staff. Hand-deliver the forms or fax them to 860-747-8822. The Administrative Staff in turn will forward them to the appropriate members of senior management. In all cases the Project Manager or Project Superintendent is ultimately responsible for the timely submission of this information to the company.

3. INCIDENT REVIEW

The Manager of Safety will review each Loureiro First Report of Incident form and subsequent Loureiro Root Cause Analysis form.

Concentra Medical Center Locations in CT, NH, MA and RI

8 South Commons Road, Waterbury, CT (203-759-1229)
701 Main Street, East Hartford, CT (860-289-5561)
333 Kennedy Drive, Suite 202, Torrington, CT (860-482-4552)
60 Watson Boulevard, Stratford, CT (203-380-5933)
10 Connecticut Avenue, Norwich, CT (860-859-5100)
972A West Main Street, New Britain, CT (860-827-0745)
900 Northrop Road, Wallingford, CT (203-949-1534)
15 Commerce Road, 3rd Floor, Stamford, CT (203-324-9100)
1080 Day Hill Road, Windsor, CT (860-298-8442)
370 James Street, New Haven, CT (203-503-0482)
14 Broad Street A, Nashua, NH (603-889-2354)
1 Pillsbury Street, Concord, NH (603.223.2300)
1279 South Willow Street, Manchester, NH (603-644-3330)
66B Concord Street, Wilmington, MA (978-657-3826)
290 Branch Avenue, Providence, RI (401-722-8880)
400 Bald Hill Road, Warwick, RI (401-737-4420)

T.E.A.M: Together Everyone Achieves More

LOUREIRO FIRST REPORT OF INCIDENT

INSTRUCTIONS: This form shall be used to report all incidents to the company. This form shall be completed by the employees involved in the incident and submitted to the Administrative Staff within 24 hours of the incident occurring. In addition, a root cause analysis (separate form) shall be completed and submitted to the Administrative Staff within 5 working days of the incident occurring. In all cases the Project Manager or Project Superintendent is ultimately responsible for the timely submission of this information to the company.

GENERAL INFORMATION

Name of Project Manager or Project Superintendent:	Name of Person Who Completed This Report:	Date Submitted to the Company:
Location of Incident (include project number, project name, street, city, state and zip code):		Date & Time of Incident (<input type="checkbox"/> a.m. <input type="checkbox"/> p.m.):
Business Unit (check all that apply): <input type="checkbox"/> Environmental <input type="checkbox"/> Structural MEP <input type="checkbox"/> LEA Services <input type="checkbox"/> Environment, Health & Safety <input type="checkbox"/> Civil/Survey <input type="checkbox"/> LCI <input type="checkbox"/> Main Office <input type="checkbox"/> WorkWaste <input type="checkbox"/> NH <input type="checkbox"/> RI Energy Services		
Type of Incident (check all that apply): <input type="checkbox"/> Near Miss <input type="checkbox"/> Injury without Medical Treatment <input type="checkbox"/> Injury with Medical Treatment <input type="checkbox"/> Motor Vehicle Accident <input type="checkbox"/> Property Damage <input type="checkbox"/> Spill <input type="checkbox"/> Other		
If "Other" please explain:		

INCIDENT DESCRIPTION (WHAT HAPPENED?)

INSTRUCTIONS: The purpose of the incident description is to provide the company with enough detail about the incident so that the company can manage it in a professional manner. As such please provide information such as the names of those involved, the type of equipment involved, the ultimate outcome or result, etc. If individuals outside of the company were involved please provide their names and contact information. Print legibly.

What happened?

What was the outcome or result?

ATTACHMENTS: Police Report yes no Medical Report yes no Photographs yes no

OFFICE DATE STAMP

APPENDIX H

JOB HAZARD ANALYSIS (JHA)

JOB HAZARD ANALYSIS

JHA Rev.#	000	Job or Operation Title: <u>Brush Clearing</u> – Trail clearing for equipment and personnel access to work areas	
Location Centredale Manor Restoration Project		Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018		Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards			
Personal Protective Equipment <ul style="list-style-type: none"> • Level D plus cut resistant gloves, face shield, hearing protection and protective chaps (Kevlar) 			
Basic Job Steps		Existing and/or Potential Hazards	Corrective Measures/Controls
Survey Work Area		Adverse Weather Conditions	<ul style="list-style-type: none"> • Obtain weather report. Do not attempt to work in low light situations, rain, thunderstorms or the extreme hot or cold.
		Slip, trip & fall	<ul style="list-style-type: none"> • Walk carefully over uneven terrain (including steep slopes) • Significant walking hazards (holes, large tree limbs) should be removed/mitigated or marked in the field utilizing flagging / marking paint to ensure Site workers are aware of the hazards
		Contact with overhead utilities/hazards	<ul style="list-style-type: none"> • Conduct a walk around of the work areas and identify potential hazards such as overhead power lines and other wires that may be impacted by falling trees or brush. • Inspect work area for dead tree limbs that may or may not be part of your scope. • Establish exclusion zone around your work area.
		Flora & Fauna	<ul style="list-style-type: none"> • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p style="text-align: right;"><i>See Flora & Fauna JHA for more detail</i></p>

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

Inspect Equipment	Cut, Abrasions, Burns	<ul style="list-style-type: none"> • Wear appropriate PPE listed above • Keep away from hot exhaust, mufflers and chains • Install chain guard on bar when not in use.
	Equipment Failure	<ul style="list-style-type: none"> • Inspect and adjust saw per manufactures recommendations • Inspect chain for sharpness and free moving along bar. Readjust chain if too tight or too loose • Ensure chain brake is functional
	Spills – Gas/Oil	<ul style="list-style-type: none"> • Gasoline must be stored in approved safety can with spring-loaded cap. • Do not overfill gas/oil tanks.
	Fire, Explosion	<ul style="list-style-type: none"> • Gasoline must be stored in approved safety can with spring-loaded cap. • Store all containers on a level surface. • Keep chainsaw away from dry leaves and tinders. • Let engine cool prior to refueling.
Chain Saw and Weed Whacker Operation	Cuts, Struck By, Insects, Noise	<ul style="list-style-type: none"> • Wear appropriate PPE listed above • Maintain situational awareness • Use low-kick back chain for chainsaw • Avoid putting the tip of the chainsaw bar against the wood to prevent kickback • Avoid poisonous plants (poison ivy, oak, sumac) avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p>
	Contact with overhead utilities/hazards	<ul style="list-style-type: none"> • Maintain awareness for overhead power lines and other wires that may be impacted by falling trees or brush. • Maintain awareness for dead tree limbs that may or may not be part of your scope.

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

		<ul style="list-style-type: none"> • Maintain an exclusion zone around your work area. • Use buddy system as spotter. • Use wedges or other appropriate equipment to assist in directional tree felling. • Do not walk under hanging trees or limbs. • Check fall path for crews and utilities when falling trees
	Slip, Trip, Fall	<ul style="list-style-type: none"> • Walk carefully over uneven terrain (including steep slopes) • Inspect and maintain clear working areas
	Exertion: Muscle, Back Strain	<ul style="list-style-type: none"> • Keep back straight and bend at the knees. • Use buddy system to assist lifting heavy or awkward objects. • Adjust work schedule as to not work in extreme heat.
	Heat / Cold Stress	<ul style="list-style-type: none"> • Use buddy system to monitor health of coworkers • Wear appropriate clothing to prevent heat exhaustion or hypothermia • Take frequent breaks

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: Direct Push Drilling Operations	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018	Team Performing JHA David Brisson	Verified By David Payne
Special or Primary Hazards	Direct Push Drilling Operation Activities	
Personal Protective Equipment	Steel-toed boots, hard hats, safety glasses, safety vests, hearing protection	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Loading & unloading equipment at Yard & site	Slip, trip, and fall, injury during lifting	Use appropriate lifting technique
. Preliminary procedures <ul style="list-style-type: none"> • Notify relevant parties of the time and place of drilling activities. • Call CBYD for utility clearance of the work area. • Schedule private utility locator contractor to clear all locations 	Underground utilities not being located prior to drilling activities	<ul style="list-style-type: none"> • Conduct preliminary procedures as noted and as otherwise required. • Note and correct any exceptions identified during this preliminary process to avoid incidents and correct exceptions in this JSA as necessary. • Follow Loureiro Ground Breaking Procedure
Equipment setup at site <ul style="list-style-type: none"> • moving equipment/drill rig 	<ul style="list-style-type: none"> • Slip, trip & fall, insects & animals • Injury from lifting. • Remote site. • Mobilizing rig using remote control 	<ul style="list-style-type: none"> • Walk carefully, wear long clothing, and be aware of surroundings. • Use a cart or drill rig to move equipment or limit weight of equipment being carried. Buddy lift heavy equipment. • At least one member carry an operating cell phone at all times. • Spotter system while mobilizing rig in obstructed view and high traffic areas. • Do not operated controls while standing directly in front of or behind rig • Test ground surface and sloped surfaces for stability prior to mobilizing rig

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

<p>Access and mark boring and well locations.</p> <ul style="list-style-type: none"> This may involve brush clearing activities. 	<ul style="list-style-type: none"> Flora/Fauna Lacerations and flying objects from chainsaw or brush clearing equipment activities. Slips/trips/falls 	<ul style="list-style-type: none"> Avoid poisonous plants (poison ivy, oak, sumac) Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p> <ul style="list-style-type: none"> Wear appropriate PPE listed above Maintain situational awareness Use low-kick back chain for chainsaw Avoid putting the tip of the chainsaw bar against the wood to prevent kickback
<p>Well Installation</p> <ul style="list-style-type: none"> Advancement of direct push equipment Installation of Monitoring wells Advancement of Screen Point sampler 	<ul style="list-style-type: none"> Dust inhalation Noise Injury or crush hazard from dropped heavy objects (rods, bits, casings, etc.) Rotational hazards from clothing being caught in rotational equipment Pinch Points Lifting heavy equipment Silica dust exposure from secondary sand pack installation Flying objects (metal drill cuttings, hydraulic fluid, acetate sleeves) Chemical exposure for unknown sources 	<ul style="list-style-type: none"> Wear protective eyewear, clothes and awareness of pinch points. Wear hearing protection for work areas and tasks that have noise levels greater than 90 dBA. Buddy lift heavy equipment Wear steel toed work boots. Support personnel should stay at least 15 feet away while the drill rig is in operation. Avoid wearing loose clothing Wet silica sand or use appropriate dust mask while handling. Wear proper PPE for chemical exposure
<p>Decontamination</p>	<ul style="list-style-type: none"> Chemical exposure (site contamination) Decontamination Fluids May use pressure washer for decon of large tooling 	<ul style="list-style-type: none"> Wear PPE including safety glasses, nitrile gloves, and work boots. If using pressure washer on equipment (not PPE), avoid contact with splash-back liquid/use face shield

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
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Waste Disposal	<ul style="list-style-type: none"> • Chemical exposure (site contamination) • Slips/trips/falls • Injury from lifting 	<ul style="list-style-type: none"> • Wear PPE including safety glasses, nitrile gloves, and work boots. • Be aware of surroundings • Good house keeping • Strap in drums prior to moving • Use a cart or drill rig to move equipment or limit weight of equipment being carried; Buddy lift heavy equipment. • Have Spill Response Kits on hand
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3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
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JOB HAZARD ANALYSIS

JHA Rev.#	000	Job or Operation Title: <u>Flora and Fauna</u> – Understanding the risks associated with plants and animals while conducting various Site activities	
Location Centredale Manor Restoration Project		Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018		Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards			
Personal Protective Equipment			
<ul style="list-style-type: none"> • Level D plus nitrile gloves • Recommend Tyvek coveralls • Tecnu cleaner 			
Basic Job Steps		Existing and/or Potential Hazards	Corrective Measures/Controls
<ul style="list-style-type: none"> • Working in areas with known or suspected poisonous plants: <ul style="list-style-type: none"> a. Poison Ivy b. Poison Oak c. Poison Sumac d. Giant Hogweed 		<p><u>Poison Ivy, Oak, and Sumac allergic skin reaction</u></p> <ul style="list-style-type: none"> • Results in an itchy rash, which can appear within hours of exposure or up to several days later <p><u>Giant Hogweed skin reaction</u></p> <ul style="list-style-type: none"> • 2nd degree burns • Blistering • Pigmentation of skin at contact points • Recurring dermatitis • Scarring • Temporary/permanent blindness 	<ul style="list-style-type: none"> • Be able to identify poisonous plants before going in the field and pay attention to placement of body and tools when working in known or suspected poisonous plant habitat. • Avoid exposure at all costs. If exposure is unavoidable, wear Tyvek coveralls and disposable gloves. • Decontaminate tools or equipment after potential contact with poisonous or toxic plants. • Shower as soon as possible after exposure to remove any potential contamination. • Wash body parts with Tecnu or other product designed for removing oil (Dawn dish soap). • Before entering a vehicle, remove outer layers of clothing or Tyvek so not to spread oil toxic oil. • Do not burn poisonous plants because the oil can become airborne and inhaled. • For Giant Hogweed - Contact RIDEM – Division of Agriculture and Resource Marketing and supply them with the location,

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		size, and number of plant(s). (401) 222-2781 ext. 4500)
Plant Name / Description	Photograph of Plant	
<p>Poison Ivy</p> <p>Solid green, pointed leaves that hang from the stem in groups of three. It grows as both a vine and a shrub. The look of poison ivy can change with the seasons. It produces yellow-green flowers in the spring and its green leaves can change to yellow and red in autumn.</p>		

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Poison Oak

Like its ivy counterpart, poison oak leaves also cluster in sets of three. The edges of the solid green leaves, while reminiscent of an oak tree, are less dramatic. Poison oak is most often seen in shrub form, but it can also grow as a vine.



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Poison Sumac

Native to swampy, acidic soils. It typically reaches about 6 metres (20 feet) in height. The compound leaves consist of 7–13 oval leaflets with smooth margins. Young leaves are often bright orange. The leaves mature to a deep glossy green and turn red-orange before they drop in autumn. The small yellow-green flowers are borne in loose hanging clusters that emerge from the leaf axils. Unlike the upright fuzzy reddish fruit clusters of true sumacs (genus *Rhus*), poison sumac has whitish waxy drupes that droop loosely from its stalks.



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Giant Hogweed

7-14 feet tall containing white flowers with 50-150 flower rays clustered into an umbrella shape up to 2.5 feet across. Huge leaves, incised and deeply lobed are up to 5 feet across. Stems, between 2-4 inches in diameter, are green with extensive purple splotches and prominent coarse white hairs.



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Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
<ul style="list-style-type: none"> • Working in areas with known or suspected hazardous animals: <ul style="list-style-type: none"> a. Ticks b. Spiders (black widow, brown recluse) c. Insects (Bees, wasps, hornets) 	Tick borne diseases	<ul style="list-style-type: none"> • Perform tick checks by scanning clothes and any exposed skin frequently. • Stay on cleared, well-traveled trails. • Keep work areas clear. • Avoid sitting directly on the ground or on stone walls. • Be aware that ticks can also be above you. • Keep long hair tied back. • Required PPE: <ul style="list-style-type: none"> ○ Wear light colored pants. ○ Tuck pants into socks or wear boot gaiters. • Encouraged PPE: <ul style="list-style-type: none"> ○ Use insect repellent contain DEET on skin or clothes. ○ Use permethrin-treated or impregnated clothing (do not apply to skin).
	Illness caused by poisonous spider bite	<ul style="list-style-type: none"> • Inspect or shake out any clothing, shoes, towels, or equipment before use. • Wear protective clothing such as long-sleeved shirt and long pants, hats, gloves, and boots when handling stacked or undisturbed piles of materials that are indoors or outdoors. • Trim or eliminate tall grasses from around outdoor work areas.
	Being stung by stinging insects	<ul style="list-style-type: none"> • Wear a Hooded Bee Jacket or face covering when disturbing a bee hive is necessary • Wear light-colored, smooth-finished clothing. • Avoid perfumed soaps, shampoos, and deodorants. • Wear clean clothing and bathe daily.

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		<ul style="list-style-type: none">• Wear clothing to cover as much of the body as possible.• Avoid flowering plants when possible.• Remove food from work areas.• Remain calm and still.• Workers with a history of severe allergic reactions to insect bites or stings should consider carrying an epinephrine auto injector (EpiPen) and should wear a medical identification bracelet or necklace stating their allergy and let people working with you know about your allergy.
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JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: Low Flow Groundwater Sampling	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018	Team Performing JHA David Brisson	Verified By David Payne
Special or Primary Hazards	Exposure to contaminated groundwater, vehicular traffic, lifting heavy items, flora/fauna	
Personal Protective Equipment	Chemical-resistant gloves, safety glasses, steel-toe boots, safety vests	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Loading & unloading equipment at Yard & Site	Slip, trip, and fall, injury during lifting Vehicular traffic	Use appropriate lifting technique. Exercise caution around vehicular traffic.
Equipment setup at site <ul style="list-style-type: none"> • Walking and working in active parking areas, wooded areas • Carrying equipment • Cutting tubing 	<ul style="list-style-type: none"> • Slip, trip & fall, on-site vehicular traffic, flora/fauna, heat and cold stress • Injury from lifting, loading equipment • Lacerations 	<ul style="list-style-type: none"> • Walk carefully, proper use of cones, workers ahead signs, danger tape, and safety clothing. Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p> <ul style="list-style-type: none"> • Wear appropriate PPE • Use a cart or limit weight of equipment being carried, or use buddy system. • Use appropriate knives, use sharp blades, cut away from yourself.

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<p>Sample collection</p> <ul style="list-style-type: none"> • Proper setup of equipment if generators or fuel operated compressors are used. • Handling glassware • Groundwater sample collection • Sample transport • Exposure to weather 	<ul style="list-style-type: none"> • Fire, carbon monoxide poisoning • Lacerations from broken bottles, chemical exposure, puncture • Splashing of contaminated groundwater, splashing of preservative (HCl), chemical exposure • Heavy lifting • Extreme hot temperatures or cold temperatures • Flora/Fauna 	<ul style="list-style-type: none"> • Operate any gasoline/diesel powered equipment in an open, well ventilated area, setup up equipment down wind of sampling location; do not fuel equipment while running. • Proper PPE, preventative maintenance on equipment. • Do not touch broken glass with hands, wear appropriate gloves or use dust broom. Use of PID to screen groundwater sampling locations. • Wear safety glasses, do not put head directly over bottle, and wear nitrile gloves. • Buddy-lift coolers. • Drink liquids, increase rest breaks in cool, dry areas, follow SOP for outdoor work. Wear appropriate cloths for weather conditions • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p>
<p>Waste Management</p> <ul style="list-style-type: none"> • Collection & pumping of groundwater into 5-gal carboys • Transporting carboys to containment drums • Dumping water into drums 	<ul style="list-style-type: none"> • Injury from lifting heavy water-filled containers. • Splashing or spilling of water. • Potential exposure to site contaminants 	<ul style="list-style-type: none"> • Buddy-lift heavy containers. • Wear safety glasses, nitrile gloves, use plastic sheeting on ground to contain spills. Secure drum prior to filling and use a drum funnel. Avoid spilling liquid on clothing.

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JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: Safe Driving	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 7/11/2018	Team Performing JHA David Brisson	Verified By Jordan Coleman
Special or Primary Hazards Vehicles		
Personal Protective Equipment		
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
1. Plan your trip	Distracted Driving.	<ul style="list-style-type: none"> • Obtain directions. • Drive during daylight hours if possible. <ul style="list-style-type: none"> • Check email, text messages, and make necessary phone calls prior to starting the trip if possible.
2. Conduct vehicle inspection	<ul style="list-style-type: none"> • Vehicle malfunction causing vehicle damage, personal injury, or death. • Impaired Vision. 	<ul style="list-style-type: none"> • Conduct a vehicle inspection prior to departing. See Chapter 4, Appendix C of the Health & Safety Manual for a checklist. • Remove snow/ice (if necessary) from windshield. • Remove snow (if necessary) from the top of the vehicle
3. Enter vehicle and prepare to drive	Vehicle Collison/Injury/Death.	<ul style="list-style-type: none"> • Fasten seatbelt. • Ensure all passengers have fastened seatbelts. <ul style="list-style-type: none"> • Adjust mirrors and seat to fit your body
5. Operate vehicle <ul style="list-style-type: none"> • Public and State Roads • Onsite as a courier 	Vehicle Collisions/Injury/Death.	<ul style="list-style-type: none"> • The operator must possess a valid driver's license for the vehicle to be operated. • Obey all traffic safety laws and follow the speed limit. • Do not drive when fatigued, if there is another licensed driver consider switching drivers. If there is not another driver pull over in a safe location, such as a parking lot or rest area, for fresh air or take a power nap. If driving late at night consider

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		<ul style="list-style-type: none"> renting a hotel room. • Follow state laws with respect to hand held devices. Pull off the road before using a cell phone whenever possible Avoid using a cell phone during heavy traffic, inclement weather, poor road conditions, or when involved other conversations. • Do not operate a vehicle under the influence of alcohol, drugs, or prescription medication that causes drowsiness. • Drivers must be at least 18 years old to drive vehicles on company business. • If your vehicle breaks down, pull over to the shoulder and do not exit the vehicle. • Do not jump off/out/on a moving vehicle. • Do not ride in the bed of a truck. • Scan the road for driving hazards. • Adhere to all site speed limits and traffic signs
6. Park vehicle	Vehicle Collision/Injury/Death.	<ul style="list-style-type: none"> • Park away from other cars. • Pull through when available. • Back into a parking spot when possible. • Remove keys from vehicle and lock vehicle.
7. Post trip	Vehicle Damage.	<ul style="list-style-type: none"> • Report maintenance or mechanical problems to Facilities Manger upon return. <p>Rental Vehicles report maintenance or mechanical problems to rental agency</p>

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JOB HAZARD ANALYSIS

JHA Rev.# 000		Job or Operation Title: Working from a Vessel (small boat or barge)	
Location Centredale Manor Restoration Project		Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 7/19/18		Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards		<ul style="list-style-type: none"> Flash flood, thunderstorm/lightning, shock hazard, known and unknown chemical exposure, moving water, risk of drowning, Flora & Fauna, dehydration 	
Personal Protective Equipment		<ul style="list-style-type: none"> Level D plus nitrile gloves over cut resistant gloves US Coast Guard Approved Personal Flotation Devices 	
Basic Job Steps		Existing and/or Potential Hazards	Corrective Measures/Controls
Mobilizing to vessel: <ul style="list-style-type: none"> Walking in vegetation and traffic areas Material Handling 		Slip, trip & fall	<ul style="list-style-type: none"> Walk carefully over uneven terrain (including steep slopes) Significant walking hazards (holes, large tree limbs) should be removed/mitigated or marked in the field utilizing flagging / marking paint to ensure Site workers are aware of the hazards
		Carrying Heavy Equipment or supplies	<ul style="list-style-type: none"> Use a cart or limit weight of equipment Use buddy system for heavy or awkward loads
		Flora & Fauna	<ul style="list-style-type: none"> Avoid poisonous plants (poison ivy, oak, sumac, giant hogweed) Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <i>See Flora & Fauna JHA for more detail</i>
		Heat / Cold Stress	<ul style="list-style-type: none"> Use buddy system to monitor health of coworkers Wear appropriate clothing to prevent heat exhaustion or hypothermia Take frequent breaks Have drinking water on the vessel

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	Traffic	<ul style="list-style-type: none"> • Wear appropriate Level D PPE. • Use traffic cones to delineate work areas, if applicable
Pre-departure check of vessel	Unsafe condition/operation of vessel	<ul style="list-style-type: none"> • Check the weather forecast for the area and timeframe during which you will be boating; monitor for storms throughout the day • Make sure that the steering and throttle controls operate properly and all lights are working properly. • Check for any fuel leaks from the tank, fuel lines, and carburetor. • Check the engine compartment for oil leaks. • Check hose connections for leaks or cracks, and make sure hose clamps are tight. • Drain all water from the engine compartment, and be sure the bilge plug is replaced and secure. • Check to be sure you have a fully charged engine battery and fire extinguishers. • If so equipped, make sure the ignition safety switch and wrist lanyard are in good order and all crew members know how to operate it • Make sure you have the required number of personal flotation devices (PFDs), horn, and radios; check that they are in good condition. • Maximum weight capacity for watercraft will not be exceeded and the stability of the vessel which includes the intended load will be calculated by the operator of the vessel. • Confirm the operator's license or boating safety certificate is on board.

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Working on a vessel (small boat or barge)	Water Craft Operation	<ul style="list-style-type: none"> • When possible, all persons on board will remain seated when in transit. • All personnel shall wear United States Coast Guard (USCG) Approved Type I or II Life Preservers at all times while on the water. • Non-slip surfaces will be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways. • All means of boat access shall be properly secured, guarded, and maintained free of slipping and tripping hazards. • A Coast Guard approved Type IV flotation device (life ring) will be maintained on each dredge/boat. • Watercraft will not be operated without a minimum of two personnel on board. • Watercraft will not be used without shore support personnel. • Personnel on board watercraft must be in constant radio contact with shore personnel. • All barge and boat pilots shall be familiar with the “Rules of the Road” that regulate movement of boat traffic. • Watercraft will be operated only by those personnel who have successfully completed the required boating safety course or hold an operator’s license • Locations of rocks, ledges and man made surface obstructions will be noted within the work area. • All watercraft must have required Coast Guard approved lighting and signaling devices.
	Sinking Boat / Damage	<ul style="list-style-type: none"> • The load ratings of dredges/boats will be strictly adhered to; overloading of vessels is prohibited.

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		<ul style="list-style-type: none"> Oil absorbent booms will be kept on board in the event of a spill. No unnecessary fuel cans will be onboard.
	Slip hazard	<ul style="list-style-type: none"> During cold conditions, ensure that de-icing salt is available to prevent water from freezing on the deck of the boat. Ramps leading down to the boat should be equipped with railings and preferably have appropriate anti-slip pad or grating. Keep all walking and working surfaces clean, dry, and unobstructed and free of debris. Clean up and/or report any spill immediately. Secure gear and equipment that is not in use. Wear safety shoes or boots with slip-resistant soles as appropriate.
	Falling overboard	<ul style="list-style-type: none"> Spread alarm by calling out “Man Overboard” followed by location person fell into the water (port/starboard/bow/stern) Operator to slow down and assess the situation and make a correct approach slowly to ensure recovery on first attempt. Maneuver the boat to recover person in water Deploy floatation device (ring buoy) with at least 90 feet of line A lifesaving skiff will be immediately available for emergency rescue. <ul style="list-style-type: none"> The skiff must be in the water or capable of being quickly launched by one person. There must be at least one person present and specifically designated to respond to water emergencies and operate the skiff at all times when there are employees above water. When the operator is on break another operator must be designated

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		<p>to provide the requisite coverage while employees are above water.</p> <ul style="list-style-type: none"> ○ The designated operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway. ○ The skiff operator may be assigned other tasks provided the tasks do not interfere with the operator's ability to quickly reach the skiff and get underway. ○ The communication system, such as a walkie-talkie, must be used to inform the skiff operator of an emergency and to inform the operator where the skiff is needed. ○ The skiff must be equipped with both a motor, blankets/towels, and oars.
	Weather, storm hazards	<ul style="list-style-type: none"> ● Be aware of the weather. Continuously check with the National Weather Service or NOAA for changing conditions. ● If an unexpected weather event arises such as a squall or storm, make way for shore immediately and secure work until weather passes. ● If an unexpected lightning storm occurs, secure work for at least an additional hour after the storm seems clear.
	Mechanical failure	<ul style="list-style-type: none"> ● Conduct daily inspections of the vessel ● Maintain paddles or oars in the boat as a back-up system.
	Hitting obstructions (rocks, shallow ground) causing mechanical failure, injury or stranding.	<ul style="list-style-type: none"> ● Review bathymetry survey maps to familiarize yourself with shallow areas before you set out.
	Capsizing	<ul style="list-style-type: none"> ● Ensure equal weight distribution when storing equipment on the boat.

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		<ul style="list-style-type: none"> • Do not overload a boat beyond its rated capacity. • Be aware of your surroundings, including potential tidal or weather hazards.
	Working around cranes, hoists, or derricks, resulting in being struck by a heavy object (such as the boom or the load being moved).	<ul style="list-style-type: none"> • Stay clear when a hoist is being used unless you are part of the procedure. • Never stand under a load or boom with a suspended load. • Wear personal protective equipment, such as head, foot, eye, and hand protection at all times. • Assess the hoisting systems for structural soundness by inspecting regularly for problems with welds, rivets, chains, pulleys, lines, blocks, hooks, etc. • Secure power blocks with a safety chain. • Ensure that cranes in use are secured to the barge. • Do not try to help lift a load being hoisted.
	Working around winches, resulting in body parts being caught in a winch drum, being struck by a broken line or cable, or tripping over a line or cable.	<ul style="list-style-type: none"> • Use a device or tool (never your hand) to keep the winch line spooling properly. • Enclose the winch drum in a cage if practical. • Stay off the deck unless you are part of the operation. • Never stand in, on, over, or in line with lines or cables connected to winches when they are under tension. The danger zone lies within 15 degrees of either side of a line under tension. • Never step on or walk over the winch drum. • Inspect the winch system regularly for problems associated with general or localized deterioration, cracked welds, and other structural, mechanical, or electrical deficiencies. • Inspect lines and cable systems regularly, including blocks, hooks, and associated

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5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: <u>Sediment Sampling</u> - Using mechanical or manual methods to collect sediment sample	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018	Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards	<ul style="list-style-type: none"> • Buddy system required when working on or near water 	
Personal Protective Equipment	<ul style="list-style-type: none"> • Level D plus cut resistant gloves, rubber boots or waders • U.S. Coast Guard Approved life vests required if water is greater than 2 feet deep 	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Mobilizing to sampling location: <ul style="list-style-type: none"> • Walking in vegetation or developed areas • Working on or near water hazards • Material Handling 	Slip, trip & fall	<ul style="list-style-type: none"> • Walk carefully over uneven terrain (including steep slopes) • Significant walking hazards (holes, large tree limbs) should be removed/mitigated or marked in the field utilizing flagging / marking paint to ensure Site workers are aware of the hazards
	Carrying Heavy Equipment or supplies	<ul style="list-style-type: none"> • Use a cart or limit weight of equipment • Use buddy system for heavy or awkward loads
	Flora & Fauna	<ul style="list-style-type: none"> • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p style="text-align: center;"><i>See Flora & Fauna JHA for more detail</i></p>
	Heat / Cold Stress	<ul style="list-style-type: none"> • Use buddy system to monitor health of coworkers • Wear appropriate clothing to prevent heat exhaustion or hypothermia • Take frequent breaks
	Traffic	<ul style="list-style-type: none"> • Wear appropriate Level D PPE. • Use traffic cones to delineate work areas, if applicable

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

Sample collection: <ul style="list-style-type: none"> • Using hand tools • Handling laboratory glassware 	Back strain	<ul style="list-style-type: none"> • Use proper body mechanics when using hand tools. <ul style="list-style-type: none"> ○ Bend at the knees, keeping the back straight as possible and avoiding twisting.
	Splash hazards (glassware preservatives / COCs)	<ul style="list-style-type: none"> • Wear safety glasses and nitrile gloves • Do not put head directly over bottle
	Lacerations from broken bottles	<ul style="list-style-type: none"> • Wear safety glasses and nitrile gloves over cut resistant gloves

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.#	000	Job or Operation Title: Site Inspection/Audits	
Location Centredale Manor Restoration Project		Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018		Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards		Direct Push Drilling Operation Activities, onsite activities, flora/fauna, vehicle traffic	
Personal Protective Equipment		Steel-toed boots, hard hats, safety glasses, safety vests, hearing protection	
Basic Job Steps		Existing and/or Potential Hazards	Corrective Measures/Controls
Perform Site inspection <ul style="list-style-type: none"> • Site Visit • Audit 		<ul style="list-style-type: none"> • Slip/trip/fall from uneven terrain or obstructions • Traffic/ Heavy Equipment • Flora/Fauna • Chemical Exposure 	<ul style="list-style-type: none"> • Maintain situational awareness • Wear appropriate high visibility clothing, stay in proper line of sight of equipment operators. • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p> <ul style="list-style-type: none"> • Wear appropriate PPE

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.#	000	Job or Operation Title: <u>Soil Sampling</u> - Using manual or mechanical methods to collect soil samples	
Location Centredale Manor Restoration Project		Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018		Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards			
Personal Protective Equipment <ul style="list-style-type: none"> • Level D plus nitrile gloves over cut resistant gloves 			
Basic Job Steps		Existing and/or Potential Hazards	Corrective Measures/Controls
Mobilizing to sampling location: <ul style="list-style-type: none"> • Walking in vegetation • Material Handling 		Slip, trip & fall	<ul style="list-style-type: none"> • Walk carefully over uneven terrain (including steep slopes) • Significant walking hazards (holes, large tree limbs) should be removed/mitigated or marked in the field utilizing flagging / marking paint to ensure Site workers are aware of the hazards
		Carrying Heavy Equipment or supplies	<ul style="list-style-type: none"> • Use a cart or limit weight of equipment • Use buddy system for heavy or awkward loads
		Flora & Fauna	<ul style="list-style-type: none"> • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <i>See Flora & Fauna JHA for more detail</i>
		Heat / Cold Stress	<ul style="list-style-type: none"> • Use buddy system to monitor health of coworkers • Wear appropriate clothing to prevent heat exhaustion or hypothermia • Take frequent breaks

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

Sample collection: <ul style="list-style-type: none"> • Using hand tools (hand auger, pry bar, etc.) • Using a drill rig (Direct-push, HSA) • Handling laboratory glassware 	Back strain	<ul style="list-style-type: none"> • Use proper body mechanics when using hand tools (hand auger, pry bar, etc.) <ul style="list-style-type: none"> ○ Take frequent rests in between hand auger locations ○ Use buddy system and rotate hand augering ○ If using hand tools to remove obstructions (rocks, roots, etc.), bend at the knees, keeping the back straight as possible
	Drilling hazards	<i>See Direct-Push Drilling JHA for more detail</i>
	Splash hazards (glassware preservatives / COCs)	<ul style="list-style-type: none"> • Wear safety glasses and nitrile gloves • Do not put head directly over bottle
	Lacerations from broken bottles	<ul style="list-style-type: none"> • Wear safety glasses and nitrile gloves over cut resistant gloves

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: <u>Utility Clearance</u> – Required before groundbreaking operations (drilling, excavation, etc.)	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018	Team Performing JHA Jordan Coleman	Verified By David Payne
Special or Primary Hazards	<ul style="list-style-type: none"> Competency in utility clearing (GPR) use and limitations required 	
Personal Protective Equipment	<ul style="list-style-type: none"> Level D 	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Preliminary planning: <ul style="list-style-type: none"> Obtain utility drawings 	Unidentified underground utilities	<ul style="list-style-type: none"> Note any identified utilities to avoid incidents
Mobilizing to locations requiring mark out: <ul style="list-style-type: none"> Walking in vegetation or in high-traffic areas Brush clearing 	Slip, trip & fall	<ul style="list-style-type: none"> Walk carefully over uneven terrain (including steep slopes) Significant walking hazards (holes, large tree limbs) should be removed/mitigated or marked in the field utilizing flagging / marking paint to ensure Site workers are aware of the hazards
	Carrying Heavy Equipment or supplies	<ul style="list-style-type: none"> Use a cart or limit weight of equipment Use buddy system for heavy or awkward loads
	Flora & Fauna	<ul style="list-style-type: none"> Avoid poisonous plants (poison ivy, oak, sumac) Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <i>See Flora & Fauna JHA for more detail</i>
	Heat / Cold Stress	<ul style="list-style-type: none"> Use buddy system to monitor health of coworkers Wear appropriate clothing to prevent heat exhaustion or hypothermia Take frequent breaks

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

	Traffic	<ul style="list-style-type: none"> • Wear appropriate Level D PPE. • Use traffic cones to delineate work areas, if applicable
	Brush Clearing	<i>See Brush Clearing JHA for more detail</i>
Notify Dig Safe (utility clearinghouse): <ul style="list-style-type: none"> • Call or e-ticket 	Dig Safe marks public utilities only. Private utilities will not be identified by Dig Safe.	<ul style="list-style-type: none"> • Use of third party utility locator to be used to reduce chance of utility strike.
Notify private utility locator (GPR)	Limitations to utility locating equipment (GPR) include: <ul style="list-style-type: none"> • Soil Moisture • Depth penetration • Composition of soil • Size of target • Anomalies (concrete, metal, boulders) 	<ul style="list-style-type: none"> • Reference utility drawings, client institutional knowledge • Use of vacuum truck to conduct clearance of locations may be used though it is not anticipated for this scope of work. Contact Health & Safety regarding the use of vacuum trucks.

