Appendix 8-C: Program Health and Safety Plan

Prepared For:

Champlain Hudson Power Express Project

Prepared by:

NKT HV Cables AB

PROGRAM HEALTH AND SAFETY PLAN

New York, United States

HEALTH AND SAFETY PLAN

New York, United States of America

Prepared By	Date
Treavor Clarke NKT HV Cables AB	

Reviewed By	Date
Dylan Hammond NKT HV Cables AB	

Prepared by: NKT HV Cables AB

December 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

>	Greater than
<	Less than
≥	Greater than or equal to
%	Percent
Abs	Absorption
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APR	Air-Purifying Respirator
CFR	Code of Federal Regulations
CHPE	Champlain Hudson Power Express
Con	Skin and/or eye contact
CP	Competent Person
CRZ	Contaminant Reduction Zone
EHS	Environmental, Health, and Safety
EMT	Emergency Medical Technician
ft.	foot/feet
GHS	Global Harmonization System
HASP	Health And Safety Plan
HAZCOM	Hazard Communication
IDLH	Immediately Dangerous to Life and Health
Ing	Ingestion
Inh	Inhalation
NA	Not Available
NIOSH	National Institute for Occupational Safety and Health
NKT	NKT HV Cables AB
OSHA	Occupational Safety and Health Administration
pDR	Personal Data RAM
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
ppm	parts per million
(R)	Respirable Particulate Matter
REL	Recommended Exposure Limit
SDS	Safety Data Sheet
SJA	Safe Job Analysis
SSL	Site Safety Lead
STEL	Short-Term Exposure Limit
TBD	To be determined
TWA	Time-Weighted Average
USA	United States of America
WESTON	Weston Solutions, Inc.

HASP EXECUTIVE SUMMARY

This document serves as the Health and Safety Plan (HASP) for NKT HV Cables AB (NKT) personnel performing work activities on the project presented in Table 1. This HASP will cover activities performed for the Champlain Hudson Power Express (CHPE) in support of the project site located in New York, United States of America (U.S.A.). To complete all work activities, NKT will procure subcontractors as needed. To ensure that hazards associated with the performance of the work activities are recognized and properly controlled each subcontractor procured by NKT will conduct their job duties in accordance with this HASP as well as their own unique safety policies and procedures. Copies of all required health and safety documentation for each subcontractor's work activities shall be provided to NKT for review prior to the start of onsite activities.

NKT will perform the following activities:

- **Task 1 – Delivery and Receipt of Cables – Performing in June& Aug. 2024**
  - Subtask 1a: Cable Inspection
  - Subtask 1b: Cutting of Cables on a Marine Vessel
  - Subtask 1c: Capping of Cables on a Marine Vessel
- **Task 2 – Underwater Placement of Cables – August 2024**
  - Subtask 2a: Cutting of Cables on a Marine Vessel
  - Subtask 2b: Splicing of Cables on a Marine Vessel
- **Task 3 – Underground Placement of Cables – to be performed at a later date**
  - Subtask 3a: Transition of Cables from Underwater to Underground
  - Subtask 3b: Splicing of Cables on Land

Table 1: Project Information

Client Name:	NKT		
Site Name:	CHPE located in New York, U.S.A.		
Prepared By:	M. Pierce	**Date Prepared:**	08/26/2023
Date Revised:	12/7/2023		
Project Start Date:	September 2023	**Project End Date:**	September 2024

UNDERGROUND UTILITIES

Notification should be no less than two -- but no more than 10 -- working days before commencing excavation. The markings are valid for 15 working days from the date of the call to the notification center. Providing the correct spelling of the street name, pavement type, nearest cross-street and the area to be marked will assist the locators in marking the location of underground facilities within the required 48-hour time period.

EMERGENCY MUSTER POINT

TO BE DETERMINED BY SITE SAFETY LEAD (SSL) - The escape route from each site and an emergency muster point will be determined and provided to all workers daily during the pre-entry briefing/initial site safety meeting. The chosen muster point will be identified by the Site Safety Lead.

NKT PROJECT REPRESENTATIVES

The Project Delivery Team includes the NKT Project Representatives and Client Representatives, contact information is presented in Table 2. As additional firms are contracted to perform work at the Site, additional representatives will be included in this table for reference. Emergency response contact information is presented in Table 3.

Table 2: Project Delivery Team Contact Information

NKT Project Representatives				
Name	**Organization**	**Responsibility**	**Telephone**	
Jonas Carlson	NKT	Installation Manager	Mobile:	917 287 3989
Mark Brain	NKT	Site Installation Manager	Mobile:	+44 7972 513 664
Cesar Reyes	NKT	Project Manager	Mobile:	215-852-3086
Kyle Kingman	NKT	Deputy Project Installation Manager	Mobile:	908 432 2728
Martin Hall	NKT	Site Safety Lead/Supervisor	Mobile:	718-316-5773
Treavor Clarke	NKT	Health and Safety Manager	Mobile:	919-664-2997
Dylan Hammond	NKT	Project Environmental Manager	Mobile:	919-561-2002
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	
			Mobile:	

Client Representatives		
Name	**Organization/ Responsibility**	**Telephone No.**
Sabrina Taylor	Transmission Developers, Inc./ Senior Project Manager	(561) 714-8555

Table 3: Project-Specific Emergency Contacts

Emergency Organization/Agency	Emergency Telephone Number	Non-Emergency Telephone Number
Police or Fire Department	911	Provided in each Site-Specific Addendum
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***		Provided in each Site-Specific Addendum
Local Medical Facility for minor injuries: A map and directions for the local medical facility are included in each Site-Specific HASP Addendum.		Provided in each Site-Specific Addendum
NYSDEC Spill Hotline	1-800-457-7362	
National Response Center	1-800-424-8802	
Poison Control Center	1-800-222-1222	

Notes:EMT – Emergency Medical Technician

POTENTIAL CHEMICAL HAZARDS

Chemical hazards include fumes from lead soldering and hot work. Additional chemical hazards include fuels – diesel and gasoline – brought onsite by project personnel. Chemical hazards are detailed in Section 4.0

PHYSICAL HAZARDS

Slips, Trips, Falls	Dust	Flying Objects (Struck-by)
Heavy Equipment	Utilities	Heat/Cold
Site Security	Pinch Points	Sharp Edges (Struck, Struck-by)
Hazardous Atmospheres	Noise	Lifting

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE), identified in the SJA for the task, will be used to protect workers from physical and chemical hazards at the site. At a minimum, PPE includes a reflective safety vest, safety glasses, full-length pants, and steel toe boots. Additionally, a hard hat, hearing protection, and task specific gloves (Nitrile, Neoprene, Leather, Cut-Resistant) will be used to afford additional protection. Required PPE for all NKT tasks are listed in the Safe Job Analysis (SJA) for each activity per the scope of work for this effort. Table 4 summarizes the PPE required for NKT tasks:

- SJA 1 – Mobilization and Demobilization
- SJA 2 – Submarine Cutting
- SJA 3 – Submarine Capping

Table 4:Task-Specific PPE Requirements

PPE Item	SJA 1	SJA 2	SJA 3
Hard Hat	*✓	*✓	*✓
FR Coveralls	✓	✓	✓
High-Visibility Safety Vests (Class 2 or 3)	✓		
FR Composite-Toe Safety Shoes (ASTM F2412)	✓	✓	✓
ANSI Z 87 Safety Glasses	✓	✓	✓
Hearing Protection		*✓	*✓
Nitrile Gloves		*✓	*✓
FR Work Gloves (can be worn beneath nitrile gloves)		✓	✓
Welding Face Shield			
Tight-Fitting APR (full - face) with particulate, organic vapor, and acid protection cartridges		✓	✓

Notes:
✓ - Required PPE
*✓ - Conditional PPE
Nitrile gloves and coveralls are required for persons likely to come in direct contact with hazardous materials or waste. Coveralls are required for extensive decontamination of contaminated equipment. Hearing protection is required when working around heavy equipment. Leather work gloves are required for general use of hands tools and equipment.

1.0 INTRODUCTION

1.1 NKT Safety Policy

NKT is committed to providing employees with a safe and healthy work environment. NKT is responsible for the implementation of all safety, health, welfare, and construction management measures necessary for the execution of the work and for the management of its subcontractors on site. To this effect the standards required by legislation as well as the contractual health and safety and other requirements hereof, will be the minimum applied for all activities undertaken on site. NKT is certified in accordance with the requirements of ISO 45001:2018 and has an integrated Quality, Health, Safety, and Environmental Management System designed to ensure that NKT manages and controls its occupational health, safety, and environmental risks and continually improves its performance. Procedures from this management system will be utilized as appropriate.

The provisions of this HASP are mandatory for all NKT personnel engaged in fieldwork associated with the work being conducted at this site. A copy of this HASP will be maintained on-site. Main subcontractors employed on the project shall have a documented management system aligned or similar to ISO 45001:2018.

1.1.1 Health and Safety Expectations

NKT has implemented the following overall project quality, health, safety, and environmental objectives:

- No damage to people, environment, property, and equipment
- Report observations for learnings
- Right the first time
- Follow the process and procedures
- Health, Safety, and Environmental project familiarization attended by NKT owners and personnel.

One of the key points is the active involvement of personnel in all health and safety matters. Therefore, everybody has the opportunity to bring up health and safety related improvement ideas. This input can be directed to NKT's Project Manager. The proposed ideas will be discussed with the Project Manager and SSL, and if possible, implemented. Feedback shall always be given to the person regarding the status of the idea.

1.1.2 Toolbox Meetings

Prior to the commencement of project activities, a pre-entry briefing will be conducted by the SSL to review the specific requirements of this HASP and all on-site staff will have to acknowledge attendance and acceptance of the provisions herein in Attachment A of this document. Prior to the commencement of daily project activities, a toolbox meeting will be conducted by the SSL to review the specific requirements of this HASP as applicable to the current scope of work and discuss site conditions that have changed since the previous day or trip to the site. Attendance at the daily toolbox meeting is mandatory for all personnel covered by this HASP at the site and must be documented on the attendance form provided in Attachment C. All documentation should be maintained in the project file.

1.1.3 Maximum Duration of the Workday for Field Activities

An employee may not work a shift that exceeds 14 hours in duration. For the purpose of this policy, the work shift includes time spent at lunch and on break. If an employee works more than one shift during a calendar day, the total number of hours worked in that day cannot exceed 14 hours.

1.2 Health and Safety Plan (HASP)

1.2.1 HASP Purpose

The purpose of this HASP is to identify hazards associated with the tasks NKT performs in executing CHPE work plan, specifically to specify engineering and administrative controls and personal protective equipment necessary to mitigate the risks associated with these hazards. This HASP addresses the currently recognized hazards as

new hazards are encountered, task-specific Safe Job Analysis (SJA) must be conducted and the results input into the HASP. This HASP also assigns responsibilities for the implementation of safety programs on this project and defines monitoring and emergency response planning specific to the project. This HASP is required per 29 CFR 1910.120.

1.2.2 HASP Applicability

This HASP has been developed by NKT and establishes the health and safety procedures required to minimize potential risk to NKT and contractor personnel involved with the investigation.

Client, subcontractor, and visiting personnel who do not need to meet the training, medical surveillance, and personal protective equipment requirements of this HASP will not be exposed to hazards on the site and must be escorted at all times by a fully trained and qualified person with knowledge of all hazards on the site. Such unqualified people can include surveyors, utility locators, government personnel, NKT and Client representatives, and others with business reasons to be at the site.

1.3 Training

All NKT personnel performing activities at the site will be trained in accordance with OSHA 29 CFR Part 1910 (General Industry) and OSHA 29 CFR Part 1926 (Construction Industry), when applicable. All personnel are required to remain current in all their required training and evaluate their need for additional training when there is a change in work.

NKT will maintain a separate binder of all applicable training certifications for personnel on the project site. All personnel on the project are require to hold the following training certificates and maintain them as valid throughout the duration of the project work:

- Hot Work Training
- Lead Hazard Awareness
- Respiratory Protection Training
- First-Aid/CPR Training
- 30-Hour Construction Safety Training – only required for supervisors or those responsible for safety on the project.
- Bloodborne Pathogens Training

In addition to the above training, all personnel must participate in OSHA-required medical surveillance for monitoring lead exposures, respirator clearance and fit testing. Respirator fit testing is based upon the type of respirator being work. The tasks involving lead work include cutting and heating of lead, requiring an assigned protection factor (APF) of 50. Respirators providing APF 50 must have quantitative fit tests completed by a qualified medical practitioner.

1.3.1 HAZWOPER Qualifications

Personnel performing work at the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific SJAs or by the SSL) and must meet the medical monitoring and training requirements specified in the OSHA HAZWOPER Standard 29 CFR 1910.120.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document any symptoms that may be specific to the materials present.

1.3.2 Site-Specific Safety Training

In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager or their delegate. Any additional required training that is completed will be documented and tracked in the project files.

1.3.3 Competent Person Training Requirements

To complete the planned scope of work, an (OSHA conformance) competent person must be designated to perform the required daily on-site inspections of operations and/or equipment. The competent person may be a NKT (if responsible for supervising that activity) or the subcontractor's employee.

1.4 Organization/Responsibility

The implementation of health and safety at this project location will be the shared responsibility of the NKT Project Manager (PM), the NKT Project SSL, and all other NKT personnel and NKT's contractors implementing the proposed scope of work. The Program HASP Organizational Chart is presented in Figure 1. Safety certifications for key NKT personnel are presented in Table 5.

1.4.1 NKT Project Manager

The NKT PM is the individual who has the primary responsibility for ensuring the overall health and safety of this project. As such, the PM is responsible for ensuring that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including NKT subcontractors, have received a copy for review.
- Providing the Safety Support with updated information regarding conditions at the site and the scope of site work.
- Providing adequate authority and resources to the on-site SSL to allow for the successful implementation of all necessary safety procedures.
- Supporting the decisions made by the SSL and Safety Manager.
- Maintaining regular communications with the SSL and, if necessary, the Safety Manager.
- Coordinating the activities of all NKT subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project, and
- Conducting periodic project audits.

1.4.2 NKT Site Safety Lead

All NKT personnel are responsible for implementing the safety requirements specified in this HASP. However, one staff member will serve as the SSL. The SSL is appointed by the PM and will be on-site during all activities covered by this HASP. The SSL is responsible for enforcing the requirements of this HASP once work begins. The SSL has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSL's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including all subcontractors, have reviewed and signed this HASP and all SJAs relevant to their work.
- Assuring that all personnel to whom this HASP applies have attended a pre-entry briefing and daily toolbox meetings.
- Maintaining a high level of health and safety consciousness among employees implementing the site work.
- Securing Work Permits. The SSL must determine what, if any, work permits must be secured from the facility prior to the commencement of activities. If required, the SSL must determine how long the work permit is good for and verify that all the provisions of the work permit can be met by NKT and its subcontractors.

- Procuring the air monitoring instrumentation required and performing air monitoring for investigative activities.
- Procuring and distributing the PPE and safety equipment needed for this project for NKT employees.
- Verifying that all PPE and health and safety equipment used by NKT is in good working order.
- Verifying that NKT contractors are prepared with the PPE, respiratory protection and safety equipment required for this program.
- Preparing an initial SJA prior to mobilization and revising the SJA onsite to reflect actual site conditions. All SJA revisions must be briefed to all staff, reviewed daily, and updated as needed (Attachment B). Then the SJA will be reviewed daily by all workers and updated as needed.
- Notifying the PM of all noncompliance situations and stopping work if an immediate danger situation is perceived.
- Monitoring and controlling the safety performance of all personnel within the established restricted areas to ensure that required safety and health procedures are being followed.
- Conducting/assisting with incident investigations and preparing incident investigation reports.
- Conducting the pre-entry briefing for all personnel prior to beginning work.
- Conducting a 360° walkaround of the jobsite daily, evaluating uncontrolled hazards. Provide updates to all staff at daily toolbox meeting; and
- Initiating emergency response procedures in accordance with the Program HASP.

1.4.3 NKT Field Personnel

All NKT field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Assess each task prior to beginning work on that task for hazards and necessary controls.
- Assess the work area for changing conditions and new hazards.
- Participate in the development of effective controls.
- Stop work and initiate corrective actions if work site risks are discovered or if personnel are uncertain of how to proceed.
- Reading this HASP and all relevant SJAs prior to beginning work on the site.
- Submitting a completed HASP Review and acceptance form (Attachment A) to the NKT SSL prior to the start of work.
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program.
- Bringing forth any questions or concerns regarding the content of the HASP to the PM or the SSL prior to the start of work.
- Reporting all Incidents, injuries, and illnesses, regardless of their severity, to the NKT SSL; and,
- Complying with the requirements of this HASP and the requests of the SSL.

1.4.4 Subcontractors

Each NKT subcontractor is responsible for directing the means and methods for their work. Each subcontractor's management will provide qualified employees and allocate enough time, materials, and equipment to safely complete assigned tasks. Each subcontractor is responsible for equipping its personnel with all required PPE and training.

NKT considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to NKT for review prior to the start of onsite activities.