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

JHA Rev.# 000	Job or Operation Title: Well Development	
Location Centredale Manor Restoration Project	Job Address 2072 and 2074 Smith Street (Route 44), North Providence, RI	Employees /Subs LEA
Date JHA Performed 07/10/2018	Team Performing JHA David Brisson	Verified By David Payne
Special or Primary Hazards	Exposure to contaminated groundwater, vehicular traffic, lifting heavy items, flora/fauna	
Personal Protective Equipment	Chemical-resistant gloves, safety glasses, steel-toe boots, safety vests	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Loading & unloading equipment at Yard & Site	Slip, trip, and fall, injury during lifting Vehicular traffic	Use appropriate lifting technique. Exercise caution around vehicular traffic.
Equipment setup at site <ul style="list-style-type: none"> • Walking and working in active parking areas, wooded areas • Carrying equipment • Cutting tubing 	<ul style="list-style-type: none"> • Slip, trip & fall, on-site vehicular traffic, flora/fauna, heat and cold stress • Injury from lifting, loading equipment • Lacerations 	<ul style="list-style-type: none"> • Walk carefully, proper use of cones, workers ahead signs, danger tape, and safety clothing. Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p> <ul style="list-style-type: none"> • Wear appropriate PPE • Use a cart or limit weight of equipment being carried, or use buddy system. • Use appropriate knives, use sharp blades, cut away from yourself.

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

<p>Sample collection</p> <ul style="list-style-type: none"> • Proper setup of equipment if generators or fuel operated compressors are used. • Handling glassware • Exposure to weather 	<ul style="list-style-type: none"> • Fire, carbon monoxide poisoning • Lacerations, chemical exposure, puncture • Splashing of contaminated groundwater chemical exposure • Heavy lifting • Extreme hot temperatures or cold temperatures • Flora/Fauna 	<ul style="list-style-type: none"> • Operate any gasoline/diesel powered equipment in an open, well ventilated area, setup up equipment down wind of sampling location; do not fuel equipment while running. • Proper PPE, preventative maintenance on equipment. • Use of PID to screen groundwater sampling locations. • Wear safety glasses, do not put head directly over bottle, and wear nitrile gloves. • Buddy-lift coolers. • Drink liquids, increase rest breaks in cool, dry areas. Wear appropriate cloths for weather conditions • Avoid poisonous plants (poison ivy, oak, sumac) • Use appropriate techniques to avoid being bitten by insects (ticks, spiders, wasps) <p><i>See Flora & Fauna JHA for more detail</i></p>
<p>Waste Management</p> <ul style="list-style-type: none"> • Collection & pumping of groundwater into 5-gal carboys • Transporting carboys to containment drums • Dumping water into drums 	<ul style="list-style-type: none"> • Injury from lifting heavy water-filled containers. • Splashing or spilling of water. • Potential exposure to site contaminants 	<ul style="list-style-type: none"> • Buddy-lift heavy containers. • Wear safety glasses, nitrile gloves, use plastic sheeting on ground to contain spills. Secure drum prior to filling and use a drum funnel. Avoid spilling liquid on clothing.

The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

		<p>components, for signs of damage or deterioration.</p> <ul style="list-style-type: none">• A guard should be installed between the winch operator and the connected cables to protect the operator from potential whiplash.
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The following are the basic JHA steps:

1. At earliest possible point (proposal/bidding) list job tasks & steps in the appropriate order.
2. Identify hazards associated with each task/step (possible harm to people, property or environment).
3. Define practical actions to eliminate/minimize hazards/risks to acceptable levels.
4. Ensure all applicable Standard Operating Procedures (SOP) and Cardinal Rules are applied.
5. Communicate JHA to all employees and Subs – Post on Job-site.
6. Update JHA information when conditions, tasks, equipment, etc., change.

JOB HAZARD ANALYSIS

Shoring / Sheet Pile Installation

JHA Rev.#	1	Job or Operation Title:	
Location	North Providence, Rhode Island	Job Address:	2072 Smith Street
		Employees /Subs	LCI
Date JHA Performed		Team Performing JHA	Verified By
Special or Primary Hazards	Chemical Exposures: Excavated Soils Containing - Dioxins, PCBs Physical Exposures: (Fall from Height, Contact with Equipment, Excavation Sidewall, Utilities, Lifted Equipment and Soils)		
Personal Protective Equipment	Level D – Hard Hats, Safety Vests, Safety Glasses, Steel Toed Boots, Hearing Protection		
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls	
A) General Site Activities: *****See Basic Job Steps for JHA General Site Activities - A *****			
D) Shoring			
Inspect crane and designate roles for personnel. Operator - <u>Responsible</u> for the safe operation of the crane and integrity of the personnel on the manlift. Spotter(s) – <u>Responsible</u> for: maintaining the integrity of the exclusion zone; monitoring the load stability and clearance around obstacles; monitoring the operator’s blind spots; and <u>communicating observations to the operator.</u>	<ol style="list-style-type: none"> 1. Exposure to leaking fluids, damaged equipment or containers. 2. Contact due to unsafe machine 	<ul style="list-style-type: none">) Inspect crane for leaks, damaged components, and integrity of tracks/tires.) Test the operation of all safety devices, controls, and brakes.) Keep hands away from lifting mechanism at all times.) Turn off machine during maintenance/fueling operations.) Follow the manufacturer’s guidelines for maintenance.) Operator must have proper training / licensing to operate a crane per OSHA regulations. <p>Note: <i>The operator should stop the machine, apply the parking break and personally check any questionable items or conditions before proceeding.</i></p>	
Inspect areas of operation and pathways of travel	<ol style="list-style-type: none"> 1. Contact with obstructions, site personnel 	<ul style="list-style-type: none">) Set up exclusion zones in the loading and unloading areas, keep bystanders a minimum of 15 feet from crane operations.) Designate and inspect a pathway of travel for uneven terrain and overhead obstacles. Revise pathway if necessary.) Review access to buildings/objects for mast/load clearance.) Minimize situations where backing up will be necessary.) Instruct bystanders to maintain a distance of 15 feet. 	

JOB HAZARD ANALYSIS
Shoring / Sheet Pile Installation

<p>Raising/Lowering sheet pile</p>	<ol style="list-style-type: none"> 1. Contact with obstructions and site personnel 2. Contact/rotating machinery/pinch points 	<ul style="list-style-type: none">) When raising lifted sheet pile, review the path and check for overhead power lines, obstructions, etc.) When lowering, review the path of the basket and check for personnel or other obstructions.) Spotter will confirm path is clear and all proper distance is maintained by all personnel (min 15 feet).) Review the weather forecast for potentially gusty wind conditions or heavy precipitation.) Gusts of wind can cause unexpected shift in and contact with overhead objects.) Heavy rain and snow can affect line of site and distance judgement.) Do not operate crane in adverse weather conditions and discontinue operation if conditions change during the task.
<p>Install Sheet Pile</p>	<ol style="list-style-type: none"> 1. Hazards of lifting and rigging heavy steel components. 2. Hazards of non-powered hand tools. 	<ul style="list-style-type: none">) Operators must always use <u>approved</u> “below hook” lifting devices (chains, straps, clamps, hook etc.) when attempting to lift a load. Operators must visually ensure that the lifting capacity of the “below hook” device is rated to pick up the intended load. Note: Device must be effectively labeled with appropriate capacity information. Note: Operator must have data available to help determine the weight of the intended load. Note: If the lifting device is a chain, there must be evidence that it has been inspected within the previous year by a competent person.) Hand tools should be selected based upon employee’s size, strength and physical capabilities. Consideration should be given to choosing a powered tool in situations where such a tool would be more beneficial than a hand tool. Wear safety glasses with side shields at all times. Note: Refer to ANSI Z Note: Ensure a protective work zone in any area where passers-by could be injured from a flying tool or debris.

JOB HAZARD ANALYSIS

Shoring / Sheet Pile Installation

	<p>3. Powered hand tools. Both electric and gas.</p> <p>4. Hazards welding.</p>	<p>) Inspect tools before use to ensure that cords and casings have not been damaged to the extent that they could impair the designed electrical current travel. Note: Includes the condition of ground pin (if so equipped). Use GFCI at power source to protect cord and tools. Note: Avoid use of corded tools in wet or rainy environments; use cordless or pneumatic tools whenever possible.</p> <p>) Protect power cords from damage by insuring that they are properly arranged away from paths of vehicle movement or by covering them with suitable protective covers. Verify factory installed guards are in place, working, and adjusted properly. Set tools to proper depth to minimize exposure to blades and bits. Clamp and support work piece and waste to prevent sagging or pinching of blade in kerf. Consider use of wedge to keep kerf open behind blade. Isolate the work area from all non-essential personnel.</p> <p>) Knowledgeable operators should be required to perform a thorough pre-shift evaluation of all of the critical inspection criteria required by the manufacturer such as tanks, gauges, hoses, valves, electrical wiring . Note: Any welding equipment that does not pass inspection should be taken out of services until the defects are appropriately addressed. Note: Flash curtains should always be used when pedestrians are near by. Note: Hoses should be managed in such a way as to minimize trip hazards. Welders should use all of the required PPE indicated in the LEA Job Hazard Assessments. Note: Under certain conditions regarding weld fumes it may also be necessary to use appropriate ventilation or fan systems. Ensure that welders are taking frequent breaks and are staying appropriately hydrated by drinking enough water.</p>
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JOB HAZARD ANALYSIS
Shoring / Sheet Pile Installation

	<p>5. Hazards of gas cutting.</p> <p>6. Hazards of working at heights.</p>	<p>) Knowledgeable operators should be required to perform a thorough pre-shift evaluation of all of the critical inspection criteria required by the manufacturer such as tanks, gauges, hoses, valves, trolleys and torch units.</p> <p>Note: Any oxygen/acetylene equipment that does not pass the inspection should be taken out of services until the defects are addressed. When not in use, oxygen/acetylene valves should be covered with protective caps that are provided by the gas vendor.</p> <p>Operators should be careful not to use grease or oil on or near the threads of any oxygen valves. During set-up operations, operators should ensure that oxygen/acetylene equipment is located away from moving vehicles, lifting devices (hoists & cranes) falling objects or any other equipment that may interfere with its stability.</p> <p>The operator must ensure that if an acetylene tanks is equipped with a wrench instead of a valve that the wrench is always left in place during operation.</p> <p>Provide fall protection/railings/tie-off</p>
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JOB HAZARD ANALYSIS

JHA Rev.# 1	Job or Operation Title: Trenching Excavation	
Location North Providence, RI	Job Address 2074 Smith Street	Employees /Subs LCI
Date JHA Performed	Team Performing JHA	Verified By
Special or Primary Hazards	Chemical Exposures: Excavated Soils Containing - Dioxins, PCBs Physical Exposures: (Fall from Height, Contact with Equipment, Excavation Sidewall, Utilities, Lifted Equipment and Soils)	
Personal Protective Equipment	Level D – Hard Hats, Safety Vests, Safety Glasses, Steel Toed Boots, Hearing Protection	
Basic Job Steps	Existing and/or Potential Hazards	Corrective Measures/Controls
Trench Excavation	<ol style="list-style-type: none"> 1. Employees involved with Excavation may be exposed to the hazards (shock/electrocution) related to broken electrical lines. 2. Employees involved with trench digging may be exposed to the hazards (explosions, air emissions, spills) related to broken fuel, sewer, or gas lines. 3. Employees involved with trench digging may be exposed to fall hazards. 4. Employees required to work in trenches may be exposed to cave-ins. 	<ul style="list-style-type: none">) Follow Loureiro’s Utility Location program. No trenching project should ever begin until the proper One-Call service (i.e. CBYD) and Private Locator have determined where (location and depth) all underground utility lines may exist.) On private site, consult with persons who are knowledgeable about the property as to the locations of potential private or abandoned utilities and locate these prior to beginning work.) In locations where trenches are less than 4ft. warning or barrier tape may be used. In locations where trenches are deeper than 4 ft. rails, fencing, or solid barriers are needed unless active digging or work is taking place.) All trenches deeper than 5ft. must be evaluated for type of soil (A, B, or C) and appropriate cave in controls applied. Safeguards could include; <ul style="list-style-type: none"> o Sloping o Stepping o Shoring o Trench Box <p>Note: Evaluation should be performed by a person who is recognized by education, training and experience as who recognized as a competent person by the jobsite foreman to understand the hazards and identify appropriate control measures.</p>

JOB HAZARD ANALYSIS

	<p>5. Employees working in trenches may be exposed to issues related to inadequate emergency egress.</p> <p>6. Employees working at or near trenching activities could be injured by contact with excavation equipment.</p> <p>7. Employees could be exposed to hazardous breathing conditions.</p>	<p>Note: Prior to each shift, the excavation shall be inspected by a competent person regarded and recognized as one who understands the issues related to the excavations hazards and controls.</p> <p>Note: See section regarding confined space entry.</p> <p>Excavated materials (spoil pile), equipment and materials shall be kept a minimum of 2 ft from the edge of the excavation.</p> <p>) No employee should be working within a trench deeper than four ft. without adequate means of egress.</p> <p>Note: A ladder or ramp or other equally effective means of egress should be within 25ft. of all employees to facilitate their escape.</p> <p>Excavation activities will be conducted only during daylight, or with lighting sufficient to allow for thorough inspection.</p> <p>) Employees working at or near trenching activities are required to wear hard hats. Employees working at or near trenching activities where excavation equipment is actively working are required to wear florescent vests. Refer to ANSI Z87.1 for Head Protection</p> <p>) Employees must follow the Air Monitoring program. For work conducted within excavations, the breathing space of all workers must be monitored per the air monitoring program detailed in the HASP. Air monitoring includes dust, PID readings (VOCs), O2, LEL, CO, and H2S.</p>
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APPENDIX I

SAFETY DATA SHEETS (SDS)

Safety Data Sheet

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Initial preparation date: 11.23.2016

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Buffer Solution pH 7.00

SECTION 1: Identification

Product identifier

Product name: Buffer Solution pH 7.00

Product code: BU5007-P

Recommended use of the product and restriction on use

Relevant identified uses: Not determined or not applicable.

Uses advised against: Not determined or not applicable.

Reasons why uses advised against: Not determined or not applicable.

Manufacturer or supplier details

Manufacturer:

QuaPhenix Identifi
860 Gitts Run Road
Hanover
P 17331
(717) 632-1291

Supplier:

QuaPhenix Identifi, Inc
860 Gitts Run Road
Hanover
P 17331
(717) 632-1291

Emergency telephone number:

United States

(717) 632-1291

SECTION 2: Hazard identification

GHS classification: Not a hazardous substance or mixture

Label elements

Hazard pictograms: None

Signal word: None

Hazard statements: None

Precautionary statements: None

Hazards not otherwise classified: None

SECTION 3: Composition/information on ingredients

Identification	Name	Weight %
Component number : 6359-83-7	Melanin Yellow 8	<0.1
Component number : 1310-73-2	Hydroxyacetone	0.12
Component number : 7732-18-5	Water	99.16

Safety Data Sheet

ing t Cana ian Haza us P u ts Regulati ns an WHMI 2015

Initial preparation date: 11.23.2016

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Buffer Solution pH 7.00

C number : 52-51-7	Bi ban Plus	0.05
C number : 7778-77-0	P tassium Ph sphate	0.68

Additional Information: N ne

SECTION 4: First-aid measures

Description of first-aid measures

General notes:

N t ete mine n t available.

After inhalation:

L sen l thing as ne essa y an p siti n in ivi ual in a mf table p siti n

Maintain an un bst u te ai way

Get me i al a vi e/attenti n if y u feel unwell

After skin contact:

Rinse affe te a ea with s ap an wate

If sympt ms evel p pe sist, seek me i al attenti n

After eye contact:

Rinse/flush exp se eye(s) gently using wate f 15-20 minutes

Rem ve nta t lenses, if p esent an easy t

C ntinue insing

Get me i al a vi e/attenti n

After ingestion:

Rinse m uth an then ink plenty f wate

D n t in u e v miting

Get me i al a vi e/attenti n if y u feel unwell

Most important symptoms and effects, both acute and delayed

Acute symptoms and effects:

N t ete mine n t available.

Delayed symptoms and effects:

N t ete mine n t available.

Immediate medical attention and special treatment

Specific treatment:

N t ete mine n t available.

Notes for the doctor:

N t ete mine n t available.

SECTION 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media:

Use app p iate fi e supp essi n agents f a ja ent mbustible mate ials s u es f igniti n

Unsuitable extinguishing media:

N t ete mine n t appli able.

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Specific hazards during fire-fighting:

The mal e mp siti n anlea t elease fi itating gases an vap s

Special protective equipment for firefighters:

Wea p te tive eye wea , gl ves an l thing

Refe t e ti n 8

Use typi al fi efighting equipment, self- ntaine b eathing appa atus, spe ial tightly seale suit

Special precautions:

Heating auses a ise in p essu e, isk f bu sting an mbusti n
hut ff s u es figniti n

Ca b n m n xi e an a b n i xi e may f m up n mbusti n

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Ensu e a equate ventilati n

Ensu e ai han ling systems a e pe ati nal

Wea p te tive eye wea , gl ves an l thing

Environmental precautions:

h ul n t be elease int the envi nment

P event f m ea hing ains, sewe wate way

Methods and material for containment and cleaning up:

bs b with n- mbustible liqui -bin ing mate ial (san , iat ma e us ea th (lay), a i bin e s,
unive sal bin e s)

Disp se f ntents / ntaine in a an e with l al egulati ns

Reference to other sections:

N t ete mine n t appli able.

SECTION 7: Handling and storage

Precautions for safe handling:

D n t eat, ink, sm ke use pe s nal p u ts when han ling hemi al substan es.

v i b eathing mist vap .

Use nly with a equate ventilati n.

Conditions for safe storage, including any incompatibilities:

t e in a l, well-ventilate a ea.

t e away f m f stuffs.

SECTION 8: Exposure controls/personal protection

Only th se substan es with limit values have been in lu e bel w.

Occupational Exposure limit values:

Country (Legal Basis)	Substance	Identifier	Permissible concentration
CGIH	ium hy xi e	1310-73-2	CGIH TLV C 2.0 mg/m ³
Unite tates (O H)	ium hy xi e	1310-73-2	O H PEL TW 2.0 mg/m ³
NIO H	ium hy xi e	1310-73-2	NIO H REL C 2.0 mg/m ³
	ium hy xi e	1310-73-2	NIO H IDLH 10.0 mg/m ³

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Biological limit values:

N b l g l al exp su e limits n te f the ing e ient(s).

Information on monitoring procedures:

N t ete mine n t appli able.

Appropriate engineering controls:

Eme gen y eye wash f untains an safety sh we s sh ul be available in the imme iate vi inity f use han ling.

P vi e exhaust ventilati n the enginee ing nt ls t keep the ai b ne n ent ati ns f vap an mists bel w the appli able w kpla e exp su e limits (O upati nal Exp su e Limits-OELs) in i ate ab ve.

Personal protection equipment

Eye and face protection:

afety g ggles glasses, app p iate eye p te ti n.

Skin and body protection:

ele t gl ve mate ial impe meable an esistant t the substan e.

Respiratory protection:

When ne essa y, use NIO H-app ve b eathing equipment.

General hygienic measures:

Wash han s bef e b eaks an at the en f w k.

v i nta t with skin, eyes an l thing.

Pe f m utine h usekeeping.

Wash ntaminate l thing bef e eusing.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance (physical state, color):	Clea , yell w liqui
Odor:	O less
Odor threshold:	N t available
pH-value:	7
Melting/Freezing point:	pp x. 0°C
Boiling point/range:	pp x. 100°C
Flash point:	N t available
Evaporation rate:	N t available
Flammability (solid, gaseous):	N t available
Explosion limit upper:	N t available
Explosion limit lower:	N t available
Vapor pressure:	N t available
Vapor density:	N t available
Density:	N t available
Relative density:	pp x. 1
Solubilities:	N t ete mine n t available.
Partition coefficient (n-octanol/water):	N t available
Auto/Self-ignition temperature:	N t available
Decomposition temperature:	N t available

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Dynamic viscosity:	N t available
Kinematic viscosity:	N t available
Explosive properties	N t ete mine n t available.
Oxidizing properties	N t ete mine n t available.

Other information

SECTION 10: Stability and reactivity

Reactivity:

D es n t ea t un e n mal n iti ns fuse an st age.

Chemical stability:

table un e n mal n iti ns fuse an st age.

Possibility of hazardous reactions:

N ne un e n mal n iti ns fuse an st age.

Conditions to avoid:

N ne kn wn.

Incompatible materials:

N ne kn wn.

Hazardous decomposition products:

N ne kn wn.

SECTION 11: Toxicological information

Acute toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Route	Result
Bi ban Plus	e mal	LD50 Rat: 2,000 mg/kg
	inhalati n	De ive n effe t level (DNEL), ute: 12.3 mg/m ³
		De ive n effe t level (DNEL), L ng-te m: 4.1 mg/m ³
		LC50 Rat: 588 mg/m ³ (4h)
al	LD50 Rat: 254 - 354 mg/kg	

Skin corrosion/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
ium hy xi e	Causes seve e skin bu ns an eye amage.

Serious eye damage/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Respiratory or skin sensitization

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Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Carcinogenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

International Agency for Research on Cancer (IARC): N ne f the ing e ients a e liste .

National Toxicology Program (NTP): N ne f the ing e ients a e liste .

Germ cell mutagenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Reproductive toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (single exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (repeated exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Aspiration toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Information on likely routes of exposure: N ata available.

Symptoms related to the physical, chemical and toxicological characteristics: N ata available.

Other information: N ata available.

SECTION 12: Ecological information

Acute (short-term) toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
Bi ban Plus	LC50 (3.2 m nths): 35.7 mg/L
	NOEC (4 ays): 20 mg/L
	EC50 (48 h): 1.4 mg/L
	EC50 (72 h): 250 - 370 µg/L

Chronic (long-term) toxicity

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Product data: N ata available.

Substance data: N ata available.

Persistence and degradability

Product data: N ata available.

Substance data: N ata available.

Bioaccumulative potential

Product data: N ata available.

Substance data: N ata available.

Mobility in soil

Product data: N ata available.

Substance data: N ata available.

Other adverse effects: N ata available.

SECTION 13: Disposal considerations

Disposal methods:

It is the esp nsibility f the waste gene at t p pe ly ha a te ize all waste mate ials a ing t appli able egulat y entities (U 40CFR262.11)

SECTION 14: Transport information

Canadian Transportation of Dangerous Goods (TDG)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Maritime Dangerous Goods (IMDG)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne

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Buffer Solution pH 7.00

Special precautions for user	N ne
------------------------------	------

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	
Bulk Name	N ne
Ship type	N ne
Pollution category	N ne

SECTION 15: Regulatory information

Canada regulations

Domestic substances list (DSL):

7778-77-0	P tassium Ph sphate	Liste
7732-18-5	Wate	Liste
1310-73-2	ium hy xi e	Liste
52-51-7	Bi ban Plus	Liste
6359-83-7	M ant Yell w 8	Liste

Non-domestic substances list (NDSL): N t ete mine .

SECTION 16: Other information

Abbreviations and Acronyms: N ne

Disclaimer:

This p u t has been lassifie in a an e with haza ite ia f the C nt lle P u ts Regulati ns an the D ntains all the inf mati n equie by the C nt lle P u ts Regulati ns. The esp nsibility t p vie a safe w kpla e emains with the use . The use sh ul nsi e the health haza s an safety inf mati n ntaine he ein as a gui e an sh ul take th se pe auti ns equie in an in ivi ual pe ati nt inst u t empl yees an evel p w k p a ti e p e u es f a safe w k envi nment. The inf mati n ntaine he ein is, t the best f u kn wle ge an belief, a u ate. H weve , sin e the n iti ns f han ling an use a e bey n u nt l, we make n gua antee f esults, an assume n liability f amages in u e by the use f this mate ial. It is the esp nsibility f the use t mply with all appli able laws an egulati ns appli able t this mate ial.

NFPA: 1-0-0

HMIS: 1-0-0

Initial preparation date: 11.23.2016

End of Safety Data Sheet

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Conductivity Standard, 1413 μ S

SECTION 1: Identification

Product identifier

Product name: C n u tivity Stan a , 4 3 μ S

Product code: CS 4 3-D

Recommended use of the product and restriction on use

Relevant identified uses: N t ete mine n t appli able.

Uses advised against: N t ete mine n t appli able.

Reasons why uses advised against: N t ete mine n t appli able.

Manufacturer or supplier details

Manufacturer:

Supplier:

quaPh enix S identi
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

quaPh enix S identi , In
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

Emergency telephone number:

United States

Eme gen y Teleph ne N .: 800-255-3924

SECTION 2: Hazard(s) identification

GHS classification: N t a haza us substan e mixtu e

Label elements

Hazard pictograms: N ne

Signal word: N ne

Hazard statements: N ne

Precautionary statements: N ne

Hazards not otherwise classified: N ne

SECTION 3: Composition/information on ingredients

Identification	Name	Weight %
C S numbe : 7732- 8-5	Dei nize wate	>99.9
C S numbe : 7447-40-7	P tassium hl i e	<0.

Additional Information: N ne

SECTION 4: First aid measures

Description of first aid measures

General notes:

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Conductivity Standard, 1413 µS

N t ete mine n t appli able.

After inhalation:

L sen l thing as ne essa y an p siti n in ivi ual in a mf table p siti n

Maintain an un bst u te ai way

Get me i al a vi e/attenti n if y u feel unwell

After skin contact:

Rinse affe te a ea with s ap an wate

If sympt ms evel p pe sist, seek me i al attenti n

After eye contact:

Rinse/flush exp se eye(s) gently using wate f 5-20 minutes

Rem ve nta t lenses, if p esent an easy t

C ntinue insing

Get me i al a vi e/attenti n

After swallowing:

Rinse m uth an then ink plenty f wate

D n t in u e v miting

Get me i al a vi e/attenti n if y u feel unwell

Most important symptoms and effects, both acute and delayed

Acute symptoms and effects:

N t ete mine n t appli able.

Delayed symptoms and effects:

N t ete mine n t appli able.

Immediate medical attention and special treatment

Specific treatment:

N t ete mine n t appli able.

Notes for the doctor:

N t ete mine n t appli able.

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media:

Use app p iate fi e supp essi n agents f a ja ent mbustible mate ials s u es f igniti n

Unsuitable extinguishing media:

N t ete mine n t appli able.

Specific hazards during fire-fighting:

The mal e mp siti n an lea t release fi itating gases an vap s

Special protective equipment for firefighters:

Wea p te tive eye wea , gl ves an l thing

Refe t Se ti n 8

Use typi al fi efighting equipment, self- ntaine b eathing appa atus, spe ial tightly seale suit

Special precautions:

Heating auses a ise in p essu e, isk f bu sting an mbusti n

Shut ff s u es f igniti n

Ca b n m n xi e an a b n i xi e may f m up n mbusti n

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

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Conductivity Standard, 1413 µS

Ensu e a equate ventilati n
Ensu e ai han ling systems a e pe ati nal
Wea p te tive eye wea , gl ves an l thing

Environmental precautions:

Sh ul n t be elease int the envi nment
P event f m ea hing ains, sewe wate way

Methods and material for containment and cleaning up:

bs b with n- mbustible liqui -bin ing mate ial (san , iat ma e us ea th (lay), a i bin e s,
unive sal bin e s)
Disp se f ntents / ntaine in a an e with l al egulati ns

Reference to other sections:

N t ete mine n t appli able.

SECTION 7: Handling and storage

Precautions for safe handling:

D n t eat, ink, sm ke use pe s nal p uts when han ling hemi al substan es.
v i b eathing mist vap .
Use nly with a equate ventilati n.

Conditions for safe storage, including any incompatibilities:

St e in a l, well-ventilate a ea.
St e away f m f stuffs.

SECTION 8: Exposure controls/personal protection

Only th se substan es with limit values have been in lu e bel w.

Occupational Exposure limit values:

Country (Legal Basis)	Substance	Identifier	Permissible concentration
Unite States (OSH)	P pan- - l	7 -23-8	OSH (PEL): 200 ppm (500 mg/m3)
CGIH	P pan- - l	7 -23-8	CGIH TLV: TW - 200 ppm
	P pan- - l	7 -23-8	CGIH TLV: STEL - 400 ppm

Biological limit values:

N bi l gi al exp su e limits n te f the ing e ient(s).

Information on monitoring procedures:

N t ete mine n t appli able.

Appropriate engineering controls:

Eme gen y eye wash f untains an safety sh we s sh ul be available in the imme iate vi inity f use han ling.
P vi e exhaust ventilati n the enginee ing nt l st keep the ai b ne n ent ati ns f vap an mists bel w the appli able w kpla e exp su e limits (O upati nal Exp su e Limits-OELs) in i ate ab ve.

Personal protection equipment

Eye and face protection:

Safety g gles glasses, app p iate eye p te ti n.

Skin and body protection:

Sele t gl ve mate ial impe meable an esistant t the substan e.

Respiratory protection:

When ne essa y, use NIOSH-app ve b eathing equipment.

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Conductivity Standard, 1413 µS

General hygienic measures:

- Wash han s bef e b eaks an at the en f w k.
- v i nta t with skin, eyes an l thing.
- Pe f m utine h usekeeping.
- Wash ntaminate l thing bef e using.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Clea , l less liqui
Odor	O less
Odor threshold	N t available
pH	N t available
Melting point/freezing point	pp x. (-6) - 0 °C
Initial boiling point/range	00. °C
Flash point (closed cup)	N t available
Evaporation rate	N t available
Flammability (solid, gas)	N t available
Upper flammability/explosive limit	N t available
Lower flammability/explosive limit	N t available
Vapor pressure	N t available
Vapor density	N t available
Density	N t available
Relative density	- .0
Solubilities	N t ete mine n t available.
Partition coefficient (n-octanol/water)	N t available
Auto/Self-ignition temperature	N t available
Decomposition temperature	N t available
Dynamic viscosity	N t available
Kinematic viscosity	N t available
Explosive properties	N t ete mine n t available.
Oxidizing properties	N t ete mine n t available.

Other information

SECTION 10: Stability and reactivity

Reactivity:

D es n t ea t un e n mal n iti ns fuse an st age.

Chemical stability:

Stable un e n mal n iti ns fuse an st age.

Possibility of hazardous reactions:

N ne un e n mal n iti ns fuse an st age.

Conditions to avoid:

N ne kn wn.

Incompatible materials:

N ne kn wn.

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Conductivity Standard, 1413 μ S

Hazardous decomposition products:

N ne kn wn.

SECTION 11: Toxicological information

Acute toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Skin corrosion/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Serious eye damage/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Respiratory or skin sensitization

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Carcinogenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

International Agency for Research on Cancer (IARC): N ne f the ing e ients a e liste .

National Toxicology Program (NTP): N ne f the ing e ients a e liste .

Germ cell mutagenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Reproductive toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (single exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (repeated exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Aspiration toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Information on likely routes of exposure: N ata available.

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Conductivity Standard, 1413 µS

Symptoms related to the physical, chemical and toxicological characteristics: N ata available.
Other information: N ata available.

SECTION 12: Ecological information

Acute (short-term) toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Chronic (long-term) toxicity

Product data: N ata available.

Substance data: N ata available.

Persistence and degradability

Product data: N ata available.

Substance data: N ata available.

Bioaccumulative potential

Product data: N ata available.

Substance data: N ata available.

Mobility in soil

Product data: N ata available.

Substance data: N ata available.

Other adverse effects: N ata available.

SECTION 13: Disposal considerations

Disposal methods:

It is the esp nsibility f the waste gene at t p pe ly ha a te ize all waste mate ials a ing t appli able egulat y entities (US 40CFR262.)

SECTION 14: Transport information

United States Transportation of dangerous goods (49 CFR DOT)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Maritime Dangerous Goods (IMDG)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

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Conductivity Standard, 1413 µS

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	
Bulk Name	N ne
Ship type	N ne
Pollution category	N ne

SECTION 15: Regulatory information

United States regulations

Inventory listing (TSCA):

7 -23-8	P pan- - l	Liste
7447-40-7	P tassium hl i e	Liste
7732- 8-5	Dei nize wate	Liste

Significant New Use Rule (TSCA Section 5): N t ete mine .

Export notification under TSCA Section 12(b): N t ete mine .

SARA Section 311/312 hazards:

ute	Ch ni	Fi e	P essu e	Rea tive
N	N	N	N	N

SARA Section 302 extremely hazardous substances: N t ete mine .

SARA Section 313 toxic chemicals: N t ete mine .

CERCLA: N t ete mine .

RCRA: N t ete mine .

Section 112(r) of the Clean Air Act (CAA): N t ete mine .

Massachusetts Right to Know:

7 -23-8	n-P pyl l h l	Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Dei nize Wate	N t Liste

New Jersey Right to Know:

7 -23-8	n-P pyl l h l	N t Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Dei nize Wate	N t Liste

New York Right to Know:

7 -23-8	n-P pyl l h l	Liste
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Safety Data Sheet

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Initial preparation date: 08.26.20 6

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Conductivity Standard, 1413 µS

7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Dei nize Wate	N t Liste

Pennsylvania Right to Know:

7 -23-8	n-P pyl l h l	Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Dei nize Wate	N t Liste

California Proposition 65: N t ete mine .

SECTION 16: Other information

Abbreviations and Acronyms: N ne

Disclaimer:

This p u t has been lassifie in a an e with haza ite ia f the C nt lle P u ts Regulati ns an the SDS ntain s all the inf mati n equie by the C nt lle P u ts Regulati ns. The esp nsibility t p vi e a safe w kpla e emains with the use . The use sh ul nsi e the health haza s an safety inf mati n ntaine he ein as a gui e an sh ul take th se p e auti ns equie in an in ivi ual pe ati nt inst u t empl yees an evel p w k p a ti e p e u es f a safe w k envi nment. The inf mati n ntaine he ein is, t the best f u kn wle ge an belief, a u ate. H weve , sin e the n iti ns f han ling an use a e bey n u nt l, we make n gua antee f esults, an assume n liability f amages in u e by the use f this mate ial. It is the esp nsibility f the use t mply with all appli able laws an egulati ns appli able t this mate ial.

NFPA: -0-0

HMIS: -0-0

Initial preparation date: 08.26.20 6

End of Safety Data Sheet



SAFETY DATA SHEET

SDS ID NO.: 0127MAR019
Revision Date 03/19/2018

1. IDENTIFICATION

Product Name: Marathon Petroleum Gasoline - All Grades

Synonym: Gasoline; Regular Unleaded Gasoline; Conventional Regular Unleaded Gasoline; Mid Grade Unleaded Gasoline; Conventional Mid Grade Unleaded Gasoline; Premium Unleaded Gasoline; Conventional Premium Unleaded Gasoline; Sub-Octane Gasoline; Regular RBOB; Super RBOB; Premium RBOB; RBOB; Reformulated Blend Stock For Oxygenated Blending; 84 Octane Gasoline; CBOB; Premium CBOB; Conventional Blend Stock for Oxygenate Blending; Recreational Gasoline; Recreational Gasoline; Recreational Unleaded Gasoline; 89 Recreational Gasoline; Brand 89 Recreational Gasoline; 7.0 Max RVP 89 Recreational Gasoline; BR 7.0 Max RVP 89 Recreational Gasoline; 90 Recreational Gasoline; 90 Marina Gasoline; Brand 91 Recreational Gasoline; 91 Recreational Gasoline; 91 Marina Gasoline; 90 Octane Midgrade Gasoline with No Ethanol; 0125MAR019; 0126MAR019; 0134MAR019; 0313MAR019; 0314MAR019

Product Code: 0127MAR019

Chemical Family: Complex Hydrocarbon Substance

Recommended Use: Fuel.

Restrictions on Use: All others.

Manufacturer, Importer, or Responsible Party Name and Address:
MARATHON PETROLEUM COMPANY LP
539 South Main Street
Findlay, OH 45840

SDS information (M-F, 8-5 PM EST): 1-419-421-3070

Emergency Telephone (24/7): CHEMTREC: 1-800-424-9300 CCN#: 13740

2. HAZARD IDENTIFICATION

Classification

OSHA Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 1
Skin corrosion/irritation	Category 2
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 1
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 2

Hazards Not Otherwise Classified (HNOC)

Static accumulating flammable liquid

Label elements

EMERGENCY OVERVIEW

Danger

EXTREMELY FLAMMABLE LIQUID AND VAPOR

May accumulate electrostatic charge and ignite or explode

May be fatal if swallowed and enters airways

Causes skin irritation

May cause respiratory irritation

May cause drowsiness or dizziness

May cause genetic defects

May cause cancer

Suspected of damaging fertility or the unborn child

Causes damage to organs (blood, blood-forming organs, immune system) through prolonged or repeated exposure

Toxic to aquatic life with long lasting effects



Appearance Clear yellow liquid

Physical State Liquid

Odor Hydrocarbon

Precautionary Statements - Prevention

Obtain special instructions before use

Do not handle until all safety precautions have been read and understood

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Keep container tightly closed

Ground/bond container and receiving equipment

Use explosion-proof electrical/ventilating/lighting/equipment

Use only non-sparking tools.

Take action to prevent static discharges

Do not eat, drink or smoke when using this product

Do not breathe mist/vapors/spray

Use only outdoors or in a well-ventilated area

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

Wash hands and any possibly exposed skin thoroughly after handling

Avoid release to the environment

Precautionary Statements - Response

IF exposed, concerned or you feel unwell: Get medical attention

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

If skin irritation occurs: Get medical attention

Wash contaminated clothing before reuse

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

Call a POISON CENTER or doctor if you feel unwell

IF SWALLOWED: Immediately call a POISON CENTER or doctor

Do NOT induce vomiting

In case of fire: Use water spray, fog or regular foam for extinction

Collect spillage

Precautionary Statements - Storage

Store in a well-ventilated place. Keep container tightly closed
 Keep cool
 Store locked up

Precautionary Statements - Disposal

Dispose of contents/container at an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Gasoline is a complex combination of hydrocarbons consisting of paraffins, cycloparaffins, aromatic and olefinic hydrocarbons having molecular chains ranging in length from four to ten carbons. May contain small amounts of dye and other additives (>0.02%) which are not considered hazardous at the concentrations used.

Composition Information:

Name	CAS Number	% Concentration
Gasoline	86290-81-5	100
Heptane (mixed isomers)	142-82-5	2.5-26
Butane (mixed isomers)	106-97-8	0.5-19
Pentane (mixed isomers)	78-78-4	6.5-19
Hexane Isomers (other than n-Hexane)	107-83-5	2-12
Toluene	108-88-3	3-9.5
Xylene (mixed isomers)	1330-20-7	3.5-9.5
Benzene	71-43-2	0.1-4.9
n-Hexane	110-54-3	0.1-4.5
Cumene	98-82-8	0-4
1,2,4 Trimethylbenzene	95-63-6	1-4
Ethylbenzene	100-41-4	0.5-2.5
Cyclohexane	110-82-7	0-1.5
Octane	111-65-9	0-1.5
1,2,3-Trimethylbenzene	526-73-8	0-1
Naphthalene	91-20-3	0.1-0.5

Benzene concentration is percent by volume. All other concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

4. FIRST AID MEASURES

First Aid Measures

- General Advice:** In case of accident or if you feel unwell, seek medical advice immediately (show directions for use or safety data sheet if possible).
- Inhalation:** Remove to fresh air. If not breathing, institute rescue breathing. If breathing is difficult, ensure airway is clear, give oxygen and continue to monitor. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). Keep affected person warm and at rest. If symptoms occur get medical attention.
- Skin Contact:** Immediately wash exposed skin with plenty of soap and water while removing contaminated clothing and shoes. May be absorbed through the skin in harmful amounts. Get medical attention if irritation persists. Any injection injury from high pressure equipment should be evaluated immediately by a physician as potentially serious (See NOTES TO PHYSICIAN).
- Place contaminated clothing in closed container until cleaned or discarded. If clothing is to be laundered, inform the person performing the operation of contaminant's hazardous properties. Destroy contaminated, non-chemical resistant footwear.
- Eye Contact:** Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Gently remove contacts while flushing. Get medical attention if irritation persists.

Ingestion: Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs, keep head below hips, or if patient is lying down, turn body and head to side to prevent aspiration and monitor for breathing difficulty. Never give anything by mouth to an unconscious person. Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

Most important signs and symptoms, both short-term and delayed with overexposure

Adverse Effects: Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Prolonged or repeated exposure may cause adverse effects on blood, blood-forming organs, and immune system. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Indication of any immediate medical attention and special treatment needed

Notes To Physician:

INHALATION: This material (or a component) sensitizes the myocardium to the effects of sympathomimetic amines. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in individuals exposed to this material. Administration of sympathomimetic drugs should be avoided.

SKIN: Leaks or accidents involving high-pressure equipment may inject a stream of material through the skin and initially produce an injury that may not appear serious. Only a small puncture wound may appear on the skin surface but, without proper treatment and depending on the nature, original pressure, volume, and location of the injected material, can compromise blood supply to an affected body part. Prompt surgical debridement of the wound may be necessary to prevent irreversible loss of function and/or the affected body part. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES.

INGESTION: This material represents a significant aspiration and chemical pneumonitis hazard. Induction of emesis is not recommended.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

For small fires, Class B fire extinguishing media such as CO₂, dry chemical, foam (AFFF/ATC) or water spray can be used. For large fires, water spray, fog or foam (AFFF/ATC) can be used. Firefighting should be attempted only by those who are adequately trained and equipped with proper protective equipment.

Unsuitable extinguishing media

Do not use straight water streams to avoid spreading fire.

Specific hazards arising from the chemical

This product has been determined to be an extremely flammable liquid per the OSHA Hazard Communication Standard and should be handled accordingly. May accumulate electrostatic charge and ignite or explode. Vapors may travel along the ground or be moved by ventilation and ignited by many sources such as pilot lights, sparks, electric motors, static discharge, or other ignition sources at locations distant from material handling. Flashback can occur along vapor trail. For additional fire related information, see NFPA 30 or the Emergency Response Guidebook 128.

Hazardous combustion products

Smoke, carbon monoxide, and other products of incomplete combustion.

Explosion data

Sensitivity to Mechanical Impact No.
Sensitivity to Static Discharge Yes.

Special protective equipment and precautions for firefighters

Firefighters should wear full protective clothing and positive-pressure self-contained breathing apparatus (SCBA) with a full

face-piece, as appropriate. Avoid using straight water streams. Water may be ineffective in extinguishing low flash point fires, but can be used to cool exposed surfaces. Avoid excessive water spray application. Water spray and foam (AFFF/ATC) must be applied carefully to avoid frothing and from as far a distance as possible. Keep run-off water out of sewers and water sources.

Additional firefighting tactics

FIRES INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after the fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

EVACUATION: Consider initial downwind evacuation for at least 1000 feet. If tank, rail car or tank truck is involved in a fire, ISOLATE for 5280 feet (1 mile) in all directions; also, consider initial evacuation of 5280 feet (1 mile) in all directions.

NFPA Health 1 Flammability 3 Instability 0 Special Hazard -

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions:** Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.
- Protective equipment:** Use personal protection measures as recommended in Section 8.
- Emergency procedures:** Advise authorities and National Response Center (800-424-8802) if the product has entered a water course or sewer. Notify local health and pollution control agencies, if appropriate.
- Environmental precautions:** Avoid release to the environment. Avoid subsoil penetration. Ethanol in gasoline phase separates in contact with water. Monitor downstream for dissolved ethanol or other appropriate indicators.
- Methods and materials for containment:** Contain liquid with sand or soil. Prevent spilled material from entering storm drains, sewers, and open waterways.
- Methods and materials for cleaning up:** Use suitable absorbent materials such as vermiculite, sand, or clay to clean up residual liquids. Recover and return free product to proper containers. When recovering free liquids ensure all equipment is grounded and bonded. Use only non-sparking tools.

7. HANDLING AND STORAGE

Safe Handling Precautions: NEVER SIPHON THIS PRODUCT BY MOUTH. Use appropriate grounding and bonding practices. Static accumulating flammable liquid. Bonding and grounding may be insufficient to eliminate the hazard from static electricity. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Vapors may travel along the ground or be moved by ventilation. Flashback may occur along vapor trails. No smoking. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing fumes, gas, or vapors. Use only with adequate ventilation. Avoid repeated and prolonged skin contact. Use personal protection measures as recommended in Section 8. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Do not cut, drill, grind or weld on empty containers since explosive residues may remain. Refer to applicable EPA, OSHA, NFPA and consistent state and local requirements.

Hydrocarbons are basically non-conductors of electricity and can become electrostatically charged during mixing, filtering, pumping at high flow rates or loading and transfer operations. If this charge reaches a sufficiently high level, sparks can form that may ignite the vapors of flammable liquids. Sudden release of hot organic chemical vapors or mists from process equipment operating under elevated temperature and pressure, or sudden ingress of air into vacuum equipment may result in ignition of vapors or mists without the presence of obvious ignition sources. Nozzle spouts must be kept in contact with the

containers or tank during the entire filling operation.

Portable containers should never be filled while in or on a motor vehicle or marine craft. Containers should be placed on the ground. Static electric discharge can ignite fuel vapors when filling non-grounded containers or vehicles on trailers. The nozzle spout must be kept in contact with the container before and during the entire filling operation. Use only approved containers.

A buildup of static electricity can occur upon re-entry into a vehicle during fueling especially in cold or dry climate conditions. The charge is generated by the action of dissimilar fabrics (i.e., clothing and upholstery) rubbing across each other as a person enters/exits the vehicle. A flash fire can result from this discharge if sufficient flammable vapors are present. Therefore, do not get back in your vehicle while refueling.

Cellular phones and other electronic devices may have the potential to emit electrical charges (sparks). Sparks in potentially explosive atmospheres (including fueling areas such as gas stations) could cause an explosion if sufficient flammable vapors are present. Therefore, turn off cellular phones and other electronic devices when working in potentially explosive atmospheres or keep devices inside your vehicle during refueling.

High-pressure injection of any material through the skin is a serious medical emergency even though the small entrance wound at the injection site may not initially appear serious. These injection injuries can occur from high-pressure equipment such as paint spray or grease or guns, fuel injectors, or pinhole leaks in hoses or hydraulic lines and should all be considered serious. High pressure injection injuries may be SERIOUS SURGICAL EMERGENCIES (See First Aid Section 4).

Storage Conditions:

Store in properly closed containers that are appropriately labeled and in a cool, well-ventilated area. Do not store near an open flame, heat or other sources of ignition.

Incompatible Materials

Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Name	ACGIH TLV	OSHA PELS:	OSHA - Vacated PELs	NIOSH IDLH
Gasoline 86290-81-5	300 ppm TWA 500 ppm STEL	-	300 ppm TWA 900 mg/m ³ TWA 500 ppm STEL 1500 mg/m ³ STEL	-
Heptane (mixed isomers) 142-82-5	400 ppm TWA 500 ppm STEL	TWA: 500 ppm TWA: 2000 mg/m ³	400 ppm TWA 1600 mg/m ³ TWA 500 ppm STEL 2000 mg/m ³ STEL	750 ppm
Butane (mixed isomers) 106-97-8	1000 ppm STEL	-	800 ppm TWA 1900 mg/m ³ TWA	-
Pentane (mixed isomers) 78-78-4	1000 ppm TWA	-	-	-
Hexane Isomers (other than n-Hexane) 107-83-5	500 ppm TWA 1000 ppm STEL	-	500 ppm TWA 1800 mg/m ³ TWA 1000 ppm STEL 3600 mg/m ³ STEL	-
Toluene 108-88-3	20 ppm TWA	TWA: 200 ppm Ceiling: 300 ppm	100 ppm TWA 375 mg/m ³ TWA 150 ppm STEL 560 mg/m ³ STEL	500 ppm
Xylene (mixed isomers) 1330-20-7	100 ppm TWA 150 ppm STEL	TWA: 100 ppm TWA: 435 mg/m ³	100 ppm TWA 435 mg/m ³ TWA 150 ppm STEL 655 mg/m ³ STEL	900 ppm
Benzene 71-43-2	0.5 ppm TWA 2.5 ppm STEL	TWA: 10 ppm (applies to industry segments exempt	25 ppm Ceiling 1 ppm TWA	500 ppm

	Skin - potential significant contribution to overall exposure by the cutaneous route	from the benzene standard) TWA: 1 ppm STEL: 5 ppm (see 29 CFR 1910.1028)	5 ppm STEL	
n-Hexane 110-54-3	50 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 500 ppm TWA: 1800 mg/m ³	50 ppm TWA 180 mg/m ³ TWA	1100 ppm
Cumene 98-82-8	50 ppm TWA	TWA: 50 ppm TWA: 245 mg/m ³ Skin	50 ppm TWA 245 mg/m ³ TWA Limit applies to skin	900 ppm
1,2,4 Trimethylbenzene 95-63-6	25 ppm TWA	-	25 ppm TWA 125 mg/m ³ TWA	-
Ethylbenzene 100-41-4	20 ppm TWA	TWA: 100 ppm TWA: 435 mg/m ³	100 ppm TWA 435 mg/m ³ TWA 125 ppm STEL 545 mg/m ³ STEL	800 ppm
Cyclohexane 110-82-7	100 ppm TWA	TWA: 300 ppm TWA: 1050 mg/m ³	300 ppm TWA 1050 mg/m ³ TWA	1300 ppm
Octane 111-65-9	300 ppm TWA	TWA: 500 ppm TWA: 2350 mg/m ³	300 ppm TWA 1450 mg/m ³ TWA 375 ppm STEL 1800 mg/m ³ STEL	1000 ppm
1,2,3-Trimethylbenzene 526-73-8	25 ppm TWA	-	25 ppm TWA 125 mg/m ³ TWA	-
Naphthalene 91-20-3	10 ppm TWA Skin - potential significant contribution to overall exposure by the cutaneous route	TWA: 10 ppm TWA: 50 mg/m ³	10 ppm TWA 50 mg/m ³ TWA 15 ppm STEL 75 mg/m ³ STEL	250 ppm

Notes: The manufacturer has voluntarily elected to provide exposure limits contained in OSHA's 1989 air contaminants standard in its SDSs, even though certain of those exposure limits were vacated in 1992.

Engineering measures: Local or general exhaust required in an enclosed area or when there is inadequate ventilation. Use mechanical ventilation equipment that is explosion-proof.

Personal protective equipment

Eye protection: Use goggles or face-shield if the potential for splashing exists.

Skin and body protection: Use nitrile rubber, Viton® or PVA gloves for repeated or prolonged skin exposure. Glove suitability is based on workplace conditions and usage. Contact the glove manufacturer for specific advice on glove selection and breakthrough times.

Respiratory protection: Use a NIOSH approved organic vapor chemical cartridge or supplied air respirators when there is the potential for airborne exposures to exceed permissible exposure limits or if excessive vapors are generated. Observe respirator assigned protection factors (APFs) criteria cited in federal OSHA 29 CFR 1910.134. Self-contained breathing apparatus should be used for fire fighting.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State Liquid
Appearance Clear yellow liquid
Color Yellow

Odor	Hydrocarbon
Odor Threshold	No data available.
Property	Values (Method)
Melting Point / Freezing Point	No data available.
Initial Boiling Point / Boiling Range	24-210 °C / 75-410 °F (ASTM D86)
Flash Point	-43 °C / -45 °F
Evaporation Rate	No data available.
Flammability (solid, gas)	Not applicable.
Flammability Limit in Air (%):	
Upper Flammability Limit:	7.6
Lower Flammability Limit:	1.4
Explosion limits:	No data available.
Vapor Pressure	5.5-15 psi (ASTM D4814)
Vapor Density	3-4
Specific Gravity / Relative Density	0.70-0.76
Water Solubility	No data available.
Solubility in other solvents	No data available.
Partition Coefficient	2.13-4.5
Decomposition temperature	No data available.
pH:	Not applicable
Autoignition Temperature	280 °C / 536 °F
Kinematic Viscosity	No data available.
Dynamic Viscosity	No data available.
Explosive Properties	No data available.
VOC Content (%)	100%
Density	No data available.
Bulk Density	Not applicable.

10. STABILITY AND REACTIVITY

<u>Reactivity</u>	The product is non-reactive under normal conditions.
<u>Chemical stability</u>	The material is stable at 70°F (21°C), 760 mmHg pressure.
<u>Possibility of hazardous reactions</u>	None under normal processing.
<u>Hazardous polymerization</u>	Will not occur.
<u>Conditions to avoid</u>	Excessive heat, sources of ignition, open flame.
<u>Incompatible Materials</u>	Strong oxidizing agents.
<u>Hazardous decomposition products</u>	None known under normal conditions of use.

11. TOXICOLOGICAL INFORMATION

Potential short-term adverse effects from overexposures

Inhalation	May cause irritation of respiratory tract. May cause drowsiness or dizziness. Breathing high concentrations of this material in a confined space or by intentional abuse can cause irregular heartbeats which can cause death.
Eye contact	Exposure to vapor or contact with liquid may cause mild eye irritation, including tearing, stinging, and redness.
Skin contact	Irritating to skin. Effects may become more serious with repeated or prolonged contact. May be absorbed through the skin in harmful amounts.
Ingestion	May be fatal if swallowed or vomited and enters airways. May cause irritation of the mouth,

throat and gastrointestinal tract.

Acute toxicological data

Name	Oral LD50	Dermal LD50	Inhalation LC50
Gasoline 86290-81-5	14000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.2 mg/L (Rat) 4 h
Heptane (mixed isomers) 142-82-5	-	3000 mg/kg (Rabbit)	103 g/m ³ (Rat) 4 h
Butane (mixed isomers) 106-97-8	-	-	658 mg/L (Rat) 4 h
Pentane (mixed isomers) 78-78-4	-	-	450 mg/L (Mouse) 2 h
Hexane Isomers (other than n-Hexane) 107-83-5	> 5000 mg/kg (Rat)	-	-
Toluene 108-88-3	> 2000 mg/kg (Rat)	8390 mg/kg (Rabbit)	12.5 mg/L (Rat) 4 h
Xylene (mixed isomers) 1330-20-7	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 5.04 mg/L (Rat) 4 h
Benzene 71-43-2	> 2000 mg/kg (Rat)	> 5000 mg/kg (Rabbit)	> 20 mg/l (Rat) 4 h
n-Hexane 110-54-3	15000 mg/kg (Rat)	3000 mg/kg (Rabbit)	48000 ppm (Rat) 4 h
Cumene 98-82-8	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 20 mg/L (Rat) 6 h
1,2,4 Trimethylbenzene 95-63-6	3280 mg/kg (Rat)	> 3160 mg/kg (Rabbit)	18,000 mg/m ³ (Rat) 4 h
Ethylbenzene 100-41-4	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Cyclohexane 110-82-7	> 5000 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	13.9 mg/L (Rat) 4 h
Octane 111-65-9	-	-	118 g/m ³ (Rat) 4 h
1,2,3-Trimethylbenzene 526-73-8	-	-	-
Naphthalene 91-20-3	490 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	> 340 mg/m ³ (Rat) 1 h

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

NAPHTHAS: In a large epidemiological study on over 15,000 employees at several petroleum refineries and amongst residents located near these refineries, no increased risk of kidney cancer was observed in association with gasoline exposures (a similar material). In a similar study, no increased risk of kidney cancer was observed among petroleum refinery workers, but there was a slight trend in the incidence of kidney cancers among service station employees, especially after a 30-year latency period. Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline.

ISOPARAFFINS: Studies in laboratory animals have shown that long-term exposure to similar materials (isoparaaffins) can cause kidney damage and kidney cancer in male laboratory rats. However, in-depth research indicates that these findings are unique to the male rat, and that these effects are not relevant to humans.

C9 AROMATIC HYDROCARBONS: A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at

1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm.

BUTANES: Studies in laboratory animals indicate exposure to extremely high levels of butanes (1-10 or higher vol.% in air) may cause cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

PENTANES: Studies of pentane isomers in laboratory animals indicate exposure to extremely high levels (roughly 10 vol.%) may induce cardiac arrhythmias (irregular heartbeats) which may be serious or fatal.

TOLUENE: Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Abuse of toluene at high concentrations (e.g., glue sniffing and solvent abuse) has been associated with adverse effects on the liver, kidney and nervous system, and can cause CNS depression, cardiac arrhythmias, and death. Studies of workers indicate longterm exposure may be related to impaired color vision and hearing. Some studies of workers suggest longterm exposure may be related to neurobehavioral and cognitive changes. Some of these effects have been observed in laboratory animals following repeated exposure to high levels of toluene. Several studies of workers suggest longterm exposure may be related to small increases in spontaneous abortions and changes in some gonadotropic hormones. However, the weight of evidence does not indicate toluene is a reproductive hazard to humans. Studies in laboratory animals indicate some changes in reproductive organs following high levels of exposure, but no significant effects on mating performance or reproduction were observed. Case studies of persons abusing toluene suggest isolated incidences of adverse effects on the fetus including birth defects. Findings in laboratory animals have been largely negative. Positive findings include small increases in minor skeletal and visceral malformations and developmental delays following very high levels of maternal exposure. Studies of workers indicate long-term exposure may be related to effects on the liver, kidney and blood, but these appear to be limited to changes in serum enzymes and decreased leukocyte counts. Adverse effects on the liver, kidney, thymus and nervous system were observed in animal studies following very high levels of exposure. The relevance of these findings to humans is not clear at this time.

XYLENES, ALL ISOMERS: Overexposure to xylene may cause upper respiratory tract irritation, headache, cyanosis, blood serum changes, nervous system damage and narcosis. Effects may be increased by the use of alcoholic beverages. Evidence of liver and kidney impairment were reported in workers recovering from a gross overexposure. Effects from Prolonged or Repeated Exposure: Impaired neurological function was reported in workers exposed to solvents including xylene. Studies in laboratory animals have shown evidence of impaired hearing following high levels of exposure. Studies in laboratory animals suggest some changes in reproductive organs following high levels of exposure but no significant effects on reproduction were observed. Studies in laboratory animals indicate skeletal and visceral malformations, developmental delays, and increased fetal resorptions following extremely high levels of maternal exposure with evidence of maternal toxicity. The relevance of these observations to humans is not clear at this time. Adverse effects on the liver, kidney, bone marrow (changes in blood cell parameters) were observed in laboratory animals following high levels of exposure. The relevance of these observations to humans is not clear at this time.

BENZENE: Studies of workers exposed to benzene show clear evidence that overexposure can cause cancer and other diseases of the blood forming organs including Acute Myelogenous Leukemia (AML), and Aplastic Anemia (AA), an often fatal disease. Some studies suggest overexposure to benzene may also be associated with Myelodysplastic Syndrome (MDS). Findings from a case control study of workers exposed to benzene was reported during the 2009 Benzene Symposium in Munich included an increase in Acute Myeloid Leukemias and Non-Hodgkins Lymphoid Neoplasms (NHLN) of the subtype follicular lymphoma (FL) in some occupational categories. Some studies of workers exposed to benzene have shown an association with increased rates of chromosome aberrations in circulating lymphocytes. One study of women workers exposed to benzene suggested a weak association with irregular menstruation. However, other studies of

workers exposed to benzene have not demonstrated clear evidence of an effect on fertility or reproductive outcome in humans. Benzene can cross the placenta and affect the developing fetus. Cases of AA have been reported in the offspring of persons severely overexposed to benzene. Studies in laboratory animals indicate that prolonged, repeated exposure to high levels of benzene vapor can cause bone marrow suppression and cancer in multiple organ systems. Studies in laboratory animals show evidence of adverse effects on male reproductive organs following high levels of exposure but no significant effects on reproduction have been observed. Embryotoxicity has been reported in studies of laboratory animals but effects were limited to reduced fetal weight and minor skeletal variations. Benzene has been classified as a proven human carcinogen by OSHA and a Group 1 (Carcinogenic to Humans) material by IARC. The current proposed IARC classification for benzene is summarized as follows: Sufficient evidence for Acute Myeloid Leukemia; limited evidence for Acute Lymphatic Leukemia, Chronic Lymphatic Leukemia, Non-Hodgkin Lymphoma, and Multiple Myeloma.

N-HEXANE: Long-term or repeated exposure to n-hexane can cause peripheral nerve damage. Initial symptoms are numbness of the fingers and toes. Also, motor weakness can occur in the digits, but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. Testicular atrophy and partial to full loss of the germ cell line were observed in sub-chronic high-dose inhalation studies of laboratory rodents. These effects appeared irreversible. Rodent reproduction studies have shown evidence of reduced fetal weight but no frank malformations.

CUMENE: Overexposure to cumene may cause upper respiratory tract irritation and CNS depression. Studies in laboratory animals indicate evidence of respiratory tract hyperplasia, and adverse effects on the liver, kidney and adrenal glands following high level exposure. The relevance of these findings to humans is not clear at this time. Findings from lifetime laboratory rodent inhalation studies were as follows: In F344/N rats: an increased incidence of renal carcinomas and adenomas, respiratory epithelial adenomas, and interstitial cell adenomas of the testes. In B6C3F1 mice: an increased incidence of carcinomas and adenomas of the bronchi and lung, liver neoplasms, hemangiosarcomas of the spleen, and adenomas of the thyroid.

1,2,4-TRIMETHYLBENZENE: The following information pertains to a mixture of C9 aromatic hydrocarbons, over 40% of which was composed of 1,2,4-trimethylbenzene. A developmental inhalation study was conducted in laboratory mice. Increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate were observed at the highest exposure level (1,500 ppm). This exposure level was extremely toxic to pregnant female mice (44% mortality). Reduced fetal body weights were also observed at 500 ppm. A multi-generation reproduction inhalation study was conducted in laboratory rats. Reductions in pup weights, pup weight gain, litter size, and pup survival were observed at 1,500 ppm, an exposure level at which significant maternal toxicity was observed. Reduced pup weight gain was also observed at 500 ppm. Embryotoxicity has been reported in studies of laboratory animals. Adverse effects included increased implantation losses, reduced fetal weights, delayed ossification and an increased incidence of cleft palate.

ETHYLBENZENE: Findings from a 2-year inhalation study in rodents conducted by NTP were as follows: Effects were observed only at the highest exposure level (750 ppm). At this level the incidence of renal tumors was elevated in male rats (tubular carcinomas) and female rats (tubular adenomas). The incidence of tumors was also elevated in male mice (alveolar and bronchiolar carcinomas) and female mice (hepatocellular carcinomas). IARC has classified ethyl benzene as "possibly carcinogenic to humans" (Group 2B). Studies in laboratory animals indicate some evidence of post-implantation deaths following high levels of maternal exposure. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals indicate limited evidence of renal malformations, resorptions, and developmental delays following high levels of maternal exposure with evidence of maternal toxicity. The relevance of these findings to humans is not clear at this time. Studies in laboratory animals have demonstrated evidence of ototoxicity (hearing loss) following exposure levels as low as 300 ppm for 5 days. Studies in laboratory animals

indicate some evidence of adverse effects on the liver, kidney, thyroid, and pituitary gland.

NAPHTHALENE: Severe jaundice, neurotoxicity (kernicterus) and fatalities have been reported in young children and infants as a result of hemolytic anemia from overexposure to naphthalene. Persons with glucose 6-phosphate dehydrogenase (G6PD) deficiency are more prone to the hemolytic effects of naphthalene. Adverse effects on the kidney have been reported in persons overexposed to naphthalene but these effects are believed to be a consequence of hemolytic anemia, and not a direct effect. Hemolytic anemia has been observed in laboratory animals exposed to naphthalene. Laboratory rodents exposed to naphthalene vapor for 2 years (lifetime studies) developed non-neoplastic and neoplastic tumors and inflammatory lesions of the nasal and respiratory tract. Cataracts and other adverse effects on the eye have been observed in laboratory animals exposed to high levels of naphthalene. Findings from a large number of bacterial and mammalian cell mutation assays have been negative. A few studies have shown chromosomal effects (elevated levels of Sister Chromatid Exchange or chromosomal aberrations) in vitro. Naphthalene has been classified as Possibly Carcinogenic to Humans (2B) by IARC, based on findings from studies in laboratory animals.

CARBON MONOXIDE: is a chemical asphyxiant with no warning properties (such as odor). At 400-500 ppm for 1 hour headache and dyspnea may occur. If activity is increased, symptoms of overexposure may include nausea, irritability, increased respiration, tinnitus, sweating, chest pain, confusion, impaired judgement, dizziness, weakness, drowsiness, ataxia, irregular heart beat, cyanosis and pallor. Levels in excess of 1000 ppm can result in collapse, loss of consciousness, respiratory failure and death. Extremely high concentrations (12,800 ppm) can cause immediate unconsciousness and death in 1-3 minutes. Repeated anoxia can lead to central nervous system damage and peripheral neuropathy, with loss of sensation in the fingers, amnesia, and mental deterioration and possible congestive heart failure. Damage may also occur to the fetus, lung, liver, kidney, spleen, cardiovascular system and other organs.

WHOLLY-VAPORIZED UNLEADED GASOLINE: Lifetime exposure to wholly vaporized unleaded gasoline produced an increased incidence of liver tumors in female mice exposed to the highest exposure concentration (2056 ppm) and α -2 urinary globulin-mediated kidney tumors in male rats. No exposure-related tumors were observed in male mice or female rats. The male-specific rat kidney tumors are not considered relevant to human health. Mice receiving lifetime repeated skin application of various petroleum naphthas exhibited an irritation-dependent increased incidence of skin tumors. Additional studies suggest that these tumors occur through a mechanism that may not be relevant to human health. Epidemiological data from over 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer resulting from gasoline exposure. Unleaded gasoline has been identified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

COMBUSTION ENGINE EXHAUST: Chronic inhalation studies of gasoline engine exhaust in mice, rats and hamsters did not produce any carcinogenic effects. Condensates/extracts of gasoline engine exhaust produced an increase in tumors compared to controls when testing by skin painting, subcutaneous injection, intratracheal instillation or implantation into the lungs. Gasoline exhaust has been classified as possibly carcinogenic to humans (2B) by the International Agency for Research on Cancer (IARC).

Adverse effects related to the physical, chemical and toxicological characteristics

Signs and Symptoms

Irritating to the skin and mucous membranes. Symptoms may include redness, itching, and inflammation. May cause nausea, vomiting, diarrhea, and signs of nervous system depression: headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Aspiration hazard. May cause coughing, chest pains, shortness of breath, pulmonary edema and/or chemical pneumonitis. Prolonged or repeated exposure may cause damage to organs. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

Sensitization

Not expected to be a skin or respiratory sensitizer.

Mutagenic effects May cause genetic defects.

Carcinogenicity May cause cancer.

Cancer designations are listed in the table below

Name	ACGIH (Class)	IARC (Class)	NTP	OSHA
Gasoline 86290-81-5	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Heptane (mixed isomers) 142-82-5	Not Listed	Not Listed	Not Listed	Not Listed
Butane (mixed isomers) 106-97-8	Not Listed	Not Listed	Not Listed	Not Listed
Pentane (mixed isomers) 78-78-4	Not Listed	Not Listed	Not Listed	Not Listed
Hexane Isomers (other than n-Hexane) 107-83-5	Not Listed	Not Listed	Not Listed	Not Listed
Toluene 108-88-3	Not Classifiable (A4)	Not Classifiable (3)	Not Listed	Not Listed
Xylene (mixed isomers) 1330-20-7	Not classifiable (A4)	Not classifiable (3)	Not Listed	Not Listed
Benzene 71-43-2	Confirmed human carcinogen (A1)	Carcinogenic to humans (1)	Known to be human carcinogen	Known carcinogen
n-Hexane 110-54-3	Not Listed	Not Listed	Not Listed	Not Listed
Cumene 98-82-8	Not listed	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not listed
1,2,4 Trimethylbenzene 95-63-6	Not Listed	Not Listed	Not Listed	Not Listed
Ethylbenzene 100-41-4	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Not Listed	Not Listed
Cyclohexane 110-82-7	Not Listed	Not Listed	Not Listed	Not Listed
Octane 111-65-9	Not Listed	Not Listed	Not Listed	Not Listed
1,2,3-Trimethylbenzene 526-73-8	Not Listed	Not Listed	Not Listed	Not Listed
Naphthalene 91-20-3	Confirmed animal carcinogen (A3)	Possible human carcinogen (2B)	Reasonably anticipated to be a human carcinogen	Not Listed

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific Target Organ Toxicity (STOT) - single exposure Respiratory system. Central nervous system.

Specific Target Organ Toxicity (STOT) - repeated exposure Blood. Blood-forming organs. Immune system.

Aspiration hazard May be fatal if swallowed or vomited and enters airways.

12. ECOLOGICAL INFORMATION

Ecotoxicity This product should be considered toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Gasoline 86290-81-5	72-hr EC50 = 56 mg/l Algae	96-hr LC50 = 11 mg/l Rainbow trout (static)	-	48-hr LC50 = 7.6 mg/l Daphnia magna
Heptane (mixed isomers) 142-82-5	-	96-hr LC50 = 375 mg/L Tilapia	-	-
Butane (mixed isomers)	-	-	-	-

106-97-8				
Pentane (mixed isomers) 78-78-4	-	96-hr LC50 = 3.1 mg/L Rainbow trout	-	48-hr EC50 = >1 - <10 mg/L Daphnia magna
Hexane Isomers (other than n-Hexane) 107-83-5	-	-	-	-
Toluene 108-88-3	72-hr EC50 = 12.5 mg/l Algae	96-hr LC50 <= 10 mg/l Rainbow trout	-	48-hr EC50 = 5.46-9.83 mg/l Daphnia magna 48-hr EC50 = 11.5 mg/l Daphnia magna (Static)
Xylene (mixed isomers) 1330-20-7	72-hr EC50 = 11 mg/l Algae	96-hr LC50 = 8 mg/l Rainbow trout	-	48-hr LC50 = 3.82 mg/l Daphnia magna
Benzene 71-43-2	72-hr EC50 = 29 mg/l Algae	96-hr LC50 = 5.3 mg/l Rainbow trout (flow-through)	-	48-hr EC50 = 8.76-15.6 mg/l Daphnia magna (Static)
n-Hexane 110-54-3	-	96-hr LC50 = 2.5 mg/l Fathead minnow	-	-
Cumene 98-82-8	72-hr EC50 = 2.6 mg/l Algae	96-hr LC50 = 6.04-6.61 mg/l Fathead minnow (Flow-through) 96-hr LC50 = 2.7 mg/l Rainbow trout (semi-static)	-	48-hr EC50 = 7.9-14.1 mg/l Daphnia magna (static)
1,2,4 Trimethylbenzene 95-63-6	-	96-hr LC50 = 7.19-8.28 mg/l Fathead minnow (flow-through)	-	48-hr EC50 = 6.14 mg/L Daphnia magna
Ethylbenzene 100-41-4	72-hr EC50 = 1.7-7.6 mg/l Algae	96-hr LC50 = 4 mg/L Rainbow trout	-	48-hr EC50 = 1-4 mg/L Daphnia magna
Cyclohexane 110-82-7	72-hr EC50 = 500 mg/l Algae	96-hr LC50 = 3.96-5.18 mg/l Fathead minnow	-	48-hr EC50 = 1.7-3.5 mg/L Bay shrimp
Octane 111-65-9	-	-	-	48-hr LC50 = 0.38 mg/l Daphnia magna
1,2,3-Trimethylbenzene 526-73-8	-	96-hr LC50 = 7.72 mg/l Fathead Minnow (flow-through)	-	-
Naphthalene 91-20-3	-	96-hr LC50 = 0.91-2.82 mg/l Rainbow trout (static) 96-hr LC50 = 1.99 mg/l Fathead minnow (static)	-	48-hr LC50 = 1.6 mg/l Daphnia magna

Persistence and degradability Expected to be inherently biodegradable. The presence of ethanol in this product may impede the biodegradation of benzene, toluene, ethylbenzene and xylene in groundwater, resulting in elongated plumes of these constituents.

Bioaccumulation Has the potential to bioaccumulate.

Mobility in soil May partition into air, soil and water.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Description of Waste Residues

This material may be a flammable liquid waste.

Safe Handling of Wastes

Handle in accordance with applicable local, state, and federal regulations. Use personal protection measures as required. Use appropriate grounding and bonding practices. Use only non-sparking tools. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. No smoking.

Disposal of Wastes / Methods of Disposal

The user is responsible for determining if any discarded material is a hazardous waste (40 CFR 262.11). Dispose of in accordance with federal, state and local regulations.

Methods of Contaminated Packaging Disposal

Empty containers should be completely drained and then discarded or recycled, if possible. Do not cut, drill, grind or weld on empty containers since explosive residues may be present. Dispose of in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

DOT (49 CFR 172.101):
UN Proper Shipping Name: Gasoline
UN/Identification No: UN 1203
Class: 3
Packing Group: II

TDG (Canada):
UN Proper Shipping Name: Gasoline
UN/Identification No: UN 1203
Transport Hazard Class(es): 3
Packing Group: II

15. REGULATORY INFORMATION

US Federal Regulatory Information:

US TSCA Chemical Inventory Section 8(b): This product and/or its components are listed on the TSCA Chemical Inventory.

EPA Superfund Amendment & Reauthorization Act (SARA):

SARA Section 302: This product does not contain any component(s) included on EPA's Extremely Hazardous Substance (EHS) List.