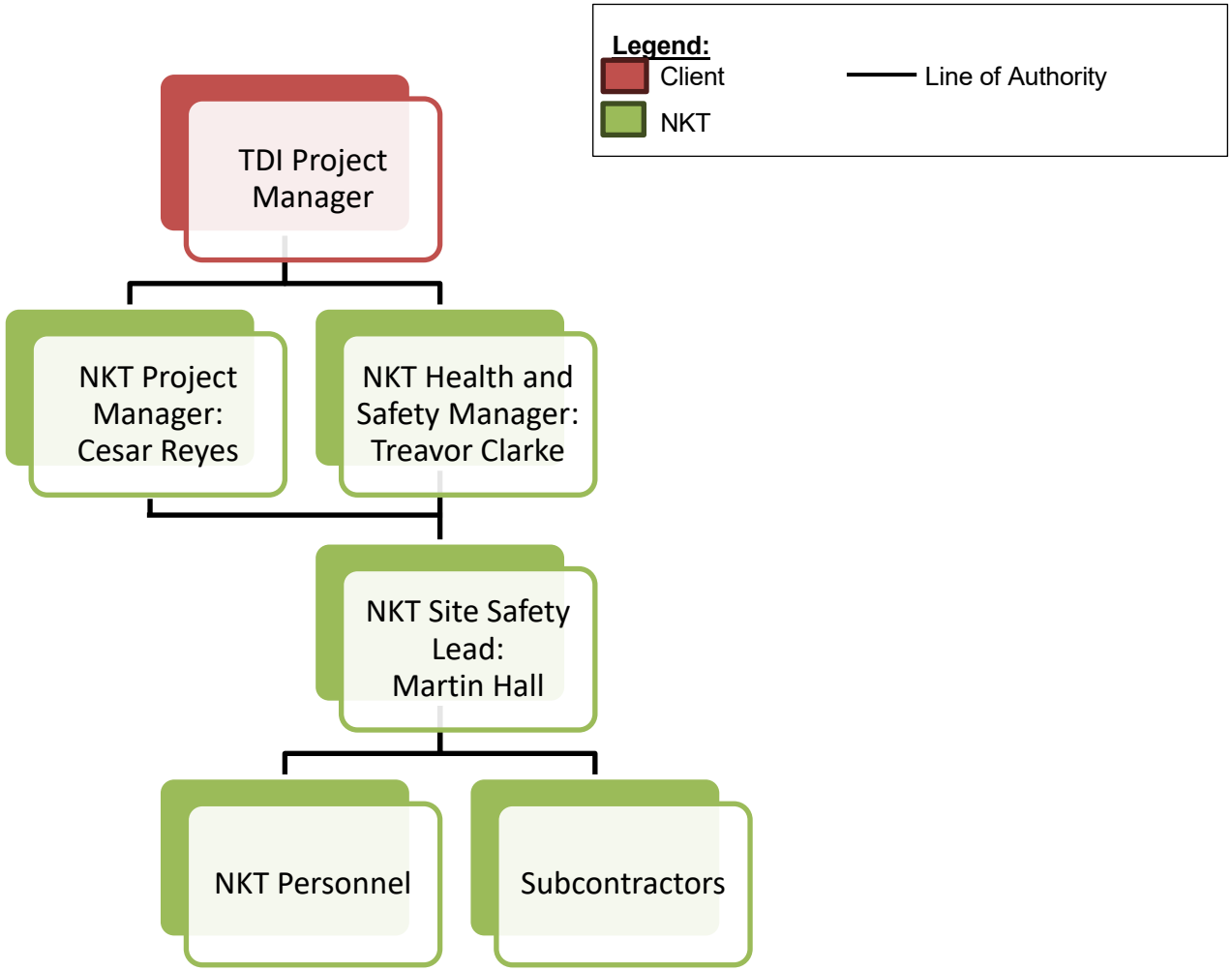
Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified, and addressed to the NKT PM or the SSL, prior to beginning work operations. The SSL has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

Additionally, contractors hired by NKT are responsible for:

- Providing in advance a copy of a written safety plan and policies pertaining to their work.
- Reading the HASP in its entirety prior to the start of on-site work.
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are conducted during the implementation of the program.
- Ensuring that their equipment is in good working order via daily inspections.
- Operating their equipment in a safe manner.
- Appointing an on-site safety coordinator to interface with the NKT SSL.
- Providing NKT with copies of safety data sheets (SDS) for all hazardous materials brought on-site.
- Providing NKT with current copies of required training certifications for all personnel operating on-site; and,

Providing all the required PPE, respiratory equipment, and safety supplies to their employees.

Figure 1: Project Organizational Chart



1.5 Management of Change/Modification of the HASP

1.5.1 Management of Change

This document discusses the physical and chemical hazards associated with the proposed activities. Unanticipated site-specific conditions or situations might occur during the implementation of this project. Also, NKT and/or the contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered a working document that is subject to change to meet the needs of this dynamic project.

1.5.2 Safe Job Analysis (SJA)

NKT and NKT's contractors will complete task specific SJAs or equivalent for each task to be performed. The use of new techniques will be reviewed and if new hazards are associated with the proposed changes, they will be assessed, and hazards/controls will be incorporated into the relevant SJA(s). The SJA(s) will be reviewed by the SSL prior to being implemented. Once approved, the completed forms will be reviewed with all field staff during the daily safety meeting. SJAs are presented in Attachment B.

1.5.3 Employees Working Alone

Employees working alone at project sites will review the that for their tasks as they are conducting their daily overview and reconnaissance of the site. After completing the review/revision and site reconnaissance, the employee should call the Project Manager and report any new hazards or site conditions observed.

1.5.4 HASP Modification

Should significant information become available regarding potential on-site hazards, it will be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the NKT Project Manager before the new work is implemented. Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The NKT PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the NKT PM. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Description and History

This HASP supports the CHPE project from Montreal, Quebec, Canada, to Queens, New York, U.S.A. The CHPE project is a 1,250 megawatt electric transmission project involving approximately 339 miles of high voltage direct current underground and underwater transmission cables laid in parallel. Transmission Developers, Inc. (TDI) has contract NKT to produce the cables, meet permitting requirements, and implement the installation of underwater and associated underground transitions.

The cables, produced by NKT, contain several layers of varying materials configured for either underground or underwater placement. Cables that will be installed underwater contain a lead alloy layer, which poses an environmental, health, and safety (EHS) risk when handled (Figure 2). Lengths of cables containing the lead alloy will need to be cut and spliced together on a marine vessel prior to placement underwater. Additional cutting and splicing of cables will occur in vaults on land where the underwater cable is connected to the underground cable. The cutting and splicing activities will pose EHS risks and create hazardous waste.

NKT will be self-performing the cutting and splicing activities in both the marine and land portions of the project. As such, NKT will be responsible for meeting EHS standards and lead waste management requirements. WESTON will provide NKT with support in EHS and waste management consultation.

2.2 Scope of Work

General site conditions and hazards present include heat stress, cold stress, inclement weather, insects and wild animals, biological hazards, noise exposure, slips, trips, and falls, lead dust and fumes exposure, construction-related activities, and marine confined spaces. PPE for all tasks is detailed in Table 4.

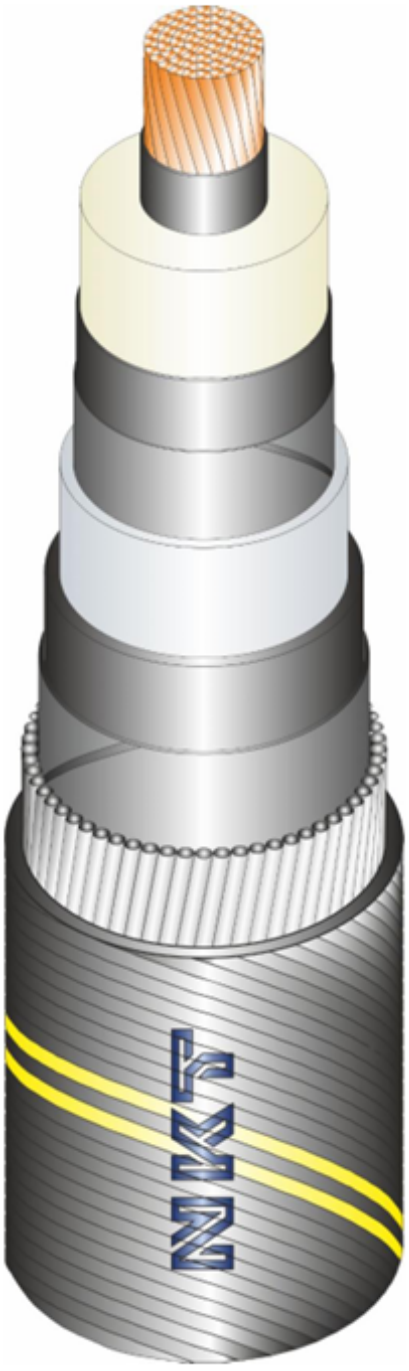
Applicable SJAs for all Tasks are listed below and provided in Attachment B.

- SJA 1 – Mobilization and Demobilization
- SJA 2 – Submarine Cutting
- SJA 3 – Submarine Capping

<u>Site Tasks</u>

- **Task 1 – Delivery and Receipt of Cables**
  - Subtask 1a: Cable Inspection
  - Subtask 1b: Cutting of Cables on a Marine Vessel
  - Subtask 1c: Capping of Cables on a Marine Vessel
- **Task 2 – Underwater Placement of Cables**
  - Subtask 2a: Cutting of Cables on a Marine Vessel
  - Subtask 2b: Splicing of Cables on a Marine Vessel
- **Task 3 – Underground Placement of Cables**
  - Subtask 3a: Transition of Cables from Underwater to Underground
  - Subtask 3b: Splicing of Cables on Land

Figure 2: Submarine Cable Design



DC Voltage	±400 kV	
Conductor	Profiled wires	
Type / material	Copper, Compound Water-Blocked	
Cross-section	4935 kcmil	2500 mm2
Water blocking	compound	
Diameter	2.28 in	57.8 mm
Conductor binder		
Material	semi-conductive swelling tape	
Thickness	22 mils	0.6 mm
Conductor shield		
Material	semi-conductive polymer	
Thickness	59 mils	1.5 mm
Insulation		
Material	cross-linked DC polymer	
Thickness	839 mils	21.3 mm
Insulation shield		
Material	semi-conductive polymer	
Thickness	55 mils	1.4 mm
Longitudinal water barrier		
Material	semi-conducting swell-able tape	
Thickness	26 mils	0.7 mm
Metallic sheath		
Type / material	extruded / lead alloy	
Thickness	118 mils	3 mm
Inner sheath		
Material	high-density polyethylene	
Thickness	98 mils	2.5 mm
Tensile armour		
Type / material	wire / steel	
Thickness	197 mils	5 mm
Outer serving		
Material	polypropylene yarn, 2 layers	
Thickness	157 mils	4 mm
Complete cable		
Diameter	5.44 inches	138.1 mm
Weight in air	36.4 lbf./ft.	54.2 kg/m
Weight in water	26.9 lbf./ft.	40.1 kg/m

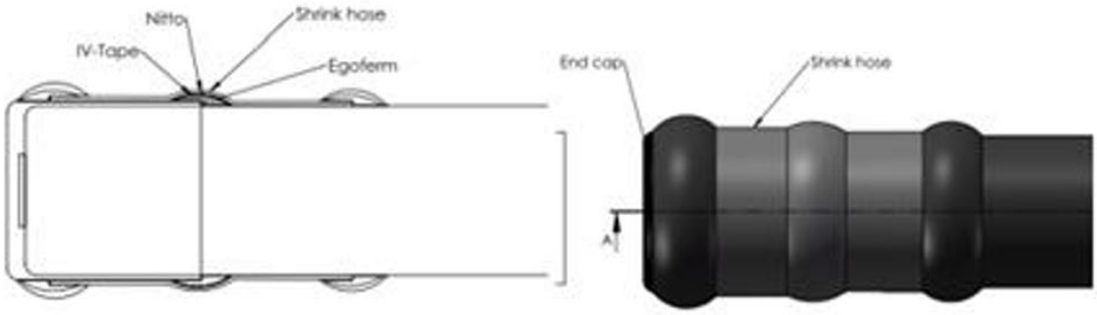
Note: All data shall be considered nominal

2.2.1 Task 1 – Delivery and Receipt of Cables

In September 2023, marine cables will be delivered to Port Albany, New York, U.S.A. As part of delivery, the cables will need to be inspected by NKT, which requires cutting and capping of the cables. For non-subsea storage, a reinforced non-metallic seal may be applied. This type of cut and seal requires less cable preparations and any time-consuming soldering is not necessary. The seal consists of a shrinking cap, shrinking sleeves, and various layers of tape (Figure 3). An exposure assessment will be conducted during the initial receipt of the cables to determine worker exposure to lead hazards.

Potential hazards include slips/trips/falls, uneven surfaces, loud noise, inclement weather, and low risk biological hazards from insects, exposure to lead dust and fumes, and work on a marine vessel. PPE for this task is detailed in Table 4. Applicable SJAs are provided in Attachment B.

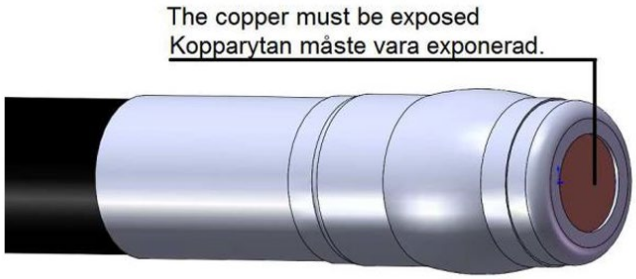
Figure 3: Reinforced Non-Metallic Seal



2.2.2 Task 2 – Underwater Placement of Cables

During this phase of work, the cables will be laid in parallel in the Hudson River. Cables will need to be cut to length and spliced together using tin-lead solder (SDS provided in Attachment D). For underwater placement, a metallic seal is necessary where a metallic end cap is soldered to the lead sheath of the cable with additional protection of shrink caps, sleeves, and tape (Figure 4). The process requires a longer time of cable preparation to open and layback the layers.

Figure 4: Metallic Seal



Potential hazards include slips/trips/falls, uneven surfaces, loud noise, inclement weather, exposure to lead dust and fumes, and low risk biological hazards from insects, plants, and animals (birds, spiders, or small indigenous wild animals). PPE for this task is detailed in Table 4. Applicable SJAs are provided in Attachment B.

2.2.3 Task 3: Underground Placement of Cables

During this phase of work, the cables will be transitioned from underwater to underground. To complete the transition, cables will need to be cut and spliced together and laid on the land surface for later underground placement by a separate contractor obtained by TDI.

Potential hazards include slips/trips/falls, uneven surfaces, loud noise, inclement weather, struck-by and caught-between, e and low risk biological hazards from insects, plants, and animals (birds, spiders, or small indigenous wild animals). PPE for this task is detailed in. Table 4. Applicable SJAs are provided in Attachment B.

.

3.0 MITIGATING EXPOSURES TO HAZARDS

The first line of defense is to identify and eliminate hazards. When eliminating a hazard (inclusive of substitution of tools, chemicals, etc.) is not feasible, workers should implement best work practices and engineering controls to mitigate exposures. PPE is the secondary choice of protection when exposure cannot be eliminated or otherwise mitigated. The hazard control hierarchy below is the general approach to mitigating both physical and chemical hazards in the workplace.

3.1 Engineering Controls

- Site Control: NKT will coordinate personnel, (including its own subcontractors) and all other subcontractors on-site to ensure that all work activities are known, and all workers understand their specific work zones (including pathways in and out of their work area).
- Barricades, cones, and other physical barriers that prevent access into the work zone.
- HEPA Ventilation of the work area for adequate amount of time to allow accumulated dusts to be collected.
- The use of water spray to control dust emissions to control potential releases or contact with contaminated material.
- Guarded cutting tools utilized for task specific applications.

3.2 Administrative Controls

- Staying upwind from cutting and splicing activities.
- Ensuring only essential personnel are in work areas.

3.3 Personal Protective Equipment

- Use of respiratory and dermal protection as required.
- Use of FR protective clothing to avoid direct dermal contact with hot metallic liquids during splicing or soldering activities.

4.0 CHEMICAL HAZARD ASSESSMENT AND CONTROL

Known anticipated hazardous materials are based upon the task plans and are presented in Table 6.

4.1 Hazardous Substances Brought On-Site by NKT

A safety data sheet (SDS) must be available for each hazardous substance that NKT or its contractors bring on the property (Attachment D). In addition, all containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard. Either the original manufacturer's label or an NFPA 704M label specific for the material is an acceptable label.

A list of known hazardous substances used by NKT personnel is listed in Table 6 and is placed in a centrally identified location with the SDSs. Further information on each chemical may be obtained by reviewing the appropriate SDS. The list will be arranged to enable cross-reference with the SDS file and the label on the container. The Site Safety Lead is responsible for ensuring the chemical listing remains up to date.

4.1.1 Gasoline and Diesel Fuel

Gasoline may be used to operate portable equipment and vehicles for travel to and from the site. The primary exposure risk from gasoline vapors is exposure to benzene. Diesel fuel is a lower toxicity material, but skin contact should be avoided. Federal or recommended airborne exposure limits have not been established for the vapors of fuel oils. However, inhalation of low concentrations of the vapor of either may cause mucous membrane irritation. Inhalation of high concentrations of the vapors may cause pulmonary edema. Chronic direct skin contact with the liquids may produce skin irritation because of de-fatting. Repeated skin contact may also cause irritation of the hair follicles and block the sebaceous glands. This produces a rash of acne pimples and spots, usually on the arms and legs.

4.1.2 Chemicals for Cable Installation

Chemicals will be brought onsite to facilitate the cutting and splicing of cables. Degreasers will be used for cleaning and preparing surfaces. Degreasers can cause skin, respiratory, and gastrointestinal irritation. Degreasers must be used in a well-ventilated area. Solder will be used to splice cables together. Soldering with lead or other metals can produce dust and fumes. Using flux containing rosin produces solder fumes that, if inhaled, can result in occupational asthma or worsen asthmatic conditions and cause eye or upper respiratory tract irritation. Propane and acetylene will be used to heat and support soldering activities. A high concentration of propane can displace oxygen in the air. If less oxygen is available to breathe, symptoms such as rapid breathing, rapid heart rate, clumsiness, emotional upsets, and fatigue can result. As less oxygen becomes available, nausea and vomiting, collapse, convulsions, coma and death can occur. Contact with acetylene liquid can cause frostbite and exposure can cause headache, dizziness, lightheadedness, and collapse.

4.2 Chemicals of Concern to be Generated During Field Work

Lead dust and fumes are anticipated to be generated during field work activities. Lead is a naturally occurring bluish-gray metal found in Earth's crust. For the purposes of this project, lead is contained within the submarine cables for weight and electrical transmission. Lead dust will be generated as a result of cutting tasks. Lead fumes will be generated as a result of splicing and other heating tasks involving the submarine cable. Land placement of cables do not contain lead and will not utilize lead solder.

Table 5: Chemicals Anticipated at the Project Site

	Chemical Name	Site Presence/ Quantity Anticipated	Exposure Limits ACGIH TLV, OSHA PEL, NIOSH IDLH	Storage Requirements (If applicable)	Detection Methods(3) (if applicable)	Routes of Exposure	Symptoms and Effects of Exposure	Special PPE Requirement?
Chemicals Anticipated to be Used During the Course of Work Activities	Gasoline as fuel for site equipment (SDS 1)	Site use, Fuel residues (Avgas, Mogas, GUR), wastes	300 ppm TWA 500 ppm STEL IDLH: NA [Ca]	Fuel Safety Can	MultiRAE, (Routine site monitoring) (Above 10ppm, measure benzene) CF = 0.9	Inh, Abs, Ing, Con	Irritated eyes, skin, mucus membranes; dermatitis; headaches, blurred vision, dizziness, slurred speech, confusion, convulsions, chemical pneumonia (aspiration), possible liver, kidney damage; potential carcinogen	Nitrile Gloves, Safety Glasses/Splash Shield
	Diesel as fuel for site equipment (SDS 2)	Vehicle/heavy equipment fuel, wastes	100 mg/m^3 TWA IDLH NA	Fuel Safety Can	MultiRAE: (Routine site monitoring) CF = 0.7 – 0.9	Inh, Abs, Ing, Con	Irritation of nose, throat, eyes, mucous membranes, and skin; corneal damage, narcosis, edema, liver enlargement, jaundice, conjunctivitis, proteinuria, skin defatting, rash.	
	Acetylene (SDS 3)	Soldering/ Heating	2500 ppm REL	Compressed Gas Tank	MultiRae (Routine site monitoring) CF = 12.9	Inh, Con	Headache, dizziness, asphyxia, frostbite	Safety Glasses, Welding Gloves, FR Coveralls, Respirator
	Propane (SDS 4)		1000 ppm TWA 2100 ppm IDLH	Compressed Gas Tank	MultiRae (Routine site monitoring) CF = 10.95	Inh, Con	Dizziness, confusion, excitation, asphyxia, frostbite	Safety Glasses, Welding Gloves, FR-Clothing, Safety Boots
	Solder Tin 30/70 (SDS 5)	Soldering	2 mg/m^3 TWA 4 mg/m^3 STEL	Drum	Personal Air Monitor for Dust and Fumes under OSHA Method ID-206	Inh, Con, Ing	Skin Irritation, Eye damage, respiratory irritation	Safety Glasses, Welding Gloves, FR Coveralls, Respirator
	Solder Tin Leg6 (SDS 6)		0.050 mg/m^3 TWA	Wire Coil	Personal Air Monitor for Dust and Fumes under OSHA Method ID-206	Inh, Ing, Con	Infertility, fetal damage, respiratory irritation, lung cancer, damage to central nervous system	
	Cold Asphalt (SDS 7)	Corrosion Protection	5 mg/m^3 STEL REL	Drum	MultiRae (Routine site monitoring) CF = 9.25	Inh, Abs, Con	Irritation to eyes and respiratory system	Safety Glasses, Work Gloves, FR Coveralls, Respirator
	Ecosolv A (SDS 8)	Degreasing/ Cleaning	0.4 ppm TWA	Drum	MultiRAE, (Routine site monitoring) (Above 10ppm, measure benzene) CF = 0.9	Inh, Con, Ing	Eye irritation, dizziness, drowsiness, Skin damage	Safety Glasses, Nitrile Gloves
	PF Solvent (SDS 9)		300 ppm TWA	Drum	MultiRAE, (Routine site monitoring) (Above 10ppm, measure benzene) CF = 0.9	Inh, Con, Ing	Skin irritation, respiratory irritation, eye damage	
	White Spirit (SDS 10)		TBD*	TBD*	TBD*	TBD*	TBD*	
	Red Ethanol (SDS 11)		1000 ppm TWA	Drum	MultiRAE, (Routine site monitoring) (Above 10ppm, measure benzene) CF = 0.9	Inh, Con, Ing	Eye irritation, respiratory irritation	

	Chemical Name	Site Presence/ Quantity Anticipated	Exposure Limits ACGIH TLV, OSHA PEL, NIOSH IDLH	Storage Requirements (If applicable)	Detection Methods(3) (if applicable)	Routes of Exposure	Symptoms and Effects of Exposure	Special PPE Requirement?
Chemical Contaminants of Concern to be Generated on the Project Site	Lead (SDS 12)	Dust and Fumes generated by Cable Splicing and Cutting	0.050 mg/m^3 TWA	Cable and Solder	Personal Air Monitor for Dust and Fumes under OSHA Method ID-206	Inh, Ing, Con	Lassitude, insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis, encephalopathy, kidney disease, irritation to eyes, hypertension	Safety Glasses, Respirator, Nitrile Gloves, Coveralls
	Particulates not otherwise classified (PNOC)	Cutting and other construction activities	3.0 mg/m^3, TLV respirable fraction	Cable and other materials	NIOSH 0600 (Exposure Assessment) Dustrack: pDR or other dust monitoring inst (with PM10 inlet)	Inh, Con	Irritation to eyes, skin, throat, upper respiratory system	Safety Glasses, Respirator, Nitrile Gloves

Notes:
Abs – Absorption (skin and mucous membranes)
ACGIH – American Conference of Governmental Industrial Hygienists
Con – skin and/or eye contact
IDLH - immediately dangerous to life and health (NIOSH)
Inh – Inhalation
mg/m^3 – milligrams per cubic meter
NA – not available
Ing – Ingestion
CF – Correction Factor – RAE Systems from publication TN-106, 10.6 eV lamp
TWA – 8-hr time-weighted average (unless other time period specified)
STEL – 15-minute short-term exposure limit (ACGIH)
NIOSH – National Institute for Occupational Safety and Health
ppm – parts per million by volume
** - Based on SDS to be provided by NKT prior to field work*

5.0 PHYSICAL HAZARDS AND CONTROLS

5.1 High-Risk Tasks

High risk activities require a Competent Person, defined by OSHA, to be on site during all high risk work activities. A work permit and task-specific plan is required to manage risk effectively. High risk activities include:

1. Rigging and Lifting – 29 CFR 1915 Subpart G
2. Excavation and Trenching – 29 CFR 1926 Subpart P
3. Live Electrical Work – 29 CFR 1926 Subpart K
4. Confined Spaces – 29 CFR 1915 Subpart B
5. Work at Heights or Elevation – 29 CFR 1926 Subpart M
6. Working Over or Near Water – 29 CFR 1926.106

5.2 Mobile or Heavy Equipment

No employee or subcontractor shall operate heavy equipment (backhoe, loader) unless they are a qualified equipment operator. Prior to operations, NKT project manager must receive and certification that the equipment is maintained and is in safe, working order. The following procedures will be followed:

- Excavation areas should be designated and controlled using cones, signs, and safety tape.
- Only authorized employees are permitted to enter the excavation area.
- The Operator should always know the number of people in the excavation area, and the authorized employees shall always be aware of the work area and location of equipment.
- Open communication must be maintained with the project manager, the operator, and the employees in the excavation area at all times. Preferably 2-way radios should be used but if not applicable, designated hand signals should be used for communication.
- Maintain eye contact with operator if practicable, always approach the equipment from the front, never from behind or other blind spots.
- When equipment is in motion, the operator should be able to see all areas that will be traversed, if this cannot be followed, then a “spotter” should be designated to guide the operator around blind turns and congested areas. Equipment should be equipped with a backup alarm to alert surroundings.
- When equipment is not in use, the equipment should be stopped on level ground, if possible, the machine placed in manufactures designated “park” gear, emergency brake put on, and any hydraulic arms lowered to the ground.

5.3 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that can result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur because of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Serious injuries may occur because of falls from elevated heights. If fall hazards exist in the scope of work, a fall hazard assessment and a site-specific Fall Protection Plan must be completed by a CP. SJAs for tasks with fall hazards must provide hazard controls consistent with the site-specific plan.

Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. The daily 360° walkaround of the site should include identification of housekeeping and material storage hazards, corrective actions, and steps to eliminate the hazard. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning. When picking up and carrying equipment, identify a path that is clear of any obstructions. The ground surface might not be visible or unreliable due to settling. Surface debris might be present and wet or swampy

areas can exist. **Always utilize roads, pathways, or other designated routes or travel. Do not take shortcuts**.

Employees should walk around, not over, obstacles. It might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

During winter months, snow shovels and salt crystals or calcium chloride should be kept on site to keep work areas free of accumulated snow and ice. Furthermore, use sand or other aggregate material to help keep work surfaces from being slippery, especially where salt/calcium chloride cannot be used. In addition, make sure work boots have soles that provide good traction. When walking on ice is necessary crampons or Yaktrax® devices (or equivalent) should be used.

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip and fall hazards at construction sites. Essential elements of good housekeeping include:

- Orderly placement of materials, tools and equipment.
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and,
- Awareness on the part of all employees to walk around, not over or on, equipment that might have been stored in the work area.

5.4 Housekeeping

During site activities, work areas will be routinely inspected for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. Tools, hoses, and other supplies will be kept orderly and out of the way for potential trip hazards. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Additional information on the requirements of housekeeping can be found in FLD37 Housekeeping, Worksite.

5.5 Back Safety

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. FLD10 Manual Lifting Heavy Objects provides additional precautions for manual lifting. The following precautions should be implemented when lifting or moving heavy objects:

- Use mechanical devices to move objects that are too heavy to be moved manually.
- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Verify the travel path is free of obstructions before starting the lift.

5.6 Noise Exposure

The use of heavy equipment or noise producing tools can expose the field team to noise levels that exceed the OSHA PEL of 85 dB for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period.
- Interference with speech communication and the perception of auditory signals.
- Interference with the performance of complicated tasks; and,
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you

or you are within 25 ft of operating heavy equipment, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs, but all hearing protection must have a minimum noise reduction rating (NRR) of 28 dB.

5.7 Airborne Particulates

Site operations may increase airborne dust concentrations. Assessing potential exposures must include an assessment of potential toxic site materials or contaminants that must be managed. Section 4.0 includes information on site contaminants that may require controls more stringent than "particulates not otherwise classified" (PNOC). Dust generated during site activities can be hazardous to the respiratory system, eyes, and can contribute to overall exposure if materials are absorbed through the skin. See Table 6 for chemicals of concern regarding the exposure risks for potential dusts generated during cutting (e.g., lead). The ACGIH has established an eight-hour exposure limit for respirable dust, not otherwise classified, of 3 mg/m^3. Controls for dust exposures should include water on site roads, site speed limits, and specific engineering controls on pieces of equipment that generate dust (screening equipment, mixers, grinding, etc.).

5.8 Drums & Waste Handling

5.8.1 Drum Handling

Accidents may occur during handling of drums and other containers. Hazards include physical injury resulting from moving heavy containers by hand and working around stacked drums, and deteriorated drums. When working around or with drums:

- Have a dry chemical fire extinguisher on hand to control small fires.
- Inspect drums at least weekly: check for labels, markings, etc., and note conditions of containers. Are the drums bulging, deteriorated, or leaking? If labels are not legible, replace them. If the drums deteriorate or leaking, initiate emergency response and cleanup efforts.
- Before moving any drum or container, determine the most appropriate sequence in which the various containers should be moved, the destination, and clear route to the destination.
- Do not move drums that are not intact or tightly sealed.
- Pressurized drums are extremely hazardous. If possible, do not move drums that may be under internal pressure as evidenced by bulging or swelling.
- Have over packs ready before any attempt is made to move drums containing hazardous wastes or chemicals.
- If the drum contents or origin are not known, do not open or move the drum. Notify your project manager and Regional Health and Safety Manager.
- Never stand on drum tops.

5.8.2 Spill Prevention

Work involving drums or other containers can create potential sources for spills. Secondary containment and proper staging areas for drums and containers are essential planning tools for spill prevention. Under this scope of work, it is anticipated that some waste may be generated as part of cutting activities. Details on spill prevention are included is Section 9.4 of this document.

5.9 Hand Safety

5.9.1 Glove Selection

Gloves should be selected to afford protection from a variety of hazards to protect onsite workers from hand injuries, the following gloves will be used for when performing a specific duty:

- Leather or mechanic's gloves (ANSI A2/A3) gloves for general protection, cushioning, or abrasion/laceration protection. Select protective level of gloves from a hazard assessment of the task.
- Nitrile gloves for dermal protection from general chemical hazards

- Insulated gloves or Thermax glove liners as appropriate in cold weather.
- Insulated gloves when working w/ electrical hazards.
- Vibration dampening gloves when utilizing vibrating/gyrating saws, hammers, or other equipment.
- Specialty gloves as appropriate: Rubber/Chemical Specific, Waterproof, added grip, filet gloves, etc.

Specify gloves based on a hazard assessment of the task. Ensure that multiple sizes are available to fit all personnel. Remove jewelry prior to work to avoid catching on equipment or creating pinch points. Pinch points are found between a moving object and a stationary object, or between two continuously moving objects. Yellow hand stickers will be placed on equipment to remind workers of pinch points. Additional requirements are outlined in FLD58 – Drum Handling Operations.

5.9.2 Hand Tools

Rules for the safe use of hand tools:

- Select the right size tool for the job. Don't use "cheaters" and avoid pulling old tools from the waste stream. There's a reason why they were thrown away!
- All hand tools must be inspected prior to use and removed from service if they are defective.
- Handles must be sound, straight and tight-fitting.
- Always keep the cutting edges sharp and never test a cutting edge with your finger.
- When working on an elevated surface (ladder, truck, scaffold), ensure your tools are secure. Falling tools can cause serious injury.
- Always carry your tools securely and never put sharp or pointed tools in your pocket.
- When carrying hand tools, always point the cutting edge to the ground.
- Always keep your tools in a dry place to prevent rust.
- Cutting tools must be kept sharp and properly shaped.
- Secure work pieces prior to cutting or drilling.
- Keep the unused hand and other people away from the tool.
- Utilize a guard when striking a chisel.

SCREWDRIVERS

Most screwdrivers are not designed to be used on electrical equipment. Use an insulated screwdriver for electrical work. No work will be performed by NKT employees that exposes the employee to greater than fifty volts.

Do not hold an object in the palm of one hand and press a screwdriver into it; place the object on a bench or table. Never hammer with a screwdriver. Never use a screwdriver with a broken handle, bent or burred blade, etc.

PLIERS

Do not use pliers as a substitute for hammers, wrenches, pry bars, etc. Use insulated pliers when doing electrical work. Inspect the pliers frequently to make certain that they are free of breaks or cracks.

Use the right type of pliers for the specific task – adjustable, locking (Vise Grip®), standard, bolt size fit, pipe wrench.

HAMMERS

Use the correct hammer for the specific type of striking work (task) to be done. Always wear safety glasses when using a hammer to strike an object. Always use the claw portion of a hammer to remove nails and not as a pick or awl. Have an unobstructed view and swing when using a hammer. Watch for overhead interference on back and forward swing. Use a good grip and use something other than your hand to hold a nail when starting hammering. Check for defects on the handle and head before using. If the hammer head shows signs of mushrooming, replace it immediately.

The handles may be wood, tubular/solid steel or fiberglass. Replace any hammer with a loose handle before the head flies off and causes injury to you or someone else. Tighten loose handles with the proper wedges; never use nails or staples for wedges. If a steel or fiberglass handle is loose replace it, since it is more difficult to repair than a wooden one. Some fiberglass handles can be tightened with the aid of a repair kit with epoxy materials.

WRENCHES

Select the correct size of wrench for the job. Never use a pipe wrench as a wrench handle extension. Too much leverage can ruin a tool and cause injury.

To avoid sudden slips, stand in a balanced position and always pull on the wrench instead of pushing against the fixed jaw, particularly when a pinch point is created. Wear gloves when using a wrench in a confined space. Whenever possible use a box end wrench instead of an open-end wrench to avoid slipping.

CHISELS

A screwdriver is not a chisel. Always wear safety goggles or a face shield when using a chisel. Drive chisels outward and away from your body. Do not use chisels to pry. Keep edges sharp for most effective work and protect when not in use. Driven tools (chisels, punches, etc.) must be dressed to remove any mushrooming. Use the proper hammer when using a chisel and use a hand guard on the chisel when striking the tool.

CUTTING TOOLS

Cutting tools must be designed for the specific task and must be safety cutting devices equipped with a completely enclosed and/or guarded blade. Always perform a thorough hazard assessment to define the proper cutting tool for the task.

- Always place the item to be cut on a solid surface, attempt to hold the cut item without your hand and cut in a direction away from the body and hand.
- Always keep hands and body clear of the cutting stroke. Always keep the cutting tool blades sharp.
- Make sure there is plenty of open space around you when using any cutting tool.
- Blade must be retracted prior to returning the cutter to the tool box/bag.

Use the following safer tools:

- Tubing cutters
- Self-retracting utility knives
- Guarded utility knives
- Shears, snips, and/or scissors
- Concealed blade cutters
- Pipe cutters
- Specialty cutters (e.g. Geoprobe Acetate Liner Cutter)
- Ratcheting tools

5.10 Traffic Safety

BASIC PROCEDURES

To make certain that motorists are aware of our presence, all employees who are potentially exposed to traffic hazards should wear orange or yellow ANSI Class II or III safety vests. Work area should be delineated with traffic cones, or other suitable warning barriers, to prevent motorists from inadvertently driving through. Where it is not feasible to implement such procedures, a standby observer should be assigned to warn the work crew of any impending traffic hazards.

5.11 Driving Safety

Drivers must be licensed to drive the class of vehicle they are operating. Only NKT personnel may drive NKT vehicles or vehicles rented for NKT business; client, subcontractor, or other work-related personnel may ride. Drivers and passengers must comply with all traffic laws and posted signs and will not operate a vehicle if under the influence of impairing medication, alcohol, or any other substance.

PLANNING/PREPARATION

- Prior to departure, check traffic reports, weather conditions, road construction, and road closures. If necessary, develop an alternative route and new, approved JMP (Journey Management Plan).
- Prior to entering the vehicle, inspect the vehicle.
- Leave early to allow for contingencies.

DISTRACTIONS

NKT employees must make every attempt NOT to operate a vehicle while talking on your cell phone, regardless of "hands free" or not. If you receive a call, attempt to pull over to answer it or pull over and return the call. Although "hands free" is allowed, it is not encouraged. Do NOT allow other distractions to interfere with the safe operation of the vehicle. Under NO CIRCUMSTANCES is driving and talking without a "hands free" device acceptable while operating a motor vehicle on company business.

SECURE PACKING

Do not move your vehicle unless all equipment and supplies are secured. Items and material that may roll, slide, or move about in your vehicle while traveling is a major hazard. Secure the load!

EMERGENCY PROCEDURES

Always move out of traffic, if possible, even if those in front of you have stopped. Stopping on an active highway can precipitate being hit from the rear. If you must stop on an active roadway, leave at least one car length in front of you, and look in the rear mirror, so you can ease up if someone behind can't stop. Keep your flashers on in this situation. If you are the only driver coming to a stop on an active roadway, leave the flashers on and when safe to do so, exit the car and get to a safe location.

If you must stop due to vehicle failure, etc. try to coast out of traffic. Put on your flashers, and tie a white handkerchief, etc. on the driver's side door or mirror. If you remain in the vehicle, lock the doors. Use your cell phone to summon help.

5.12 Environmental Hazards – Biological Hazards Assessment

Additional preparation and planning, to include clearing and grubbing of pathways, is recommended for work conducted within the remote areas. Contact with animals, insects, and plants can cause injury and illness to personnel. Biological hazards, which can be found throughout the project site, include bees and other stinging insects, mosquitos, ticks, hazardous plants, and snakes. Project team awareness and adherence to the safe work practices outlined in this HASP should reduce the risks associated with these hazards.