Name	CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs
Gasoline	NA
Heptane (mixed isomers)	NA
Butane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	NA
Xylene (mixed isomers)	NA
Benzene	NA
n-Hexane	NA
Cumene	NA
1,2,4 Trimethylbenzene	NA
Ethylbenzene	NA
Cyclohexane	NA
Octane	NA
1,2,3-Trimethylbenzene	NA
Naphthalene	NA

SARA Section 304: This product may contain component(s) identified either as an EHS or a CERCLA Hazardous substance which in case of a spill or release may be subject to SARA reporting requirements:

Name	Hazardous Substances RQs
Gasoline	NA
Heptane (mixed isomers)	NA
Butane (mixed isomers)	NA
Pentane (mixed isomers)	NA
Hexane Isomers (other than n-Hexane)	NA
Toluene	1000 lb final RQ 454 kg final RQ

Xylene (mixed isomers)	100
Benzene	10
n-Hexane	5000
Cumene	5000
1,2,4 Trimethylbenzene	NA
Ethylbenzene	1000
Cyclohexane	1000
Octane	NA
1,2,3-Trimethylbenzene	NA
Naphthalene	100 lb final RQ 45.4 kg final RQ

SARA Section 311/312: The following EPA hazard categories apply to this product:

- Acute Health Hazard
- Chronic Health Hazard
- Fire Hazard

SARA Section 313: This product may contain component(s), which if in exceedance of the de minimus threshold, may be subject to the reporting requirements of SARA Title III Section 313 Toxic Release Reporting (Form R).

Name	CERCLA/SARA 313 Emission reporting:
Gasoline	None
Heptane (mixed isomers)	None
Butane (mixed isomers)	None
Pentane (mixed isomers)	None
Hexane Isomers (other than n-Hexane)	None
Toluene	1.0 % de minimis concentration
Xylene (mixed isomers)	1.0 % de minimis concentration
Benzene	0.1 % de minimis concentration
n-Hexane	1.0 % de minimis concentration
Cumene	1.0 % de minimis concentration
1,2,4 Trimethylbenzene	1.0 % de minimis concentration
Ethylbenzene	0.1 % de minimis concentration
Cyclohexane	1.0 % de minimis concentration
Octane	None
1,2,3-Trimethylbenzene	None
Naphthalene	0.1 % de minimis concentration

State and Community Right-To-Know Regulations:

The following component(s) of this material are identified on the regulatory lists below:

Gasoline

- | | |
|---|---|
| Louisiana Right-To-Know: | Not Listed |
| California Proposition 65: | Not Listed |
| New Jersey Right-To-Know: | SN 0957 |
| Pennsylvania Right-To-Know: | Present |
| Massachusetts Right-To Know: | Present |
| Florida Substance List: | Not Listed |
| Rhode Island Right-To-Know: | Not Listed |
| Michigan Critical Materials Register List: | Not Listed |
| Massachusetts Extraordinarily Hazardous Substances: | Not Listed |
| California - Regulated Carcinogens: | Not Listed |
| Pennsylvania RTK - Special Hazardous Substances: | Not Listed |
| New Jersey - Special Hazardous Substances: | Carcinogen; Flammable - third degree |
| New Jersey - Environmental Hazardous Substances List: | SN 0957 TPQ: 10000 lb (Under N.J.A.C. 7:1G, environmental hazardous substances in mixtures such as gasoline or new and used petroleum oil may be reported under these categories) |

Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Heptane (mixed isomers)	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1339
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Butane (mixed isomers)	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0273
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 0273 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Pentane (mixed isomers)	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1064
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - fourth degree
New Jersey - Environmental Hazardous Substances List:	SN 1064 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Hexane Isomers (other than n-Hexane)	

Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1285
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Not Listed
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Toluene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Developmental toxicity, initial date 1/1/91 Female reproductive toxicity, initial date 8/7/09
New Jersey Right-To-Know:	SN 1866
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree; Teratogen
New Jersey - Environmental Hazardous Substances List:	SN 1866 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)
Xylene (mixed isomers)	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 2014
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold all isomers
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 2014 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)
Benzene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 2/27/87 Developmental toxicity, initial date 12/26/97

	Male reproductive toxicity, initial date 12/26/97
New Jersey Right-To-Know:	SN 0197
Pennsylvania Right-To-Know:	Environmental hazard; Special hazardous substance
Massachusetts Right-To Know:	Carcinogen; Extraordinarily hazardous
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin); Carcinogen (skin)
Michigan Critical Materials Register List:	100 lb Annual usage threshold
Massachusetts Extraordinarily Hazardous Substances:	Carcinogen; Extraordinarily hazardous
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Present
New Jersey - Special Hazardous Substances:	Carcinogen; Flammable - third degree; Mutagen
New Jersey - Environmental Hazardous Substances List:	SN 0197 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	10 lb RQ (air); 1 lb RQ (land/water)
n-Hexane	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1340
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 1340 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1 lb RQ (air); 1 lb RQ (land/water)
Cumene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/6/10
New Jersey Right-To-Know:	SN 0542
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic (skin); Flammable (skin)
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0542 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	5000 lb RQ (air); 1 lb RQ (land/water)
1,2,4 Trimethylbenzene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present

Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Ethylbenzene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 6/11/04
New Jersey Right-To-Know:	SN 0851
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen; flammable - Third degree
New Jersey - Environmental Hazardous Substances List:	SN 0851 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)
Cyclohexane	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 0565
Pennsylvania Right-To-Know:	Environmental hazard
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	SN 0565 TPQ: 500 lb
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	1000 lb RQ (air); 1 lb RQ (land/water)
Octane	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1434
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed

California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Flammable - third degree
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Not Listed
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
1,2,3-Trimethylbenzene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Not Listed
New Jersey Right-To-Know:	SN 1929
Pennsylvania Right-To-Know:	Present
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Not Listed
New Jersey - Environmental Hazardous Substances List:	Not Listed
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	Not Listed
Naphthalene	
Louisiana Right-To-Know:	Not Listed
California Proposition 65:	Carcinogen, initial date 4/19/02
New Jersey Right-To-Know:	SN 1322 SN 3758
Pennsylvania Right-To-Know:	Environmental hazard Present (particulate)
Massachusetts Right-To Know:	Present
Florida Substance List:	Not Listed
Rhode Island Right-To-Know:	Toxic; Flammable
Michigan Critical Materials Register List:	Not Listed
Massachusetts Extraordinarily Hazardous Substances:	Not Listed
California - Regulated Carcinogens:	Not Listed
Pennsylvania RTK - Special Hazardous Substances:	Not Listed
New Jersey - Special Hazardous Substances:	Carcinogen
New Jersey - Environmental Hazardous Substances List:	SN 1322 TPQ: 500 lb (Reportable at the de minimis quantity of >0.1%)
Illinois - Toxic Air Contaminants:	Present
New York - Reporting of Releases Part 597 - List of Hazardous Substances:	100 lb RQ (air); 1 lb RQ (land/water)

Canada DSL/NDSL Inventory: This product and/or its components are listed either on the Domestic Substances List (DSL) or are exempt.

Canadian Regulatory Information: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all of the information required by those regulations.

Name	Canada - WHMIS: Classifications of Substances:	Canada - WHMIS: Ingredient Disclosure:
Gasoline	B2,D2A,D2B	0.1%
Heptane (mixed isomers)	B2,D2B	1%
Butane (mixed isomers)	A,B1	1%
Pentane (mixed isomers)	B2	1%

Hexane Isomers (other than n-Hexane)	B2	1%
Toluene	B2,D2A,D2B	0.1%
Xylene (mixed isomers)	B2,D2A,D2B	m-, o-isomers 1.0%; p-isomer 0.1%
Benzene	B2,D2A,D2B	0.1%
n-Hexane	B2,D2A,D2B	1%
Cumene	B2,D2A	0.1%
1,2,4 Trimethylbenzene	B3,D2B	1%
Ethylbenzene	B2,D2A,D2B	0.1%
Cyclohexane	B2,D2B	1%
Octane	B2,D2B	1%
1,2,3-Trimethylbenzene	B3	1%
Naphthalene	B4,D2A	0.1%



Note: Not applicable.

16. OTHER INFORMATION

Prepared By Toxicology and Product Safety

Revision Notes

Revision Date 03/19/2018
 Previous Publish Date 11/06/2017
 Revised Sections The following sections (§) have been updated:
 2. HAZARD IDENTIFICATION
 3. COMPOSITION/INFORMATION ON INGREDIENTS
 4. FIRST AID MEASURES
 11. TOXICOLOGICAL INFORMATION

Disclaimer

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

SAFETY DATA SHEET

1. Identification

Product identifier: HEXANE

Other means of identification

Product No.: 9427, N168, 9304, 9262, 12083

Recommended use and restriction on use

Recommended use: Not available.

Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name: Avantor Performance Materials, Inc.
Address: 3477 Corporate Parkway, Suite 200
Center Valley, PA 18034

Telephone: Customer Service: 855-282-6867

Fax:
Contact Person: Environmental Health & Safety
e-mail: info@avantormaterials.com

Emergency telephone number:

24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Flammable liquids	Category 2
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Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2B
Toxic to reproduction	Category 2
Specific target organ toxicity - single exposure	Category 3
Specific target organ toxicity - repeated exposure (Dermal)	Category 1
Aspiration hazard	Category 1

Environmental hazards

Acute hazards to the aquatic environment	Category 2
Chronic hazards to the aquatic environment	Category 2

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement: Highly flammable liquid and vapor.
Causes skin irritation.
Causes eye irritation.
Suspected of damaging fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure.
May be fatal if swallowed and enters airways.
Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. IF exposed or concerned: Get medical advice/attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting. Collect spillage.

Storage: Keep container tightly closed. Store locked up. Store in a well-ventilated place. Keep cool.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
HEXANE		110-54-3	95 - 99%
METHYLCYCLOPENTANE		96-37-7	1 - 5%

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

4. First-aid measures

General information:	Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.
Ingestion:	Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Inhalation:	Move to fresh air. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration. Get medical attention.
Skin contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
Eye contact:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

Symptoms:	May be fatal if swallowed. Irritating to eyes, respiratory system and skin. Narcotic effect.
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Indication of immediate medical attention and special treatment needed

Treatment:	Treat symptomatically. Symptoms may be delayed.
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5. Fire-fighting measures

General fire hazards:	Highly flammable liquid and vapour.
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Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Water spray, foam, dry powder or carbon dioxide.
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Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.
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Specific hazards arising from the chemical:	Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Heat may cause the containers to explode. Can be ignited easily and burns vigorously. Vapor from the solvent may accumulate in container headspace resulting in flammability hazard.
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Special protective equipment and precautions for firefighters

Special fire fighting procedures:	Cool containers exposed to flames with water until well after the fire is out. Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool.
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Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Keep unauthorized personnel away. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
Methods and material for containment and cleaning up:	Eliminate all ignition sources if safe to do so. Stop leak if possible without any risk. Use only non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures:	Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.
Environmental precautions:	Do not contaminate water sources or sewer. 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:	DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Use personal protective equipment as required. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash hands thoroughly after handling. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use.
Conditions for safe storage, including any incompatibilities:	Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values	Source
HEXANE	TWA	50 ppm	US. ACGIH Threshold Limit Values (2011)
	REL	50 ppm 180 mg/m ³	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	500 ppm 1,800 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	50 ppm 180 mg/m ³	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)

Biological limit values

Chemical identity	Exposure Limit values	Source
HEXANE (2,5-Hexanedion, without hydrolysis: Sampling time: End of shift at end of work week.)	0.4 mg/l (Urine)	ACGIH BEL (2011)

Appropriate engineering controls

No data available.

Individual protection measures, such as personal protective equipment

- General information:** 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. An eye wash and safety shower must be available in the immediate work area.
- Eye/face protection:** Wear safety glasses with side shields (or goggles) and a face shield.
- Skin protection**
- Hand protection:** Chemical resistant gloves
- Other:** Wear appropriate clothing to prevent repeated or prolonged skin contact.
- Respiratory protection:** In case of inadequate ventilation use suitable respirator. Chemical respirator with organic vapor cartridge and full facepiece.
- Hygiene measures:** Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

- Physical state:** Liquid
- Form:** Liquid
- Color:** Colorless
- Odor:** Slight
- Odor threshold:** No data available.
- pH:** No data available.
- Melting point/freezing point:** -95.0 °C
- Initial boiling point and boiling range:** 68 °C

Flash Point:	-23 °C
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	7.7 %(V)
Flammability limit - lower (%):	1.2 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	20.2 kPa
Vapor density:	No data available.
Relative density:	0.66 (20 °C)
Solubility(ies)	
Solubility in water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	224 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.
Other information	
Molecular weight:	86.18 g/mol

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Heat, sparks, flames. Contact with incompatible materials.
Incompatible materials:	Strong oxidizing agents.
Hazardous decomposition products:	Thermal decomposition may release oxides of carbon.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful or fatal if swallowed.
Inhalation:	Harmful if inhaled. May cause irritation to the respiratory system.
Skin contact:	Causes skin irritation.
Eye contact:	Causes eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral	
Product:	No data available.
Specified substance(s):	
HEXANE	LD 50 (Rat): 24 mg/kg

Dermal

Product:

No data available.

Not classified for acute toxicity based on available data.

Inhalation

Product:

No data available.

Specified substance(s):

HEXANE

LC 50 (Rat, 4 h): < 48,000 mg/l

Repeated dose toxicity

Product:

No data available.

Skin corrosion/irritation

Product:

Causes skin irritation.

Serious eye damage/eye irritation

Product:

Causes eye irritation.

Respiratory or skin sensitization

Product:

Not a skin sensitizer.

Carcinogenicity

Product:

This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:

No carcinogenic components identified

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

No carcinogenic components identified

Germ cell mutagenicity

In vitro

Product:

No mutagenic components identified

In vivo

Product:

No mutagenic components identified

Reproductive toxicity

Product:

Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure

Product:

Narcotic effect. Respiratory tract irritation.

Specific target organ toxicity - repeated exposure

Product:

Central nervous system. Peripheral nervous system

Aspiration hazard

Product:

May be fatal if swallowed and enters airways.

Other effects:

None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

HEXANE LC 50 (Fathead minnow (*Pimephales promelas*), 96 h): 2.101 - 2.981 mg/l Mortality
LC 50 (Carp (*Leuciscus idus melanotus*), 48 h): 210 mg/l Mortality

Aquatic invertebrates

Product: No data available.

Specified substance(s):

HEXANE EC 50 (Brine shrimp (*Artemia salina*), 24 h): 1.36 - 1.66 mg/l Intoxication
LC 50 (Water flea (*Daphnia magna*), 24 h): > 50 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: The product is not expected to be biodegradable.

BOD/COD ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)

Product: Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

Partition coefficient n-octanol / water (log Kow)

Product: No data available.

Specified substance(s):

HEXANE Log Kow: 3.90

METHYLCYCLOPENTANE Log Kow: 3.37

Mobility in soil:

The product is insoluble in water and will spread on the water surface.

Other adverse effects:

Toxic to aquatic life with long lasting effects.

13. Disposal considerations

Disposal instructions:

Discharge, treatment, or disposal may be subject to national, state, or local laws. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

Contaminated packaging:

Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 1208
UN proper shipping name:	Hexanes
Transport hazard class(es)	
Class(es):	3
Label(s):	3
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 1208
UN proper shipping name:	HEXANES
Transport hazard class(es)	
Class(es):	3
Label(s):	3
EmS No.:	F-E, S-D
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 1208
Proper Shipping Name:	Hexanes
Transport hazard class(es):	
Class(es):	3
Label(s):	3
Marine Pollutant:	No
Packing group:	II

15. Regulatory information

US federal regulations

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

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

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

HEXANE Reportable quantity: 5000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

Acute (Immediate) Chronic (Delayed) Fire Reactive Pressure Generating

SARA 302 Extremely hazardous substance

None present or none present in regulated quantities.

SARA 304 Emergency release notification

Chemical identity	RQ
HEXANE	5000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
HEXANE	500 lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
HEXANE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

None present or none present in regulated quantities.

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

None present or none present in regulated quantities.

US state regulations

US. California Proposition 65

No ingredient regulated by CA Prop 65 present.

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

HEXANE Listed

US. Massachusetts RTK - Substance List

HEXANE Listed

US. Pennsylvania RTK - Hazardous Substances

HEXANE Listed

US. Rhode Island RTK

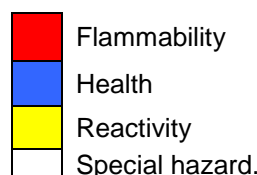
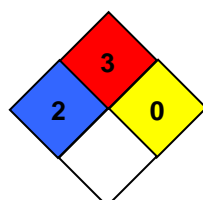
HEXANE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan (ENCS) List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

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

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date: 06-17-2014

Revision date: No data available.

Version #: 1.0

Further information: No data available.

Disclaimer: THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED "AS IS," AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(> , <)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.



Safety Data Sheet

SECTION 1: Identification

1.1. Product Identifier

Trade Name or Designation: Hydrochloric Acid, 50% (v/v)

Product Number: 3580

Other Identifying Product Numbers: 3580-1, 3580-100, 3580-16, 3580-2.5, 3580-32, 3580-5, 3580-55, 3580-5PT

1.2. Recommended Use and Restrictions on Use

General Laboratory Reagent

1.3. Details of the Supplier of the Safety Data Sheet

Company: Ricca Chemical Company

Address: 448 West Fork Drive
Arlington, TX 76012 USA

Telephone: 888-467-4222

1.4. Emergency Telephone Number (24 hours)

CHEMTREC (USA) 800-424-9300
CHEMTREC (International) 1+ 703-527-3887

Safety Data Sheet

SECTION 2: Hazard(s) Identification

2.1. Classification of the Substance or Mixture (in accordance with OSHA HCS 29 CFR 1910.1200)

For the full text of the Hazard and Precautionary Statements listed below, see Section 16.

Hazard Class	Category	Hazard Statement	Precautionary Statements
Acute Toxicity - Oral	Category 4	H302	P264, P270, P301+P312, P330, P501
Acute Toxicity - Inhalation	Category 3	H331	P261, P271, P304+P340, P311, P321, P403+P233, P405, P501
Skin Corrosion / Irritation	Category 1A	H314	P260, P264, P280, P301+P330+P331, P303+P361+P353, P363, P304+P340, P310, P321, P305+P351+P338, P405, P501
Eye Damage / Irritation	Category 1	H318	P280, P305+P351+P338, P310
Respiratory Sensitizer	Category 1	H334	P261, P285, P304+P341, P342+P311, P501
Specific Target Organs/Systemic Toxicity Following Single Exposure	Category 1	H370	P260, P264, P270, P307+P311, P321, P405, P501
Specific Target Organs/Systemic Toxicity Following Repeated Exposure	Category 1	H372	P260, P264, P270, P314, P501
Corrosive to Metals	Category 1	H290	P234, P390, P406
Hazardous to the Aquatic Environment (Acute)	Category 2	H401	P273, P501

2.2. GHS Label Elements

Pictograms:



Signal Word: **Danger**



Safety Data Sheet

Hazard Statements:

Hazard Number	Hazard Statement
H290	May be corrosive to metals.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H370	Causes damage to organs.
H372	Causes damage to organs through prolonged or repeated exposure.
H401	Toxic to aquatic life.



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Precautionary Statements:

Precautionary Number:	Precautionary Number:
P234	Keep only in original container.
P260	Do not breathe fumes, mist, vapors, or spray.
P261	Avoid breathing fumes, mist, vapors, or spray.
P264	Wash arms, hands and face thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves and eye protection.
P285	In case of inadequate ventilation wear respiratory protection.
P301+P312	IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell.
P301+P330+P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P304+P341	IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P307+P311	IF exposed: Call a POISON CENTER or physician.
P310	Immediately call a POISON CENTER or physician.
P311	Call a POISON CENTER or physician.
P314	Get medical attention if you feel unwell.
P321	Specific treatment (Wash areas of contact with water).
P330	Rinse mouth.
P342+P311	If experiencing respiratory symptoms: Call a POISON CENTER or physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P406	Store in corrosive resistant container with a resistant inner liner.
P501	Dispose of contents in accordance with local, state, federal and international regulations.

2.3. WHMIS Classification

WHMIS classification is not included based on the recommended option (Option 4) found in the Canada Gazette Part II, Vol. 149, No.3, page 458

2.4. Hazards not Otherwise Classified or Covered by GHS

Data not available.



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SECTION 3: Composition / Information on Ingredients

3.1. Components of Substance or Mixture

Chemical Name	Formula	Molecular Weight	CAS Number	Weight%
Water	H ₂ O	18.01 g/mol	7732-18-5	80.15%
Hydrochloric Acid	HCl	36.46 g/mol	7647-01-0	19.85%

SECTION 4: First-Aid Measures

4.1. General First Aid Information

Eye Contact: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. May cause severe burns and permanent damage.

Inhalation: IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.

Skin Contact: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. May cause irritation, redness, and pain.

Ingestion: IF SWALLOWED: rinse mouth. Do NOT induce vomiting. Dilute with water or milk. Do not induce vomiting. Call a physician if necessary.

4.2. Most Important Symptoms and Effects, Acute and Delayed

DANGER! Corrosive liquid! Causes severe burns to all areas of contact. May be fatal if swallowed. Wash areas of contact with water immediately for at least 15 minutes. Inhalation can cause coughing, choking, inflammation of the nose, throat and upper respiratory tract. If ingested, give large quantity of water. Do not induce vomiting. Call a physician immediately. EYE CONTACT: May cause severe burns and permanent damage. SKIN CONTACT: May cause irritation, redness, and pain.

4.3. Medical Attention or Special Treatment Needed

Immediately call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water).

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing Media

Does not burn. Use extinguishing agents compatible with acid and appropriate for the burning material.

5.2. Specific Hazards Arising from the Substance or Mixture

Not combustible. Aqueous hydrochloric acid solutions react with most metals, forming flammable hydrogen gas. (anhydrous or refrigerated liquid)

5.3. Special Protective Equipment for Firefighters

Wear special protective clothing and positive pressure self-contained breathing apparatus. Butyl rubber or Teflon barrier recommended. (anhydrous or refrigerated liquid)

Safety Data Sheet

SECTION 6: Accidental Release Measures

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection.

6.2. Cleanup and Containment Methods and Materials

Approach release from upwind. Stop or control the leak, if this can be done without undue risk. Use water fog or spray to knock down and absorb vapors. Releases may require isolation or evacuation. Control runoff and isolate discharged material for proper disposal. (anhydrous or refrigerated liquid)

SECTION 7: Handling and Storage

7.1. Precautions for Safe Handling and Storage Conditions

Store in corrosive resistant container with a resistant inner liner. As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SECTION 8: Exposure Controls / Personal Protection

Control Parameters

Chemical Name	Limit Type	Country	Exposure Limit	Information Source
Hydrochloric Acid (7647-01-0)	TLV-Ceiling	USA	2 ppm Ceiling	ACGIH - Threshold Limit Values - Ceilings (TLV-C)
Hydrochloric Acid (7647-01-0)	PEL-Ceiling	USA	5 ppm Ceiling 7 mg/m ³ Ceiling	U.S. - OSHA - Final PELs - Ceiling Limits

8.2. Exposure Controls

Engineering Controls: Use only outdoors or in a well-ventilated area. No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: In case of inadequate ventilation wear respiratory protection. Normal room ventilation is adequate. If necessary, wear a respirator equipped with an acid gas cartridge.

Skin Protection: Wear protective gloves and eye protection. Chemical resistant gloves.

Eye Protection: Wear protective gloves and eye protection. Safety glasses or goggles.

8.3. Personal Protective Equipment

Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection. Normal room ventilation is adequate. If necessary, wear a respirator equipped with an acid gas cartridge. Chemical resistant gloves. Safety glasses or goggles.



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SECTION 9: Physical and Chemical Properties

9.1. Basic Physical and Chemical Properties

Appearance: Colorless to slightly greenish-yellow liquid

Physical State: Liquid

Odor: Pungent

Odor Threshold: Data not available.

pH: < 1

Melting/Freezing Point: Approximately 0°C

Initial Boiling Point/Range: Approximately 100°C - Approximately 100°C

Flash Point: Data not available.

Evaporation Rate: Data not available.

Flammability: Data not available.

Flammability/Explosive Limits: Data not available.

Vapor Pressure: Approximately 20 kPa at 20°C

Vapor Density: Data not available.

Relative Density: 1.10

Solubility: Miscible

Partition Coefficient: Data not available.

Auto-Ignition Temperature: Data not available.

Decomposition Temperature: Data not available.

Viscosity: Data not available.

Explosive Properties: Data not available.

Oxidizing Properties: Data not available.

SECTION 10: Stability and Reactivity

10.1. Reactivity and Chemical Stability

Stable under normal conditions of use and storage.

10.2. Possibility of Hazardous Reactions

Data not available.

10.3. Conditions to Avoid and Incompatible Materials

Keep only in original container. Most metals, Alkalis, active metals, Cyanides, Sulfides, Sulfites, Metal Oxides, Formaldehyde.

10.4. Hazardous Decomposition Products

Will not occur.



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SECTION 11: Toxicological Information

11.1. Information on Toxicological Effects

Acute Toxicity - Oral Exposure:

Harmful if swallowed. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. Dispose of contents in accordance with local, state, federal and international regulations.

Acute Toxicity - Dermal Exposure:

Not applicable.

Acute Toxicity - Inhalation Exposure:

Toxic if inhaled. Avoid breathing fumes, mist, vapors, or spray. Use only outdoors or in a well-ventilated area. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water). Store in a well-ventilated place. Keep container tightly closed. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

Acute Toxicity - Other Information:

LD50, Oral, Rabbit (Hydrochloric Acid) 900 mg/kg; Details of toxic effects not reported other than lethal dose value. LCLo, inhalation, human: 3000 ppm/5 minutes: No toxic effects noted.

Skin Corrosion and Irritation:

Causes severe skin burns and eye damage. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Wear protective gloves and eye protection. IF SWALLOWED: rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Wash contaminated clothing before reuse. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water). IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

Serious Eye Damage and Irritation:

Causes serious eye damage. Wear protective gloves and eye protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Respiratory Sensitization:

May cause allergy or asthma symptoms or breathing difficulties if inhaled. Avoid breathing fumes, mist, vapors, or spray. In case of inadequate ventilation wear respiratory protection. IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or physician. Dispose of contents in accordance with local, state, federal and international regulations.

Skin Sensitization:

Not applicable.

Germ Cell Mutagenicity:

Not applicable.

Carcinogenicity:

Not applicable.

Safety Data Sheet

Reproductive Toxicity:

Not applicable.

Specific Target Organ Toxicity from Single Exposure:

Causes damage to organs. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. IF exposed: Call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water). Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

Specific Target Organ Toxicity from Repeated Exposure:

Causes damage to organs through prolonged or repeated exposure. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Get medical attention if you feel unwell. Dispose of contents in accordance with local, state, federal and international regulations.

Aspiration Hazard:

Not applicable.

Additional Toxicology Information:

Data not available.

SECTION 12: Ecological Information

12.1. Ecotoxicity

Toxic to aquatic life. Avoid release to the environment. Dispose of contents in accordance with local, state, federal and international regulations.

12.2. Persistence and Degradability

Data not available.

12.3. Bioaccumulative Potential

Data not available.

12.4. Mobility in Soil

Data not available.

12.5. Other Adverse Ecological Effects

Data not available.

SECTION 13: Disposal Considerations

13.1. Waste Treatment Methods

Data not available.

Safety Data Sheet

SECTION 14: Transportation Information

14.1. Transportation by Land-Department of Transportation (DOT, United States of America)

Sizes: 1 L, 2.5 L, 4 L, 10 L, 20 L, 55 Gal, 100 mL, 500 mL

UN Number: UN1789

Proper Shipping Name: Hydrochloric Acid Solution

Hazard Class: 8

Packing Group: II

Hazard Placard Labels:



14.2. Transportation by Air - International Air Transport Association (IATA)

Sizes: 1 L, 2.5 L, 4 L, 10 L, 20 L, 55 Gal, 100 mL, 500 mL

UN Number: UN1789

Proper Shipping Name: Hydrochloric Acid Solution

Hazard Class: 8

Packing Group: II

Hazard Placard Labels:



SECTION 15: Regulatory Information

15.1. Occupational Safety and Health Administration (OSHA) Hazards

Not listed.

15.2. Superfund Amendments and Reauthorization Act (SARA) 302 Extremely Hazardous Substances

Hydrochloric Acid (CAS # 7647-01-0): 500 lb TPQ (gas only)

Hydrochloric Acid (CAS # 7647-01-0): 5000 lb EPCRA RQ (gas only)

15.3. Superfund Amendments and Reauthorization Act (SARA) 311/312 Hazardous Chemicals

Hydrochloric Acid (CAS # 7647-01-0): 5000 lb final RQ; 2270 kg final RQ

15.4. Superfund Amendments and Reauthorization Act (SARA) 313 Toxic Release Inventory (TRI)

Hydrochloric Acid (CAS # 7647-01-0): 1.0 % de minimis concentration (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)

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15.5. Massachusetts Right-to-Know Substance List

Hydrochloric Acid (CAS # 7647-01-0): Extraordinarily hazardous

15.6. Pennsylvania Right-to-Know Hazardous Substances

Hydrochloric Acid (CAS # 7647-01-0): Environmental hazard

Hydrochloric Acid (CAS # 7647-01-0): Present

Water (CAS # 7732-18-5): Present

15.7. New Jersey Worker and Community Right-to-Know Components

Hydrochloric Acid (CAS # 7647-01-0): corrosive

Hydrochloric Acid (CAS # 7647-01-0): sn 1012

Hydrochloric Acid (CAS # 7647-01-0): SN 1012 500 lb TPQ (>=37% concentration); SN 2909 500 lb TPQ (Hydrogen chloride gas only)

15.8. California Proposition 65

Not listed.

15.9. Canada Domestic Substances List / Non-Domestic Substances List (DSL/NDSL)

Hydrochloric Acid (CAS # 7647-01-0): Present (DSL)

Water (CAS # 7732-18-5): Present (DSL)

15.10. United States of America Toxic Substances Control Act (TSCA) List

Hydrochloric Acid (CAS # 7647-01-0): Present [T]

Water (CAS # 7732-18-5): Present

15.11. European Inventory of Existing Commercial Chemical Substances (EINECS), European List of Notified Chemical Substances (ELINCS), and No Longer Polymers (NLP)

Not listed.

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SECTION 16: Other Information

16.1. Full Text of Hazard Statements and Precautionary Statements

May be corrosive to metals. Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. Toxic if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Toxic to aquatic life.

Keep only in original container. Do not breathe fumes, mist, vapors, or spray. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves and eye protection. In case of inadequate ventilation wear respiratory protection.

IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. 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. IF exposed: Call a POISON CENTER or physician. Get medical attention if you feel unwell. Specific treatment (Wash areas of contact with water). If experiencing respiratory symptoms: Call a POISON CENTER or physician. Wash contaminated clothing before reuse. Absorb spillage to prevent material damage.

Store in a well-ventilated place. Keep container tightly closed. Store locked up. Store in corrosive resistant container with a resistant inner liner.

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

16.2. Miscellaneous Hazard Classes

Canadian Carcinogenicity Hazard Class: Not Applicable.

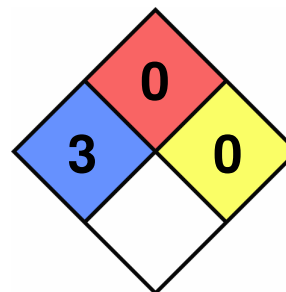
Physical Hazards Not Otherwise Classified (PHNOC): Not Applicable.

Health Hazards Not Otherwise Classified (HHNOC): Not Applicable.

Biohazardous Infectious Materials Hazard Class: Not Applicable.

16.3. National Fire Protection Association (NFPA) Rating

Health: 3
Flammability: 0
Reactivity: 0
Special Hazard:



16.4. Document Revision

Last Revision Date: 5/4/2015

Safety Data Sheet

DISCLAIMER

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox**I Identification of the substance/mixture and of the supplier****I.1 Product identifier****Trade Name:** Liquinox**Synonyms:****Product number:** Liquinox**I.2 Application of the substance / the mixture :** Cleaning material/Detergent**I.3 Details of the supplier of the Safety Data Sheet**

Manufacturer	Supplier
Alconox, Inc. 30 Glenn Street White Plains, NY 10603 1-914-948-4040	Not Applicable

Emergency telephone number:**ChemTel Inc**

North America: 1-800-255-3924

International: 01-813-248-0585

2 Hazards identification**2.1 Classification of the substance or mixture:**

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:Alcohol ethoxylate
Sodium alkylbenzene sulfonate
Sodium xylenesulphonate
Lauramine oxide**2.2 Label elements:**

Eye irritation, category 2A.

Skin irritation, category 2.

Hazard pictograms:**Signal word:** Warning**Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P501 Dispose of contents and container as instructed in Section 13.

Additional information: None.**Hazard description**

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox**Hazards Not Otherwise Classified (HNOC):** None**Information concerning particular hazards for humans and environment:**

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients**3.1 Chemical characterization :** None**3.2 Description :** None**3.3 Hazardous components (percentages by weight)**

Identification	Chemical Name	Classification	Wt. %
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	10-25
CAS number: 1300-72-7	Sodium Xylenesulphonate	Eye Irrit. 2; H319	2.5-10
CAS number: 84133-50-6	Alcohol Ethoxylate	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	2.5-10
CAS number: 1643-20-5	Lauramine oxide	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	1-2

3.4 Additional Information: None.**4 First aid measures****4.1 Description of first aid measures****General information:** None.**After inhalation:**

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

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according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox**4.3 Indication of any immediate medical attention and special treatment needed:**

No additional information.

5 Firefighting measures**5.1 Extinguishing media****Suitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None**5.2 Special hazards arising from the substance or mixture :**

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters**Protective equipment:**

Wear protective eye wear, gloves and clothing.

Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.

Avoid contact with skin, eyes and clothing.

6 Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures :**

Ensure adequate ventilation.

Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.

Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None**7 Handling and storage****7.1 Precautions for safe handling :**

Avoid breathing mist or vapor.

Do not eat, drink, smoke or use personal products when handling chemical substances.

Conditions for safe storage, including any incompatibilities:

Store closed upright and in a cool dry place, should be 15 - 30 deg C or 60 - 90 deg F.

7.2 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox

8 Exposure controls/personal protection**8.1 Control parameters :**

No applicable occupational exposure limits

8.2 Exposure controls**Appropriate engineering controls:**

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.

Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	Pale yellow liquid	Explosion limit lower: Explosion limit upper:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	Vapor pressure at 20°C:	Not determined or not available.
Odor threshold:	Not determined or not available.	Vapor density:	Not determined or not available.
pH-value:	8.5 as is	Relative density:	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	Solubilities:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	Partition coefficient (n-octanol/water):	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	Auto/Self-ignition temperature:	Not determined or not available.
Evaporation rate:	Not determined or not available.	Decomposition temperature:	Not determined or not available.
Flammability (solid, gaseous):	Not determined or not available.	Viscosity:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox

Density at 20°C: Not determined or not available.

10 Stability and reactivity

- 10.1 Reactivity** : None
- 10.2 Chemical stability** : None
- 10.3 Possibility hazardous reactions** : None
- 10.4 Conditions to avoid** : None
- 10.5 Incompatible materials** : None
- 10.6 Hazardous decomposition products** : None

11 Toxicological information**11.1 Information on toxicological effects** :**Acute Toxicity:****Oral:**

: LD50 >5000 mg per kg Rat, Oral) - product .

Chronic Toxicity: No additional information.**Skin corrosion/irritation:**

Alcohol Ethoxylate: May cause mild to moderate skin irritation.

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

Lauramine oxide: Causes skin irritation.

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation.

Alcohol Ethoxylate: Causes moderate to severe eye irritation and conjunctivitis.

Sodium xylenesulphonate: Rabbit: irritating to eyes.

Lauramine oxide: Causes serious eye damage.

Respiratory or skin sensitization: No additional information.**Carcinogenicity:** No additional information.**IARC (International Agency for Research on Cancer):** None of the ingredients are listed.**NTP (National Toxicology Program):** None of the ingredients are listed.**Germ cell mutagenicity:** No additional information.**Reproductive toxicity:** No additional information.**STOT-single and repeated exposure:** No additional information.**Additional toxicological information:** No additional information.**12 Ecological information****12.1 Toxicity:**

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox

Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.

Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.

Lauramine oxide: Fish, LC0 24.3 mg/l, 96h [Killifish (Cyprinodontidae)]

Lauramine oxide: Aquatic invertebrates, (LC50): 3.6 mg/l 96 hours [Daphnia (Daphnia)].

Lauramine oxide: Aquatic plants, EC50 Algae 0.31 mg/l 72 hours [Algae]

Alcohol Ethoxylate: Aquatic invertebrates, (LC50): 4.01 mg/l 48 hours [Daphnia (daphnia)].