5.12.1 Tick Bites

The Center for Disease Control and Prevention (CDC) has noted the increase of Lyme disease and Rocky Mountain Spotted Fever (RMSF), which are caused by bites from infected ticks that live in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma (,) up to about 0.25-inch. The tick season extends from Spring through the Autumn, and they can be difficult to see.

Lyme disease has occurred in almost all states and is caused by ticks infected with a type of spirochete bacteria. Deer Ticks are about 0.25 inch in size, and black or brick red in color (Figure 5). The Deer Tick nymphs are very small, approximately 0.125-inch long. RMSF has occurred in over 50% of the U.S., with the /heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. RMSF is caused by Rocky Mountain Wood Ticks and Dog Ticks (Figure 5) that have become infected with rickettsia bacteria. Both are black or tan in color. The first symptoms of either disease can include:

- Flu-like symptoms – chills
- Fever
- Headache
- Dizziness
- Fatigue
- Stiff neck

- Bone pain

MINIMUM CONTROLS REQUIRED TO MANAGE TICK EXPOSURE

- Project planning must include an assessment of tick risks in the project work area(s).
- Protective clothing
  - Tyvek – may be required in high exposure scenarios. Heat stress will be addressed on a project-specific basis and addressed in SJA (s). Tyvek will be provided by the project.
- DEET and Permethrin is available on site and employees maintain their personal supply – Both are to be used on site (DEET for skin, Permethrin on clothing).

OTHER CONTROLS

- When in the field, check yourself often for ticks. Check your lower legs and areas covered with hair. Look for a "freckle that moves".
- Spray outer clothing, not your skin, with permethrin or permanone based insecticide. Pay particular attention to your pant legs, waist, boots, and socks.
- Tape your pant legs to your boots or utilize "tick gaiters".
- Follow manufacturer's instructions if using an insect repellent on the skin.
- Avoid contact with bushes, tall grass, or brush as much as possible.

IF YOU DISCOVER AN EMBEDDED TICK, REMOVE IT CAREFULLY USING FINE-TIPPED TWEEZERS OR A TICK KEY ONLY!

ALL EMBEDDED TICKS REQUIRE A CALL TO THE MISHAP HOTLINE!

Take the following first-aid measures when removing a tick:

1. Do not use nail polish or any other type of chemical. Do not use matches, a lighter, or other flammable means.
2. Grasp the tick near the head with the Tick Key and pull upwards gently.
3. Be sure to remove all parts of the tick's body.
4. Once removed, disinfect the area with alcohol or a similar antiseptic.

If signs or symptoms of Lyme disease or RMSF appear, immediately contact an Urgent Care provider for guidance. Lone Star Ticks, Blacklegged Ticks, and Dog Ticks are presented in Figure 5 for field identification purposes.

Figure 5: Disease-Carrying Ticks

Lone Star Tick

Blacklegged Tick

Dog Tick

5.12.2 Bees and Other Stinging Insects

There are several types of bees and wasps which may be encountered during site activities. These include the common yellow jacket, paper wasps, and honeybees. Bees are generally not as aggressive as wasps. Most stinging insects are relatively safe to be near, even in large numbers, as long as they are not aggravated. The sting of bees and wasps are quite different. The wasp may sting a victim multiple times and still live The bee will sting once, tearing itself away leaving the stinger embedded and still connected to the venom sac. The sac continues to pump venom into the victim for up to a minute from the time of insertion.

The following precautions should be taken for the prevention of stings from bees, wasps, and other insects:

- Be aware of the presence of bees and wasps while you are working. Pay particular attention to areas with flowers. Bees tend to sting if they feel threatened or disturbed.
- Keep sources of water under control in work areas. Bees are attracted to open water sources or leaking water containers.
- Avoid wearing floral patterns or using floral scents that attract bees.
- Only strike a wasp if you are sure to kill it. If you strike or kill a wasp you will trigger the insect's defense pheromone, attracting other wasps to attack.
- In the event of a massive sting attack, try to stay calm and cover your head if possible. Get into anything that is sealed in such a way as to not allow insect entry, like a vehicle.

TREATMENT OF NORMAL INSECT STINGS

All insect stings include an alarm pheromone, which incites their mates to attack, so the primary response for treatment of a normal insect sting is to get away from a nest/hive with haste. Scrape or pull out stingers as soon as possible. A honeybee stinger has a venom sac attached that continues to introduce venom after stinging. A wasp does not leave its stinger. A stung victim should apply an ice pack to minimize swelling and pain while lifting the limb to heart level to reduce swelling.

TREATMENT OF SEVERE REACTION TO INSECT STINGS

If the victim has been stung multiple times, is young or old, or is experiencing anaphylactic shock, seek immediate medical help. Signs of anaphylactic shock may include:

- Localized swelling and redness at sting area
- Headache
- Fever
- Nausea
- Vomiting
- Swelling of the tongue or throat
- Difficulty in breathing
- Increased heart rate
- Drowsiness
- Unconsciousness

Personnel with known sensitivity to stings and who have an EpiPen® should have it administered, followed by an ice pack and transit to the hospital. Employees on the site who know they are allergic to stings should make the SSL aware of that fact and should have their EpiPen® with them at all times. The SSL should know where the kit is located and how to administer it in an emergency in the event that the individual cannot self-administer the medication.

5.12.3 Mosquitos

Mosquitos are a threat to human health and well-being. Mosquitos need water to complete their life cycle and there is potential for rapid population development, especially following rain events that result in standing water. Potential mosquito-breeding sites are often created during construction activities. This occurs for example, as equipment and vehicles leave ruts and dips for water to collect and also when normal runoff routes are disrupted, impeding drainage.

Female mosquitos bite to feed. While they are feeding, the female mosquitos may transmit disease-causing organisms to humans and animals. These diseases are potential threats at the project site, include West Nile Virus, encephalitis, and Dengue Fever. To avoid the threat of mosquitoes at the project site, check to be sure containers are not left to collect water, avoid leaving severe depressions in the ground, and fix or report any clogged drainage ways or ditches.

For prevention of mosquito bites, exercise the following cautions:

- Apply insect repellent on exposed skin and clothing (following the manufacturer's instructions)
- Select an insect repellent with active ingredients recommended by the CDC.
- Cover up as much as you can without influencing the effectiveness of required PPE.

5.12.4 Hazardous Plants

During project field work, the number and variety of hazardous plants that may be encountered are few. The plants with the greatest degree of risk to site personnel (i.e., potential for contact versus effect produced) are those which produce skin reactions and skin tissue injury.

Contact with splinters, thorns, and sharp leaf edges is of special concern to site personnel, as is the contact with pointed surfaces found on branches, limbs, and small tree trunks. Punctures, cuts, and even minor scrapes caused by accidental contact may result in non-infectious skin lesions and the introduction of fungi or bacteria through the skin. Personnel receiving any of these injuries must report it immediately for initial and continued observation and care of the injury.

Poison ivy, poison oak, and poison sumac release oil, urushiol, when the leaf or other plant parts are bruised, damaged, or burned (Figure 6). When the oil gets on the skin an allergic reaction, referred to as contact dermatitis, occurs in most exposed people as an itchy red rash with bumps or blisters. When exposed to 50 micrograms of urushiol, an amount that is less than one grain of table salt, 80 to 90 percent of adults will develop a rash. The rash, depending upon where it occurs and how broadly it is spread, may significantly impede or prevent a person from working. Although over-the-counter topical medications may relieve symptoms for most people, immediate medical attention may be required for severe reactions, particularly when exposed to the smoke from burning these poisonous plants. Burning these poisonous plants can be very dangerous because the allergens can be inhaled, causing lung irritation.

Figure 6: Poisonous Plants

Poison Ivy

Poison Oak

Poison Sumac

Workers can prevent contact with poisonous plants by taking these steps:

- Identify areas where you are working that have poisonous plants and mitigate exposure to them by delineation of their boundaries with flagging, marking paint, etc. or covering them with visqueen or drop cloths.
- Wear long sleeves, long pants, boots, and gloves.
    - Wash exposed clothing separately in hot water with detergent.
- If work in an area where poison ivy is present is required, evaluate the use of Tyvek to prevent exposure to work clothes or skin. Consideration must be given to the potential increase in heat stress risk.
- Barrier skin creams, such as IvyX, may offer some protection before contact.
    - Barrier creams should be washed off and reapplied twice a day.
- After working in areas with poisonous plant hazards and at the end of the workday, wash all exposed skin with Technu liquid or wipes, or soap/water and vigorous rubbing with a washcloth to ensure effective removal of urushiol oil.
- After use, clean tools and work boots with rubbing alcohol (isopropanol) or soap and lots of water. Urushiol can remain active on the surface of objects for up to 5 years.
    - Wear disposable gloves during this process.
- Do not burn plants that may be poison ivy, poison oak, or poison sumac.
    - Inhaling smoke from burning plants can cause severe allergic respiratory problems.

Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with soap and water.

5.12.5 Wild Animals

All wild animals are to be avoided, particularly wild animals that are clearly aggressive or unusually passive. Any such animals will be reported to the appropriate site personnel. Wild animals at the project site with potential to infect a person with rabies include coyotes, bats, racoons, and skunks. If an individual is bitten by an animal suspected of rabies infection, an attempt will be made to keep the animal under surveillance until appropriate animal assistance is obtained to retrieve the animal for testing. A dead animal suspected of infection should also be preserved and tested. Local health departments are often sources for testing and obtaining information about where testing can be done.

Rabies is preventable, even after being bitten. If treatment is provided quickly, it is effective at preventing symptoms and disease. Prompt medical attention and determining whether the animal is infected are imperative to proper treatment. Rabies is not curable once symptoms or signs appear. The bite area should washed with soap and water and disinfected with 70% alcohol solution as quickly as possible, followed by treatment by a doctor or emergency room.

5.12.5.1 Dangerous Wild Animals

Work in remote areas inhabited by wild animals that have been known to cause injury and kill human beings, requires that NKT carefully plan for wildlife encounters. The best protective measure is simply avoidance. Large numbers of humans present deterrence to wild animals; therefore whenever possible, teams in the field should work together in groups of four or more. Fieldwork should be scheduled around the seasonal cycles of wildlife in the area. When wild animal avoidance cannot be achieved through scheduling, personnel involved in field activities in which encounters with wild animals may result, take the steps in the following sections.

BLACK BEARS

Fieldwork may be conducted in a location where bears may be encountered. The following technical information, precautions, and guidelines for operations in which bears could be encountered must be considered in those areas. The more bears are understood, the less they will be feared.

Bears generally prefer to be left alone, but they share their homes with other creatures, including humans, who intrude on virtually every aspect of the bear's life. Bears are normally tolerant of these activities and generally find a secure way to avoid them. Humans can help bears make a graceful retreat and avoid many close encounters by letting them know we are coming. Walking in groups, talking, and wearing noise making devices, such as bear bells, all serve to warn a bear of your approach. When possible, avoid hiking and camping in areas where bears are common, such as bear trails through heavy brush or along salmon streams. Always keep an eye out for bears and bear signs. If you happen upon a dead animal, especially one that is covered with sticks and duff (a bear cache), immediately retreat the way you came, but do not run, and make a detour around the area. If you see a cub up a tree or a small bear walking alone, immediately retreat and detour around the area. Like all young animals, cubs wander away from their mothers, but females are furiously protective when they believe their cubs are threatened. Even if we do everything possible to avoid meeting a bear, sometimes bears come to us.

1. Clear the area: Evaluate and control the area before entry by:
    a. Determine areas of recent sightings through local Fish and Game Officers
    b. Conduct a site observation from an offsite elevated point, if possible;
    c. Conduct a controlled walk through in the area by a trained observer;
    d. Arrange a briefing by a local specialist (i.e., Fish and Game Officer); and
    e. Utilize appropriate noisemakers.

2. Basic Equipment: NKT Personnel entering an environment where encounters with wild animals are possible should be provided, as a minimum:

    a. Noisemakers, such as air horns, bells; and

    b. Bear spray of not less than 16-ounce capacity with holster, equivalent to capsicum pepper (red pepper extract), which is capable of spraying at least 15 feet.

3. Training: Prior to entering and/or working in areas inhabited by dangerous wildlife, each worker should receive training as follows:

    a. Wildlife present, habitat, behavior patterns, including when wild animals are most active;

    b. Warning signs, such as tracks, bedding areas, scat, claw marks, offspring, paths;

    c. Avoidance measures;

    d. Other hazards, precautions, and protective measures; and

    e. Spray demonstration at the jobsite and safety instructions which include the location of and persons designated as “bear watch”.

MOOSE

Moose are the world’s largest members of the deer family. The Alaska race is the largest of all the moose. Moose are generally associated with northern forest in North America, Europe, and Russia. In Alaska, they occur in suitable habitat from the Stikine River in the Panhandle to the Colville River on the Arctic Slope, and as far south on the Alaska Peninsula as Herendeen bay. They are most abundant in recently burned areas that contain willow and birch shrubs, on timberline plateaus, and along the major rivers of South-central and interior Alaska. General Description Moose are long-legged and heavy-bodied with a drooping nose, with a “bell” or dewlap under the chin, and a small tail. Their color ranges from golden brown to almost black, depending on the season and the age of the animal. The hair of newborn calves is generally red-brown, fading to a lighter rust color within a few weeks. Newborn calves weigh 28 to 35 pounds and within five months grow to over 300 pounds. Males in prime condition weigh from 1,200 to 1,600 pounds. Adult females weigh 800 to 1,300 pounds. Only the bull has antlers.

Every year someone is injured by a moose and in some cases fatalities are caused by moose attacks. Most cases of moose attack are from cows defending their calves and they are well equipped to do so. Cow moose attack with their front feet and sharp hooves; they can kill wolves and in some cases drive grizzly bears away from their offspring. Bull moose attack with their massive antlers and can do great damage in a short amount of time. One should always be alert when working in moose country. If you encounter a moose, never approach too closely. Moose will generally declare their displeasure of your presence by lowering their ears and raising their hackles (the long hair on their neck and back). Immediately retreat if you see a moose displaying this behavior. If you are about to be attacked by a moose and there are trees present, stay behind the tree. A human can move around a tree faster than a moose can. Use common sense. Avoid contact with any wild animal. Most have the ability injure a human. Never play dead if attacked by a moose. Put something substantial between you and the moose.

WHITE-TAILED DEER

The White-tailed deer found thought the eastern and western part of the United States have been known to attack people on many occasions. It is unknown whether Blacktailed deer have made any such attacks, but it is possible for someone to be injured by an irate buck in the breeding season (late fall). Deer are well equipped to injure humans. They are very fast. Bucks have sharp antlers and can clear amazingly high obstacles with graceful, arching leaps. They can run with remarkable speed, even in dense cover, and have excellent camouflage. When working in areas populated with deer, whether it is White-tailed, Black-tailed, or Mule deer, it is just common sense not to approach any large wild animal too closely. It is unlikely that an attack from a deer would be fatal but it is possible and serious injury is likely.

SNAKES

Snake bites are typically very painful and medical attention should be sought immediately. There are two native venomous snake in Colorado – the Eastern Massasauga Rattlesnake, the Timber Rattlesnake, and the Copperhead (Figure 7).

The venom of the Eastern Massassauga Rattlesnake is a cytotoxin that destroys tissue and contains digestive enzymes that disrupt blood flow and clotting. Rattlesnakes have a distinctive triangular head shape, which is a key characteristic in their identification. The rattle is on the end of the tail and is composed of interlocking horned segments. Young rattlesnakes are born with a small rattle and a new segment is formed each time the skin is shed.

The Timber Rattlesnake grows to be approximately 36-60 inches in length. They are potentially one of North America's most dangerous snakes due to their long fangs, impressive size, and high venom yield. This is to some degree offset by the rattlesnake's relatively mild disposition. The venom is hemorrhagic and proteolytic.

Although both species of rattlesnakes are capable of injecting a powerful venom, they are shy and tend to avoid human contact whenever possible. Most bites from these snakes are caused by humans deliberately handling them or accidentally stepping on them.

Copperhead snakes are some of the more commonly seen North American snakes. They're also most likely to bite, although their venom is relatively mild and rarely fatal for humans. Copperhead snakes are medium-size, averaging between 2-3 feet in length. Copperhead snakes bite more people in most years than any other species of snake in the U.S.A. They give no warning signs and strike almost immediately if they feel threatened. Copperheads have hemotoxic venom that often results in temporary tissue damage in the immediate area of the bite. People with compromised immune systems may have very strong reactions to the venom.

Figure 7: Venomous Snakes


Eastern Massasauga Rattlesnake


Timber Rattlesnake


Copperhead

If bitten by a snake, personnel should remain calm and keep the affected area below the level of the heart and walk, **do not run** to the nearest aid station for assistance. The SSL will immediately transport the victim to the closest medical facility for treatment or send appropriate medical assistance (EMS), whichever is faster. The use of snakebite kits is not authorized. If at all possible, the snake should be identified to ensure prompt medical treatment by the physician.

5.13 Weather

The Site Safety Officer will check the weather forecast for the project area each morning prior to mobilization. Predicted weather conditions will be included in the discussion during the daily toolbox safety meeting. Weather changes should initiate a review and update of the work schedule as necessary. Severe weather can occur with little warning. The employee must be aware of the potential for lightning, flash flooding and high wind events.

BE PREPARED, KNOW WHAT IS COMING YOUR WAY

- Utilize a weather app on a mobile device to track storm risks. Monitor National Weather Service (NWS) watch and warning alerts for inclement weather.

- Check the Storm Prediction Center's web page for alerts and warnings. http://www.spc.noaa.gov/products/wwa/
- Monitor wind conditions whenever work is underway that can be impacted by high winds.
- When in the field, be aware of the route you must take to get to shelter.
- When working in low areas be aware of the potential for flash flooding and the route to higher ground.

5.13.1 Lightning

Lightning can strike up to 10 miles from the source cloud, but thunder can only be heard at 6-8 miles. Therefore, if site personnel working outdoors hear thunder and/or see lightning, work will be stopped, and personnel will move to an indoor location. Lightning proximity should be monitored via the use of a smartphone application such as Spark©. When lightning is detected within 10 miles of the worksite, stop work and seek shelter in specified locations. Work may resume at least 30 minutes after the last detection of lightning.

If a storm comes up suddenly and you are outdoors, seek the best shelter you can find. If choosing between a building and a car, choose the building. If you're in a car, keep the windows closed. If there is no shelter, find a low-lying, open place that is a safe distance from trees, poles or metal objects that can conduct electricity. Make sure it is an area that is not likely to flood! Remember, lightning does not necessarily strike the tallest object; it will strike the best conductor on the ground, which might be a human being. Assume a tucked position and squat low to the ground. Place your hands on your knees with your head tucked between them. Try to touch as little of your body to the ground as possible and keep your feet touching each other. If you feel your hair stand on end in a storm, drop into a tucked position immediately. This sensation means electric charges are already rushing up your body from the ground toward an electrically charged cloud.

5.13.2 Thunderstorms, Tornadoes, and High Wind Conditions

5.13.2.1 Thunderstorms

Severe weather may occur during this project. In the event that a storm threatens the area through observation of a storm system (lightning observation and thunder), all field work will be halted, and weather service bulletins and civil defense messages will be monitored on local radio or through cell phone applications. The SSL will determine through visual observations and weather updates (gathered through the radio or cell phone) when it is necessary to halt work and when to re-start field activities, which include observing the "30-30" rule that states:

1. If you see lightning and thunder is heard within 30 seconds (approximately 6 miles), seek shelter.
2. If you hear thunder, but did not see lightning, assume that lightning is within 6 miles and seek shelter.
3. Remain in the shelter for 30 minutes following the last lightning strike.

5.13.2.2 Tornadoes and High Wind Conditions

When a tornado warning goes into effect, the following actions will be taken:

1. If in your vehicle: Leave your vehicle and seek shelter in a sturdy building. As a last resort, seek shelter in a ditch or culvert.
2. In buildings: Take shelter in an interior hallway on a lower floor. A closet, bathroom, or other small room with short, stout walls will give some protection from collapse and flying debris. Otherwise, get under heavy furniture and stay away from the windows.
3. Out in open country: Seek inside shelter immediately. If a tornado approaches, lie flat in the nearest depression, such as a ditch or culvert, and cover your head with your arms.

Additionally, when wind speed exceeds 30 miles per hour (mph), the following actions will be taken:

1. Follow manufacturer instructions in assessing the limitations with field equipment.
2. Shut down outdoor activities involving work at elevation.
3. Move mobile items stored outside to indoor locations.
4. Secure any items that cannot be moved inside.
5. Be careful opening exterior doors.
6. Stay away from power lines.

7. Avoid downed power lines, tree limbs, and debris on roads. Assume that all downed power lines are energized.

If weather remains unstable for more than 1 hour, the SSL will monitor weather bulletins to further assess changing conditions.

5.13.3 Heat/Cold Stress

Detailed procedures on mitigating heat and cold stress are outlined in FLD06 – Cold Stress and FLD05 – Heat Stress. Staff should take the time to acclimatize to these work conditions prior to conducting long duration work and plan to take breaks accordingly. Access to potable water and electrolyte replacements is a requirement.

MEASURES TO AVOID HEAT STRESS

The implementation and enforcement of the heat stress avoidance measures will be the joint responsibility of the Project Manager and health and the Site Safety Officer. Use the OSHA-NIOSH Heat Safety Tool to identify the heat index and apply controls to prevent employee exposure to heat stress and heat-related illnesses. Use the following procedure:

A. Use the "Hourly" tab to anticipate how the heat index and hazards change throughout the workday.
B. Use the OSHA-NIOSH Heat Safety Tool for recommended precautions.
C. Refer to Table 7 to determine work-rest cycles when measuring heat stress exposure with the OSHA-NIOSH Heat Safety Tool. When workers are wearing FR-Coveralls over their normal clothes – two layers of woven clothing, add an adjustment factor of 5.5°F to the heat index.

Table 6: Work-Rest Cycles Using the OSHA-NIOSH Heat Safety Tool

How Much Work per Work-Rest Cycle	Heat Index Temperature Ranges for Each Category of Work			
	Light	Moderate	Heavy	Very Heavy
No specified requirements	<80 °F	<75 °F	<70 °F	<65 °F
15 minutes of rest every 90 minutes of work	80-90 °F	75-85 °F	70-80 °F	65-75 °F
15 minutes of rest every 60 minutes of work	90-100 °F	85-95 °F	80-85 °F	75-80 °F
15 minutes of rest every 30 minutes of work	100-110 °F	95-100 °F	85-90 °F	80-85 °F
15 minutes of rest every 15 minutes of work	110-115 °F	100-105 °F	90-95 °F	85-90 °F
Stop Work	>115 °F	>105 °F	>95 °F	>90 °F

Notes:
< – less than
> – greater than

D. Conduct Employee Physiological Monitoring when the heat index exceeds 90°F (orange shaded areas).

Refer to

E. Table 8 when determining level of effort (i.e., work category).

Table 7: Categories of Work

Category	Example Activity
Rest	Sitting
Light	Sitting with light manual work with hands or hands and arms, and driving. Standing with some light arm work and occasional walking.
Moderate	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking.
Heavy	Intense arm and trunk work, carrying, shoveling, manual sawing, pushing and pulling heavy loads, and walking at a fast pace.
Very Heavy	Very intense activity at a fast to maximum pace.

The most important measure to prevent heat-related illness is fluid intake. Personnel must drink 1/2 to 1 quart of liquid per hour in heat strain conditions (most of the liquid being water). Under heat strain conditions, a person's body may lose up to two gallons of fluids per day, and it is imperative that this fluid be replaced. Provide disposable cups (4 ounce [oz.]) and water maintained at 50 to 60 °F (requires ice). Personnel must drink a minimum of 16 oz. of water before beginning work and 8 oz. of water at each rest period.
Provide electrolytes on the site for personnel who:

A. Sweat profusely throughout the work day.
B. Are unacclimated to environmental heat.
C. Are performing work in categories Heavy or Very Heavy continuously.
D. Encounter anorexia as a subjective symptom of a heat-related illness or otherwise experience a caloric deficit.
E. Are sick.

The fluid-electrolyte needs of each worker are specific to intensity, frequency, and duration of work tasks involved and consider environmental conditions. If using commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes. Hydration must continue after the workday is complete when personnel are off-site. Consumption of fruits and vegetables is another valuable hydration source.

Engineering controls to prevent heat-related illness are to make the work environment cooler and reduce manual workload with mechanization. Examples include the following:

A. Shaded areas for rest breaks.
B. Air conditioning.
C. Increased general ventilation.
D. Cooling fans.
E. Local exhaust ventilation points of high heat production or moisture (e.g., exhaust hoods).
F. Reflect shields to redirect radiant heat.
G. Insulation of hot surfaces (e.g., furnace walls).
H. Elimination of steam leaks.
I. Cooled seats or benches for rest breaks.
J. Use of mechanical equipment to reduce manual work (e.g., conveyors or forklifts).
K. Misting fans that produce a spray of fine water droplets.

Administrative controls and work practice modifications include:

A. Modify work schedules or activities for workers who are new to warm environments. Schedule shorter shifts for newly hired workers and unacclimated existing workers. Gradually increase shift length over the first 1 to 2 weeks.
B. Implement the buddy system or provide alternative technologies for new workers and in heat strain environments.

C. Require mandatory rest breaks in a cooler environment (e.g., shady location, inside an air conditioned building or vehicle). The duration of the rest breaks should increase as heat stress rises
D. Schedule work at a cooler time of day, such as early morning or late afternoon.
E. Reduce physical demands as much as possible by planning the work to minimize manual effort (e.g., deliver materials to the point of use so that manual handling is minimized).
F. Rotate job functions among workers to minimize exertion and heat exposure.
G. Ensure that workers drink water or electrolyte-containing fluids.
H. Instruct personnel to monitor each other for symptoms of heat-related illness and be prepared to administer appropriate first aid.
I. Advise personnel to avoid drinking hot beverages during lunch and afternoon breaks.
J. Avoid diuretics, caffeinated beverages, and energy and hot drinks.

Certain personal protective equipment can increase the risk of heat-related illness and must be considered when assessing the heat risk. The following special cooling devices can protect workers in hot environments:

A. Insulated suits.
B. Reflective clothing.
C. Infrared reflecting face shields.
D. Cooling neck wraps.

MEASURES TO PREVENT COLD STRESS

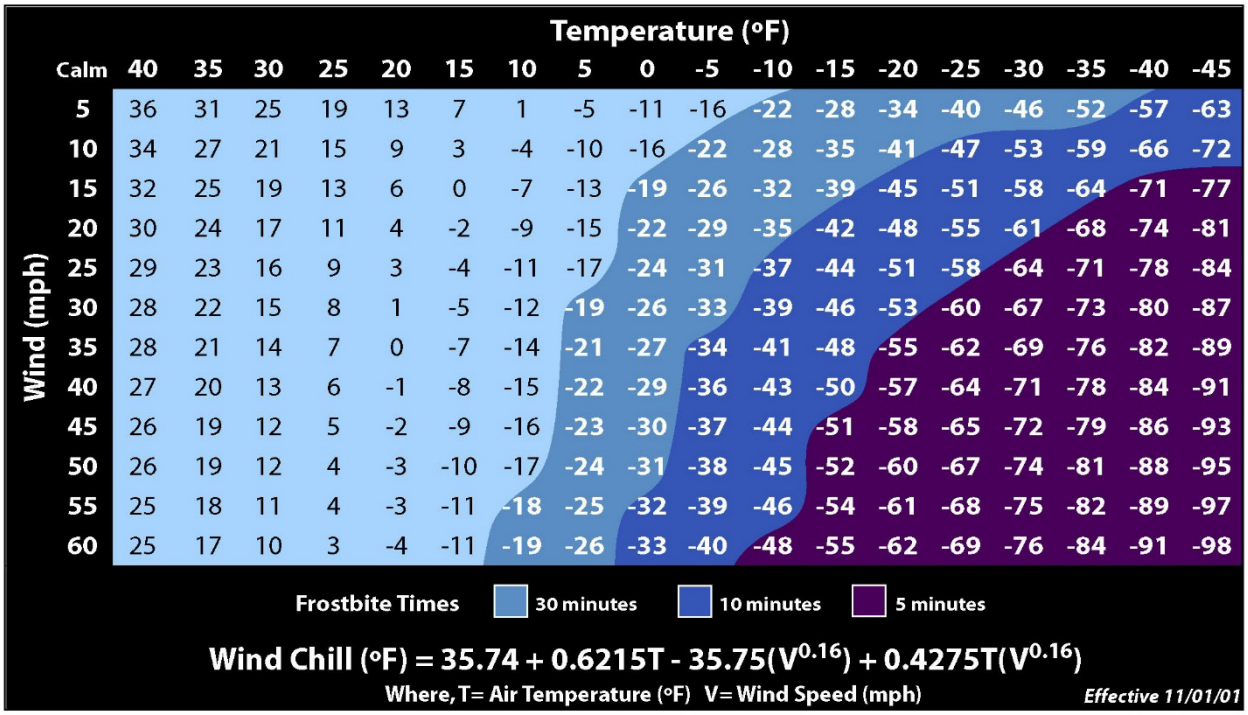
When the ambient temperature, or a wind chill equivalent, falls to below 40° F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven, which allows moisture to penetrate. Socks with high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene or similar types of synthetic material that wick away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it might become necessary to shield the work area temporarily. The SSL and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20° F (Figure 8).

Dehydration occurs in the cold environment and can increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids but limit the intake of caffeine.

Figure 8: Wind Chill Chart



To prevent employee exposure to environmental cold, work must be performed in the warmest part of the day. If work is performed continuously in the cold, winter weather conditions, or where rain or cool winds are expected, provide heated warming shelters, tents, cabins, or break rooms nearby. Require workers to use the shelter(s) at regular intervals depending on the severity of cold exposure. Utilize Table 9 to determine worker warming cycles.

Table 8: Cold Work/Warming Cycles

ECT	Estimated Time Until Frostbite Occurs	Maximum Work Period Duration	Number of Breaks per Work Period
≥ -24°F	30 minutes	Normal	1
- 25°F to – 30°F	30 minutes	75 minutes	2
- 31°F to – 35°F	10 minutes	55 minutes	3
- 36°F to – 40°F	10 minutes	40 minutes	4
- 41°F to – 45°F	5 minutes	30 minutes	5
≤ - 46°F	**Stop work**	**Stop work**	**Stop work**

Note:
- = Negative
≥ = Greater than or equal to

5.14 Confined Spaces

A confined space is defined as any space that meets all the following criteria:

- Is not designed for continuous human occupancy;
- Is large enough to physically enter with the whole body; and,
- Has limited access and egress (you must climb over pipes, one way in/out, etc.).

Marine confined spaces may exist during future tasks. If confined spaces are encountered, this HASP will be updated to reflect current site conditions including the addition of a Marine Chemist.

5.14.1 Jointing Habitat

Most jointing activities will take place in a jointing habitat (i.e., a modular container). Habitats will be equipped with exhaust fans and temperature controls with multiple means of ingress and egress. Exhaust fans will be equipped with high efficiency particulate air (HEPA) filters that can collect hazardous dusts before they escape into the environment.

Treavor Clarke will serve as NKT's Confined Space Competent Person. NKT will provide a letter designating Mr. Clarke as the Competent Person signed by a company official, upon request. Mr. Clarke will be onsite during any potential confined space tasks to monitor the environment. If Mr. Clarke is unavailable, NKT may hire a subcontractor to serve as the Confined Space Competent Person.

Other jointing activities will occur on stands in the open air, this includes cutting and capping.

6.0 AIR MONITORING

The following is a discussion of the hazards potentially presented to worker personnel during this project from on-site chemical hazards known or anticipated to be present on site.

6.1 Personal Air Sampling

The NKT Project Manager, or the NKT Regional Health and Safety Manager can prescribe personal air sampling based on observations, real-time air monitoring results, or concerns recognized during the project. Air sampling will be completed using pre-assembled cassettes with mixed cellulose ester filters 0.8 micron with a sampling time of 240-480 minutes and maximum volume of 480-960 liters over a time-weighted average. The sample cassettes must have a flow rate of 2 liters per minute and will be analyzed for each worker using inductively coupled plasma mass spectrometry. The samples will be collected under the supervision of a Certified Industrial Hygienist in accordance with OSHA Method ID-206 for both lead dust and fumes.

6.1.1 Health and Safety Action Levels

Action levels for real-time air monitoring measurements are presented in Table 6.

6.2 Calibration and Recordkeeping

Equipment used by NKT will be calibrated in accordance with the manufacturers' standard operating procedures. A log of the calibrations and readings will be kept in the field notebook. Daily calibration information will also be recorded in the field notebook.

7.0 PERSONAL PROTECTIVE EQUIPMENT

PPE will be utilized during all site activities to control physical, biological, and chemical exposure hazards. Effective engineering and administrative controls should be evaluated and specified, and PPE should be utilized for remaining hazards that are not well controlled. Table 4 describes the PPE and chemical protective clothing to be worn for general site activities and for certain specific tasks.

7.1 Other Safety Equipment

The following additional safety items will be available at the site:

- Portable, hand-held eyewash bottles
- Safety shower
- First aid kit
- Type A-B-C fire extinguisher (various sizes may be needed)
- Portable phones, jobsite radios, satellite phones (were needed for emergency notifications)

8.0 SITE CONTROL

Site Control: NKT will coordinate NKT personnel, (including its own subcontractors) and all other subcontractors on-site to ensure that all work activities are known, and all workers understand their specific work zones (including pathways in and out of their work area).

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, hazardous work areas will be clearly identified, and decontamination procedures will be required for personnel and equipment leaving those areas. Figure 9 below illustrate a typical example of site control through the use of the exclusion zone, contamination reduction zone, and support zone.

8.1 Designation of Zones

NKT designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November 1985. They recommend that the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone
- Contamination Reduction Zone
- Support Zone

8.1.1 Exclusion Zone

An exclusion zone will be established around the project site. If the project site is accessible to the public or other workers not covered by this HASP, the perimeter of the exclusion zone will be marked with caution tape or indicated by traffic cones so that employees, visitors, and client or host employer personnel are aware of the work being conducted.

All NKT and contractor personnel entering these work areas must wear the prescribed level of protective equipment.

8.1.2 Contamination Reduction Zone

A decontamination zone will be established adjacent to each work area. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of. Equipment leaving the exclusion zone will be decontaminated in the CRZ prior to leaving the work area.

8.1.3 Support Zone

The support zone will include the area outside of the exclusion zone and CRZ.

8.1.4 Site Access Control

The public will be restricted from the project site and monitoring well locations (during monitoring) by fences, barricade tape, traffic cones, and/or signs.

8.1.5 Parking and Staging Areas

Parking will be restricted to designated areas that have been cleared of tall grass and combustible material. Staging of equipment and supplies will be managed within the site control methodology discussed above.

8.2 General Site Safety Practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- The "buddy system" will be used whenever possible by all field personnel. No one is to perform field work alone unless there is a written plan to work alone per the guidance of FLD64 – Working Alone. Standby team members must be intimately familiar with the procedures for initiating an emergency responses.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in these areas.

- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.
- Beards or other facial hair that interfere with respirator fit are prohibited when the potential use of respirators is suspected.
- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.
- Parking and pedestrian areas will be established and communicated to all workers.

8.3 Hazard Control Methods

Methods employed to control exposure to hazards include Engineering Controls (Section 8.3.1), Administrative Controls (Section 8.3.2), and PPE (Section 8.3.3).

8.3.1 Engineering Controls

- Ventilation of the well head and/or vault for adequate enough amount of time to allow accumulated vapors to dissipate or migrate away from the workers breathing zone.
- The use of water spray to control dust emissions to control potential releases or contact with contaminated material.