12.2 Persistence and degradability: No additional information.**12.3 Bioaccumulative potential:** No additional information.**12.4 Mobility in soil:** No additional information.**General notes:** No additional information.**12.5 Results of PBT and vPvB assessment:****PBT:** No additional information.**vPvB:** No additional information.**12.6 Other adverse effects:** No additional information.**13 Disposal considerations****13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)****Relevant Information:**

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class:	None
Label:	None
LTD.QTY:	None

US DOT
Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017

Revision : 05/17/2017

Trade Name: Liquinox	
14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user: Danger code (Kemler): EMS number: Segregation groups:	None None None None
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.	
14.8 Transport/Additional information: Transport category: Tunnel restriction code: UN "Model Regulation":	 None None None

15 Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.****North American****SARA****Section 313 (specific toxic chemical listings):** None of the ingredients are listed.**Section 302 (extremely hazardous substances):** None of the ingredients are listed.**CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable****Spill Quantity:** None of the ingredients are listed.**TSCA (Toxic Substances Control Act):****Inventory:** All ingredients are listed.**Rules and Orders:** Not applicable.**Proposition 65 (California):****Chemicals known to cause cancer:** None of the ingredients are listed.**Chemicals known to cause reproductive toxicity for females:** None of the ingredients are listed.**Chemicals known to cause reproductive toxicity for males:** None of the ingredients are listed.**Chemicals known to cause developmental toxicity:** None of the ingredients are listed.**Canadian****Canadian Domestic Substances List (DSL):**

All ingredients are listed.

EU**REACH Article 57 (SVHC):** None of the ingredients are listed.**Germany MAK:** Not classified.

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according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

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Revision : 05/17/2017

Trade Name: Liquinox**Asia Pacific****Australia****Australian Inventory of Chemical Substances (AICS):** All ingredients are listed.**China****Inventory of Existing Chemical Substances in China (IECSC):** All ingredients are listed.**Japan****Inventory of Existing and New Chemical Substances (ENCS):** All ingredients are listed.**Korea****Existing Chemicals List (ECL):** All ingredients are listed.**New Zealand****New Zealand Inventory of Chemicals (NZOIC):** All ingredients are listed.**Philippines****Philippine Inventory of Chemicals and Chemical Substances (PICCS):** All ingredients are listed.**Taiwan****Taiwan Chemical Substance Inventory (TSCI):** All ingredients are listed.**16 Other information****Abbreviations and Acronyms:** None**Summary of Phrases****Hazard statements:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P332+P313 If skin irritation occurs: Get medical advice/attention.

P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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

NFPA: 1-0-0**HMIS:** 1-0-0

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Methanol, Lab Grade, 4L

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Methanol, Lab Grade, 4L

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25426A

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

Aqu Phoenix S identifi
9 B nth t Drive, H n ve , PA 17331

Supplier Details:

Fishe S ien e E u ti n
15 Jet View D ive, R heste , NY 14624

Emergency telephone number:

Fishe S ien e E u ti n Eme gen y Teleph ne N : 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Flammable

Fl mm ble liqui s , teg y 2



Toxic

A ute t xi ity (l , e m l, inh l ti n), teg y 3



Health hazard

Spe ifi t get g n t xi ity f ll wing single exp su e, teg y 1

A T x De m l 3

Fl mm ble liq 2

A T x O l 3

A T x Inh ln 3

St t SE 1

Signal word : D nge

Hazard statements:

Highly fl mm ble liqui n v p u

T xi if sw ll we

T xi in nt t with skin

T xi if inh le

C uses m get g ns

Precautionary statements:

If me i l vi e is nee e , h ve p u t nt ine l bel th n

Keep ut f e h f hil en

Re l bel bef e use

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Methanol, Lab Grade, 4L

We p te tive gl ves/p te tive l thing/eye p te ti n/ e p te ti n
 W sh skin th oughly fte h n ling
 D n t e t, ink sm ke when using this p u t
 Av i b e thing ust/fume/g s/mist/v p u s/sp y
 Keep w y f m he t/sp ks/ penfl mes/h t su f es N sm king
 D n t b e the ust/fume/g s/mist/v p u s/sp y
 Spe ifi t e tment (see supplement l fi st i inst u ti ns n this l bel)
 IF ON SKIN: W sh with s p n w te
 C ll POISON CENTER t /physi i n if y u feel unwell
 Spe ifi me su es (see supplement l fi st i inst u ti ns n this l bel)
 T ke ff nt min te l thing n w sh bef e euse
 W sh nt min te l thing bef e euse
 IF SWALLOWED: Imme i tely ll POISON CENTER t /physi i n
 IF exp se : C ll POISON CENTER t /physi i n
 IF INHALED: Rem ve vi tim t fesh i n keep t est in p siti n mf t ble f b e thing
 St e l ke up
 St e in well ventil te pl e Keep l
 Disp se f ntents n nt ine s inst u te in Se ti n 13

Other Non-GHS Classification:

WHMIS



NFPA/HMIS



NFPA SCALE (0-4)

Health	2
Flammability	3
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 67-56-1	Meth n l	>90 %

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Methanol, Lab Grade, 4L

Pe ent ges e by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Remove clothing if necessary. If breathing is difficult, give oxygen.

After skin contact: Wash affected areas with soap and water. Rinse/flush exposed skin gently using water for 15-20 minutes. Seek medical attention if irritation persists.

After eye contact: Promptly flush eyes gently with water for at least 15-20 minutes, lifting upper and lower lids. Seek medical attention if irritation persists.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Move exposed individual to fresh air. Dilute mouth with water or milk if necessary. Seek medical attention.

Most important symptoms and effects, both acute and delayed:

Respiratory irritation, dizziness, headache, skin irritation, possibly causing severe effects. Irritation of eyes, skin, and respiratory tract. Irritation of the respiratory system. Severe effects may be observed. Use of the respiratory system is affected. Skin irritation, pre-existing eye irritation, gastrointestinal irritation; Toxic: ingestion of very small amounts may cause severe effects by inhalation, ingestion, skin contact, and eye contact. Experiments have shown acute toxicity effects in laboratory animals. May cause severe kidney and liver effects.

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician. Physician should treat symptoms.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Dry chemical, foam, water, carbon dioxide. Water spray can keep fire out.

For safety reasons unsuitable extinguishing agents: Water may be ineffective.

Special hazards arising from the substance or mixture:

Risk of ignition. Volatile flammable mixtures with vapors may contribute to fire. Risk of combustion when heated.

Advice for firefighters:

Protective equipment: Wear protective eyewear, gloves, and clothing. Refer to Section 8.

Additional information (precautions): Remove sources of ignition. Avoid contact with skin, eyes, and clothing. Ensure adequate ventilation. Temperature limits for installation are high.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Use spark-proof tools and explosion-proof equipment. Provide exhaust ventilation. The engineering department should keep the inventory of flammable vapors below the applicable explosion limits (Occupational Exposure Limits-OELs) in the laboratory. Ensure adequate ventilation.

Environmental precautions:

Prevent formation of sludge, sewage, and water. Should not be released into the environment.

Methods and material for containment and cleaning up:

If necessary, use appropriate absorbent material. Remove sources of ignition. Contain spillage. Then

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Methanol, Lab Grade, 4L

lle t D n t flush t sewe Abs b with n n mbustible bs bent m te i l s u h s s n e th n
nt ine ize f isp s l Ventil te e fle k spill Use sp k-p ft ls n expl si n-p f
equipment F ll w p pe isp s l meth s Refe t Se ti n 13

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Use in hemi l fume h W sh h n s bef e b e ks n imme i tely fte h n ling the p u t Av i
nt t with skin, eyes, n l thing T ke p e uti ns g inst st ti is h ge

Conditions for safe storage, including any incompatibilities:

St e in ll ti n P vi e ventil ti n f nt ine s Av i st ge ne ext eme he t, igniti n s u es
pen fl me Keep nt ine tightly se le St e with like h z s P te t f m freezing n physi l m ge

SECTION 8 : Exposure controls/personal protection



Control Parameters:

67-56-1, Meth n l, ACGIH: 250 ppm STEL; 200 ppm TWA
67-56-1, Meth n l, NIOSH: 250 ppm STEL; 325 mg/m³ STEL
67-56-1, Meth n l, NIOSH: 200 ppm TWA; 260 mg/m³ TWA

Appropriate Engineering controls:

Eme gen y eye w sh f unt ins n s fety sh we s sh ul be v il ble in
the imme i te vi inity f use h n ling Ensu e th t ust-h n ling
systems (exh ust u ts, ust lle t s, vessels, n p essing
equipment) e esigne t p event the es pe f ust int the w k
e

Respiratory protection:

Use in hemi l fume h If exp su e limit is ex ee e , full-f e
espi t with g ni ti ge m y be w n

Protection of skin:

Sele t gl ve m te i l impe me ble n esist nt t the subst n e Sele t
gl ve m te i l b se n tes f iffusi n n eg ti n

Eye protection:

S fety gl sses with si e shiel s g ggles

General hygienic measures:

W sh h n s bef e b e ks n t the en f w k Av i nt t with the
eyes n skin Disp se f nt min te gl ves fte use in n e
with ppli ble l ws n g l b t y p ti es Pe f m utine
h usekeeping

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Cle l less liqui	Explosion limit lower:	6
		Explosion limit upper:	31
Odor:	Al h l	Vapor pressure:	128 hP @ 20°C
Odor threshold:	N t Av il ble	Vapor density:	1 11
pH-value:	N t Av il ble	Relative density:	0 79
Melting/Freezing point:	-98°C	Solubilities:	Mis ible t 20 °C

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Boiling point/Boiling range:	64 7°C @ 760mmHg	Partition coefficient (n-octanol/water):	N t Av il ble
Flash point (closed cup):	12°C	Auto/Self-ignition temperature:	455°C
Evaporation rate:	5 2	Decomposition temperature:	N t Av il ble
Flammability (solid,gaseous):	Fl mm ble	Viscosity:	Kinem ti :N t Av il ble b Dyn mi : N t Av il ble
Density: N t Av il ble			

SECTION 10 : Stability and reactivity

Reactivity: V p u s m y f m expl sive mixtu e with i

Chemical stability: St ble un e n m l n iti ns

Possible hazardous reactions: N ne un e n m l p essing

Conditions to avoid: Ex ess he t, In mp tible M te i ls, fl mes, sp ks

Incompatible materials: Oxi izing gents, e u ing gents, lk li met ls, i s, s ium, p t ssiium, met ls s p w es, i hl i es, i nhy i es, p w e e m gnesium, n luminum

Hazardous decomposition products: b n m n xi e, f m l ehy e

SECTION 11 : Toxicological information

Acute Toxicity:		
Dermal:	(bbit)	LD-50 15800 mg/kg
Oral:	(t)	LD-50 5628 mg/kg
Inhalation:	(t)	LC-50 130,7 mg/l
Chronic Toxicity: N iti n l inf m ti n		
Corrosion Irritation:		
Ocular:		I it ting t eyes
Dermal:		I it ting t skin
Sensitization: N iti n l inf m ti n		
Single Target Organ (STOT):		Cl ssifie s using m ge t g ns: Eyes, skin, pti ne ve, g st intestin lt t, ent l ne v us system, espi t y system, live , spleen, ki ney, bl
Numerical Measures: N iti n l inf m ti n		
Carcinogenicity:		Te t geni ty : h s u e in expe iment l nim ls
Mutagenicity:		Mut geneti effe ts h ve u e in expe iment l nim ls

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Reproductive Toxicity:

Devel pment l Effe ts
(Imme i te/Del ye) h ve u e in
expe iment l nim ls

SECTION 12 : Ecological information

Ecotoxicity

Freshwater Fish: 96 H LC50 Pimeph les p mel s: 28200 mg/L

Freshwater Fish: 96 H LC50 On hyn hus mykiss: 19500 - 20700 mg/L

Freshwater Fish: 96 H LC50 Pimeph les p mel s: >100 mg/L

Freshwater Fish: 96 H LC50 On hyn hus mykiss: 18 - 20 mL/L

Freshwater Fish: 96 H LC50 Lep mis m hi us: 13500 - 17600 mg/L

Persistence and degradability: N t pe sist nt

Bioaccumulative potential: N t Bi umul tive

Mobility in soil: Aque us s luti n h s high m bility in s il

Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Meth n l RCRA w ste e U154 D n t ll w p u t t e h sew ge system pen w te It is the
esp nsibility f the w ste gene t t p pe ly h te ize ll w ste m te i ls ing t ppli ble
egul t y entities (US 40CFR262 11) Abs b with n n mbustible bs bent m te i l su h s s n e th
n nt ine ize f isp s l P vi e ventil ti n H ve fi e extinguishing gent v il ble in se ffi e
Elimin te ll s u es f igniti n Use sp k-p ft ls n expl si n-p f equipment Chemi l w ste
gene t s must ete mine whethe is e hemi l is l ssifie s h z us w ste Chemi l w ste
gene t s must ls nsult l l, egi n l, n n ti n l h z us w ste egul ti ns Ensu e mplete n
u te l ssifi ti n

SECTION 14 : Transport information

UN-Number

UN1230

UN proper shipping name

Meth n l

Transport hazard class(es)



Class:

3 Fl mm ble liqui s



Class:

6 1 T xi subst n es

Packing group: II

Environmental hazard:

Transport in bulk:

Special precautions for user:

SECTION 15 : Regulatory information

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Methanol, Lab Grade, 4L

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

A ute, Ch ni , Fi e

SARA Section 313 (Specific toxic chemical listings):

67-56-1 Meth n l

RCRA (hazardous waste code):

67-56-1 Meth n l RCRA w ste e U154

TSCA (Toxic Substances Control Act):

All ing e ients e liste

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

67-56-1 Meth n l 5000 lbs

Proposition 65 (California):

Chemicals known to cause cancer:

N ne f the ing e ients is liste

Chemicals known to cause reproductive toxicity for females:

N ne f the ing e ients is liste

Chemicals known to cause reproductive toxicity for males:

N ne f the ing e ients is liste

Chemicals known to cause developmental toxicity:

67-56-1 Meth n l

Canada

Canadian Domestic Substances List (DSL):

All ing e ients e liste

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

N ne f the ing e ients is liste

Canadian NPRI Ingredient Disclosure list (limit 1%):

67-56-1 Meth n l

SECTION 16 : Other information

This p u t h s been l ssifie in n e with h z ite i f the C nt lle P u ts Regul ti ns n the SDS nt ins ll the inf m ti n equie by the C nt lle P u ts Regul ti ns N te: The esp nsibility t p vi e s fe w kpl e em ins with the use The use sh ul nsi e the he lth h z s n s fety inf m ti n nt ine he ein s gui e n sh ul t keth se pe uti ns equie in n in ivi u l pe ti n t inst u t empl yees n evel p w k p ti e p e ues f s fe w k envi nment The inf m ti n nt ine he ein is, t the best f u kn wle ge n belief, u te H weve , sin e the n iti ns fh n ling n use e bey n u nt l, we m ken gu ntee f esults, n ssume n li bility f m ges in u e by the use f this m te i l It is the esp nsibility f the use t mply with ll ppli ble l ws n egul ti ns ppli ble t this m te i l

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: Inte n ti n l M itime C e f D nge us G s

PNEC: P e i te N -Effe t C n ent ti n (REACH)

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Methanol, Lab Grade, 4L

CFR: C e f Fe e l Regul ti ns (USA)

SARA: Supe fun Amen ments n Re uth iz ti n A t (USA)

RCRA: Res u e C nse v ti n n Re ve y A t (USA)

TSCA: T xi Subst n es C nt I A t (USA)

NPRI: N ti n l P llut nt Rele se Invent y (C n)

DOT: US Dep tment f T nsp t ti n

IATA: Inte n ti n l Ai T nsp t Ass i ti n

GHS: Gl b lly H m nize System f Cl ssifi ti n n L belling f Chemi ls

ACGIH: Ame i n C nfe en e f G ve nment l In ust i l Hygienists

CAS: Chemi l Abst ts Se vi e (ivisi n f the Ame i n Chemi l S iety)

NFPA: N ti n l Fi e P te ti n Ass i ti n (USA)

HMIS: H z us M te i ls l entifi ti n System (USA)

WHMIS: W kpl e H z us M te i ls Inf m ti n System (C n)

DNEL: De ive N -Effe t Level (REACH)

Effective date : 01 08 2015

Last updated : 03 27 2015

SAFETY DATA SHEET

Creation Date 12-Mar-2009

Revision Date 18-Jan-2018

Revision Number 7

1. Identification

Product Name Nitric acid (65 - 70%)

Cat No. : A198C-212, A200-212, A200-212LC, A200-500, A200-500LC, A200-612GAL, A200C-212, A200S-212, A200S-212LC, A200S-500, A200SI-212, A467-1, A467-2, A467-250, A467-500, A483-212; S719721

CAS-No 7697-37-2
Synonyms Azotic acid; Engraver's acid; Aqua fortis

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Oxidizing liquids	Category 3
Corrosive to metals	Category 1
Skin Corrosion/irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word

Danger

Hazard Statements

May intensify fire; oxidizer
May be corrosive to metals
Causes severe skin burns and eye damage

**Precautionary Statements****Prevention**

Do not breathe dust/fume/gas/mist/vapors/spray
 Wash face, hands and any exposed skin thoroughly after handling
 Wear protective gloves/protective clothing/eye protection/face protection
 Use only outdoors or in a well-ventilated area
 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 Keep/Store away from clothing/ other combustible materials
 Take any precaution to avoid mixing with combustibles
 Keep only in original container
 Wear respiratory protection

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
 Immediately call a POISON CENTER or doctor/physician

Skin

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

Eyes

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

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Fire

In case of fire: Use CO₂, dry chemical, or foam for extinction

Spills

Absorb spillage to prevent material damage

Storage

Store locked up
 Store in a well-ventilated place. Keep container tightly closed
 Store in corrosive resistant polypropylene container with a resistant liner
 Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Corrosive to the respiratory tract

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Nitric acid	7697-37-2	65 - 70
Water	7732-18-5	30 - 35

4. First-aid measures

General Advice

Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

	Immediate medical attention is required.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing before re-use. Call a physician immediately.
Inhalation	If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Remove from exposure, lie down. Call a physician immediately.
Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Clean mouth with water. Call a physician immediately.
Most important symptoms and effects	Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO ₂ , dry chemical, dry sand, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Oxidizing Properties	Oxidizer
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Oxidizer: Contact with combustible/organic material may cause fire. May ignite combustibles (wood paper, oil, clothing, etc.).

Hazardous Combustion Products

Nitrogen oxides (NO_x) Thermal decomposition can lead to release of irritating gases and vapors

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	OX

6. Accidental release measures

Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Handling	Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not ingest. Do not breathe vapors or spray mist. Keep away from clothing and other combustible materials.
Storage	Keep containers tightly closed in a cool, well-ventilated place. Do not store near combustible materials.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Nitric acid	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m ³ (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m ³ TWA: 2 ppm TWA: 5 mg/m ³	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³	TWA: 2 ppm TWA: 5 mg/m ³ STEL: 4 ppm STEL: 10 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures	Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.
-----------------------------	--

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tightly fitting safety goggles. Face-shield.
Skin and body protection	Long sleeved clothing.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Keep away from food, drink and animal feeding stuffs. When using, do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. For environmental protection remove and wash all contaminated protective equipment before re-use. Wear suitable gloves and eye/face protection.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear Colorless, Light yellow
Odor	Strong Acrid
Odor Threshold	No information available
pH	< 1.0 (0.1M)
Melting Point/Range	-41 °C / -41.8 °F
Boiling Point/Range	Not applicable
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable

Flammability or explosive limits

Upper	No data available
Lower	No data available
Vapor Pressure	0.94 kPa (20°C)
Vapor Density	No information available
Specific Gravity	1.40
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	HNO ₃
Molecular Weight	63.01

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Oxidizer: Contact with combustible/organic material may cause fire.
Conditions to Avoid	Incompatible products. Combustible material. Excess heat. Exposure to air or moisture over prolonged periods.
Incompatible Materials	Combustible material, Strong bases, Reducing agents, Metals, Powdered metals, Organic materials, Aldehydes, Alcohols, Cyanides, Ammonia, Strong reducing agents
Hazardous Decomposition Products	Nitrogen oxides (NO _x), Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity**Product Information**

Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Vapor LC50 Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Nitric acid	Not listed	Not listed	LC50 = 2500 ppm. (Rat) 1h
Water	-	Not listed	Not listed

Toxicologically Synergistic Products No information available

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

Irritation Causes severe burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Nitric acid	7697-37-2	Not listed	Not listed	Not listed	Not listed	Not listed
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	None known
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation: Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Large amounts will affect pH and harm aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Nitric acid	Not listed	LC50: = 72 mg/L, 96h (Gambusia affinis)	Not listed	Not listed

Persistence and Degradability Miscible with water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Nitric acid	-2.3

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

TDG

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

IATA

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

IMDG/IMO

UN-No	UN2031
Proper Shipping Name	NITRIC ACID
Hazard Class	8
Subsidiary Hazard Class	5.1
Packing Group	II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Nitric acid	X	X	-	231-714-2	-		X	X	X	X	X
Water	X	X	-	231-791-2	-		X	-	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Nitric acid	7697-37-2	65 - 70	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid	-	TQ: 500 lb

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid	1000 lb	1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Nitric acid	X	X	X	X	X
Water	-	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid	2000 lb STQ

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By Regulatory Affairs
 Thermo Fisher Scientific
 Email: EMSDS.RA@thermofisher.com

Creation Date 12-Mar-2009

Revision Date 18-Jan-2018

Print Date 18-Jan-2018

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

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

End of SDS

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ing t OSH Haza C mmuni ati n Stan a , 29 CFR 9 0. 200

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ORP Standard, 200 mV +/-5% @ 25°C

SECTION 1: Identification

Product identifier

Product name: ORP Stan a , 200 mV +/-5% @ 25°C

Product code: OR4200-P

Recommended use of the product and restriction on use

Relevant identified uses: N t ete mine n t appli able.

Uses advised against: N t ete mine n t appli able.

Reasons why uses advised against: N t ete mine n t appli able.

Manufacturer or supplier details

Manufacturer:

Supplier:

quaPh enix S ientifi
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

quaPh enix S ientifi , In
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

Emergency telephone number:

United States

Eme gen y Teleph ne N .: 800-255-3924

SECTION 2: Hazard(s) identification

GHS classification: N t a haza us substan e mixtu e

Label elements

Hazard pictograms: N ne

Signal word: N ne

Hazard statements: N ne

Precautionary statements: N ne

Hazards not otherwise classified: N ne

SECTION 3: Composition/information on ingredients

Identification	Name	Weight %
C S numbe : 7732- 8-5	Wate	>97
C S numbe : 7447-40-7	P tassium hl i e	<
C S numbe : 3746-66-2	T ip tassium hexa yan fe ate	<
C S numbe : 4459-95-	P tassium Fe yani e	<

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Additional Information: N ne

SECTION 4: First aid measures

Description of first aid measures

General notes:

N t ete mine n t appli able.

After inhalation:

L sen l thing as ne essa y an p siti n in ivi ual in a mf table p siti n

Maintain an un bst u te ai way

Get me i al a vi e/attenti n if y u feel unwell

After skin contact:

Rinse affe te a ea with s ap an wate

If sympt ms evel p pe sist, seek me i al attenti n

After eye contact:

Rinse/flush exp se eye(s) gently using wate f 5-20 minutes

Rem ve nta t lenses, if p esent an easy t

C ntinue insing

Get me i al a vi e/attenti n

After swallowing:

Rinse m uth an then ink plenty f wate

D n t in u e v miting

Get me i al a vi e/attenti n if y u feel unwell

Most important symptoms and effects, both acute and delayed

Acute symptoms and effects:

N t ete mine n t appli able.

Delayed symptoms and effects:

N t ete mine n t appli able.

Immediate medical attention and special treatment

Specific treatment:

N t ete mine n t appli able.

Notes for the doctor:

N t ete mine n t appli able.

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media:

Use app p iate fi e supp essi n agents f a ja ent mbustible mate ials s u es f igniti n

Unsuitable extinguishing media:

N t ete mine n t appli able.

Specific hazards during fire-fighting:

The mal e mp siti n an lea t elease fi itating gases an vap s

Special protective equipment for firefighters:

Wea p te tive eye wea , gl ves an l thing

Refe t Se ti n 8

Use typi al fi efighting equipment, self- ntaine b eathing appa atus, spe ial tightly seale suit

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Special precautions:

Heating causes a rise in pressure, risk of bursting and combustion
Shut off sources of ignition
Combustion may form up to 10% combustion

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation
Ensure adequate respiratory protection
Wear protective eye wear, gloves and clothing

Environmental precautions:

Should not be released into the environment
Prevent from entering drains, sewerage and waterways

Methods and material for containment and cleaning up:

Do not use non-combustible liquid-binding material (sand, inorganic materials), absorbents, universal binders
Dispose of contents/containers in accordance with local regulations

Reference to other sections:

Not determined to be applicable.

SECTION 7: Handling and storage

Precautions for safe handling:

Do not eat, drink, smoke or use personal products when handling chemical substances.
Avoid breathing mist/vapour.
Use only with adequate ventilation.

Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.
Store away from flammable substances.

SECTION 8: Exposure controls/personal protection

Only those substances with limit values have been included below.

Occupational Exposure limit values:

No occupational exposure limits defined for the ingredient(s).

Biological limit values:

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

Information on monitoring procedures:

Not determined to be applicable.

Appropriate engineering controls:

Emergency eye wash facilities and safety showers should be available in the immediate vicinity of use.
Provide exhaust ventilation. The engineering team must keep the airborne concentration of vapour and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) in the atmosphere.

Personal protection equipment

Eye and face protection:

Safety goggles or glasses, appropriate eye protection.

Skin and body protection:

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Sele t gl ve mate ial impe meable an esistant t the substan e.

Respiratory protection:

When ne essa y, use NIOSH-app ve b eathing equipment.

General hygienic measures:

Wash han s bef e b eaks an at the en f w k.

v i nta t with skin, eyes an l thing.

Pe f m utine h usekeeping.

Wash ntaminate l thing bef e eusing.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Clea , yell w t yell w-g een liqui
Odor	O less
Odor threshold	N t available
pH	N t available
Melting point/freezing point	pp x. 0°C
Initial boiling point/range	pp x. 00°C
Flash point (closed cup)	N t available
Evaporation rate	N t available
Flammability (solid, gas)	N t available
Upper flammability/explosive limit	N t available
Lower flammability/explosive limit	N t available
Vapor pressure	N t available
Vapor density	N t available
Density	N t available
Relative density	pp x.
Solubilities	N t ete mine n t available.
Partition coefficient (n-octanol/water)	N t available
Auto/Self-ignition temperature	N t available
Decomposition temperature	N t available
Dynamic viscosity	N t available
Kinematic viscosity	N t available
Explosive properties	N t ete mine n t available.
Oxidizing properties	N t ete mine n t available.

Other information

SECTION 10: Stability and reactivity

Reactivity:

D es n t ea t un e n mal n iti ns f use an st age.

Chemical stability:

Stable un e n mal n iti ns f use an st age.

Possibility of hazardous reactions:

N ne un e n mal n iti ns f use an st age.

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Conditions to avoid:

N ne kn wn.

Incompatible materials:

N ne kn wn.

Hazardous decomposition products:

N ne kn wn.

SECTION 11: Toxicological information

Acute toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Skin corrosion/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
T ip tassium hexa yan fe ate	Causes skin i itati n.

Serious eye damage/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
T ip tassium hexa yan fe ate	Causes se i us eye i itati n.

Respiratory or skin sensitization

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Carcinogenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

International Agency for Research on Cancer (IARC): N ne f the ing e ients a e liste .

National Toxicology Program (NTP): N ne f the ing e ients a e liste .

Germ cell mutagenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Reproductive toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (single exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

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Substance data:

Name	Result
T ip tassium hexa yan fe ate	May ause espi at y i itati n t gans th ugh single exp su e

Specific target organ toxicity (repeated exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Aspiration toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Information on likely routes of exposure: N ata available.

Symptoms related to the physical, chemical and toxicological characteristics: N ata available.

Other information: N ata available.

SECTION 12: Ecological information

Acute (short-term) toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Chronic (long-term) toxicity

Product data: N ata available.

Substance data: N ata available.

Persistence and degradability

Product data: N ata available.

Substance data: N ata available.

Bioaccumulative potential

Product data: N ata available.

Substance data: N ata available.

Mobility in soil

Product data: N ata available.

Substance data: N ata available.

Other adverse effects: N ata available.

SECTION 13: Disposal considerations

Disposal methods:

It is the esp nsibility f the waste gene at t p pe ly ha a te ize all waste mate ials a ing t appli able egulat y entities (US 40CFR262.)

SECTION 14: Transport information

United States Transportation of dangerous goods (49 CFR DOT)

UN number	N t egulate
UN proper shipping name	N t egulate
UN transport hazard class(es)	N ne

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Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Maritime Dangerous Goods (IMDG)

UN number	N t egulate
UN proper shipping name	N t egulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

UN number	N t egulate
UN proper shipping name	N t egulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	N ne
Special precautions for user	N ne

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Bulk Name	N ne
Ship type	N ne
Pollution category	N ne

SECTION 15: Regulatory information

United States regulations

Inventory listing (TSCA):

7447-40-7	P tassium hl i e	Liste
3746-66-2	T ip tassium hexa yan fe ate	Liste
7732- 8-5	Wate	Liste
4459-95-	P tassium Fe yani e	N t Liste

Significant New Use Rule (TSCA Section 5): N t ete mine .

Export notification under TSCA Section 12(b): N t ete mine .

SARA Section 311/312 hazards:

ute	Ch ni	Fi e	P essu e	Rea tive
N	N	N	N	N

SARA Section 302 extremely hazardous substances: N t ete mine .

SARA Section 313 toxic chemicals: N t ete mine .

CERCLA: N t ete mine .

RCRA: N t ete mine .

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Section 112(r) of the Clean Air Act (CAA): N t ete mine .

Massachusetts Right to Know:

3746-66-2	T ip tassium hexa yan fe ate	N t Liste
4459-95-	P tassium Fe yani e	N t Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Wate	N t Liste

New Jersey Right to Know:

3746-66-2	T ip tassium hexa yan fe ate	N t Liste
4459-95-	P tassium Fe yani e	N t Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Wate	N t Liste

New York Right to Know:

3746-66-2	T ip tassium hexa yan fe ate	N t Liste
4459-95-	P tassium Fe yani e	N t Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Wate	N t Liste

Pennsylvania Right to Know:

3746-66-2	T ip tassium hexa yan fe ate	N t Liste
4459-95-	P tassium Fe yani e	N t Liste
7447-40-7	P tassium hl i e	N t Liste
7732- 8-5	Wate	N t Liste

California Proposition 65: N t ete mine .

SECTION 16: Other information

Abbreviations and Acronyms: N ne

Disclaimer:

This p ut has been lassifie in a an e with haza ite ia f the C nt lle P uts Regulati ns an the SDS ntains all the inf mati n equie by the C nt lle P uts Regulati ns. The esp nsibility t p vi e a safe w kpla e emains with the use . The use sh ul nsi e the health haza s an safety inf mati n ntaine he ein as a gui e an sh ul take th se p e auti ns equie in an in ivi ual pe ati n t inst u t empl yees an evel p w k p a ti e p e u es f a safe w k envi nment. The

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inf mati n ntaine he ein is, t the best f u kn wle ge an belief, a u ate. H weve , sin e the n iti ns f han ling an use a e bey n u nt l, we make n gua antee f esults, an assume n liability f amages in u e by the use f this mate ial. It is the esp nsibility f the use t mply with all appli able laws an egulati ns appli able t this mate ial.

NFPA: -0-0

HMIS: -0-0

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End of Safety Data Sheet

Safety Data Sheet

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Initial preparation date: 08.24.20 6

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Revision date: 2.08.20 7

Buffer Solution pH 4.00

SECTION 1: Identification

Product identifier

Product name: Buffe S luti n pH 4.00

Product code: BU5004-P

Recommended use of the product and restriction on use

Relevant identified uses: N t ete mine n t appli able.

Uses advised against: N t ete mine n t appli able.

Reasons why uses advised against: N t ete mine n t appli able.

Manufacturer or supplier details

Manufacturer:

Supplier:

quaPh enix S ientifi
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

quaPh enix S ientifi , In
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

Emergency telephone number:

United States

(7 7) 632- 29

SECTION 2: Hazard(s) identification

GHS classification: N t a haza us substan e mixtu e

Label elements

Hazard pictograms: N ne

Signal word: N ne

Hazard statements: N ne

Precautionary statements: N ne

Hazards not otherwise classified: N ne

SECTION 3: Composition/information on ingredients

Identification	Name	Weight %
C S numbe : 0-44-	S bi i	0.0
C S numbe : 877-24-7	P tassium hy gen phthalate	.02
C S numbe : 7732- 8-5	Wate	98.97
C S numbe : 6625-46-3	P nta yl Ca mine 2B	<0.0

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Buffer Solution pH 4.00

Additional Information: N ne

SECTION 4: First aid measures

Description of first aid measures

General notes:

N t ete mine n t appli able.

After inhalation:

L sen l thing as ne essa y an p siti n in ivi ual in a mf table p siti n

Maintain an un bst u te ai way

Get me i al a vi e/attenti n if y u feel unwell

After skin contact:

Wash affe te a ea with s ap an wate

Seek me i al attenti n if sympt ms evel p pe sist

After eye contact:

Rinse/flush exp se eye(s) gently using wate f 5-20 minutes

Rem ve nta t lens(es) if able t s u ing insing

Seek me i al attenti n if i itati n pe sist if n e ne

After swallowing:

Rinse m uth an then ink plenty f wate

D n t in u e v miting

Get me i al a vi e/attenti n if y u feel unwell

Most important symptoms and effects, both acute and delayed

Acute symptoms and effects:

N t ete mine n t appli able.

Delayed symptoms and effects:

N t ete mine n t appli able.

Immediate medical attention and special treatment

Specific treatment:

N t ete mine n t appli able.

Notes for the doctor:

N t ete mine n t appli able.

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media:

Use app p iate fi e supp essi n agents f a ja ent mbustible mate ials s u es f igniti n

Unsuitable extinguishing media:

N t ete mine n t appli able.

Specific hazards during fire-fighting:

The mal e mp siti n an lea t elease fi itating gases an vap s

Special protective equipment for firefighters:

Wea p te tive eye wea , gl ves an l thing

Refe t Se ti n 8

Use typi al fi efighting equipment, self- ntaine b eathing appa atus, spe ial tightly seale suit

Special precautions:

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Heating causes a rise in pressure, risk of bursting and combustion
Shut off sources of ignition
Caution: Do not mix with other chemicals as they may form a combustible mixture

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation
Ensure adequate respiratory protection
Wear protective eye wear, gloves and clothing

Environmental precautions:

Should not be released into the environment
Prevent from entering drains, sewers and waterways

Methods and material for containment and cleaning up:

Use a non-combustible liquid-tight container (such as a metal drum), a spill bin or a universal bin
Dispose of contents/containers in accordance with local regulations

Reference to other sections:

Not determined to be applicable.

SECTION 7: Handling and storage

Precautions for safe handling:

Do not eat, drink, smoke or use personal products when handling chemical substances.
Avoid breathing mist or vapour.
Use only with adequate ventilation.

Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.
Store away from flammable substances.

SECTION 8: Exposure controls/personal protection

Only those substances with limit values have been included below.

Occupational Exposure limit values:

No occupational exposure limits for the ingredient(s).

Biological limit values:

No biological exposure limits for the ingredient(s).

Information on monitoring procedures:

Not determined to be applicable.

Appropriate engineering controls:

Emergency eye wash facilities and safety showers should be available in the immediate vicinity of use.
Provide exhaust ventilation. The engineering must keep the airborne concentration of vapour and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) in immediate vicinity.

Personal protection equipment

Eye and face protection:

Safety goggles or glasses, appropriate eye protection.

Skin and body protection:

Select glove material impermeable and resistant to the substance.

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Respiratory protection:

When ne essa y, use NIOSH-app ve b eathing equipment.

General hygienic measures:

Wash han s bef e b eaks an at the en f w k.

v i nta t with skin, eyes an l thing.

Wash ntaminate l thing bef e eusing.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Clea l less liqui
Odor	N t available
Odor threshold	N t available
pH	4
Melting point/freezing point	N t available
Initial boiling point/range	pp x. 00°C
Flash point (closed cup)	N t available
Evaporation rate	N t available
Flammability (solid, gas)	N t available
Upper flammability/explosive limit	N t available
Lower flammability/explosive limit	N t available
Vapor pressure	N t available
Vapor density	N t available
Density	N t available
Relative density	N t available
Solubilities	Infinite s lubility in wate .
Partition coefficient (n-octanol/water)	N t available
Auto/Self-ignition temperature	N t available
Decomposition temperature	N t available
Dynamic viscosity	N t available
Kinematic viscosity	N t available
Explosive properties	N t ete mine n t available.
Oxidizing properties	N t ete mine n t available.

Other information

SECTION 10: Stability and reactivity

Reactivity:

D es n t ea t un e n mal n iti ns fuse an st age.

Chemical stability:

Stable un e n mal n iti ns fuse an st age.

Possibility of hazardous reactions:

N ne un e n mal n iti ns fuse an st age.

Conditions to avoid:

N ne kn wn.

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Incompatible materials:

N ne kn wn.