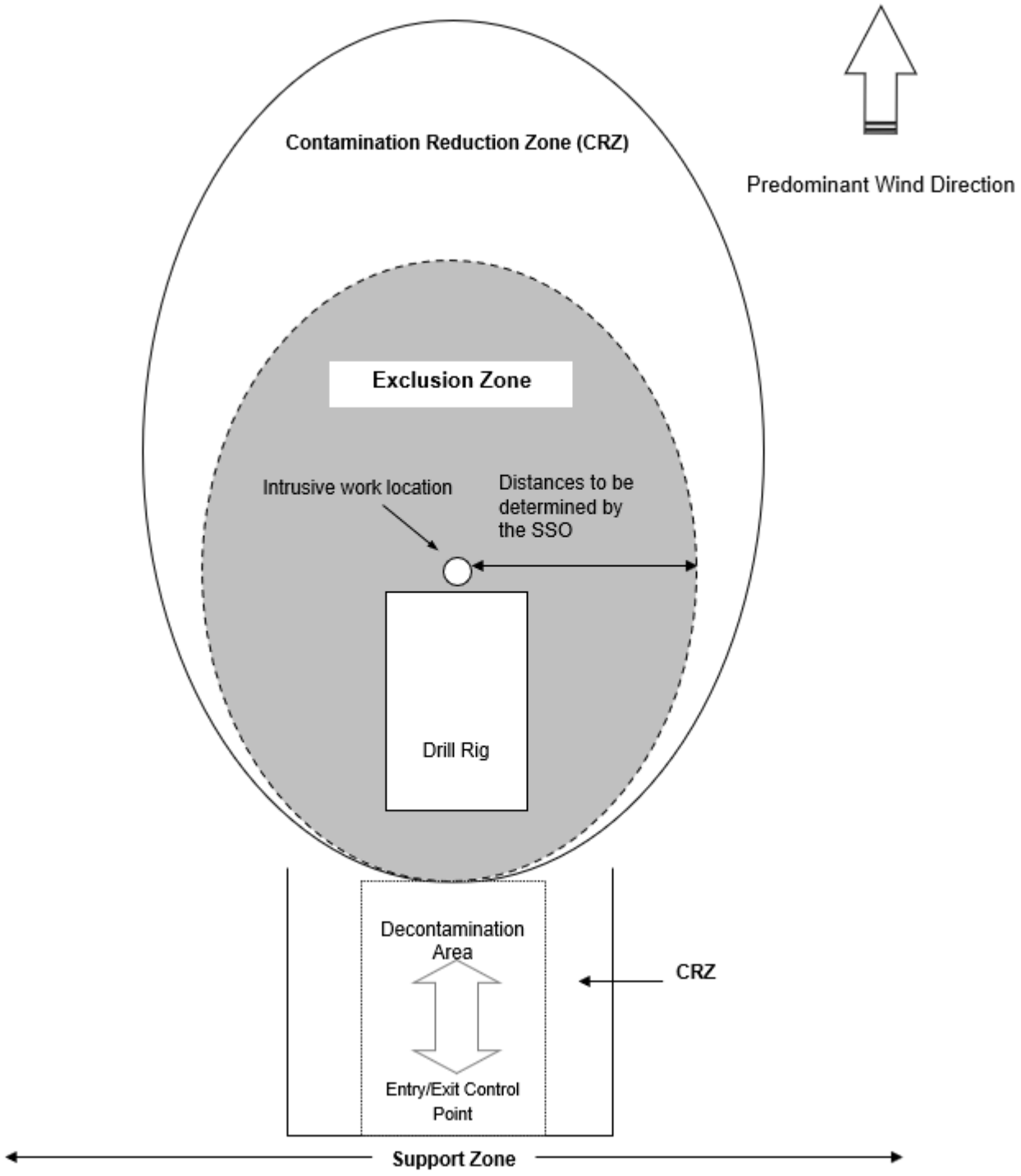
8.3.2 Administrative Controls

- Distance between worker and actual contaminated area, i.e., placing heavy equipment on clean side during certain activities to provide some measure of remoteness to the operation.
- Staying upwind from contaminant emissions.
- Ensuring only essential personnel are in work areas.

8.3.3 PPE

- Use of Level D PPE is required at a minimum. This should include ANSI-approved steel toe boots, hardhat, ANSI safety glasses, long pants, sleeved shirt, ANSI Class II or higher Safety Vest. Additionally hearing protection, respiratory protection, or other task specific PPE may be required. Table 6 describes the PPE required for each project-specific task. When respiratory protection is required the following fit tests must be conducted based on the type of protection:
    - Quantitative Fit Tests must be conducted for full-face respiratory protection providing an assigned protection factor (APF) of 50.
    - Qualitative Fit Tests must be conducted for half-face respiratory protection providing an APF of 10.

Figure 9: Drilling Site Control Layout



9.0 DECONTAMINATION

9.1 General Decontamination Plan

All personnel will use inside out techniques when removing spent PPE. Hands and face will be wet wiped prior to any hand to mouth contact.	
Decontamination Waste Disposition	
Consistent with the levels of protection required, provide step-by-step procedures for personnel decontamination:	
☒	Disposable equipment will be used where possible and will be disposed of in plastic trash bags.
☒	Driller will be responsible for placing waste generated during work in drums and staged a predetermined location.
☒	Drums will be properly labeled and logged in the field log book.
Heavy Equipment Decontamination	
A procedure for decontamination steps required for non-sampling equipment and heavy machinery follows:	
☒	Subcontractor will be responsible for decontamination of heavy machinery
☒	Decontamination will generally be performed by buckets or wash bin.
☒	Soil & debris will be knocked off equipment and transferred to drums. The equipment will be rinsed with clean water.
☒	Decontamination water will be transferred from the pad to drums for subsequent disposal.
Sampling Equipment Decontamination	
Sampling equipment will be decontaminated in accordance with the following procedure:	
☒	Non-disposable equipment will be decontaminated using a non-phosphate detergent and rinsed clean with water. Decontamination water will be disposed in accordance with other potentially contaminated water by transferring to drums for subsequent disposal.
Waste Disposal Plan	
Describe procedure to dispose of waste to include who is responsible for waste disposal.	
☒	NKT will be responsible for the proper disposal of waste.

9.2 Personal Decontamination

Proper decontamination is required of all personnel before leaving the site. Decontamination will occur within the contamination reduction zone. Regardless of the type of decontamination system required, a container of potable water and liquid soap should be made available so employees can wash their hands and face before leaving the site for lunch or at the end of the day. Additional provisions for decontamination can be found in FLD59 Decontamination Guidelines – Personnel & Equipment.

9.2.1 PPE Decontamination

Disposable PPE, such as Tyvek coveralls, gloves, etc. will be removed in the decontamination zone and placed in garbage bags. Final disposal of contaminated PPE will be in accordance with the work plan.

If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored upright in plastic bags. Refer to the cleaning instructions provided with the respirator or specified by Appendix B-2 to the OSHA regulations at 29 CFR 1910.134. Respirator cartridges are disposable and will not be decontaminated or re-used.

9.3 Equipment Decontamination

Equipment will be decontaminated prior to being moved to other locations. Decontamination procedures will be specified by the SSL or Project Manager.

9.4 Spill Prevention & Response

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. Potential sources for spills under this scope of services include contractor fueling containers, dewatering fluids, and decontamination fluids.

Secondary containment and proper staging areas for drums and containers are essential planning tools for spill prevention. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.
- Secondary containment will be implemented in staging areas as appropriate.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up materials shall be available at each work site (more as needed).

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.

In the event of a spill or release, ensure safety, assess the situation, and perform containment and control measures, as appropriate & mobilize per Site Spill Response Plan.

a. Cleanup per SDSs if small; or sound alarm, call for assistance, notify Emergency Coordinator.
b. Evacuate to pre-determined safe place.
c. Account for personnel.
d. Determine if team can respond safely.

10.0 EMERGENCY RESPONSE

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (e.g., mutual-aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result in an uncontrolled release of a hazardous substance." Personnel shall not participate in any emergency response where there are potential safety or health hazards (e.g., fire, explosion, or chemical exposure). Response actions will be limited to evacuation and medical/first aid as described within the following sections. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- Employee training;
- Alarm systems;
- Escape routes;
- Escape procedures;
- Critical operations or equipment;
- Rescue and medical duty assignments;
- Designation of responsible parties;
- Emergency reporting procedures; and,
- Methods to account for all employees after evacuation.

10.1 Employee Training

Employees must be instructed in the site-specific aspects of emergency evacuation. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed.

10.2 Alarm System/Emergency Signals

An emergency communication system must be in effect at all sites. The simplest and most and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (e.g., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all personnel because of distance, terrain or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. Therefore, NKT will bring a portable phone to the site to ensure that communications with local emergency responders is maintained, when necessary.

In the event of a fire or explosion, ensure personal safety, assess situation, and perform containment and control measures, as appropriate:

a. Sound alarm and call for assistance, notify Emergency Coordinator and SSL.
b. Evacuate to a predetermined safe place.
c. Account for personnel.
d. Use fire extinguisher only if safe and trained in its use.
e. Standby to inform emergency responders of materials and conditions

10.3 Escape Routes and Procedures

The escape route from the site and an emergency muster point will be provided to all workers during the project mobilization. Prior to mobilizing to a new project area, the SSL or his designee will confirm that the escape routes are clear and lead to a safe area

Table 9: Emergency Muster Point

Emergency	Evacuation Route	Muster Location
Chemical Spill Fire/Explosion Tornado Lightning	Addressed in Daily toolbox Briefing by SSL	

10.4 Employee Accounting Method

The SSL is responsible for identifying all NKT personnel on-site at all times. NKT and its subcontract employees will notify the SSL when they enter and leave the site. The SSL will account for all NKT and its subcontract employees following an evacuation.

10.5 Injuries and Illnesses

The phone numbers of the police and fire departments, ambulance service, local hospital, and NKT representatives are provided in Table 3. **All injuries must be reported to direct supervisor/site safety lead and project manager.** All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSL and the immediate supervisor.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSL within 24 hours after the accident has occurred. All accidents/incidents will be investigated. Copies of all subcontractor accident investigations will be provided to the SSL within 5 days of the accident/incident.

10.5.1 First Aid

Provide first aid, if trained; assess and determine need for further medical assistance. Contact the WorkCare Incident Intervention Program hotline for injury evaluation, as appropriate. Transport or arrange for transport after appropriate decontamination. Contact insurance provider to report the claim.

Minor injuries will be treated on site using materials from the first aid kit or other local sources. All cuts and abrasions will be cleaned with potable water and a clean dressing applied. The injured employee will be evaluated at the end of the workday and the following day when the employee arrives at the project site to determine whether the wound has started the healing process. The wound will be protected from contamination during the project activities.

10.5.2 Professional Treatment

In the event an injury or illness requires more than first aid treatment, the SSL will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site project manager and the Safety Manager.

If the injured employee can be moved from the accident area, he or she will be brought to the CRZ where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSL must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this is not feasible, decontamination will be performed after the injured person has been stabilized.

A map and directions to the selected local medical facility is presented in each Site-Specific Addendum to this HASP.

10.6 Designation of responsible parties

The SSL is responsible for initiating emergency responses. In the event the SSL cannot fulfill this duty, the alternate SSL will take charge.

10.7 Emergency Response Drills

For projects with durations of greater than four days on site, the SSL will initiate an evacuation drill during the first five days and shall repeat the drills at least quarterly. Deficiencies noted during the drills will be documented as a Near Loss, a Root Cause Analysis conducted, and corrective actions initiated.

A table-top run through of the evacuations procedures from the manufacturing site will be conducted the first day on the site and reviewed with all workers arriving on site after that date.

Emergency Response drills and subsequent personnel briefings on evacuation procedures will be documented in the safety briefing agenda or briefing notes.

10.8 Incident Reporting and Investigation

Any incident resulting in injury, illness, or property damage is required to be reported. Any serious incident resulting in injury, illness, or property damage requires an Incident investigation. (Refer to Section 10.5 above.) The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided.

Immediately after occurrence, the incident must be reported to the supervisor on the project site. NKT shall immediately notify the client of all incidents, accidents, injuries, illnesses, and near miss incidents. NKT shall follow up with documented notification to all entities within twelve hours. All incidents including near miss events will be investigated to establish the root cause and outline preventative measures to be implemented to prevent recurrence. When applicable, health and safety incidents will be reported to the relevant statutory body.

Table 10: Environmental Compliance Field Form

Environmental Compliance Review			
☒	Generation of Hazardous Waste*	→	***Environmental Compliance/Waste Management Plan Required**
☐	Generation of Investigation Derived Waste*		
☒	Treatment, Storage, or Disposal of Hazardous Waste*	→	Containers: dated, labeled, closed, full, stored less than 90 days
☐	Contingency to prevent or contain hazardous materials or oil spills or discharges to drains, body of water, soil*	→	Risk of explosion or catastrophic release due to chemical storage or processing involving reactivity, flammables, solvents or explosives
☐	Disturbing of Asbestos Containing Materials (ACM)*	→	Training & Licensing for Asbestos Remediation Activities
☐	Application of Pesticides or Herbicides*		
☐	Work on Above or Under-ground Storage Tanks*		
☐	Transportation, Storage or Disposal of Radioactive Material*	→	Training & Licensing for Use of Radioactive Materials/Sources
☒	Activities producing or generating Air Emissions (or fugitive "fence-line" emissions) requiring either monitoring and/or permit*		
☐	Excavations, Drilling, Probing or other activities that could impact underground utilities, pipelines, sewer or treatment systems.		
☒	Shipment of Hazardous Waste off-site* Shipment of Samples in accordance with DOT/IATA	→	Waste Identification & Manifesting - Marking, Placarding, Labeling

Attachment A– Health and Safety Plan Review Form

Personnel Acknowledgement

By signing below, the undersigned acknowledges that he/she has read and reviewed the NKT Health and Safety Plan for services performed at the 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

Attachment B – Safe Job Analysis

SAFE JOB ANALYSIS

Activity/Work Task:	**SJA 1 – Mobilization and Demobilization**
Client:	CHPE
Project Location:	New York, USA
Date Prepared:	08/28/2023
Date Revised:	
Prepared by (Name/Title):	NKT with support from WESTON
Revised by:	
Reviewed by SSL (Printed Name/Signature	Date:
Reviewed by Sub. Foreman (Printed Name/Signature):	Date:
NOTES:	

Overall Risk Assessment Code (RAC) *(Use highest code):* **M**

Risk Assessment Code (RAC) Matrix

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each "**Hazard**" with identified safety "**Controls**" and determine RAC (See above).

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "**Hazard**" on SJA. Annotate the overall highest RAC at the top of the SJA.

"**Probability**" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"**Severity**" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible.

RAC Chart

E = Extremely High Risk	**H = High Risk**
M = Moderate Risk	**L = Low Risk**

Job Steps	Hazards	Hazard Controls	RAC
Mobilize and Demobilize Equipment and Personnel –	1. Struck-by vehicles or equipment. 2. Fire hazards posed by refueling vehicles and using	1a. Backup alarms on vehicles so equipped, must be operable to warn personnel in the area behind vehicles and equipment. 1b. If ground hazards exist, utilize spotters for all backing. 1c. Maintain awareness of personnel on foot and other vehicles.	**L**

Job Steps	Hazards	Hazard Controls	RAC
Equipment, tools, and other necessary items will be delivered to the site or removed from the site on vehicles and trailers. *Coordinate site security requirements with site personnel.*	vehicles over dry/grassy areas 3. Driving motor vehicles 4. Slips, trips, and falls 5. Site Security and hazards from unauthorized access 6. Biological hazards including the possibility of stinging insects, venomous snakes, and poisonous plants 7. Non-ionizing radiation – Ultraviolet rays from the sun 8. Adverse weather conditions 9. Tool hazards - Caught-in, -between hazards to hands/fingers 10. Lifting hazards 11. Working alone	2a. When loading/unloading equipment from trailers, properly secure ramps and keep personnel clear of the fall radius. Load equipment evenly and do not overload. 2b. vehicles shall be provided with at least one fire extinguisher (rated 10BC or greater) 2c. All sources of ignition shall be prohibited in areas where flammable liquids are stored, handled, and processed. 2d. All Fuel storage and dispensing areas must be marked with signage at the approach boundary. 2e. Equipment and vehicles will be shut down for fueling.	**L**
Site Preparation and Restoration *Initial safety meetings, establishment of staging areas, unloading of equipment and project supplies.* *Restoration of site areas that may have been impacted by project field work activities. Removal of wastes from the site to proper disposal authorities.*		3a. Equipment operators and drivers will conduct daily inspections during use, utilizing a checklist form that will be turned in each day or weekly. 3b. Motor vehicle/utility vehicle/equipment operators shall hold a license and/or appropriate training for the type and class of vehicle they are operating. 3c. Seat belt use is required for all equipment/vehicles. 3d. Do not use communication devices while operating a vehicle. 3e. Follow established and/or posted speed limits. Reduce speeds during poor conditions. 3f. Initial orientation discussions with all personnel mobilized to the site will include clear expectations that personnel will operate vehicles in accordance with local/state/and federal regulations, and, that failure to abide by traffic laws will result in personal liability to individuals and potential dismissal from the site. 3g. Cell phones use if prohibited when operating motorized vehicles or equipment. 3h. The specified speed limit with the limits of work – the jobsite is 15 mph unless travelling on a public road with a specified speed limit. 3i. Ensure that personnel understand that up/down/side-slope travel exceeding manufacturer's specifications is prohibited. 3j. Vehicle lights, tires, and dashboard lights (if any) should be inspected prior to departing. 3k. Scout the path ahead to identify any hazards that could cause the vehicle to become stuck in mud, snow, or otherwise. 3l. Do not exceed more than 14 total hours of combined driving and work. Each worker is required to have 10 hours of rest each day.	**M**

Job Steps	Hazards	Hazard Controls	RAC
		4a. Exercise good housekeeping. Remove items from pathways that could pose a trip hazard. 4b. Remove ice from walkways to prevent slipping 4c. Wear boots that include a safety toe and puncture-resistant soles 4d. Each work area will be routinely inspected for slip/trip/fall hazards. 4e. Observed debris will be removed and other identified obstacles and/or encumbrances will be marked or barricaded. 4f. Materials will be organized in a site location that does not impact the active work area. Materials will be stored to prevent ground hazards in the work area. 4g. Avoid muddy or wet areas in rainy conditions. 4h. Ensure non-slip pads are present on stairs or ramps especially in rainy conditions. 4i. Treat all icy walkways or paths in winter conditions and emphasize awareness of conditions in daily briefings. 4j. Work will be completed in adequate natural light. 4k. I	**L**
		5a. Verify field certifications and personnel have the required authorization to enter the installation. 5b. Obtain all necessary permits or paperwork (i.e. hot work, lifts). 5c. Complete all necessary or required installation training. 5d. Complete review of Project specific documents. 5e. Use the “buddy system” whenever possible. 5f. All personnel arriving to the work site will be provided with the APP for review, given a site orientation, be briefed on, and sign all applicable site-specific SJAs. 5g. Field changes to the SJA’s will be redlined and resubmitted for acceptance **IF** the RAC increases. If no increase, the redlined documents will be submitted with the final site documentation at the end of the project. 5h. Change of the qualified or competent persons require prior approval of the Project Manager. 5i. Personnel who do not review, sign, or accept the Project specific documents will not be permitted onsite.	**L**

Job Steps	Hazards	Hazard Controls	RAC
		6a. When in the field, check yourself often for ticks. Check your lower legs and areas covered with hair. Look for a “freckle that moves”. 6b. Spray outer clothing, not your skin, with permethrin or permanone based insecticide. Pay particular attention to your pant legs, waist, boots, and socks. 6c. Tape your pant legs to your boots or utilize “tick gaiters”. 6d. Follow manufacturer’s instructions if using an insect repellent on the skin. 6e. Avoid contact with bushes, tall grass, or brush as much as possible. 6f. Avoid wild animals. Do not feed wild animals. 6g. Avoid contact with potential virus-hosting rodents, their urine and their droppings.	**M**
		7a. Use sun block to prevent sun burns as recommended by the manufacturer. 7b. Avoid direct sun exposure for long periods of time	**L**
		8a. As determined by the SSL, operations are to cease during severe weather conditions. Outdoor activities will be suspended when the potential for lightning occurs. 8b. Monitor hazardous weather warnings 8c. Avoid trees, water, open fields, and using hard-wired telephones and headsets when lightning is in the area. 8d. If isolated from shelter during close-in lightning, adopt a low crouching position, with feet together (up on toes, if possible) and hands on ears. 8e. Wear clothing appropriate for weather conditions	**L**
		9a. Identify operations that pose “caught between” hazards and brief all site personnel on risks. 9b. Personnel will carefully coordinate the handling and placement of heavy objects. 9c. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions will be taken to cover sharp edges. 9d. Daily briefings will include discussion of this issue and PPE choices to minimize risks. 9e. Personnel will avoid placing hands between objects.	**M**

Job Steps	Hazards	Hazard Controls	RAC
		10a. Use proper lifting techniques - keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. 10b. Split heavy loads (>50lb) into smaller loads and/or seek assistance. 10c. Follow weight/size recommendations when planning all manual lifts. 10d. Verify the path of travel is clear prior to the lift.	L
		11a. Employees must check in with Project Manager at the start and end of each shift and any other time the Project Manager requires check in. 11b. Document every check in. 11c. Employees must check in no later than 15 minutes after the designated times (11a). The Project Manager will make immediate contact or rescue arrangements after 15 minutes beyond the designated check in time.	M

Equipment	PPE (ALL PPE MUST BE FR)	Competent or Qualified Personnel Name(s)	Inspection	Training
• Motor Vehicles • Fire Extinguishers • First Aid Kits • Small hand tools • BBP Kits • Hearing Protectors • Sunscreen • Insect repellents	• Hard hats – when overhead hazards are present or heavy equipment is in use • Safety toed boots with ankle supports (ASTM F2413 compliant) – when overhead hazards are present or heavy equipment is in use • Safety glasses (ANSI Z87) • Safety vests (Class 2 or 3 Reflective Vest) • Long pants and sleeved shirts. Pants, shirts and socks treated with permethrins where ticks are present • Coveralls	• Competent Person: SSL • Qualified Person: SSL	• Initial inspection of all equipment and tools to be used. • Daily inspection of equipment and tools prior to tool use. • PPE inspections prior to each use.	• OSHA 30-hour Construction course (SSO minimum) • First aid/CPR • BBP • Initial site safety briefing • Daily toolbox safety briefings • Vehicle training • Specific user, competent person training for the scope of work elements.

In accordance with NKT policies and regulatory requirements “Work will not begin until the SJA for the work activity has been reviewed and briefed to all site personnel. The SJA shall be reviewed and modified as necessary to address changing site conditions, operations or change of competent/qualified persons.

By signing below I understand, agree to, and will conform to the site rules set forth in this SJA, my respective company’s EHS Planning Documents (including amendments and attachments), and those controls agreed upon during any site-specific health and safety briefing(s).

SAFE JOB ANALYSIS

Activity/Work Task:	**SJA 2 – Submarine Cutting**
Client:	CHPE
Project Location:	New York, USA
Date Prepared:	08/28/2023
Date Revised:	
Prepared by (Name/Title):	NKT with support from WESTON
Revised by:	
Reviewed by SSL (Printed Name/Signature	Date:
Reviewed by Sub. Foreman (Printed Name/Signature):	Date:
NOTES:	

Overall Risk Assessment Code (RAC) *(Use highest code):* **M**

Risk Assessment Code (RAC) Matrix

Severity	**Probability**				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each "**Hazard**" with identified safety "**Controls**" and determine RAC (See above).

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "**Hazard**" on SJA. Annotate the overall highest RAC at the top of the SJA.

"**Probability**" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"**Severity**" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible.

RAC Chart

E = Extremely High Risk	**H = High Risk**
M = Moderate Risk	**L = Low Risk**

Job Steps	Hazards	Hazard Controls	RAC
Prepared for Cable Cutting –	1. Struck-by vehicles or equipment. 2. Fire hazards posed by refueling vehicles and using	1a. Backup alarms on vehicles so equipped, must be operable to warn personnel in the area behind vehicles and equipment. 1b. If ground hazards exist, utilize spotters for all backing. 1c. Maintain awareness of personnel on foot and other vehicles.	**L**

Job Steps	Hazards	Hazard Controls	RAC
Inventory and inspect tools, consumables, PPE, and lifting equipment. *Confirm fire prevention in place.* *Confirm first aid and AED available.* *Confirm alarms working on applicable equipment.* *Keep workspace clean and tidy for work.* *Cordone work zone with barricades and fire guard.* *Conduct toolbox Safety Briefing and review SDS.* Conduct Cable Cutting - *Determine type of cut to be performed and identify location for cut.* *Secure and rig cables in a safe manner for cut to ensure cut length cannot drop.* *Secure armor on both sides of cut mark to make section. Use*	vehicles over dry/grassy areas 3. Driving motor vehicles 4. Slips, trips, and falls 5. Site Security and hazards from unauthorized access 6. Biological hazards including the possibility of stinging insects, venomous snakes, and poisonous plants 7. Non-ionizing radiation – Ultraviolet rays from the sun 8. Adverse weather conditions 9. Tool hazards - Caught-in, -between hazards to hands/fingers 10. Lifting hazards 11. Lead Exposure 12. Hot Work 13. Use of Chemicals	2a. When loading/unloading equipment from trailers, properly secure ramps and keep personnel clear of the fall radius. Load equipment evenly and do not overload. 2b. vehicles shall be provided with at least one fire extinguisher (rated 10BC or greater) 2c. All sources of ignition shall be prohibited in areas where flammable liquids are stored, handled, and processed. 2d. All Fuel storage and dispensing areas must be marked with signage at the approach boundary. 2e. Equipment and vehicles will be shut down for fueling.	**L**
		3a. Vehicle operators and drivers will conduct daily inspections during use, utilizing a checklist form that will be turned in each day or weekly. Inspections will include vehicle lights, tires, and all display/indicator lights are in proper working order and documented on the checklists. 3b. Motor vehicle/utility vehicle/equipment operators shall hold a license and/or appropriate training for the type and class of vehicle they are operating. 3c. Seat belt use is required for all equipment/vehicles. 3d. Do not use communication devices while operating a vehicle. 3e. Follow established and/or posted speed limits. Reduce speeds during poor conditions. 3f. Initial orientation discussions with all personnel mobilized to the site will include clear expectations that personnel will operate vehicles in accordance with local/state/and federal regulations, and, that failure to abide by traffic laws will result in personal liability to individuals and potential dismissal from the site. 3g. Cell phones use is prohibited when operating motorized vehicles or equipment. 3h. The specified speed limit with the limits of work – the jobsite is 15 mph unless travelling on a public road with a specified speed limit. 3i. Ensure that personnel understand that up/down/side-slope travel exceeding manufacturer's specifications is prohibited. 3j. Scout the path ahead to identify any hazards that could cause the vehicle to become stuck in mud, snow, or otherwise. 3k. Do not exceed more than 14 total hours of combined driving and work. Each worker is required to have 10 hours of rest each day.	**M**

Job Steps	Hazards	Hazard Controls	RAC
metal straps and tape as necessary. *Cut and remove the armor in the prepared section with an angle grinder.* *Cut through the cable using a reciprocating saw and remove cut length.* *Measure open cable end and maintain ground.*		4a. Exercise good housekeeping. Remove items from pathways that could pose a trip hazard; if unable to remove the encumbrance will be marked or barricaded. . 4b. Remove allhazards (ice, tripping, etc.) from walkways to prevent slipping 4c. Wear boots that include a safety toe and puncture-resistant soles 4d. Each work area will be routinely inspected for slip/trip/fall hazards. 4e. Materials will be organized in a site location that does not impact the active work area. Materials will be stored to prevent ground hazards in the work area. 4f. Avoid muddy, wet, or icy areas in rain/snow conditions. 4g. Ensure non-slip pads are present on stairs or ramps especially in rainy conditions. 4h. Work will be completed in adequate natural light. 4i.	**L**
		5a. Verify field certifications and personnel have the required authorization to enter the installation. 5b. Obtain all necessary permits or paperwork (i.e. hot work, lifts). 5c. Complete all necessary or required training. 5d. Complete review of project-specific documents. 5e. Use the “buddy system” whenever possible.	**L**
		6a. When in the field, check yourself often for ticks. Check your lower legs and areas covered with hair. Look for a “freckle that moves”. 6b. Spray outer clothing, not your skin, with permethrin or permanone based insecticide. Pay particular attention to your pant legs, waist, boots, and socks. 6c. Tape your pant legs to your boots or utilize “tick gaiters”. 6d. Follow manufacturer’s instructions if using an insect repellent on the skin. 6e. Avoid contact with bushes, tall grass, or brush as much as possible. 6f. Avoid wild animals including venomous snakes. Do not feed wild animals. 6g. Avoid livestock. Do not feed livestock. 6h. Avoid contact with potential virus-hosting rodents, their urine and their droppings.	**M**

Job Steps	Hazards	Hazard Controls	RAC
		7a. Use sun block to prevent sun burns as recommended by the manufacturer. 7b. Avoid direct sun exposure for long periods of time	L
		8a. As determined by the SSO, operations are to cease during severe weather conditions. Outdoor activities will be suspended when the potential for lightning occurs. 8b. Monitor hazardous weather warnings 8c. Avoid trees, water, open fields, and using hard-wired telephones and headsets when lightning is in the area. 8d. If isolated from shelter during close-in lightning, adopt a low crouching position, with feet together (up on toes, if possible) and hands on ears. 8e. Wear clothing appropriate for weather conditions	L
		9a. Identify operations that pose “caught between” hazards and brief all site personnel on risks. 9b. Personnel will carefully coordinate the handling and placement of heavy objects. 9c. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions will be taken to cover sharp edges. 9d. Daily briefings will include discussion of this issue and PPE choices to minimize risks. 9e. Personnel will avoid placing hands between objects. Avoid pinch points.	M
		10a. Use proper lifting techniques - keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. 10b. Split heavy loads (>50lb) into smaller loads and/or seek assistance. 10c. Follow weight/size recommendations when planning all manual lifts. 10d. Verify the path of travel is clear prior to the lift.	L

Job Steps	Hazards	Hazard Controls	RAC
		11a. Separate all lead waste from other wastes 11b. Do not allow non-essential personnel to enter the work zone. 11c. Use gloves and respirator when handling lead waste. 11d. Use respirator when cutting or heating lead sheath. 11e. Use ventilation and HEPA filtration in work zones with active lead work. 11f. Use wetting methods to minimize exposure to airborne lead dusts. 11g. Practice good personal hygiene. Wash hands with soap and water before eating or leaving the project site. 11h. Participate in medical surveillance.	**M**
		12a. Task-specific hot work permit must be issued by vessel bridge prior to work start 12b. Fire extinguishers must be readily available throughout duration of hot work. 12c. Work zone must be kept clean and free of flammable materials. 12d. Flashback arresters and regulator must be fitted on flammable gas equipment. 12e. Fire watch must be present during hot work execution. Fire watch must be present for 1 hour after completion of hot work activities. 12f. Gas cylinder must be stored in gas rack outside next to jointing hose.	**M**
		13a. Use PPE including gloves and safety glasses when handling chemicals. 13b. Maintain SDS in Project HASP on site. 13c. Mark storage bins with content. 13d. Do not mix chemicals 13e. Only use what chemical is intended for. 13f. Take care not to spill from containers. Containerize dirty cloths. 13g. Have an eyewash and spill kit available at all times. 13h. Provide ventilation in the work zone. 13i. Do not use an open flame around chemicals.	**M**

Equipment	PPE	Competent or Qualified Personnel Name(s)	Inspection	Training
• Motor Vehicles • Fire Extinguishers • First Aid Kits • Small hand tools • BBP Kits • Hearing Protectors • Sunscreen • Insect repellents • Standard Jointers Toolbox • Power Supply and Cords • Strap steel tools • Reciprocating Saw • Angle Grinder • Raychem kit • Acetylene Kit • Propane and Acetylene cylinders • Rigging equipment as needed.	• Hard hats – when overhead hazards are present or heavy equipment is in use • Safety toed boots with ankle supports (ASTM F2413 compliant) – when overhead hazards are present or heavy equipment is in use • Safety glasses (ANSI Z87) • Safety vests (Class 2 or 3 Reflective Vest) • Gloves (leather, nitrile and/or specialty types) – When lifting as appropriate • Long pants and sleeved shirts. Pants, shirts and socks treated with permethrins where ticks are present • FR Coveralls • NIOSH-approved full-face respirator with APF 50 • Sunscreen •	• Competent Person: SSL • Qualified Person: SSL	• Initial inspection of all equipment and tools to be used. • Daily inspection of equipment and tools prior to tool use. • PPE inspections prior to each use. • Rigging inspections as needed	• OSHA 30-hour Construction course • First aid/CPR • BBP • Initial site safety briefing • Daily toolbox safety briefings • Motor vehicle license • Respiratory Training • Lead Hazard Awareness Training • Respirator Fit Test and Medical Surveillance

In accordance with NKT policies and regulatory requirements “Work will not begin until the SJA for the work activity has been reviewed and briefed to all site personnel. The SJA shall be reviewed and modified as necessary to address changing site conditions, operations or change of competent/qualified persons.

By signing below I understand, agree to, and will conform to the site rules set forth in this SJA, my respective company’s EHS Planning Documents (including amendments and attachments), and those controls agreed upon during any site-specific health and safety briefing(s).

SAFE JOB ANALYSIS			
Activity/Work Task:	**SJA 3 – Submarine Capping**	Overall Risk Assessment Code (RAC) *(Use highest code):*	**M**
Client:	CHPE	**Risk Assessment Code (RAC) Matrix**	
Project Location:	New York, USA	**Severity** / **Probability**	
Date Prepared:	08/28/2023	
Date Revised:	
Prepared by (Name/Title):	NKT with support from WESTON
Revised by:	

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Reviewed by SSL (Printed Name/Signature Date:	**Step 1**: Review each "**Hazard**" with identified safety "**Controls**" and determine RAC (See above).
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "**Hazard**" on SJA. Annotate the overall highest RAC at the top of the SJA.
Reviewed by Sub. Foreman (Printed Name/Signature): Date:	"**Probability**" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.
	"**Severity**" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible.
NOTES:	**RAC Chart**

E = Extremely High Risk	**H = High Risk**
M = Moderate Risk	**L = Low Risk**

Job Steps	Hazards	Hazard Controls	RAC
Non-Metallic Seal – *Remove the metal strap and layback sufficient armor. Maintain in small bundles. Do*	1. Struck-by vehicles or equipment. 2. Fire hazards posed by refueling vehicles and using	1a. Backup alarms on vehicles so equipped, must be operable to warn personnel in the area behind vehicles and equipment. 1b. If ground hazards exist, utilize spotters for all backing. 1c. Maintain awareness of personnel on foot and other vehicles.	**L**

Job Steps	Hazards	Hazard Controls	RAC
not overbend and ensure metal strap is securing armoring at the back. *Cutback cable to produce an overlength of armor.* *Chamfer the sheath at the cable end and ensure there are no sharp edges or flakes.* *Clean and rug the sheath where any shrink cap, sleeve, or tape will be applied.* *Prepared for hot work by pre-heating the cleaned section with Raychem torch. Ensure it is fully heated and gripping the sheath. Glue residue should be visible.* *Install shrink sleeve centered over shrink cap transition. Ensure fully heated and gripping the sheath. Apply tape layers to the transition.* Metallic Seal - *Remove metal strap and layback sufficient armor and maintain in small bundles. Do not overbend and ensure metal*	vehicles over dry/grassy areas 3. Driving motor vehicles 4. Slips, trips, and falls 5. Biological hazards including the possibility of stinging insects, venomous snakes, and poisonous plants 6. Non-ionizing radiation – Ultraviolet rays from the sun 7. Adverse weather conditions 8. Tool hazards - Caught-in, -between hazards to hands/fingers 9. Lifting hazards 10. Lead Exposure 11. Hot Work 12. Use of Chemicals	2a. When loading/unloading equipment from trailers, properly secure ramps and keep personnel clear of the fall radius. Load equipment evenly and do not overload. 2b. vehicles shall be provided with at least one fire extinguisher (rated 10BC or greater) 2c. All sources of ignition shall be prohibited in areas where flammable liquids are stored, handled, and processed. 2d. All Fuel storage and dispensing areas must be marked with signage at the approach boundary. 2e. Equipment and vehicles will be shut down for fueling.	**L**
		3a. Equipment operators and drivers will conduct daily inspections during use, utilizing a checklist form that will be turned in each day or weekly. 3b. Motor vehicle/utility vehicle/equipment operators shall hold a license and/or appropriate training for the type and class of vehicle they are operating. 3c. Seat belt use is required for all equipment/vehicles. 3d. Do not use communication devices while operating a vehicle. 3e. Follow established and/or posted speed limits. Reduce speeds during poor conditions. 3f. Initial orientation discussions with all personnel mobilized to the site will include clear expectations that personnel will operate vehicles in accordance with local/state/and federal regulations, and, that failure to abide by traffic laws will result in personal liability to individuals and potential dismissal from the site. 3g. Cell phones use if prohibited when operating motorized vehicles or equipment. 3h. The specified speed limit with the limits of work – the jobsite is 15 mph unless travelling on a public road with a specified speed limit. 3i. Ensure that personnel understand that up/down/side-slope travel exceeding manufacturer's specifications is prohibited. 3j. Vehicle lights, tires, and dashboard lights (if any) should be inspected prior to departing. 3k. Scout the path ahead to identify any hazards that could cause the vehicle to become stuck in mud, snow, or otherwise. 3l. Do not exceed more than 14 total hours of combined driving and work. Each worker is required to have 10 hours of rest each day.	**M**