Hazardous decomposition products:

N ne kn wn.

SECTION 11: Toxicological information

Acute toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Skin corrosion/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
S bi i	Causes skin i itati n.

Serious eye damage/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
S bi i	Causes se i us eye i itati n.

Respiratory or skin sensitization

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Carcinogenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

International Agency for Research on Cancer (IARC): N ne f the ing e ients a e liste .

National Toxicology Program (NTP): N ne f the ing e ients a e liste .

Germ cell mutagenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Reproductive toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (single exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

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Specific target organ toxicity (repeated exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Aspiration toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Information on likely routes of exposure: N ata available.

Symptoms related to the physical, chemical and toxicological characteristics: N ata available.

Other information: N ata available.

SECTION 12: Ecological information

Acute (short-term) toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Chronic (long-term) toxicity

Product data: N ata available.

Substance data: N ata available.

Persistence and degradability

Product data: N ata available.

Substance data: N ata available.

Bioaccumulative potential

Product data: N ata available.

Substance data: N ata available.

Mobility in soil

Product data: N ata available.

Substance data: N ata available.

Other adverse effects: N ata available.

SECTION 13: Disposal considerations

Disposal methods:

It is the esp nsibility f the waste gene at t p pe ly ha a te ize all waste mate ials a ing t appli able egulat y entities (US 40CFR262.)

SECTION 14: Transport information

United States Transportation of dangerous goods (49 CFR DOT)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	
Special precautions for user	N ne

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International Maritime Dangerous Goods (IMDG)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	
Special precautions for user	N ne

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	
Special precautions for user	N ne

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	
Bulk Name	N ne
Ship type	N ne
Pollution category	N ne

SECTION 15: Regulatory information

United States regulations

Inventory listing (TSCA):

877-24-7	P tassium hy gen phthalate	Liste
7732- 8-5	Wate	Liste
6625-46-3	P nta yl Ca mine 2B	Liste
0-44-	S bi i	Liste

Significant New Use Rule (TSCA Section 5): N t ete mine .

Export notification under TSCA Section 12(b): N t ete mine .

SARA Section 311/312 hazards:

ute	Ch ni	Fi e	P essu e	Rea tive
N	N	N	N	N

SARA Section 302 extremely hazardous substances: N t ete mine .

SARA Section 313 toxic chemicals: N t ete mine .

CERCLA: N t ete mine .

RCRA: N t ete mine .

Section 112(r) of the Clean Air Act (CAA): N t ete mine .

Massachusetts Right to Know:

0-44-	S bi i	N t Liste
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6625-46-3	P nta yl Ca mine 2B	N t Liste
7732- 8-5	Wate	N t Liste
877-24-7	P tassium hy gen phthalate	N t Liste

New Jersey Right to Know:

0-44-	S bi i	N t Liste
6625-46-3	P nta yl Ca mine 2B	N t Liste
7732- 8-5	Wate	N t Liste
877-24-7	P tassium hy gen phthalate	N t Liste

New York Right to Know:

0-44-	S bi i	N t Liste
6625-46-3	P nta yl Ca mine 2B	N t Liste
7732- 8-5	Wate	N t Liste
877-24-7	P tassium hy gen phthalate	N t Liste

Pennsylvania Right to Know:

0-44-	S bi i	N t Liste
6625-46-3	P nta yl Ca mine 2B	N t Liste
7732- 8-5	Wate	N t Liste
877-24-7	P tassium hy gen phthalate	N t Liste

California Proposition 65: N t ete mine .

SECTION 16: Other information

Abbreviations and Acronyms: N ne

Disclaimer:

This p ut has been lassifie in a an e with haza ite ia f the C nt lle P uts Regulati ns an the SDS ntains all the inf mati n equie by the C nt lle P uts Regulati ns. The esp nsibility t p vi e a safe w kpla e emains with the use . The use sh ul nsi e the health haza s an safety inf mati n ntaine he ein as a gui e an sh ul take th se pe auti ns equie in an in ivi ual pe ati nt inst u t empl yees an evel p w k pa ti e p e u es f a safe w k envi nment. The inf mati n ntaine he ein is, t the best f u kn wle ge an belief, a u ate. H weve , sin e the n iti ns f han ling an use a e bey n u nt l, we make n gua antee f esults, an assume n liability f amages in u e by the use f this mate ial. It is the esp nsibility f the use t mply with all appli able laws an egulati ns appli able t this mate ial.

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End of Safety Data Sheet

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SECTION 1: Identification

Product identifier

Product name: Buffe S luti n pH 0.00

Product code: BU50 0-P

Recommended use of the product and restriction on use

Relevant identified uses: N t ete mine n t appli able.

Uses advised against: N t ete mine n t appli able.

Reasons why uses advised against: N t ete mine n t appli able.

Manufacturer or supplier details

Manufacturer:

Supplier:

quaPh enix S ientifi
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

quaPh enix S ientifi , In
860 Gitts Run R a
Han ve
P 733
(7 7) 632- 29

Emergency telephone number:

United States

(7 7) 632- 29

SECTION 2: Hazard(s) identification

GHS classification: N t a haza us substan e mixtu e

Label elements

Hazard pictograms: N ne

Signal word: N ne

Hazard statements: N ne

Precautionary statements: N ne

Hazards not otherwise classified: N ne

SECTION 3: Composition/information on ingredients

Identification	Name	Weight %
C S numbe : 44-55-8	S ium hy gen a b nate	<2
C S numbe : 34722-90-2	B m thym l Blue, S ium Salt	<2
C S numbe : 7732- 8-5	Wate	>90
C S numbe : 497- 9-8	S ium Ca b nate	<2

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Additional Information: N ne

SECTION 4: First aid measures

Description of first aid measures

General notes:

N t ete mine n t appli able.

After inhalation:

L sen l thing as ne essa y an p siti n in ivi ual in a mf table p siti n

Maintain an un bst u te ai way

Get me i al a vi e/attenti n if y u feel unwell

After skin contact:

Wash affe te a ea with s ap an wate

Seek me i al attenti n if sympt ms evel p pe sist

After eye contact:

Rinse/flush exp se eye(s) gently using wate f 5-20 minutes

Rem ve nta t lens(es) if able t s u ing insing

Seek me i al attenti n if i itati n pe sist if n e ne

After swallowing:

Rinse m uth an then ink plenty f wate

D n t in u e v miting

Get me i al a vi e/attenti n if y u feel unwell

Most important symptoms and effects, both acute and delayed

Acute symptoms and effects:

N t ete mine n t appli able.

Delayed symptoms and effects:

N t ete mine n t appli able.

Immediate medical attention and special treatment

Specific treatment:

N t ete mine n t appli able.

Notes for the doctor:

N t ete mine n t appli able.

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media:

Use app p iate fi e supp essi n agents f a ja ent mbustible mate ials s u es f igniti n

Unsuitable extinguishing media:

N t ete mine n t appli able.

Specific hazards during fire-fighting:

The mal e mp siti n an lea t elease fi itating gases an vap s

Special protective equipment for firefighters:

Wea p te tive eye wea , gl ves an l thing

Refe t Se ti n 8

Use typi al fi efighting equipment, self- ntaine b eathing appa atus, spe ial tightly seale suit

Special precautions:

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Heating causes a rise in pressure, risk of bursting and combustion
Shut off supplies if ignited
Caution: may form up on combustion

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation
Ensure adequate respiratory protection
Wear protective eye wear, gloves and clothing

Environmental precautions:

Should not be released into the environment
Prevent from entering drains, sewerage and waterways

Methods and material for containment and cleaning up:

Use absorbent non-combustible liquid-absorbent material (sand, inert material, earth (clay), absorbents, universal absorbents)
Dispose of contents/containers in accordance with local regulations

Reference to other sections:

Not determined to be applicable.

SECTION 7: Handling and storage

Precautions for safe handling:

Do not eat, drink, smoke or use personal products when handling chemical substances.
Avoid breathing mist/vapour.
Use only with adequate ventilation.

Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.
Store away from flammable substances.

SECTION 8: Exposure controls/personal protection

Only those substances with limit values have been included below.

Occupational Exposure limit values:

No occupational exposure limits determined for the ingredient(s).

Biological limit values:

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

Information on monitoring procedures:

Not determined to be applicable.

Appropriate engineering controls:

Emergency eye wash facilities and safety showers should be available in the immediate vicinity of use.
Provide exhaust ventilation. The engineering must keep the airborne concentration of vapour and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) in immediate vicinity.

Personal protection equipment

Eye and face protection:

Safety goggles, glasses, appropriate eye protection.

Skin and body protection:

Select glove material impermeable and resistant to the substance.

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Respiratory protection:

When ne essa y, use NIOSH-app ve b eathing equipment.

General hygienic measures:

Wash han s bef e b eaks an at the en f w k.

v i nta t with skin, eyes an l thing.

Pe f m utine h usekeeping.

Wash ntaminate l thing bef e eusing.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Clea , blue liqui
Odor	O less
Odor threshold	N t available
pH	0
Melting point/freezing point	pp x. 0°C
Initial boiling point/range	pp x. 00°C
Flash point (closed cup)	N t available
Evaporation rate	N t available
Flammability (solid, gas)	N t available
Upper flammability/explosive limit	N t available
Lower flammability/explosive limit	N t available
Vapor pressure	N t available
Vapor density	N t available
Density	N t available
Relative density	pp x.
Solubilities	Infinite s lubility in wate .
Partition coefficient (n-octanol/water)	N t available
Auto/Self-ignition temperature	N t available
Decomposition temperature	N t available
Dynamic viscosity	N t available
Kinematic viscosity	N t available
Explosive properties	N t ete mine n t available.
Oxidizing properties	N t ete mine n t available.

Other information

SECTION 10: Stability and reactivity

Reactivity:

D es n t ea t un e n mal n iti ns fuse an st age.

Chemical stability:

Stable un e n mal n iti ns fuse an st age.

Possibility of hazardous reactions:

N ne un e n mal n iti ns fuse an st age.

Conditions to avoid:

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N ne kn wn.

Incompatible materials:

N ne kn wn.

Hazardous decomposition products:

N ne kn wn.

SECTION 11: Toxicological information

Acute toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Skin corrosion/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Serious eye damage/irritation

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
S ium Ca b nate	Causes eye i itati n

Respiratory or skin sensitization

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Carcinogenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

International Agency for Research on Cancer (IARC): N ne f the ing e ients a e liste .

National Toxicology Program (NTP): N ne f the ing e ients a e liste .

Germ cell mutagenicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Reproductive toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (single exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Specific target organ toxicity (repeated exposure)

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

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Product data: N ata available.

Substance data: N ata available.

Aspiration toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data: N ata available.

Information on likely routes of exposure: N ata available.

Symptoms related to the physical, chemical and toxicological characteristics: N ata available.

Other information: N ata available.

SECTION 12: Ecological information

Acute (short-term) toxicity

Assessment: Base n available ata, the lassifi ati n ite ia a e n t met.

Product data: N ata available.

Substance data:

Name	Result
S ium Ca b nate	LC50 - Lep mis ma hi us (Bluegill) - 300 mg/l - 96 h
	EC50 - Daphnia magna (Wate flea) - 265 mg/l - 48 h

Chronic (long-term) toxicity

Product data: N ata available.

Substance data: N ata available.

Persistence and degradability

Product data: N ata available.

Substance data: N ata available.

Bioaccumulative potential

Product data: N ata available.

Substance data: N ata available.

Mobility in soil

Product data: N ata available.

Substance data: N ata available.

Other adverse effects: N ata available.

SECTION 13: Disposal considerations

Disposal methods:

It is the esp nsibility f the waste gene at t p pe ly ha a te ize all waste mate ials a ing t appli able egulat y entities (US 40CFR262.)

SECTION 14: Transport information

United States Transportation of dangerous goods (49 CFR DOT)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	

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Special precautions for user	N ne
-------------------------------------	------

International Maritime Dangerous Goods (IMDG)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	
Special precautions for user	N ne

International Air Transport Association Dangerous Goods Regulations (IATA-DGR)

UN number	N t Regulate
UN proper shipping name	N t Regulate
UN transport hazard class(es)	N ne
Packing group	N ne
Environmental hazards	
Special precautions for user	N ne

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	
Bulk Name	N ne
Ship type	N ne
Pollution category	N ne

SECTION 15: Regulatory information

United States regulations

Inventory listing (TSCA):

34722-90-2	B m thym l Blue, S ium Salt	Liste
7732- 8-5	Wate	Liste
44-55-8	S ium hy gen a b nate	Liste
497- 9-8	S ium Ca b nate	Liste

Significant New Use Rule (TSCA Section 5): N t ete mine .

Export notification under TSCA Section 12(b): N t ete mine .

SARA Section 311/312 hazards:

ute	Ch ni	Fi e	P essu e	Rea tive
N	N	N	N	N

SARA Section 302 extremely hazardous substances: N t ete mine .

SARA Section 313 toxic chemicals:

44-55-8	S ium hy gen a b nate	N t Liste
---------	-----------------------	--------------

CERCLA: N t ete mine .

RCRA: N t ete mine .

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Section 112(r) of the Clean Air Act (CAA): N t ete mine .

Massachusetts Right to Know:

44-55-8	S ium hy gen a b nate	N t Liste
34722-90-2	B m thym l Blue, S ium Salt	N t Liste
497- 9-8	S ium Ca b nate	N t Liste
7732- 8-5	Wate	N t Liste

New Jersey Right to Know:

44-55-8	S ium hy gen a b nate	N t Liste
34722-90-2	B m thym l Blue, S ium Salt	N t Liste
497- 9-8	S ium Ca b nate	N t Liste
7732- 8-5	Wate	N t Liste

New York Right to Know:

44-55-8	S ium hy gen a b nate	N t Liste
34722-90-2	B m thym l Blue, S ium Salt	N t Liste
497- 9-8	S ium Ca b nate	N t Liste
7732- 8-5	Wate	N t Liste

Pennsylvania Right to Know:

44-55-8	S ium hy gen a b nate	N t Liste
34722-90-2	B m thym l Blue, S ium Salt	N t Liste
497- 9-8	S ium Ca b nate	N t Liste
7732- 8-5	Wate	N t Liste

California Proposition 65: N t ete mine .

SECTION 16: Other information

Abbreviations and Acronyms: N ne

Disclaimer:

This p ut has been lassifie in a an e with haza ite ia f the C nt lle P uts Regulati ns an the SDS ntains all the inf mati n equie by the C nt lle P uts Regulati ns. The esp nsibility t p vie a safe w kpla e emains with the use . The use sh ul nsi e the health haza s an safety inf mati n ntaine he ein as a gui e an sh ul take th se p e auti ns equie in an in ivi ual pe ati n t inst u t empl yees an evel p w k p a ti e p e u es f a safe w k envi nment. The

Safety Data Sheet

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Initial preparation date: .24.20 6

Page 9 f 9

Revision date: 2.08.20 7

Buffer Solution pH 10.00

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Initial preparation date: .24.20 6

Revision date: 2.08.20 7

End of Safety Data Sheet



CEMENT & CONCRETE PRODUCTS™

C1: Portland Cement Based Concrete Products

SAFETY DATA SHEET

(Complies with OSHA 29 CFR 1910.1200)

SECTION I: PRODUCT IDENTIFICATION

The QUIKRETE® Companies
5 Concourse Parkway, Suite 1900
Atlanta, GA 30328

Emergency Telephone Number
INFOTRAC (800) 535-5053
Information Telephone Number
(800) 282-5828

SDS C1

Revision: Feb-18

QUIKRETE® Product Name	Item #(s)
Fence Post Mix	1005
Fiber-Reinforced Concrete Mix	1006
Crack Resistant Concrete Mix	1006-80
Pro-Finish Crack Resistant Concrete Mix	1006-68
QUIKRETE 5000 Concrete Mix	1007
QUIKRETE 6000 Concrete Mix	1007
Pro-Finish QUIKRETE 5000	1007-85
Lightweight Concrete Mix	1008
Basic Concrete Mix	1015
Maximum Yield Concrete Mix	1100-80
Concrete Mix	1101-10, -20, -40, -60, -80, -90
Green Concrete Mix	1101-63, -73
B-Crete	1101-81
Red-E-Crete Concrete mix	1101-91, -87; 1141-62, -63, -92, -93, Bulk NR810035
Countertop Mix	1106-80
Form & Pour Concrete Mix	1120-80/NR810065
Form & Pour Concrete Mix MS	1120-80/NR810065
All-Star Concrete Mix	1121
Rip Rap	1129
Rip Rap Scrim	1134-80
Handicrete Concrete Mix	1141-59, -60, -80
RiteMix Concrete	1171-60
Fiber Reinforced Deck Mix	1251-80, -81
All-Star Crack Resistant Concrete Mix	1470-03
All-Star 5000 Concrete Mix	1470-01
FlowCrete 5000 (Mix 801)	8080026/NR80026
Mix 801 Concrete Mix	NR81001

Product Use: Portland cement-based, aggregated products for general construction

SDS C1

QUIKRETE Companies, LLC

2/7/2018

QUIKRETE**CEMENT & CONCRETE PRODUCTS™**

See most current revision of this document at www.QUIKRETE.com.

SECTION II - HAZARD IDENTIFICATION

Hazard-determining components of labeling: Silica, Portland cement

2.1 Classification of the substance or mixture

Carcinogen – Category 1A

Skin Corrosion – Category 1B

Eye Damage – Category 1

Skin Sensitization – Category 1B

Specific Target Organ Toxicity Repeat Exposure – Category 1

Specific Target Organ Toxicity: Single Exposure – Category 3

2.2a Signal word DANGER!

2.2b Hazard Statements

May cause cancer through chronic inhalation

Causes severe skin burns and serious eye damage

May cause an allergic skin reaction

Causes damage to lungs through prolonged or repeated inhalation

May cause respiratory irritation

Harmful if swallowed.

2.2c Pictograms



2.2d Precautionary statements

Do not handle until all safety precautions have been read and understood.

Wear impervious gloves, such as nitrile. Wear eye protection, and protective clothing.

Do not eat, drink or smoke when using this product.

Wash thoroughly after handling.

Use only in a well-ventilated area. Wear a NIOSH approved respirator (mask) such as N95 in poorly ventilated areas, when used for extended periods, when use is frequent, or when permissible exposure limits may be exceeded.

Do not breathe dust.

If swallowed: Rinse mouth. Do NOT induce vomiting.

**CEMENT & CONCRETE PRODUCTS™**

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.

If on skin (or hair): Remove immediately all contaminated clothing and wash before re-use. Rinse skin or hair with water.

If significant skin irritation or rash occurs: get medical advice or attention.

Immediately seek medical advice or attention if symptoms are significant or persist.

Store in a well-ventilated place. Keep container tightly closed.

Dispose of contents/containers in accordance with all regulations.

2.3 Additional Information

The Portland cement in this product can cause serious, potentially irreversible damage to skin, eye, respiratory and digestive tracts due to chemical (caustic) burns, including third degree burns. Burns from Portland cement may not cause immediate pain or discomfort. You cannot rely on pain to alert you to cement burns. Portland cement can cause dermatitis or sensitization. Therefore precautions must be taken to prevent all contact with Portland cement. Cement burns can become worse even after contact has ended. If there is contact with this product, immediately remove all product from body and thoroughly rinse with water. If you experience or suspect a cement burn or inflammation you should immediately see a health care professional.

Skin burns and irritation may be caused by brief exposure, though often are caused by extended exposure of 15 minutes, an hour, or longer. Interaction of Portland cement with water or sweat releases a caustic solution which produces the burns or irritation. Any extended exposure should be treated as though a burn has occurred until determined otherwise.

Skin contact with Portland cement can also cause inflammation of the skin, referred to as dermatitis. Signs and symptoms of dermatitis can include itching, redness, swelling, blisters, scaling, and other changes in the normal condition of the skin. Signs and symptoms of burns include the above and whitening, yellowing, blackening, peeling or cracking of skin.

The Portland cement in this product may cause allergic contact dermatitis in sensitized individuals. This overreaction of the immune system can lead to severe inflammation. Sensitization may result from a single exposure to the low levels of Cr (VI) in Portland cement or repeated exposures over months or years. Sensitization is long lasting and, after sensitization, even very small quantities can trigger the dermatitis. Sensitization is uncommon. Individuals who experience skin problems, including seemingly minor ones, are advised to seek medical attention.

2.3a HNOC – Hazards not otherwise classified: Not applicable

2.3b Unknown Acute Toxicity: None



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SECTION III - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

<u>Hazardous Components</u>	<u>CAS No.</u>	<u>% by Weight</u>
Sand, Silica, Quartz	14808-60-7	60-100*
Portland Cement	65997 15 1	10-30*
Fly Ash	68131-74-8	5-10*

*The concentrations ranges are provided due to batch-to-batch variability.
None of the constituents of this material are of unknown toxicity.

SECTION IV – FIRST AID MEASURES

4.1 Description of the first-aid measures**General information:**

After inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. In case of unconsciousness, place patient stably in side position for transportation.

After skin contact: Wash skin with cool water and pH-neutral soap or a mild detergent. If significant skin irritation or rash occurs: get medical advice or attention.

After eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

After swallowing: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately. Never give anything by mouth to an unconscious person.

4.2 Most important symptoms/effects, acute and delayed

Inhalation: May cause respiratory tract irritation. Causes damage to organs through prolonged or repeated inhalation. This product contains crystalline silica. Prolonged or repeated inhalation of respirable silica from this product can cause silicosis.

Skin contact: Skin burns and irritation may be caused by brief exposure, though often are caused by extended exposure of 15 minutes, an hour, or longer.

Eye Contact: Causes serious eye damage. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

Ingestion: May be harmful if swallowed. Ingestion may cause discomfort and/or distress, nausea or vomiting.

4.3 Indication of immediate medical attention and special treatment needed:

Immediately seek medical advice or attention if symptoms are significant or persist.

SECTION V - FIRE FIGHTING MEASURES

5.1 Flammability of the Product: Non-flammable and non-combustible

5.2 Suitable extinguishing agents: Treat for surrounding material

5.3 Special hazards arising from the substance or mixture: None



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5.3a Products of Combustion: None

5.3b Explosion Hazards in Presence of Various Substances: Non-explosive in presence of shocks

SECTION VI – ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures: Wear personal protective equipment (See section VIII). Keep unprotected persons away.

6.2 Methods and material for containment and cleaning up:

Do not allow to enter sewers/ surface or ground water. Dispose of unwanted materials and containers properly in accordance with all regulations.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND STORAGE

7.1 Handling

Precautions for safe handling: Ensure good ventilation/exhaustion at the workplace. **DO NOT BREATHE DUST.** In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator and tight fitting goggles is recommended. Wear appropriate PPE (See section 8). Do not mix with other chemical products, except as indicated by the manufacturer. Do not get in eyes, on skin or clothing. Good housekeeping is important to prevent accumulation of dust.

7.2 Storage

Requirements to be met by storerooms and receptacles: No special requirements.

Information about storage in one common storage facility: Not required.

Further information about storage conditions: Keep out of the reach of children. Keep container tightly closed and prevent exposure to humidity. Do not allow water to contact the product until time of use to preserve product utility.

SECTION VIII – EXPOSURE CONTROL MEASURES / PERSONAL PROTECTION

8.1 Components with limit values that require monitoring at the workplace:

Hazardous Components	CAS No.	PEL (OSHA) mg/M ³	TLV (ACGIH) mg/M ³
Silica Sand, crystalline	14808-60-7	0.1	0.025 (resp)
Portland Cement	65997-15-1	5 (resp) 15 (total)	10 (resp)
Fly Ash	68131-74-8	N/A	N/A

8.2 Exposure Controls

Use ventilation adequate to keep exposures below recommended exposure limits.



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8.3 General protective and hygienic measures

Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.

8.3a Personal protective equipment

Protection of hands:

Wear gloves of adequate length to offer appropriate skin protection from splashes. Nitrile, Butyl and PVC gloves have been found to offer adequate protection for incidental contact. You cannot rely on pain to alert you to cement burns. Portland cement can cause dermatitis or sensitization.

Eye protection:

Wear approved eye protection (properly fitted dust- or splash-proof chemical safety glasses).

Respiratory protection:

Wear a NIOSH approved respirator (mask) such as N95 in poorly ventilated areas, when used for extended periods, when use is frequent, or when permissible exposure limits may be exceeded. Respirators should be selected by and used under the direction of a trained health and safety professional, following requirements found in OSHA's respirator standard (29 CFR 1910.134) and ANSI's standard for respiratory protection (Z88.2).

SECTION IX - PHYSICAL/CHEMICAL CHARACTERISTICS

General Information

Appearance	Form: Granular Solid Color: Gray to gray-brown colored Odor: None
pH-value at 20°C (68 °F):	13 (10%)
Boiling point/Boiling range:	Not applicable
Flash point:	Not applicable
Auto igniting:	Product is not self-igniting
Vapor pressure at 21°C (70°F)	Not available
Density at 25°C (77 °F):	2.6 to 3.15

Solubility in / Miscibility with

Water:	Insoluble
VOC content:	0 g/L VOC

SECTION X – STABILITY AND REACTIVITY

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under normal storage conditions. Keep in dry storage.



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10.3 Possibility of hazardous reaction

No dangerous reaction known under conditions of normal use.

10.4 Thermal decomposition / conditions to be avoided

No decomposition if used according to specifications.

10.5 Incompatible materials

Contact of silica with powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, or oxygen difluoride may cause fires

10.6 Hazardous Decomposition or By-products

Silica will dissolve in Hydrofluoric Acid and produce a corrosive gas – silicon tetrafluoride.

SECTION XI – TOXICOLOGICAL INFORMATION

11.1 Exposure Routes: Skin contact, skin adsorption, eye contact, inhalation, or ingestion.

11.2 Symptoms related to physical/chemical/toxicological characteristics:

Inhalation: May cause respiratory tract irritation. Causes damage to organs through prolonged or repeated exposure. This product contains crystalline silica. Prolonged or repeated inhalation of respirable silica from this product can cause silicosis.

Skin contact: Causes severe skin burns. Handling can cause dry skin, discomfort, irritation, and dermatitis. May cause sensitization by skin contact. Product becomes extremely alkaline when exposed to moisture, and can cause alkali burns and affect the mucous membranes.

Eye Contact: Causes serious eye damage. Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

Ingestion: Harmful if swallowed. Ingestion may cause discomfort and/or distress, nausea or vomiting.

11.3 Delayed, immediate and chronic effects of short-term and long-term exposure

Short Term

Skin Corrosion/Irritation: Causes severe skin burns.

Serious Eye Damage/Irritation: Causes severe eye damage.

Respiratory Sensitization: Not available

Skin Sensitization: May cause an allergic skin reaction.

Specific Target Organ Toxicity-Single Exposure: (Category 3) May cause respiratory irritation.

Aspiration Hazard: Not available

Long Term

Carcinogenicity: May cause cancer through chronic inhalation.

Germ Cell Mutagenicity: Not available

Reproductive Toxicity: Not available


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Specific Target Organ Toxicity- Repeated Exposure: (Category 1) Causes damage to lungs through prolonged/repeated exposure
 Synergistic/Antagonistic Effects: Not available.

SECTION XII – ECOLOGICAL INFORMATION

12.1 Ecotoxicity

May cause long-term adverse effects to the aquatic environment. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system. Must not reach bodies of water or drainage ditch undiluted or un-neutralized

12.2 Persistence and degradability

No further relevant information available.

12.3 Bioaccumulative potential:

No further relevant information available.

12.4 Mobility in soil

No further relevant information available.

12.5 Other Adverse Effects

No further relevant information available.

SECTION XIII – DISPOSAL CONSIDERATIONS

13.1 Waste Disposal Method

The packaging and material may be land filled; however, material should be covered to minimize generation of airborne dust. This product is not classified as a hazardous waste under the authority of the RCRA (40CFR 261) or CERCLA (40CFR 117&302). Disposal must be made in accordance with local, state and federal regulations.

13.2 Other disposal considerations
Uncleaned packaging

Recommendation: Disposal must be made in accordance with local, state and federal regulations.

Recommended cleansing agent: Water, if necessary with cleansing agents.

SECTION XIV – TRANSPORT INFORMATION

	DOT (U.S.)	TDG (Canada)
UN-Number	Not Regulated	Not Regulated
UN proper shipping name	Not Regulated	Not Regulated
Transport Hazard Class(es)	Not Regulated	Not Regulated
Packing Group (if applicable)	Not Regulated	Not Regulated

**CEMENT & CONCRETE PRODUCTS™****14.1 Environmental hazards:**

Not Available

14.2 Transport in bulk according to Annex II of Marpol 73/78 and the IBC Code

Not available

14.3 Special precautions for user

Do not handle until all safety precautions have been read and understood.

SECTION XV – OTHER REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations/Legislations specific for the chemical**Canada**

WHMIS Classification: Considered to be a hazardous material under the Hazardous Products Act as defined by the Hazardous Products Regulations and subject to the requirements of Health Canada's Workplace Hazardous Material Information (WHMIS). This document complies with the WHMIS requirements of the Hazardous Products Act (HPA) and the HPR.

15.2 US Federal Information**SARA 302/311/312/313 Components**

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302, 311, 312 or 313.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act (SARA Title III): Crystalline silica (quartz) is not an extremely hazardous substance under Section 302 and is not a toxic chemical subject to the requirements of Section 313.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).

NTP: Respirable crystalline silica, primarily quartz dusts occurring in industrial and occupational settings, is classified as Known to be a Human Carcinogen.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

**CEMENT & CONCRETE PRODUCTS™**

15.3 State Right to Know Laws

California Prop. 65 Components



WARNING: This product can expose you to chemicals including crystalline silica which is known to the State of California to cause cancer and hexavalent chromium compounds which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Inhalation Reference Exposure Level (REL): California established a chronic REL of 3 µg for silica (crystalline, respirable). A chronic REL is an airborne level of a substance at or below which no adverse health effects are anticipated in individuals indefinitely exposed to the substance at that level.

Massachusetts Toxic Use Reduction Act: Silica, crystalline (respirable size, <10 microns) is "toxic" for purposes of the Massachusetts Toxic Use Reduction Act.

15.4 Global Inventories

DSL All components of this product are on the Canadian DSL list.

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7. All constituents are listed in the TSCA inventory.

SECTION XVI – OTHER INFORMATION

Last Updated: February 7, 2018

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to silica contained in our products.

Prepared by

The QUIKRETE Companies, LLC

End of SDS

y D h

according to 1907/2006/EC (EACH), 1272/2008/EC (CLP), 29CF 1910/1200 and GHS ev. 3

E c i v d : 12.08.2015**R v i s i o n** : 12.10.2015**Tr d N m** : Alconox**I d n i c i o n o h s u b s n c / m i x u r n d o h s u p p l i r****1.1 P r o d u c i d n i i r****Tr d N m** : Alconox**ynonyms:****Pr o d u c n u m b r**: Alconox**1.2 A p p l i c i o n o h s u b s n c / h m i x u r** : Cleaning material/Detergent**1.3 D i l s o h s u p p l i r o h y D h****M n u c u r r**

Alconox, Inc.

30 Glenn Street

White Plains, NY 10603

1-914-948-4040

u p p l i r

Not Applicable

Em r g n c y l p h o n n u m b r:**Ch m T l l n c**

North America: 1-800-255-3924

International: 01-813-248-0585

2 H z r d s i d n i c i o n**2.1 C l s s i c i o n o h s u b s n c o r m i x u r** :

In compliance with EC regulation No. 1272/2008, 29CF 1910/1200 and GHS ev. 3 and amendments.

H z r d - d e t e r m i n i n g c o m p o n e n t s o l b l i n g:

Tetrasodium Pyrophosphate

Sodium tripolyphosphate

Sodium Alkylbenzene Sulfonate

2.2 L a b e l l i n g:

Skin irritation, category 2.

Eye irritation, category 2A.

H z r d p i c t o g r a m s:**W a r n i n g**: Warning**H z r d s t a t e m e n t s**:

H315 Causes skin irritation.

H319 Causes serious eye irritation.

P r e c a u t i o n a r y m e a s u r e s:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P321 Specific treatment (see supplemental first aid instructions on this label).

P332+P313 If skin irritation occurs: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

P501 Dispose of contents and container as instructed in Section 13.

y D h

according to 1907/2006/EC (EACH), 1272/2008/EC (CLP), 29CF 1910/1200 and GHS rev. 3

E c i v d : 12.08.2015

R v i s i o n : 12.10.2015

Tr d N m : Alconox**Addi ion I in orm ion:** None.**H z r d d scrip ion****H z r ds No O h r wis Cl ssi i d (HNOC):** None**In orm ion conc rning p r icul r h z r ds or hum ns nd nvironm n :**

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Cl ssi ic ion sys m:

The classification is according to EC regulation No. 1272/2008, 29CF 1910/1200 and GHS rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composi ion/in orm ion on ingr di n s**3.1 Ch mic l ch r c riz ion :** None**3.2 D scrip ion :** None**3.3 H z rdous compon n s (p rc n g s by w igh)**

Id n i ic ion	Ch mic I N m	Cl ssi ic ion	W . %
CA numb r: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CA numb r: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CA numb r: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Addi ion I In orm ion : None.**4 Firs id m sur s****4.1 D scrip ion o irs id m sur s****G n r I in orm ion:** None.**A r inh l ion:**

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

A r skin con c :

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

A r y con c :

rinse/flush exposed eye(s) gently using water for 15-20 minutes.

remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

A r sw llowing:

rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

y D h

according to 1907/2006/EC REACH), 1272/2008/EC CLP), 29CFR1910/1200 and GHS Rev. 3

E c iv d : 12.08.2015

R vision : 12.10.2015

Tr d N m : Alconox**4.2 Most important symptoms and effects, both acute and delayed**

None

4.3 Information on immediate medical attention and special requirements:

No additional information.

5 Fire fighting measures**5.1 Extinguishing media****Unsuitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For reasons unsuitable extinguishing agents: None**5.2 Potential hazards arising from substance or mixture:**

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice or instructions**Protective equipment:**

Wear protective eye wear, gloves and clothing.

Refer to Section 8.

5.4 Additional information:

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.

Avoid contact with skin, eyes and clothing.

6 Accidental releases measures**6.1 Personal precautions, protective equipment and emergency procedures:**

Ensure adequate ventilation.

Ensure air handling systems are operational.

6.2 Environmental precautions:

Should not be released into the environment.

Prevent from reaching drains, sewer or waterway.

6.3 Methods and materials for containment and cleaning up:

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections: None**7 Handling and storage****7.1 Precautions for safe handling:**

Avoid breathing mist or vapor.

Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions of storage, including any incompatibilities:

Store in a cool, well-ventilated area.

7.3 Physical and chemical (s):

No additional information.

y D h

according to 1907/2006/EC REACH), 1272/2008/EC CLP), 29CFR1910/1200 and GHS Rev. 3

E c i v d : 12.08.2015

R v i s i o n : 12.10.2015

T r a d e N a m e : Alconox

8 Exposure controls/personal protection**8.1 Control parameters:**

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3.

8.2 Exposure controls**Appropriately engineering controls:**

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygiene measures:

Wash hands before breaks and at the end of work.

Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	Explosion limit lower: Explosion limit upper:	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	Vapor pressure 20°C:	Not determined or not available.
Odor threshold:	Not determined or not available.	Vapor density:	Not determined or not available.
pH-value:	9.5 (aqueous solution)	Relative density:	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	Solubility:	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	Reaction color change (non-oxidizing):	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	Auto-ignition temperature:	Not determined or not available.
Evaporation rate:	Not determined or not available.	Decomposition temperature:	Not determined or not available.

y D h

according to 1907/2006/EC REACH), 1272/2008/EC CLP), 29CFR1910/1200 and GHS Rev. 3

E c i v d : 12.08.2015**R v i s i o n** : 12.10.2015

Tr d N m : Alconox			
Fl m m b i l i y (s o l i d, g s o u s):	Not determined or not available.	Viscosi y:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
D n s i y 20°C:	Not determined or not available.		

10 b i l i y n d r c i v i y**10.1 R c i v i y** : None**10.2 Ch m i c l s b i l i y** : None**10.3 Possibili y h z r d o u s r c i o n s** : None**10.4 Condi ions o v o i d** : None**10.5 Incomp ibl m r i l s** : None**10.6 H z r d o u s d c o m p o s i t i o n p r o d u c t s** : None**11 Toxicologic l i n o r m i o n****11.1 In o r m i o n o n t o x i c o l o g i c l c s** :**Acu Toxici y:****Or l:**

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxici y: No additional information.**kin corrosion/irri ion:**

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

rious y d m g /irri ion:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

R spir ory or skin s n s i z ion: No additional information.**C rcinog nici y:** No additional information.**IARC (In rn ion l Ag ncy or R s rch on C nc r):** None of the ingredients are listed.**NTP (N ion l Toxicology Progr m):** None of the ingredients are listed.**G rm c ll mu g nici y:** No additional information.**R produc iv oxici y:** No additional information.**TOT-singl nd r p d xposur :** No additional information.**Addi ion l oxicologic l i n o r m i o n:** No additional information.**12 Ecologic l i n o r m i o n**

y D h

according to 1907/2006/EC (EACH), 1272/2008/EC (CLP), 29CF 1910/1200 and GHS rev. 3

E c i v d : 12.08.2015**R v i s i o n** : 12.10.2015**T r d N m** : Alconox**12.1 Toxicity:**

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.

Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.

Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.

Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.

Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.**12.3 Bioaccumulation potential:** No additional information.**12.4 Mobility in soil:** No additional information.**General notes:** No additional information.**12.5 Regulatory PBT and vPvB assessment:****PBT:** No additional information.**vPvB:** No additional information.**12.6 Other dangers:** No additional information.**13 Disposal considerations****13.1 Waste management methods (consult local, regional and national authorities or proper disposal)****Responsible party:**

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CF 262.11).

14 Transportation information**14.1 UN Number:** None
AD, ADN, DOT, IMDG, IATA**14.2 UN Proper shipping name:** None
AD, ADN, DOT, IMDG, IATA**14.3 Transportation hazard classes:**
AD, ADN, DOT, IMDG, IATA
Classes: None
Labels: None
LTD. QTY: None**U.S. DOT Limited Quantity Exemption:** None

Bulk:	Non Bulk:
RQ (applicability): None	RQ (applicability): None
Proper shipping Name: None	Proper shipping Name: None
Hazard Classes: None	Hazard Classes: None
Packing Group: None	Packing Group: None
Marine Pollution (applicability): No additional information.	Marine Pollution (applicability): No additional information.

y D h

according to 1907/2006/EC (EACH), 1272/2008/EC (CLP), 29CF 1910/1200 and GHS rev. 3

E c i v d : 12.08.2015

R v i s i o n : 12.10.2015

Tr d N m : Alconox	
Comm n s : None	Comm n s : None
14.4 P cking group : AD , ADN, DOT, IMDG, IATA	None
14.5 Environm n l h z rds :	None
14.6 p c i l p r c u i o n s o r u s r : D ng r cod (K ml r) : EM numb r : gr g i o n groups :	None None None None
14.7 Tr nspor in bulk ccording o Ann x II o MARPOL73/78 nd h IBC Cod :	Not applicable.
14.8 Tr nspor /Addi ion l in orm ion : Tr nspor c gory : Tunn l r s ric ion cod : UN "Mod l R gul ion" :	None None None

15 R gul ory in orm ion

15.1 y, h l h nd nvironm n l r gul ions/ l gisl ion sp c i c o r h subs nc o r mix ur .
Nor h Am ric n

ARA c ion 313 (sp c i c o x i c h m i c l i s i n g s) : None of the ingredients are listed. c ion 302 (x r m l y h z r d o u s s u b s n c s) : None of the ingredients are listed.
CERCLA (Compr h nsiv Environm n l R spons , Cl n up nd Li bili y Ac) R por bl pill Qu n i y : None of the ingredients are listed.
T CA (Toxic ubs nc s Con rol Ac) : Inv n ory : All ingredients are listed. Rul s nd Ord rs : Not applicable.
Proposi ion 65 (C li orni) : Ch mic ls known o c us c nc r : None of the ingredients are listed. Ch mic ls known o c us r produc iv o x i c i y o r m l s : None of the ingredients are listed. Ch mic ls known o c us r produc iv o x i c i y o r m l s : None of the ingredients are listed. Ch mic ls known o c us d v lopm n l o x i c i y : None of the ingredients are listed.

C n di n

C n di n Dom s ic ubs nc s Lis (D L):
All ingredients are listed.

EU

REACH Ar icl 57 (VHC): None of the ingredients are listed.

y D h

according to 1907/2006/EC REACH), 1272/2008/EC CLP), 29CFR1910/1200 and GHS Rev. 3

E c i v d : 12.08.2015**R v i s i o n** : 12.10.2015**T r d N m** : Alconox**G r m n y M A K**: Not classified.**A s i P c i i c****A u s r l i****A u s r l i n I n v n o r y o C h m i c I u b s n c s (A I C)**: All ingredients are listed.**C h i n****I n v n o r y o E x i s i n g C h m i c I u b s n c s i n C h i n (I E C C)**: All ingredients are listed.**J p n****I n v n o r y o E x i s i n g n d N w C h m i c I u b s n c s (E N C)**: All ingredients are listed.**K o r****E x i s i n g C h m i c I s L i s (E C L)**: All ingredients are listed.**N w Z l n d****N w Z l n d I n v n o r y o C h m i c I s (N Z O I C)**: All ingredients are listed.**P h i l i p p i n s****P h i l i p p i n I n v n o r y o C h m i c I s n d C h m i c I u b s n c s (P I C C)**: All ingredients are listed.**T i w n****T i w n C h m i c I u b s n c I n v n o r y (T C I)**: All ingredients are listed.**16 O h r i n f o r m a t i o n****Abbr v i o n s n d A c r o n y m s**: None**h a z a r d o P h r s s****H z r d s m n s:**

H315 Causes skin irritation.

H319 Causes serious eye irritation.

P r c u i o n r y s m n s:

P264 Wash skin thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P302+P352 If on skin: Wash with soap and water.

P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P321 Specific treatment see supplemental first aid instructions on this label).

P332+P313 If skin irritation occurs: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

P501 Dispose of contents and container as instructed in Section 13.

M n u c u r r m n s:

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

N F P A: 1-0-0

S D Sh

according to 1907/2006/EC (EACH), 1272/2008/EC (CLP), 29CF 1910/1200 and GHS ev. 3

E c i v d : 12.08.2015

R vision : 12.10.2015

Tr d N m : Alconox

HMIS: 1-0-0

Section 1: IDENTIFICATION**Product Name:** Simple Green® All-Purpose Cleaner**Additional Names:****Manufacturer's Part Number:** **Please refer to Section 16***Recommended Use:** Cleaner & Degreaser for water tolerant surfaces.**Restrictions on Use:** Do not use on non-rinsable surfaces.**Company:** Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA**Telephone:** 800-228-0709 • 562-795-6000 *Mon – Fri, 8am – 5pm PST***Fax:** 562-592-3830**Email:** info@simplegreen.com**Emergency Phone:** Chem-Tel 24-Hour Emergency Service: 800-255-3924**Section 2: HAZARDS IDENTIFICATION****This product is not classified as hazardous under 2012 OSHA Hazard Communication Standards (29 CFR 1910.1200).**OSHA HCS 2012Label Elements**Signal Word:** None**Hazard Symbol(s)/Pictogram(s):** None required**Hazard Statements:** None**Precautionary Statements:** None**Hazards Not Otherwise Classified (HNOC):** None**Other Information:** None Known**Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**

<u>Ingredient</u>	<u>CAS Number</u>	<u>Percent Range</u>
Water	7732-18-5	> 84.998%*
Ethoxylated Alcohol	68439-46-3	< 5%*
Sodium Citrate	68-04-2	< 5%*
Tetrasodium <i>N,N</i> -bis(carboxymethyl)-L-glutamate	51981-21-6	< 1%*
Sodium Carbonate	497-19-8	< 1%*
Citric Acid	77-92-9	< 1%*
Isothiazolinone mixture	55965-84-9	0.002%
Fragrance	Proprietary Mixture	< 1%*
Colorant	Proprietary Mixture	< 1%*

specific percentages of composition are being withheld as a trade secret*Section 4: FIRST-AID MEASURES****Inhalation:** Not expected to cause respiratory irritation. If adverse effect occurs, move to fresh air.**Skin Contact:** Not expected to cause skin irritation. If adverse effect occurs, rinse skin with water.**Eye Contact:** Not expected to cause eye irritation. If adverse effect occurs, flush eyes with water.**Ingestion:** May cause upset stomach. Drink plenty of water to dilute. See section 11.**Most Important Symptoms/Effects, Acute and Delayed:** None known.**Indication of Immediate Medical Attention and Special Treatment Needed, if necessary:** Treat symptomatically

Section 5: FIRE-FIGHTING MEASURES

Suitable & Unsuitable Extinguishing Media: Use Dry chemical, CO₂, water spray or “alcohol” foam. Avoid high volume jet water.
Specific Hazards Arising from Chemical: In event of fire, fire created carbon oxides may be formed.
Special Protective Actions for Fire-Fighters: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

This product is non-flammable. See Section 9 for Physical Properties.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: *For non-emergency and emergency personnel:* See section 8 – personal protection. Avoid eye contact. Safety goggles suggested.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Methods and Materials for Containment and Clean Up: Dike or soak up with inert absorbent material. See section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Precautions for Safe Handling: Ensure adequate ventilation. Keep out of reach of children. Keep away from heat, sparks, open flame and direct sunlight. Do not pierce any part of the container. Do not mix or contaminate with any other chemical. Do not eat, drink or smoke while using this product.

Conditions for Safe Storage including Incompatibilities: Keep container tightly closed. Keep in cool dry area. Avoid prolonged exposure to sunlight. Do not store at temperatures above 109°F (42.7°C). If separation occurs, mix the product for reconstitution.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values: No components listed with TWA or STEL values under OSHA or ACGIH.

Appropriate Engineering Controls: Showers, eyewash stations, ventilation systems

Individual Protection Measures / Personal Protective Equipment (PPE)

Eye Contact: Use protective glasses or safety goggles if splashing or spray-back is likely.

Respiratory: Use in well ventilated areas or local exhaust ventilations when cleaning small spaces.

Skin Contact: Use protective gloves (any material) when used for prolonged periods or dermally sensitive.

General Hygiene Considerations: Wash thoroughly after handling and before eating or drinking.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	Partition Coefficient: n-octanol/water:	Not determined	
Odor:	Added sassafras odor	Autoignition Temperature:	Non-flammable	
Odor Threshold:	Not determined	Decomposition Temperature:	109°F	
pH ASTM D-1293:	8.5 – 9.5	Viscosity:	Like water	
Freezing Point ASTM D-1177:	0-3.33°C (32-38°F)	Specific Gravity ASTM D-891:	1.01 – 1.03	
Boiling Point & Range ASTM D-1120:	101°C (213.8°F)	VOCs:	<i>**Water & fragrance exemption in calculation</i>	
Flash Point ASTM D-93:	> 212°F	SCAQMD 304-91 / EPA 24:	0 g/L	0 lb/gal
Evaporation Rate ASTM D-1901:	½ Butyl Acetate @ 25°C	CARB Method 310**:	2.5 g/L	0.021 lb/gal
Flammability (solid, gas):	Not applicable	SCAQMD Method 313:	Not tested	
Upper/Lower Flammability or Explosive Limits:	Not applicable	VOC Composite Partial Pressure:	Not determined	
Vapor Pressure ASTM D-323:	0.60 PSI @77°F, 2.05 PSI @100°F	Relative Density ASTM D-4017:	8.34 – 8.42 lb/gal	
Vapor Density:	Not determined	Solubility:	100% in water	

Section 10: STABILITY AND REACTIVITY

Reactivity:	Non-reactive.
Chemical Stability:	Stable under normal conditions 70°F (21°C) and 14.7 psig (760 mmHg).
Possibility of Hazardous Reactions:	None known.
Conditions to Avoid:	Excessive heat or cold.
Incompatible Materials:	Do not mix with oxidizers, acids, bathroom cleaners, or disinfecting agents.
Hazardous Decomposition Products:	Normal products of combustion - CO, CO ₂ .

Section 11: TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:	Inhalation -	Overexposure may cause headache.
	Skin Contact -	Not expected to cause irritation, repeated contact may cause dry skin.
	Eye Contact -	Not expected to cause irritation.
	Ingestion -	May cause upset stomach.

Symptoms related to the physical, chemical and toxicological characteristics: no symptoms expected under typical use conditions.

Delayed and immediate effects and or chronic effects from short term exposure: no symptoms expected under typical use conditions.

Delayed and immediate effects and or chronic effects from long term exposure: headache, dry skin, or skin irritation may occur.

Interactive effects: Not known.

Numerical Measures of Toxicity

Acute Toxicity:	Oral LD ₅₀ (rat)	> 5 g/kg body weight
	Dermal LD ₅₀ (rabbit)	> 5 g/kg body weight

Calculated via OSHA HCS 2012 / Globally Harmonized System of Classification and Labelling of Chemicals

Skin Corrosion/Irritation:	Non-irritant per Dermal Irritation® assay modeling. No animal testing performed.
Eye Damage/Irritation:	Minimal irritant per Ocular Irritation® assay modeling. No animal testing performed.
Germ Cell Mutagenicity:	Mixture does not classify under this category.
Carcinogenicity:	Mixture does not classify under this category.
Reproductive Toxicity:	Mixture does not classify under this category.
STOT-Single Exposure:	Mixture does not classify under this category.
STOT-Repeated Exposure:	Mixture does not classify under this category.
Aspiration Hazard:	Mixture does not classify under this category.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Aquatic:	Aquatic Toxicity - Low, based on OECD 201, 202, 203 + Microtox: EC ₅₀ & IC ₅₀ ≥100 mg/L. Volume of ingredients used does not trigger toxicity classifications under the Globally Harmonized System of Classification and Labelling of Chemicals.
Terrestrial:	Not tested on finished formulation.
Persistence and Degradability:	Readily Biodegradable per OCED 301D, Closed Bottle Test
Bioaccumulative Potential:	No data available.
Mobility in Soil:	No data available.
Other Adverse Effects:	No data available.

Section 13: DISPOSAL CONSIDERATIONS

Unused or Used Liquid: May be considered hazardous in your area depending on usage and tonnage of disposal – check with local, regional, and or national regulations for appropriate methods of disposal.

Empty Containers: May be offered for recycling.

Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.N. Number: Not applicable **U.N. Proper Shipping Name:** Cleaning Compound, Liquid NOI
Transport Hazard Class(es): Not applicable **NMFC Number:** 48580-3
Packing Group: Not applicable **Class:** 55
Environmental Hazards: Marine Pollutant - NO
Transport in Bulk (according to Annex II of MARPOL 73/78 and IBC Code): Unknown.
Special precautions which user needs to be aware of/comply with, in connection with transport or conveyance either within or outside their premises: None known.

U.S. (DOT) / Canadian TDG: Not Regulated for shipping. **ICAO/ IATA:** Not classified as Hazardous
IMO / IDMG: Not classified as Hazardous **ADR/RID:** Not classified as Hazardous

Section 15: REGULATORY INFORMATION

All components are listed on: TSCA and DSL Inventory.

SARA Title III: Sections 311/312 Hazard Categories – Not applicable.
 Sections 313 Superfunds Amendments and Reauthorizations Act of 1986 – Not applicable.
 Sections 302 – Not applicable.

Clean Air Act (CAA): Not applicable
Clean Water Act (CWA): Not applicable

State Right To Know Lists: No ingredients listed
California Proposition 65: No ingredients listed

Texas ESL:

Ethoxylated Alcohol	68439-46-3	60 µg/m ³ long term	600 µg/m ³ short term
Sodium Citrate	68-04-2	5 µg/m ³ long term	50 µg/m ³ short term
Sodium Carbonate	497-19-8	5 µg/m ³ long term	50 µg/m ³ short term
Citric Acid	77-92-9	10 µg/m ³ long term	100 µg/m ³ short term

Section 16: OTHER INFORMATION

<u>Size</u>	<u>UPC</u>	<u>Size</u>	<u>UPC</u>
2 oz. Pump	043318130366	1 Gallon w/ Dilution Bottle	043318000669
2 oz. Pump	043318131035	1 Gallon	043318000799
4 oz. Pump	043318130014	1 Gallon w/ Dilution Bottle	043318001383
16 oz. Trigger	043318130021	1 Gallon w/ Dilution Bottle	043318002021
22 oz. Trigger	043318130229	1 Gallon	043318130052
24 oz. Trigger, 12 per case	043318000034	1 Gallon w/ Dilution Bottle, 112 per case	043318480140
24 oz. Trigger	043318000300	1 Gallon w/ Dilution Bottle, 4 per case	043318480416
24 oz. Trigger	043318130137	1 Gallon w/ Dilution Bottle, 24 per case	043318480492
32 oz. Trigger	043318000652	1 Gallon w/ laundry	043318002052
32 oz. Trigger	043318130335	1 Gallon w/ towel	043318001222
67.6 oz	043318000393	140 oz.	043318001390
67.6 oz.	043318130144	140 oz., 168 per case	043318561405
1 Gallon w/ Dilution Bottle	043318000539	140 oz. w/ Dilution Bottle	043318001468
1 Gallon w/ Dilution Bottle	043318000645	2.5 Gallon	043318004889

USA items listed only. Not all items listed. USA items may not be valid for international sale.

Section 16: OTHER INFORMATION - continued

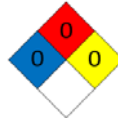
NFPA:

Health – None

Flammability – Non-flammable

Stability – Stable

Special - None



Acronyms

NTP	National Toxicology Program	IARC	International Agency for Research on Cancer
OSHA	Occupational Safety and Health Administration	CPSC	Consumer Product Safety Commission
TSCA	Toxic Substances Control Act	DSL	Domestic Substances List

Prepared / Revised By: Sunshine Makers, Inc., Regulatory Department.

This SDS has been revised in the following sections: Exact Isothizaolinone amount disclosed

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

SAFETY DATA SHEET

Preparation Date: 06/29/2015

Revision Date: 06/29/2015

Revision Number: G1

1. IDENTIFICATION

Product identifier

Product code: S1172
Product Name: SODIUM BISULFITE, GRANULAR, FCC

Other means of identification

Synonyms: Bisulfite de sodium [French]
Hydrogen sodium sulfite
Hydrogen sulfite sodium
Monosodium sulfite
Sodium acid sulfite
Sodium bisulfite (1:1)
Sodium bisulfite (NaHSO₃)
Sodium bisulphite
Sodium hydrogen sulfite
Sodium hydrosulfite(DOT)
Sodium metabisulfite
Sodium sulfite (NaHSO₃)
Sodium sulhydrate
Sulfurous acid, monosodium salt
Uantax SBS

CAS #: 7631-90-5
RTECS # VZ2000000
CI#: Not available

Recommended use of the chemical and restrictions on use

Recommended use: Chemical intermediate. vat. dye preparation. In textiles. Bleaching groundwood, wool, etc; cask sterilization (brewing); plating; color preservative for pale crepe rubber; wood pulp digestion; antiseptic in fermentation industries; pharmaceutical acid; antioxidant in eyedrops. Reducing agent. Analytical reagent. Dietary supplement. Disinfectant. Bleaching agent. Food preservative. Medication.

Uses advised against No information available

Supplier: Spectrum Chemical Mfg. Corp
14422 South San Pedro St.
Gardena, CA 90248
(310) 516-8000

Order Online At: <https://www.spectrumchemical.com>

Emergency telephone number Chemtrec 1-800-424-9300
Contact Person: Martin LaBenz (West Coast)
Contact Person: Ibad Tirmiz (East Coast)

2. HAZARDS IDENTIFICATION

2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral	Category 4
Serious eye damage/eye irritation	Category 2A
Respiratory sensitization	Category 1
Skin sensitization	Category 1

Label elements

Danger

Hazard statements

Harmful if swallowed
Causes serious eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction



Hazards not otherwise classified (HNOC)

Not Applicable

Other hazards

May be harmful if inhaled

Precautionary Statements - Prevention

Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response

Specific treatment (see .? on this label)

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

IF ON SKIN: Wash with plenty of soap and water

If skin irritation or rash occurs: Get medical advice/attention

Wash contaminated clothing before reuse

IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Rinse mouth

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS-No.	Weight %	Trade Secret
------------	---------	----------	--------------

Product code: S1172

Product name: SODIUM BISULFITE,
GRANULAR, FCC

2 / 13

3. COMPOSITION/INFORMATION ON INGREDIENTS

Sodium Bisulfite 7631-90-5	7631-90-5	100	*
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4. FIRST AID MEASURES

First aid measures

General Advice:

Poison information centers in each State capital city can provide additional assistance for scheduled poisons (13 1126).

Skin Contact:

Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention. If skin irritation persists, call a physician.

Eye Contact:

Flush eye with water for 15 minutes. Get medical attention.

Inhalation:

Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Obtain medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms

Causes serious eye irritation. Causes skin irritation. May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause irritation of respiratory tract.

Indication of any immediate medical attention and special treatment needed

Notes to Physician:

Treat symptomatically

Protection of first-aiders

First-Aid Providers: Avoid exposure to blood or body fluids. Wear gloves and other necessary protective clothing. Dispose of contaminated clothing and equipment as bio-hazardous waste

5. FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media:

The product is not flammable. If it is involved in a fire, extinguish the fire using an agent suitable for the type of surrounding fire.

Unsuitable Extinguishing Media:

No information available.

Specific hazards arising from the chemical

Hazardous Combustion Products:

Sodium oxides. Sulfur oxides

Specific hazards:

When heated to decomposition it emits toxic fumes

Special Protective Actions for Firefighters

Specific Methods:

No information available.

Special Protective Equipment for Firefighters:

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions: Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid contact with skin, eyes and clothing. Use personal protective equipment. Avoid breathing dust. Avoid dust formation.

Environmental precautions Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Prevent entry into waterways, sewers.

Methods and material for containment and cleaning up

Methods for containment Stop leak if you can do it without risk. Cover with plastic sheet to prevent spreading.

Methods for cleaning up Use appropriate tools to put the spilled solid in a suitable waste disposal container. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Technical Measures/Precautions:

Provide sufficient air exchange and/or exhaust in work rooms. Avoid dust formation. Keep away from incompatible materials.

Safe Handling Advice

Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Avoid dust formation. Do not breathe vapours/dust. Do not ingest. Do not smoke. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Technical Measures/Storage Conditions:

Keep container tightly closed in a dry and well-ventilated place. Store away from incompatible materials.

Incompatible Materials:

Oxidizing agents. Acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

National occupational exposure limits

United States

Components	OSHA	NIOSH	ACGIH	AIHA WHEEL
Sodium Bisulfite 7631-90-5	None	= 5 mg/m ³ TWA	= 5 mg/m ³ TWA	None

Canada

Components	Alberta	British Columbia	Ontario	Quebec
Sodium Bisulfite 7631-90-5	= 5 mg/m ³ TWA	= 5 mg/m ³ TWA	5 mg/m ³ TWA	5 mg/m ³ TWAEV

Australia and Mexico

Components	Australia	Mexico
Sodium Bisulfite 7631-90-5	5 mg/m ³ TWA	None

Appropriate engineering controls

Engineering measures to reduce exposure:

Ensure adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Individual protection measures, such as personal protective equipment

Personal Protective Equipment

- Eye protection:** Safety glasses with side-shields
- Skin and body protection:** Long sleeved clothing. Chemical resistant apron. Gloves.
- Respiratory protection:** Wear respirator with dust filter. Be sure to use an approved/certified respirator or equivalent..
- Hygiene measures:** Avoid contact with skin, eyes and clothing. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Solid.	Appearance: Granular.	Color: White. Off-white.
Odor: Sulfurous.	Taste Disagreeable.	Molecular/Formula weight: 104.06
Formula: NaHSO ₃	Flammability: No information available	Flash point (°C): No data available
Flashpoint (°C/°F): No information available.	Flash Point Tested according to: Not available	Lower Explosion Limit (%): No information available
Autoignition Temperature (°C/°F): No information available	Upper Explosion Limit (%): No information available	pH: No information available
Melting point/range(°C/°F): No information available	Boiling point/range(°C/°F): 146°C/ 294.8°F	Decomposition temperature(°C/°F): No information available
Bulk density: No information available	Specific gravity: 1.31-1.48	Vapor pressure @ 20°C (kPa): No information available
Density (g/cm³): No information available	Evaporation rate: No information available	Vapor density: No information available
VOC content (g/L): No information available	Odor threshold (ppm): No information available	Partition coefficient (n-octanol/water): No information available
Viscosity: No information available	Miscibility: No information available	Solubility: Easily soluble in hot water Soluble in cold water Soluble in 3.5 parts cold water Soluble in 2 parts boiling water Soluble in 70 parts alcohol Insoluble in liquid chloride, ammonia

10. STABILITY AND REACTIVITY

Reactivity

Reactive with acids
Reactive with oxidizing agents
Oxidizes in air to sulfate

Chemical stability

Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Hazardous polymerization does not occur

Conditions to avoid: Incompatible materials.

Incompatible Materials: Oxidizing agents. Acids.

Hazardous decomposition products: Sodium oxides. Sulfur oxides.

Other Information

Corrosivity: Non-corrosive in the presence of glass
Corrosive in presence of aluminum

Special Remarks on Corrosivity: No information available

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Principal Routes of Exposure:

Inhalation. Ingestion.

Acute Toxicity

Component Information

Sodium Bisulfite - 7631-90-5

LD50/oral/rat = 1310 mg/kg Oral LD50 Rat

LD50/oral/mouse = No information available

LD50/dermal/rat = No information available

LD50/dermal/rabbit = No information available

LC50/inhalation/rat = No information available

LC50/inhalation/mouse = No information available

Other LD50 or LC50 information = No information available

Product Information

LD50/oral/rat =

VALUE- Acute Tox Oral = 1310mg/kg

LD50/oral/mouse =

Value - Acute Tox Oral = No information available

LD50/dermal/rabbit

VALUE-Acute Tox Dermal = No information available

LD50/dermal/rat

VALUE -Acute Tox Dermal = No information available

LC50/inhalation/rat

VALUE-Vapor = No information available

VALUE-Gas = No information available

VALUE-Dust/Mist = No information available

LC50/Inhalation/mouse

VALUE-Vapor = No information available

VALUE - Gas = No information available

VALUE - Dust/Mist = No information available

Symptoms

Skin Contact: Causes skin irritation.

Eye Contact: Causes serious eye irritation.

Inhalation Can cause respiratory tract irritation with cough, wheezing, and shortness of breath. It can produce anaphylaxis or other hypersensitivity reactions in some sensitized individuals.

Ingestion May be harmful if swallowed. It may cause nausea, vomiting, diarrhea, abdominal pain, gastric hemorrhage. Extremely large amounts may affect behavior/central nervous system and may produce central nervous system stimulation, irritation, seizures and may also cause, cyanosis, respiratory depression, apnea, circulatory disturbances, hypotension and cardiovascular collapse. May cause asthmatic reaction in sensitized individuals.

Aspiration hazard No information available

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

Chronic Toxicity Prolonged or repeated inhalation may cause bronchitis with coughing, phlegm, and/or shortness of breath. Inhalation: May cause allergic respiratory reaction (occupational asthma). Prolonged or repeated inhalation may cause asthma-like allergy or hypersensitivity reactions such as anaphylaxis, angioedema, bronchoconstriction, shortness of breath, wheezing, coughing, chest tightness, flushing, sweating, rash, tachycardia and hypotension in sensitized individuals. Future exposures may cause shortness of breath, wheezing, cough, and/or chest tightness. Prolonged or repeated ingestion may affect the liver. Prolonged or repeated ingestion may affect the blood. Skin: Sensitizer. May cause allergic skin reaction (allergic contact dermatitis).

Sensitization: May cause sensitization by inhalation and skin contact

Mutagenic Effects: Experiments with bacteria and/or yeast have shown mutagenic effects
May affect genetic material

Carcinogenic effects: Not considered carcinogenic

Components	IARC	ACGIH - Carcinogens	NTP	OSHA HCS - Carcinogens	Australia - Prohibited Carcinogenic Substances	Australia - Notifiable Carcinogenic Substances
Sodium Bisulfite	Monograph 54 [1992] Sulfur dioxide and some sulfites bisulfites and metabisulfites	A4 Not Classifiable as a Human Carcinogen	Not listed	Not listed	Not listed	Not listed

Reproductive toxicity No data is available

Reproductive Effects: No information available
Developmental Effects: No information available
Teratogenic Effects: No information available

Specific Target Organ Toxicity

STOT - single exposure No information available
STOT - repeated exposure No information available
Target Organs: Lungs. Respiratory system. Skin. Eyes.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects: Harmful to aquatic organisms.

Sodium Bisulfite - 7631-90-5

Freshwater Fish Species Data: 240 mg/L LC50 Gambusia affinis 96 h static 1

Water Flea Data: 119 mg/L EC50 Daphnia magna 48 h

Persistence and degradability: No information available

Bioaccumulative potential: No information available

Mobility: No information available

13. DISPOSAL CONSIDERATIONS

Disposal Methods

Waste from residues / unused products:

Waste must be disposed of in accordance with Federal, State and Local regulation.

Contaminated packaging:

Empty containers should be taken for local recycling, recovery or waste disposal

Components	RCRA - F Series Wastes	RCRA - K Series Wastes	RCRA - P Series Wastes	RCRA - U Series Wastes
Sodium Bisulfite	None	None	None	None

14. TRANSPORT INFORMATION

DOT

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: None
ERG No: No information available
Marine Pollutant: No data available
DOT RQ (lbs): No information available

TDG (Canada)

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Description: No information available

ADR

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Packing Group: No information available
Subsidiary Risk: No information available
Classification Code: No information available
Description: No information available

14. TRANSPORT INFORMATION

CEFIC Tremcard No: No information available

IMO / IMDG

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Description: No information available
IMDG Page: No information available
Marine Pollutant No information available
MFAG: No information available
Maximum Quantity: No information available

RID

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Classification Code: No information available
Description: No information available

ICAO

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Description: No information available

IATA

UN-No: Not Regulated
Proper Shipping Name: No information available
Hazard Class: No information available
Subsidiary Risk: No information available
Packing Group: No information available
Description: No information available

15. REGULATORY INFORMATION

International Inventories

Components	U.S. TSCA	KOREA KECL	Philippines (PICCS)	Japan ENCS	CHINA	Australia (AICS)	EINECS-No.
<i>Sodium Bisulfite</i>	Present	Present KE-31484	Present	Present (1)-502	Present	Present	Present 231-548-0

U.S. Regulations

Sodium Bisulfite

Massachusetts RTK: Present
New Jersey RTK Hazardous Substance List: 1685
New Jersey - Discharge Prevention - List of Hazardous Substances: Present
Pennsylvania RTK: Environmental hazard
Pennsylvania RTK - Environmental Hazard List Present
Pennsylvania RTK - Special Hazardous Substances Present

Sodium Bisulfite

Minnesota - Hazardous Substance List: Present
New York Release Reporting - List of Hazardous Substances:
 = 100 lb RQ
 = 5000 lb RQ
Louisiana Reportable Quantity List for Pollutants: Listed
California Directors List of Hazardous Substances: Present
FDA - Food Additives Generally Recognized as Safe (GRAS): 21 CFR 182.3739
FDA - 21 CFR - Total Food Additives 161.173 173.310 177.1200 182.3739

California Prop. 65: Safe Drinking Water and Toxic Enforcement Act of 1986.

Chemicals Known to the State of California to Cause Cancer:

This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

Chemicals Known to the State of California to Cause Reproductive Toxicity:

This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

Components	Carcinogen	Developmental Toxicity	Male Reproductive Toxicity	Female Reproductive Toxicity:
Sodium Bisulfite	Not Listed	Not Listed	Not Listed	Not Listed

CERCLA/SARA

Components	CERCLA - Hazardous Substances and their Reportable Quantities	Section 302 Extremely Hazardous Substances and TPQs	Section 302 Extremely Hazardous Substances and RQs	Section 313 - Chemical Category	Section 313 - Reporting <i>de minimis</i>
Sodium Bisulfite	= 2270 kg final RQ = 5000 lb final RQ	None	None	None	None

U.S. TSCA

Components	TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS)	TSCA 8(d) -Health and Safety Reporting
Sodium Bisulfite	Not Applicable	01/26/199406/30/1998

Canada

WHMIS hazard class:

D2B Toxic materials

Sodium Bisulfite

D2B

Canada Controlled Products Regulation:

This product has been classified according to the hazard criteria of the CPR (Controlled Products Regulation) and the MSDS contains all of the information required by the CPR.

Components	WHMIS Ingredient Disclosure List -
Sodium Bisulfite	1 %

Inventory

Components	Canada (DSL)	Canada (NDSL)
Sodium Bisulfite	Present	Not Listed

Components	CEPA Schedule I - Toxic Substances	CEPA - 2010 Greenhouse Gases Subject to Mandatory Reporting

Sodium Bisulfite	Not listed	Not listed
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EU Classification

R-phrase(s)

R22 - Harmful if swallowed.

R31 - Contact with acids liberates toxic gas.

S -phrase(s)

S 2 - Keep out of the reach of children.

S25 - Avoid contact with eyes.

S46 - If swallowed, seek medical advice immediately and show this container or label.

Components	Classification	Concentration Limits:	Safety Phrases
Sodium Bisulfite	Xn; R22 R31	No information	S2 S25 S46

The product is classified in accordance with Annex VI to Directive 67/548/EEC

Indication of danger:

Xn - Harmful.

Xn



16. OTHER INFORMATION

16. OTHER INFORMATION

Preparation Date: 06/29/2015
Revision Date: 06/29/2015
Prepared by: Sonia Owen

Disclaimer:

All chemicals may pose unknown hazards and should be used with caution. This Safety Data Sheet (SDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this SDS. The physical properties reported in this SDS are obtained from the literature and do not constitute product specifications. Information contained herein does not constitute a warranty, whether expressed or implied, as to the safety, merchantability or fitness of the goods for a particular purpose. Spectrum Chemicals & Laboratory Products, Inc. assumes no responsibility for results obtained or for incidental or consequential damages, including lost profits, arising from the use of these data. No warranty against infringement of any patent, copyright or trademark is made or implied. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this SDS is based on technical data judged to be reliable, Spectrum assumes no responsibility for the completeness or accuracy of the information contained herein.

End of Safety Data Sheet

SAFETY DATA SHEET

Creation Date 21-May-2012

Revision Date 18-Jan-2018

Revision Number 3

1. Identification

Product Name Sodium Hydroxide Solution 10 N

Cat No. : SS255-1; SS255-1LC; SS255-4; SS255-4LC; SS255-20; SS255-200; SS255FB-19; SS255FB-50; SS255FB-115; SS255FB-200; SS255SS-28; SS255SS-50; SS255SS-115; SS255SS-200; SS267

Synonyms Caustic soda

Recommended Use Laboratory chemicals.

Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Corrosive to metals	Category 1
Skin Corrosion/Irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word

Danger

Hazard Statements

May be corrosive to metals
Causes severe skin burns and eye damage
May cause respiratory irritation

**Precautionary Statements****Prevention**

Do not breathe dust/fume/gas/mist/vapors/spray
 Wash face, hands and any exposed skin thoroughly after handling
 Wear protective gloves/protective clothing/eye protection/face protection
 Use only outdoors or in a well-ventilated area
 Keep only in original container

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

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

Skin

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

Eyes

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

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Spills

Absorb spillage to prevent material damage

Storage

Store locked up
 Store in a well-ventilated place. Keep container tightly closed
 Store in corrosive resistant polypropylene container with a resistant inliner
 Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Water	7732-18-5	60
Sodium hydroxide	1310-73-2	40

4. First-aid measures

General Advice

Take off contaminated clothing and shoes immediately.

Eye Contact

Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Immediate medical attention is required.

Inhalation

Remove from exposure, lie down. Move to fresh air. If not breathing, give artificial respiration. Immediate medical attention is required.

Ingestion	Do not induce vomiting. Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Most important symptoms and effects	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.
Unsuitable Extinguishing Media	No information available
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. Corrosive Material.

Hazardous Combustion Products

Sodium oxides

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	1	N/A

6. Accidental release measures

Personal Precautions	Avoid contact with the skin and the eyes. Use personal protective equipment. Evacuate personnel to safe areas. Do not touch or walk through spilled material.
Refer to protective measures listed in Sections 7 and 8	
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Use only in well-ventilated areas. Wash thoroughly after handling.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Corrosives area. Store in original container. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Sodium hydroxide	Ceiling: 2 mg/m ³	Ceiling: 2 mg/m ³ TWA: 2 mg/m ³	IDLH: 10 mg/m ³ Ceiling: 2 mg/m ³	Ceiling: 2 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Tightly fitting safety goggles.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures When using, do not eat, drink or smoke. Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear
Odor	Odorless
Odor Threshold	No information available
pH	> 12.0 Alkaline
Melting Point/Range	-10 °C / 14 °F
Boiling Point/Range	>100 °C / > 212 °F
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	14 mmHg
Vapor Density	> 1.0
Specific Gravity	1.32
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Stable under recommended storage conditions.
Conditions to Avoid	Exposure to air. Incompatible products.
Incompatible Materials	Acids, Organic materials, Metals, Aluminium, copper,

Hazardous Decomposition Products Sodium oxides

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions Corrosive to metals.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product
Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Vapor LC50 Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	Not listed	Not listed
Sodium hydroxide	Not listed	LD50 = 1350 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

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

Irritation Causes burns by all exposure routes

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed
Sodium hydroxide	1310-73-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Contains no substances known to be hazardous to the environment or that are not degradable in waste water treatment plants. Large amounts will affect pH and harm aquatic organisms. Contains a substance which is: Harmful to aquatic organisms. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium hydroxide	Not listed	LC50: = 45.4 mg/L, 96h	Not listed	Not listed

		static (Oncorhynchus mykiss)		
--	--	------------------------------	--	--

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods Should not be released into the environment.

14. Transport information

DOT

UN-No UN1824
 Proper Shipping Name SODIUM HYDROXIDE SOLUTION
 Hazard Class 8
 Packing Group II

TDG

UN-No UN1824
 Proper Shipping Name SODIUM HYDROXIDE SOLUTION
 Hazard Class 8
 Packing Group II

IATA

UN-No UN1824
 Proper Shipping Name SODIUM HYDROXIDE SOLUTION
 Hazard Class 8
 Packing Group II

IMDG/IMO

UN-No UN1824
 Proper Shipping Name SODIUM HYDROXIDE SOLUTION
 Hazard Class 8
 Packing Group II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Water	X	X	-	231-791-2	-		X	-	X	X	X
Sodium hydroxide	X	X	-	215-185-5	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Sodium hydroxide	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sodium hydroxide	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Water	-	-	X	-	-
Sodium hydroxide	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 21-May-2012

Revision Date 18-Jan-2018

Print Date 18-Jan-2018

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

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

End of SDS

SAFETY DATA SHEET

Version 5.7
Revision Date 03/04/2015
Print Date 03/27/2015

1. PRODUCT AND COMPANY IDENTIFICATION**1.1 Product identifiers**

Product name : Sulfuric acid

Product Number : 339741
Brand : Aldrich
Index-No. : 016-020-00-8

CAS-No. : 7664-93-9

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

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Corrosive to metals (Category 1), H290
Skin corrosion (Category 1A), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H290 : May be corrosive to metals.
H314 : Causes severe skin burns and eye damage.
H318 : Causes serious eye damage.

Precautionary statement(s)

P234 : Keep only in original container.
P264 : Wash skin thoroughly after handling.
P280 : Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331 : IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 : IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	: H ₂ O ₄ S
Molecular weight	: 98.08 g/mol
CAS-No.	: 7664-93-9
EC-No.	: 231-639-5
Index-No.	: 016-020-00-8
Registration number	: 01-2119458838-20-XXXX

Hazardous components

Component	Classification	Concentration
Sulfuric acid		
	Met. Corr. 1; Skin Corr. 1A; Eye Dam. 1; H290, H314, H318	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Sulphur oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures**

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE**7.1 Precautions for safe handling**

Avoid inhalation of vapour or mist.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**8.1 Control parameters****Components with workplace control parameters**

Sulfuric acid	7664-93-9	TWA	0.2 mg/m ³	USA. ACGIH Threshold Limit Values (TLV)
		TWA	1 mg/m ³	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 mg/m ³	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

Derived No Effect Level (DNEL)

Workers	Inhalation	Acute local effects	0.1 mg/m ³
Workers	Inhalation	Long-term local effects	0.05 mg/m ³

Predicted No Effect Concentration (PNEC)

Compartment	Value
Marine water	0.00025 mg/l
Fresh water	0.0025 mg/l

Marine sediment	0.002 mg/kg
Fresh water sediment	0.002 mg/kg
Onsite sewage treatment plant	8.8 mg/l

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.2 mm

Break through time: 30 min

Material tested: Dermatrill® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

- | | |
|--|------------------------|
| a) Appearance | Form: clear, liquid |
| b) Odour | No data available |
| c) Odour Threshold | No data available |
| d) pH | 1.2 at 5 g/l |
| e) Melting point/freezing point | 3 °C (37 °F) |
| f) Initial boiling point and boiling range | 290 °C (554 °F) - lit. |

g) Flash point	Not applicable
h) Evaporation rate	No data available
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	No data available
k) Vapour pressure	1.33 hPa (1.00 mmHg) at 145.8 °C (294.4 °F)
l) Vapour density	3.39 - (Air = 1.0)
m) Relative density	1.84 g/cm ³ at 25 °C (77 °F)
n) Water solubility	soluble
o) Partition coefficient: n-octanol/water	No data available
p) Auto-ignition temperature	No data available
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

9.2 Other safety information

Surface tension	55.1 mN/m at 20 °C (68 °F)
Relative vapour density	3.39 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Bases, Halides, Organic materials, Carbides, fulminates, Nitrates, picrates, Cyanides, Chlorates, alkali halides, Zinc salts, permanganates, e.g. potassium permanganate, Hydrogen peroxide, Azides, Perchlorates., Nitromethane, phosphorous, Reacts violently with: cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous(III) oxide, Powdered metals

10.6 Hazardous decomposition products

Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 2,140 mg/kg

LC50 Inhalation - Rat - 2 h - 510 mg/m³

Dermal: No data available

No data available

Skin corrosion/irritation

Skin - Rabbit

Result: Extremely corrosive and destructive to tissue.

Serious eye damage/eye irritation

Eyes - Rabbit

Result: Corrosive to eyes

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-inorganic-acid mists containing sulfuric acid is carcinogenic to humans (group 1).

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

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

No data available

Additional Information

RTECS: WS5600000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delayed., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish LC50 - Gambusia affinis (Mosquito fish) - 42 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 29 mg/l - 24 h

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1830 Class: 8 Packing group: II
Proper shipping name: Sulfuric acid
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 1830 Class: 8 Packing group: II EMS-No: F-A, S-B
Proper shipping name: SULPHURIC ACID

IATA

UN number: 1830 Class: 8 Packing group: II
Proper shipping name: Sulphuric acid

15. REGULATORY INFORMATION

SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Sulfuric acid	7664-93-9	2007-07-01

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Sulfuric acid	7664-93-9	2007-07-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sulfuric acid	7664-93-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sulfuric acid	7664-93-9	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sulfuric acid	7664-93-9	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.
Sulfuric acid

CAS-No.
7664-93-9

Revision Date
2007-09-28

16. OTHER INFORMATION**Full text of H-Statements referred to under sections 2 and 3.**

Eye Dam.	Serious eye damage
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
Met. Corr.	Corrosive to metals
Skin Corr.	Skin corrosion

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.7

Revision Date: 03/04/2015

Print Date: 03/27/2015

APPENDIX J

OSHA TABLE 1 – SILICA CONTROL METHODS

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
Stationary masonry saws	<ul style="list-style-type: none"> • Use saw equipped with integrated water delivery system that continuously feeds water to the blade • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	None	None
Handheld power saws (any blade diameter)	<ul style="list-style-type: none"> • Use saw equipped with integrated water delivery system that continuously feeds water to the blade • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	<ul style="list-style-type: none"> • None (when used outdoors) • APF 10 (when indoors or in enclosed area) 	APF 10 (indoors or outdoors)
Drivable saws	<ul style="list-style-type: none"> • For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	None	None
Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	<ul style="list-style-type: none"> • For tasks performed outdoors, use saw equipped with commercially available dust collection system • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with ≤ 99% efficiency 	None	None.
Walk-behind saws	<ul style="list-style-type: none"> • Use saw equipped with integrated water delivery system that continuously feeds water to the blade • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	<ul style="list-style-type: none"> • None (when outdoors) • APF 10 (when indoors or in enclosed area) 	<ul style="list-style-type: none"> • None (when outdoors) • APF 10 (when indoors or in enclosed area)

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
Rig-mounted core saws or drills	<ul style="list-style-type: none"> • Use tool equipped with integrated water delivery system that supplies water to cutting surface • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions 	None	None
Handheld and stand-mounted drills (including impact and rotary hammer drills)	<ul style="list-style-type: none"> • Use drill equipped with commercially available shroud or cowling with dust collection system • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with ≤ 99% efficiency and a filter-cleaning mechanism • Use a HEPA-filtered vacuum when cleaning holes 	None	None
Dowel drilling rigs for concrete	<ul style="list-style-type: none"> • For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with ≤ 99% efficiency and a filter-cleaning mechanism • Use a HEPA-filtered vacuum when cleaning holes 	APF 10	APF 10
Vehicle-mounted drilling rigs for rock and concrete	<ul style="list-style-type: none"> • Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector OR • Operate from within an enclosed cab and use water for dust suppression on drill bit 	None	None

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
Jackhammers and handheld powered chipping tools	<ul style="list-style-type: none"> • Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. <p>OR</p> <ul style="list-style-type: none"> • Use tool equipped with commercially available shroud and dust collection system • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with ≤ 99% efficiency and a filter-cleaning mechanism. 	<ul style="list-style-type: none"> • None (when outdoors) • APF 10 (when indoors or in enclosed area) 	APF 10 (when indoors or outdoors)
Handheld grinders for mortar removal (<i>i.e.</i> , tuckpointing)	<ul style="list-style-type: none"> • Use grinder equipped with commercially available shroud and dust collection system • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with ≤ 99% efficiency and a cyclonic pre-separator or filter-cleaning mechanism 	APF 10	APF 25
Handheld grinders for uses other than mortar removal	<ul style="list-style-type: none"> • For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions <p>OR</p>	None	None

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
	<ul style="list-style-type: none"> • Use grinder equipped with commercially available shroud and dust collection system • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with ≤ 99% efficiency and a cyclonic pre-separator or filter-cleaning mechanism 	None (when used indoors or outdoors)	<ul style="list-style-type: none"> • None (when used outdoors) • APF 10 (when used indoors or in an enclosed area)
Walk-behind milling machines and floor grinders	<ul style="list-style-type: none"> • Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions <p>OR</p> <ul style="list-style-type: none"> • Use machine equipped with dust collection system recommended by the manufacturer • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions • Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with ≤ 99% efficiency and a filter-cleaning mechanism • When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes 	None	None
Small drivable milling machines (less than half-lane)	<ul style="list-style-type: none"> • Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant • Operate and maintain machine to minimize dust emissions 	None	None.
Large drivable milling machines (half-lane)	<ul style="list-style-type: none"> • For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water 	None	None

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
and larger)	sprays designed to suppress dust <ul style="list-style-type: none"> • Operate and maintain machine to minimize dust emissions • For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust • Operate and maintain machine to minimize dust emissions OR <ul style="list-style-type: none"> • Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant • Operate and maintain machine to minimize dust emissions 		
Crushing machines	<ul style="list-style-type: none"> • Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points) • Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions • Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station 	None	None
Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or during demolition with silica-containing materials	<ul style="list-style-type: none"> • Operate equipment from within an enclosed cab • When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions 	None	None.

Exposure Control Methods When Working with Materials Containing Crystalline Silica (Information obtained from Table 1 of 29 CFR 1926.1153(c))

Equipment/task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
Heavy equipment / utility vehicles for tasks such as grading and excavating but not including: abrading, demolishing, or fracturing silica-containing materials	<ul style="list-style-type: none"> • Apply water and/or dust suppressants as necessary to minimize dust emissions <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab 	None	None

Notes:

1. For each employee engaged in a task identified above, the employer will fully and properly implement the engineering controls, work practices, and respiratory protection for each identified task.
2. When implementing the control measures specified in the table above, each employer will:
 - i. For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
 - ii. For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
 - iii. For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
 - A. Is maintained as free as practicable from settled dust;
 - B. Has door seals and closing mechanisms that work properly;
 - C. Has gaskets and seals that are in good condition and working properly;
 - D. Is under positive pressure maintained through continuous delivery of fresh air;
 - E. Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0µm range (*e.g.*, MERV-16 or better); and
 - F. Has heating and cooling capabilities.
3. When an employee performs more than one task on the table above during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on the table above combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

For tasks not listed in the table, or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in the table, the employer must ensure that no employee is exposed to respirable crystalline silica above 50 µg/m³, calculated as an 8-hour TWA.

APPENDIX D

Hydrodynamic Separator Operations and Maintenance Manual



Hydroworks® HydroStorm

Operations & Maintenance Manual

Version 1.0

Please call Hydroworks at 888-290-7900 or email us at support@hydroworks.com if you have any questions regarding the Inspection Checklist. Please fax a copy of the completed checklist to Hydroworks at 888-783-7271 for our records.

Introduction

The HydroStorm is a state of the art hydrodynamic separator. Hydrodynamic separators remove solids, debris and lighter than water (oil, trash, floating debris) pollutants from stormwater. Hydrodynamic separators and other water quality measures are mandated by regulatory agencies (Town/City, State, Federal Government) to protect storm water quality from pollution generated by urban development (traffic, people) as part of new development permitting requirements.

As storm water treatment structures fill up with pollutants they become less and less effective in removing new pollution. Therefore, it is important that storm water treatment structures be maintained on a regular basis to ensure that they are operating at optimum performance. The HydroStorm is no different in this regard and this manual has been assembled to provide the owner/operator with the necessary information to inspect and coordinate maintenance of their HydroStorm.

Hydroworks® HydroStorm Operation

The Hydroworks HydroStorm (HS) separator is a unique hydrodynamic by-pass separator. It incorporates a protected submerged pretreatment zone to collect larger solids, a treatment tank to remove finer solids, and a dual set of weirs to create a high flow bypass. High flows are conveyed directly to the outlet and do not enter the treatment area, however, the submerged pretreatment area still allows removal of coarse solids during high flows.

Under normal or low flows, water enters an inlet area with a horizontal grate. The area underneath the grate is submerged with openings to the main treatment area of the separator. Coarse solids fall through the grate and are either trapped in the pretreatment area or conveyed into the main treatment area depending on the flow rate. Fines are transported into the main treatment area. Openings and weirs in the pretreatment area allow entry of water and solids into the main treatment area and cause water to rotate in the main treatment area creating a vortex motion. Water in the main treatment area is forced to rise along the walls of the separator to discharge from the treatment area to the downstream pipe.

The vortex motion forces solids and floatables to the middle of the inner chamber. Floatables are trapped since the inlet to the treatment area is submerged. The design maximizes the retention of settled solids since solids are forced to the center of the inner chamber by the vortex motion of water while water must flow up the walls of the separator to discharge into the downstream pipe.

A set of high flow weirs near the outlet pipe create a high flow bypass over both the pretreatment area and main treatment chamber. The rate of flow into the treatment area is regulated by the number and size of openings into the treatment chamber and the height of by-pass weirs. High flows flow over the weirs directly to the outlet pipe preventing the scour and resuspension of any fines collected in the treatment chamber.



A central access tube is located in the structure to provide access for cleaning. The arrangement of the inlet area and bypass weirs near the outlet pipe facilitate the use of multiple inlet pipes.

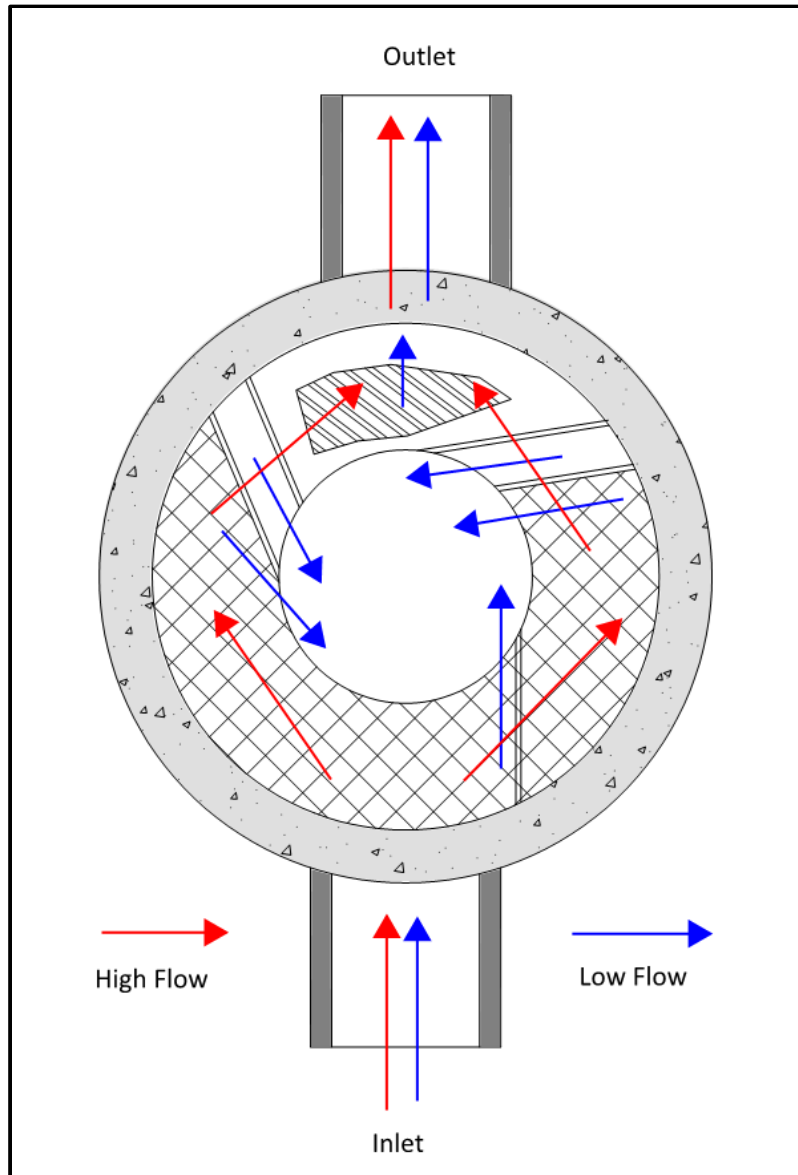


Figure 1. Hydroworks HydroStorm Operation – Plan View

Figure 2 is a profile view of the HydroStorm separator showing the flow patterns for low and high flows.

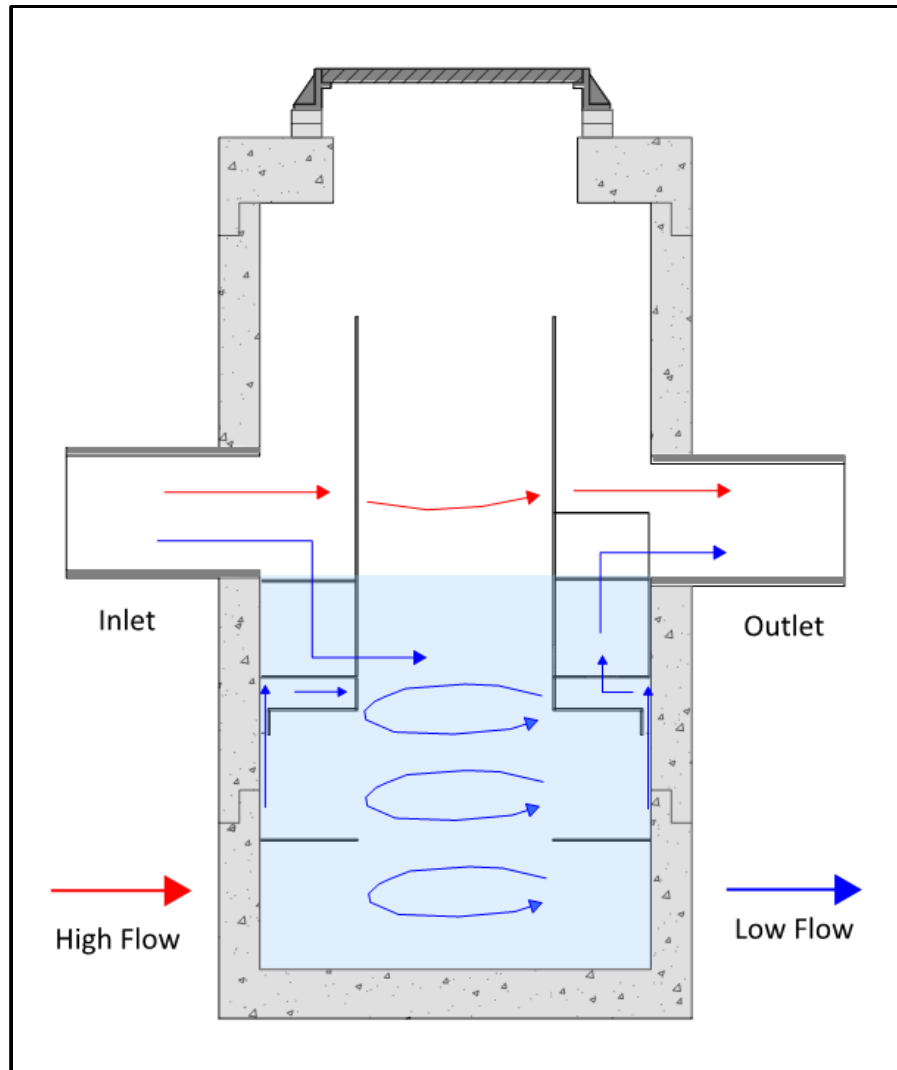


Figure 2. Hydroworks HydroStorm Operation – Profile View

The HS 4i is an inlet version of the HS 4 separator. There is a catch-basin grate on top of the HS 4i. A funnel sits underneath the grate on the frame and directs the water to the inlet side of the separator to ensure all low flows are properly treated. The whole funnel is removed for inspection and cleaning.

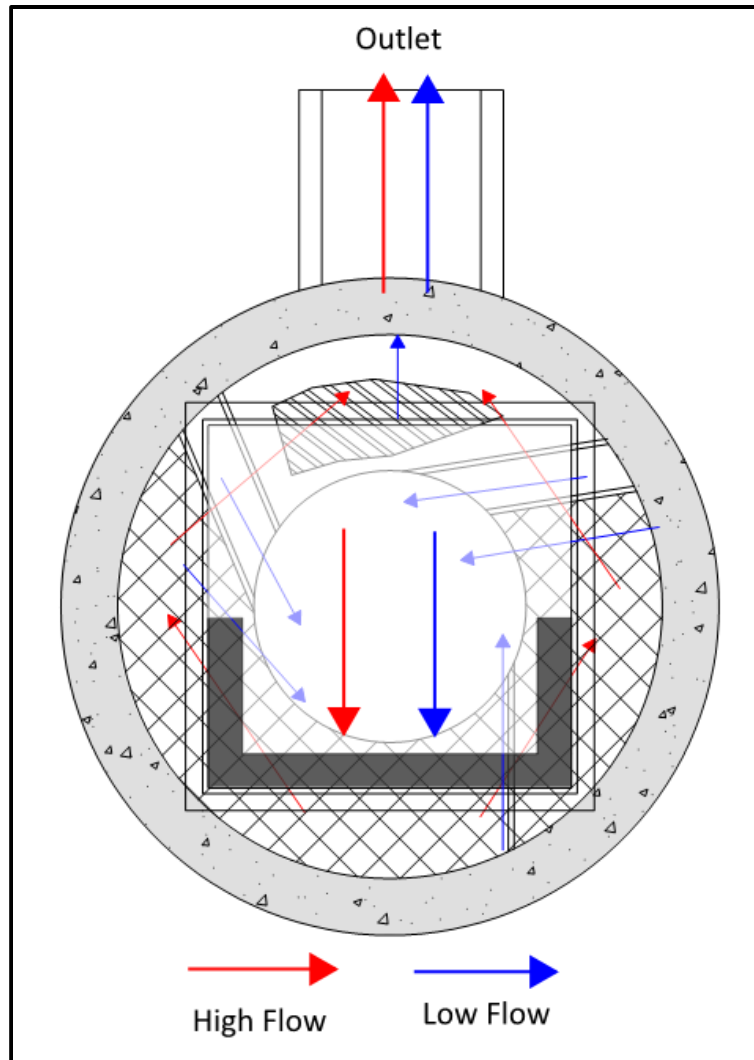


Figure 3. Hydroworks HS 4i Funnel

Inspection

Procedure

Floatables

A visual inspection can be conducted for floatables by removing the covers and looking down into the center access tube of the separator. Separators with an inlet grate (HS 4i or custom separator) will have a plastic funnel located under the grate that must be removed from the frame prior to inspection or maintenance. If you are missing a funnel please contact Hydroworks at the numbers provided at the end of this document.

TSS/Sediment

Inspection for TSS build-up can be conducted using a Sludge Judge®, Core Pro®, AccuSludge® or equivalent sampling device that allows the measurement of the depth of TSS/sediment in the unit. These devices typically have a ball valve at the bottom of the tube that allows water and TSS to flow into the tube when lowering the tube into the unit. Once the unit touches the bottom of the device, it is quickly pulled upward such that the water and TSS in the tube forces the ball valve closed allowing the user to see a full core of water/TSS in the unit. The unit should be inspected for TSS through each of the access covers. Several readings (2 or 3) should be made at each access cover to ensure that an accurate TSS depth measurement is recorded.

Frequency

Construction Period

The HydroStorm separator should be inspected every four weeks and after every large storm (over 0.5" (12.5 mm) of rain) during the construction period.

Post-Construction Period

The Hydroworks HydroStorm separator should be inspected during the first year of operation for normal stabilized sites (grassed or paved areas). If the unit is subject to oil spills or runoff from unstabilized (storage piles, exposed soils) areas the HydroStorm separator should be inspected more frequently (4 times per year). The initial annual inspection will indicate the required future frequency of inspection and maintenance if the unit was maintained after the construction period.

Reporting

Reports should be prepared as part of each inspection and include the following information:

1. Date of inspection
2. GPS coordinates of Hydroworks unit
3. Time since last rainfall
4. Date of last inspection
5. Installation deficiencies (missing parts, incorrect installation of parts)
6. Structural deficiencies (concrete cracks, broken parts)
7. Operational deficiencies (leaks, blockages)
8. Presence of oil sheen or depth of oil layer
9. Estimate of depth/volume of floatables (trash, leaves) captured
10. Sediment depth measured
11. Recommendations for any repairs and/or maintenance for the unit
12. Estimation of time before maintenance is required if not required at time of inspection



A sample inspection checklist is provided at the end of this manual.

Maintenance

Procedure

The Hydroworks HydroStorm unit is typically maintained using a vacuum truck. There are numerous companies that can maintain the HydroStorm separator. Maintenance with a vacuum truck involves removing all of the water and sediment together. The water is then separated from the sediment on the truck or at the disposal facility.

A central access opening (24" or greater) is provided to the gain access to the lower treatment tank of the unit. This is the primary location to maintain by vacuum truck. The pretreatment area can also be vacuumed and/or flushed into the lower treatment tank of the separator for cleaning via the central access once the water level is lowered below the pretreatment floor.

In instances where a vacuum truck is not available other maintenance methods (i.e. clamshell bucket) can be used, but they will be less effective. If a clamshell bucket is used the water must be decanted prior to cleaning since the sediment is under water and typically fine in nature. Disposal of the water will depend on local requirements. Disposal options for the decanted water may include:

1. Discharge into a nearby sanitary sewer manhole
2. Discharge into a nearby LID practice (grassed swale, bioretention)
3. Discharge through a filter bag into a downstream storm drain connection

The local municipality should be consulted for the allowable disposal options for both water and sediments prior to any maintenance operation. Once the water is decanted the sediment can be removed with the clamshell bucket.

Disposal of the contents of the separator depend on local requirements. Maintenance of a Hydroworks HydroStorm unit will typically take 1 to 2 hours based on a vacuum truck and longer for other cleaning methods (i.e. clamshell bucket).



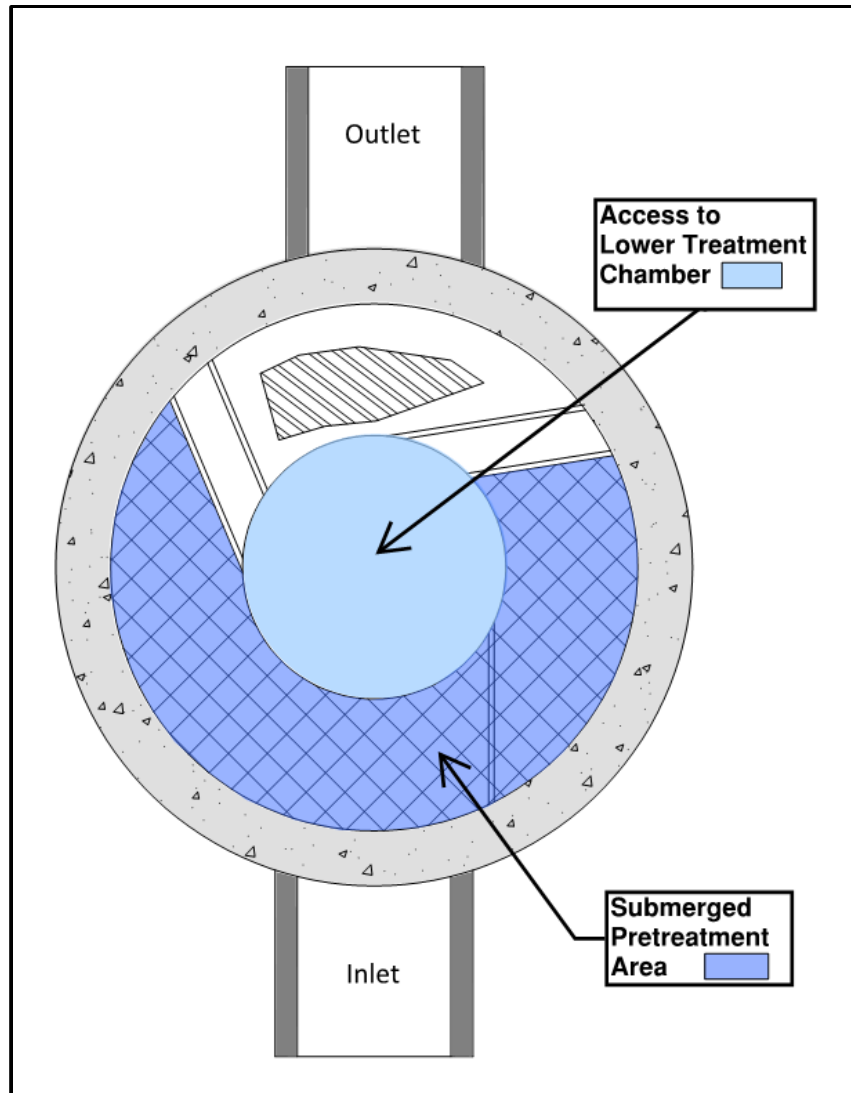


Figure 3. Maintenance Access

Frequency

Construction Period

A HydroStorm separator can fill with construction sediment quickly during the construction period. The HydroStorm must be maintained during the construction period when the depth of TSS/sediment reaches 24" (600 mm). It must also be maintained during the construction period if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the area of the separator

The HydroStorm separator should be maintained at the end of the construction period, prior to operation for the post-construction period.

Post-Construction Period

The HydroStorm was independently tested by Alden Research Laboratory in 2017. A HydroStorm HS 4 was tested for scour with a 50% sediment depth of 0.5 ft. Therefore, maintenance for sediment accumulation is required if the depth of sediment is 1 ft or greater in separators with standard water (sump) depths (Table 1).

There will be designs with increased sediment storage based on specifications or site-specific criteria. A measurement of the total water depth in the separator through the central access tube should be taken and compared to water depth given in Table 1. The standard water depth from Table 1 should be subtracted from the measured water depth and the resulting extra depth should be added to the 1 ft to determine the site-specific sediment maintenance depth for that separator.

For example, if the measured water depth in the HS-7 is 7 feet, then the sediment maintenance depth for that HS-7 is 2 ft ($= 1 + 7 - 6$) and the separator does not need to be cleaned for sediment accumulation until the measure sediment depth is 2 ft.

The HydroStorm separator must also be maintained if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the water surface of the separator.

Table 1 Standard Dimensions for Hydroworks HydroStorm Models

Model	Diameter (ft)	Total Water Depth (ft)	Sediment Maintenance Depth for Table 1 Total Water Depth(ft)
HS-3	3	3	1
HS-4	4	4	1
HS-5	5	4	1
HS-6	6	4	1
HS-7	7	6	1
HS-8	8	7	1
HS-9	9	7.5	1
HS-10	10	8	1
HS-11	11	9	1
HS-12	12	9.5	1



HYDROSTORM INSPECTION SHEET

Date
Date of Last Inspection _____

Site
City _____
State _____
Owner _____

GPS Coordinates _____

Date of last rainfall _____

Site Characteristics	Yes	No
Soil erosion evident	<input type="checkbox"/>	<input type="checkbox"/>
Exposed material storage on site	<input type="checkbox"/>	<input type="checkbox"/>
Large exposure to leaf litter (lots of trees)	<input type="checkbox"/>	<input type="checkbox"/>
High traffic (vehicle) area	<input type="checkbox"/>	<input type="checkbox"/>

HydroStorm	Yes	No
Obstructions in the inlet or outlet	<input type="checkbox"/> *	<input type="checkbox"/>
Missing internal components	<input type="checkbox"/> **	<input type="checkbox"/>
Improperly installed inlet or outlet pipes	<input type="checkbox"/> ***	<input type="checkbox"/>
Internal component damage (cracked, broken, loose pieces)	<input type="checkbox"/> **	<input type="checkbox"/>
Floating debris in the separator (oil, leaves, trash)	<input type="checkbox"/>	<input type="checkbox"/>
Large debris visible in the separator	<input type="checkbox"/> *	<input type="checkbox"/>
Concrete cracks/deficiencies	<input type="checkbox"/> ***	<input type="checkbox"/>
Exposed rebar	<input type="checkbox"/> **	<input type="checkbox"/>
Water seepage (water level not at outlet pipe invert)	<input type="checkbox"/> ***	<input type="checkbox"/>
Water level depth below outlet pipe invert _____"		

Routine Measurements			
Floating debris depth	< 0.5" (13mm)	<input type="checkbox"/>	>0.5" 13mm) <input type="checkbox"/> *
Floating debris coverage	< 50% of surface area	<input type="checkbox"/>	> 50% surface area <input type="checkbox"/> *
Sludge depth	< 12" (300mm)	<input type="checkbox"/>	> 12" (300mm) <input type="checkbox"/> *

* Maintenance required
 ** Repairs required
 *** Further investigation is required





Hydroworks® HydroStorm

One Year Limited Warranty

Hydroworks, LLC warrants, to the purchaser and subsequent owner(s) during the warranty period subject to the terms and conditions hereof, the Hydroworks HydroStorm to be free from defects in material and workmanship under normal use and service, when properly installed, used, inspected and maintained in accordance with Hydroworks written instructions, for the period of the warranty. The standard warranty period is 1 year.

The warranty period begins once the separator has been manufactured and is available for delivery. Any components determined to be defective, either by failure or by inspection, in material and workmanship will be repaired, replaced or remanufactured at Hydroworks' option provided, however, that by doing so Hydroworks, LLC will not be obligated to replace an entire insert or concrete section, or the complete unit. This warranty does not cover shipping charges, damages, labor, any costs incurred to obtain access to the unit, any costs to repair/replace any surface treatment/cover after repair/replacement, or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to any material that has been disassembled or modified without prior approval of Hydroworks, LLC, that has been subjected to misuse, misapplication, neglect, alteration, accident or act of God, or that has not been installed, inspected, operated or maintained in accordance with Hydroworks, LLC instructions and is in lieu of all other warranties expressed or implied. Hydroworks, LLC does not authorize any representative or other person to expand or otherwise modify this limited warranty.

The owner shall provide Hydroworks, LLC with written notice of any alleged defect in material or workmanship including a detailed description of the alleged defect upon discovery of the defect. Hydroworks, LLC should be contacted at 136 Central Ave., Clark, NJ 07066 or any other address as supplied by Hydroworks, LLC. (888-290-7900).

This limited warranty is exclusive. There are no other warranties, express or implied, or merchantability or fitness for a particular purpose and none shall be created whether under the uniform commercial code, custom or usage in the industry or the course of dealings between the parties. Hydroworks, LLC will replace any goods that are defective under this warranty as the sole and exclusive remedy for breach of this warranty.

Subject to the foregoing, all conditions, warranties, terms, undertakings or liabilities (including liability as to negligence), expressed or implied, and howsoever arising, as to the condition, suitability, fitness, safety, or title to the Hydroworks HydroStorm are hereby negated and excluded and Hydroworks, LLC gives and makes no such representation, warranty or undertaking except as expressly set forth herein. Under no circumstances shall Hydroworks, LLC be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the HydroStorm, or the cost of other goods or services related to the purchase and installation of the HydroStorm. For this Limited Warranty to apply, the HydroStorm must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Hydroworks' written installation instructions.

Hydroworks, LLC expressly disclaims liability for special, consequential or incidental damages (even if it has been advised of the possibility of the same) or breach of expressed or implied warranty. Hydroworks, LLC shall not be liable for penalties or liquidated damages, including loss of production and profits; labor and materials; overhead costs; or other loss or expense incurred by the purchaser or any third party. Specifically excluded from limited warranty coverage are damages to the HydroStorm arising from ordinary wear and tear; alteration, accident, misuse, abuse or neglect; improper maintenance, failure of the product due to improper installation of the concrete sections or improper sizing; or any other event not caused by Hydroworks, LLC. This limited warranty represents Hydroworks' sole liability to the purchaser for claims related to the HydroStorm, whether the claim is based upon contract, tort, or other legal basis.