Job Steps	Hazards	Hazard Controls	RAC
straps are securing the armor in the back: *Cutback cable to produce an overlength of armor.* *Remove sheath and expose lead sheath.* *Connect conductor and lead sheath with a nail. Mount the metallic end cap with insulator.* *Solder the metallic end seal to lead sheath.. Ensure minimum thickness and no air pockets. Let solder cool between apply the layers. Maintain a circular smooth surface with no sharp edges. Solder can be ground if necessary.* *Apply tape layers to the transition between sheath and lead sheath.* *Install shrink sleeve centered over shrink cap transition. Ensure fully heated and gripping the sheath.* Open the drum -		4a. Exercise good housekeeping. Remove items from pathways that could pose a trip hazard. 4b. Remove ice from walkways to prevent slipping 4c. Wear boots that include a safety toe and puncture-resistant soles 4d. Each work area will be routinely inspected for slip/trip/fall hazards.	**L**
		4e. Observed debris will be removed and other identified obstacles and/or encumbrances will be marked or barricaded. 4f. Materials will be organized in a site location that does not impact the active work area. Materials will be stored to prevent ground hazards in the work area. 4g. Avoid muddy or wet areas in rainy conditions. 4h. Ensure non-slip pads are present on stairs or ramps especially in rainy conditions. 4i. Treat all icy walkways or paths in winter conditions and emphasize awareness of conditions in daily briefings. 4j. Work will be completed in adequate natural light. 4k. Be aware of ongoing activities on the vessel deck. 4l. Use handrails in staircases 4m. Follow marked gangway when walking on deck	**L**
		5a. When in the field, check yourself often for ticks. Check your lower legs and areas covered with hair. Look for a “freckle that moves”. 5b. Spray outer clothing, not your skin, with permethrin or permanone based insecticide. Pay particular attention to your pant legs, waist, boots, and socks. 5c. Tape your pant legs to your boots or utilize “tick gaiters”. 5d. Follow manufacturer’s instructions if using an insect repellent on the skin. 5e. Avoid contact with bushes, tall grass, or brush as much as possible. 5f. Avoid wild animals. Do not feed wild animals. 5g. Avoid contact with potential virus-hosting rodents, their urine and their droppings.	**M**
		6a. Use sun block to prevent sun burns as recommended by the manufacturer. 6b. Avoid direct sub exposure for long periods of time	**L**

Job Steps	Hazards	Hazard Controls	RAC
Use non-sparking bung wrenches. *Open drum in upright position with the bung up. For drums with bungs on the sides, lay the drum on its side with the bung upward.* *Slowly wrench on the bung with a steady pull across the drum.* Armor Restoration - *Apply tape to level seal.* *Restore armor using metal straps to secure wires.* *Bend armor wires to form a cone at the cable end.* *Apply anti-slip tape over the work area for Kellum grip.* *Ensure control cards are completed and signed.*		7a. As determined by the SSO, operations are to cease during severe weather conditions. Outdoor activities will be suspended when the potential for lightning occurs. 7b. Monitor hazardous weather warnings 7c. Avoid trees, water, open fields, and using hard-wired telephones and headsets when lightning is in the area. 7d. If isolated from shelter during close-in lightning, adopt a low crouching position, with feet together (up on toes, if possible) and hands on ears. 7e. Wear clothing appropriate for weather conditions	**L**
		8a. Identify operations that pose “caught between” hazards and brief all site personnel on risks. 8b. Personnel will carefully coordinate the handling and placement of heavy objects. 8c. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions will be taken to cover sharp edges. 8d. Daily briefings will include discussion of this issue and PPE choices to minimize risks. 8e. Personnel will avoid placing hands between objects. 8f. Do not use Kevlar gloves during the operation of rotating tools to avoid being tangled. 8g. Inspect electrical equipment prior to use 8h. Confirm voltage rating, compatibility, and proper grounding arrangements.	**M**
		9a. Use proper lifting techniques - keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. 9b. Split heavy loads (>50lb) into smaller loads and/or seek assistance. 9c. Follow weight/size recommendations when planning all manual lifts. 9d. Verify the path of travel is clear prior to the lift. 9e. Use only certified slings and chain blocks to adjust lifting position	**L**

Job Steps	Hazards	Hazard Controls	RAC
		10a. Separate all lead waste from other wastes 10b. Do not allow non-essential personnel to enter the work zone. 10c. Use gloves and respirator when handling lead waste. 10d. Use respirator when cutting or heating lead sheath. 10e. Use ventilation and HEPA filtration in work zones with active lead work. 10f. Use wetting methods to minimize exposure to airborne lead dusts. 10g. Practice good personal hygiene. Wash hands with soap and water before eating or leaving the project site. 10h. Participate in medical surveillance. 10i. **IF LEAD IS TO BE HEATED WITH WELDING, SOLDERING, OR OTHERWISE HOT WORK – DO NOT PROCEED WITHOUT A RESPIRATOR CAPABLE OF APF 50.**	**M**
		11a. Task-specific hot work permit must be issued by vessel bridge prior to work start 11b. Fire extinguishers must be readily available throughout duration of hot work. 11c. Work zone must be kept clean and free of flammable materials. 11d. Flashback arresters and regulator must be fitted on flammable gas equipment. 11e. Fire watch must be present during hot work execution. Fire watch must be present for 1 hour after completion of hot work activities. 11f. Gas cylinder must be stored in gas rack outside next to jointing hose.	**M**
		12a. Use PPE including gloves and safety glasses when handling chemicals. 12b. Maintain SDS in Project HASP on site. 12c. Mark storage bins with content. 12d. Do not mix chemicals 12e. Only use what chemical is intended for. 12f. Take care not to spill from containers. Containerize dirty cloths. 12g. Have an eyewash and spill kit available at all times. 12h. Provide ventilation in the work zone. 12i. Do not use an open flame around chemicals.	**M**

Equipment	PPE	Competent or Qualified Personnel Name(s)	Inspection	Training
• Motor Vehicles • Fire Extinguishers • First Aid Kits • Small hand tools • BBP Kits • Hearing Protectors • Sunscreen • Insect repellents • Standard Jointers Toolbox • Power Supply and Cords • Strap steel tools • Reciprocating Saw • Angle Grinder • Raychem kit • Acetylene Kit • Propane and Acetylene cylinders Rigging equipment as needed.	• Hard hats – when overhead hazards are present or heavy equipment is in use • Safety toed boots with ankle supports (ASTM F2413 compliant) – when overhead hazards are present or heavy equipment is in use • Safety glasses (ANSI Z87) • Safety vests (Class 2 or 3 Reflective Vest) • Gloves (leather, nitrile and/or specialty types) – When lifting as appropriate • Long pants and sleeved shirts. Pants, shirts and socks treated with permethrins where ticks are present • FR Coveralls • NIOSH-approved full-face respirator with APF 50 • Sunscreen •	• Competent Person: SSL • Qualified Person: SSL	• Initial inspection of all equipment and tools to be used. • Daily inspection of equipment and tools prior to tool use. • PPE inspections prior to each use. • Rigging inspections as needed	• OSHA 30-hour Construction course • First aid/CPR • BBP • Initial site safety briefing • Daily toolbox safety briefings • Motor vehicle license • Respiratory Training • Lead Hazard Awareness Training • Respirator Fit Test and Medical Surveillance

In accordance with NKT policies and regulatory requirements “Work will not begin until the SJA for the work activity has been reviewed and briefed to all site personnel. The SJA shall be reviewed and modified as necessary to address changing site conditions, operations or change of competent/qualified persons.

By signing below I understand, agree to, and will conform to the site rules set forth in this SJA, my respective company’s EHS Planning Documents (including amendments and attachments), and those controls agreed upon during any site-specific health and safety briefing(s).

BLANK SAFE JOB ANALYSIS

Activity/Work Task:		Overall Risk Assessment Code (RAC) *(Use highest code):*	
Client:		**Risk Assessment Code (RAC) Matrix**	
Project Location:		**Severity**	**Probability**
Date Prepared: **Date Revised:**		**Prepared by (Name/Title):** **Revised by:**	

Risk Assessment Code (RAC) Matrix

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Reviewed by SSL (Printed Name/Signature Date:	**Step 1**: Review each "**Hazard**" with identified safety "**Controls**" and determine RAC (See above).
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "**Hazard**" on SJA. Annotate the overall highest RAC at the top of the SJA.
Reviewed by Sub. Foreman (Printed Name/Signature): Date:	"**Probability**" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.
	"**Severity**" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible.
NOTES: *This Blank SJA is for NKT Field Personnel to populate if a new task is identified that is not covered in this HASP.*	**RAC Chart**

E = Extremely High Risk	**H = High Risk**
M = Moderate Risk	**L = Low Risk**

Job Steps	Hazards	Hazard Controls	RAC

Job Steps	Hazards	Hazard Controls	RAC

Job Steps	Hazards	Hazard Controls	RAC

Equipment	PPE	Competent or Qualified Personnel Name(s)	Inspection	Training
	•			

In accordance with NKT policies and regulatory requirements “Work will not begin until the SJA for the work activity has been reviewed and briefed to all site personnel. The SJA shall be reviewed and modified as necessary to address changing site conditions, operations or change of competent/qualified persons.

By signing below I understand, agree to, and will conform to the site rules set forth in this SJA, my respective company’s EHS Planning Documents (including amendments and attachments), and those controls agreed upon during any site-specific health and safety briefing(s).

Attachment C – Pre-Entry Briefing and Daily Toolbox Meeting Attendance Form

Toolbox Safety Briefing Log

This sign-in log documents the topics of the Toolbox Safety Briefing and individual attendence at the breifing. Personnel who perform work operations on the project site are required to attend eachToolbox Safety Briefing and acknowledge their ability to ask questions and reciept of such briefings daily. Please provide a brief narrative of the following topics as applicable to the project.

Meeting Leader Name:		**Signature:**	
Date/Time/Weather:		**Project Location:**	
Emergency Muster Location:			
Emergency Route:			

Topic	Discussed? Check One
Today's Scope of Work	☐ Yes or ☐ N/A
Schedule/New Work/Scope Changes	☐ Yes or ☐ N/A
Reviewed Procedures and SJAs	☐ Yes or ☐ N/A
Emergency Action Plan and Procedures	☐ Yes or ☐ N/A
Communication Protocol	☐ Yes or ☐ N/A
Required PPE	☐ Yes or ☐ N/A
Required Monitoring and Instruments	☐ Yes or ☐ N/A
Site Control/Work Zones/Security	☐ Yes or ☐ N/A
Access/Egreess/Slips, Trips, and Falls	☐ Yes or ☐ N/A
Smoking, Eating, and Drinking	☐ Yes or ☐ N/A
Washroom Facilities Location	☐ Yes or ☐ N/A
Heat/Cold Stress	☐ Yes or ☐ N/A
Exclusion Areas	☐ Yes or ☐ N/A
Required Permits	☐ Yes or ☐ N/A
Decontamination Procedures and Waste Management	☐ Yes or ☐ N/A
Equipment Inspections	☐ Yes or ☐ N/A
Fit for Duty – All Staff	☐ Yes or ☐ N/A

Comments:

Questions for Success – as your final preparedness step, take two minutes to think through and answer these questions:	
What are we about to do?	
What equipment are we going to use?	
Have we been trained to use this equipment?	
Have we been trained to do this job?	
How can we be hurt?	
How can we prevent an accident?	

Validation of Safety Measures Taken *Work cannot take place until the applicable measure(s) have been confirmed*	
Have subcontractors on site provided their Job Safety Analysis or Safe Job Analysis?	☐ Yes or ☐ N/A

End of Day Sign-Off:	
Number of incidents that occurred:	
Number of near-misses or observations reported:	
Were all incidents reported to the Project Manager?	☐ Yes or ☐ N/A

Attendence Signature Log		
Printed Name	**Signature**	**Company/Organization**

Attachment D – Safety Data Sheets

SDS 1: Gasoline

SAFETY DATA SHEET

1. Identification

Product identifier	**UNLEADED GASOLINE**
Other means of identification	
SDS number	002-GHS
Synonyms	Regular/Premium/Midgrade - Unleaded Gasoline, RFG - Reformulated Unleaded Gasoline, Conventional Unleaded Gasoline, Oxygenated Unleaded Gasoline, Non-Oxygenated Unleaded Gasoline, CARB (California Air Resource Board) Unleaded Gasoline, RBOB - Reformulated Blendstock for Oxygenate Blending, CBOB - Conventional Blendstock for Oxygenate Blending, Petrol, Motor Fuel. See section 16 for complete information.
Recommended use	Motor Fuel Motor fuels.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Manufacturer/Supplier	Valero Marketing & Supply Company and Affiliates One Valero Way San Antonio, TX 78269-6000
General Assistance	210-345-4593
E-Mail	CorpHSE@valero.com
Contact Person	Industrial Hygienist
Emergency Telephone	24 Hour Emergency 866-565-5220 1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 1
Health hazards	Skin corrosion/irritation	Category 2
	Germ cell mutagenicity	Category 1B
	Carcinogenicity	Category 1B
	Reproductive toxicity	Category 2
	Specific target organ toxicity, single exposure	Category 3 narcotic effects
	Specific target organ toxicity, repeated exposure	Category 2
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements

Signal word	Danger
Hazard statement	Extremely flammable liquid and vapor. Causes skin irritation. May cause genetic defects. May cause cancer. Suspected of damaging fertility or the unborn child. May cause drowsiness or dizziness. May cause damage to organs (blood, liver, kidney) 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. Do not breathe gas/mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area. Avoid release to the environment.
Response	If exposed or concerned: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. In case of fire: Use alcohol-resistant foam, carbon dioxide, dry powder or water fog for extinction. Collect spillage.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed. Keep cool.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Gasoline	86290-81-5	80-100
Toluene	108-88-3	0-30
Hexane (Other Isomers)	96-14-0	5-25
Xylene (o, m, p isomers)	1330-20-7	0-25
Octane (All isomers)	111-65-9	0-18.5
Ethanol	64-17-5	0-10
1,2,4, Trimethylbenzene	95-63-6	0-6
n-Heptane	142-82-5	1-5
Pentane	109-66-0	1-5
Cumene	98-82-8	0-5
Ethylbenzene	100-41-4	0-5
Benzene	71-43-2	0-4.9
n-Hexane	110-54-3	0-3
Cyclohexane	110-82-7	0-3

4. First-aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin contact	Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.
Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.
Most important symptoms/effects, acute and delayed	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash.

Indication of immediate medical attention and special treatment needed	In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards arising from the chemical	Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Special protective equipment and precautions for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Fire-fighting equipment/instructions	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapors may form explosive air mixtures even at room temperature. Prevent buildup of vapors or gases to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage. Use compatible foam to minimize vapor generation as needed.
Specific methods	Use water spray to cool unopened containers.
General fire hazards	Extremely flammable liquid and vapor. Containers may explode when heated.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas. Use non-sparking tools and explosion-proof equipment. Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste. Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.
Environmental precautions	Gasoline may contain oxygenated blend products (Ethanol, etc.) that are soluble in water and therefore precautions should be taken to protect surface and groundwater sources from contamination. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Use compatible foam to minimize vapor generation as needed. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802.

7. Handling and storage

Precautions for safe handling

Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity.
Wear personal protective equipment. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is extremely flammable, and explosive vapor/air mixtures may be formed even at normal room temperatures. 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. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

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

Components	Type	Value
Benzene (CAS 71-43-2)	STEL	5 ppm
	TWA	1 ppm

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

Components	Type	Value
Cumene (CAS 98-82-8)	PEL	245 mg/m3
		50 ppm
Cyclohexane (CAS 110-82-7)	PEL	1050 mg/m3
		300 ppm
Ethanol (CAS 64-17-5)	PEL	1900 mg/m3
		1000 ppm
Ethylbenzene (CAS 100-41-4)	PEL	435 mg/m3
		100 ppm
n-Heptane (CAS 142-82-5)	PEL	2000 mg/m3
		500 ppm
n-Hexane (CAS 110-54-3)	PEL	1800 mg/m3
		500 ppm
Octane (All isomers) (CAS 111-65-9)	PEL	2350 mg/m3
		500 ppm
Pentane (CAS 109-66-0)	PEL	2950 mg/m3
		1000 ppm
Xylene (o, m, p isomers) (CAS 1330-20-7)	PEL	435 mg/m3
		100 ppm

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value
Benzene (CAS 71-43-2)	Ceiling	25 ppm
	TWA	10 ppm
Toluene (CAS 108-88-3)	Ceiling	300 ppm
	TWA	200 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
1,2,4, Trimethylbenzene (CAS 95-63-6)	TWA	25 ppm
Benzene (CAS 71-43-2)	STEL	2.5 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
	TWA	0.5 ppm
Cumene (CAS 98-82-8)	TWA	50 ppm
Cyclohexane (CAS 110-82-7)	TWA	100 ppm
Ethanol (CAS 64-17-5)	STEL	1000 ppm
Ethylbenzene (CAS 100-41-4)	TWA	20 ppm
Gasoline (CAS 86290-81-5)	STEL	500 ppm
	TWA	300 ppm
Hexane (Other Isomers) (CAS 96-14-0)	STEL	1000 ppm
	TWA	500 ppm
n-Heptane (CAS 142-82-5)	STEL	500 ppm
	TWA	400 ppm
n-Hexane (CAS 110-54-3)	TWA	50 ppm
Octane (All isomers) (CAS 111-65-9)	TWA	300 ppm
Pentane (CAS 109-66-0)	TWA	600 ppm
Toluene (CAS 108-88-3)	TWA	20 ppm
Xylene (o, m, p isomers) (CAS 1330-20-7)	STEL	150 ppm
	TWA	100 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
1,2,4, Trimethylbenzene (CAS 95-63-6)	TWA	125 mg/m3
		25 ppm
Benzene (CAS 71-43-2)	STEL	1 ppm
	TWA	0.1 ppm
Cumene (CAS 98-82-8)	TWA	245 mg/m3
		50 ppm
Cyclohexane (CAS 110-82-7)	TWA	1050 mg/m3
		300 ppm
Ethanol (CAS 64-17-5)	TWA	1900 mg/m3
		1000 ppm
Ethylbenzene (CAS 100-41-4)	STEL	545 mg/m3
		125 ppm
	TWA	435 mg/m3
		100 ppm
Hexane (Other Isomers) (CAS 96-14-0)	Ceiling	1800 mg/m3
		510 ppm
	TWA	350 mg/m3
		100 ppm
n-Heptane (CAS 142-82-5)	Ceiling	1800 mg/m3
		440 ppm
	TWA	350 mg/m3
		85 ppm
n-Hexane (CAS 110-54-3)	TWA	180 mg/m3
		50 ppm
Octane (All isomers) (CAS 111-65-9)	Ceiling	1800 mg/m3
		385 ppm
	TWA	350 mg/m3
		75 ppm
Pentane (CAS 109-66-0)	Ceiling	1800 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
		610 ppm
	TWA	350 mg/m3
		120 ppm
Toluene (CAS 108-88-3)	STEL	560 mg/m3
		150 ppm
	TWA	375 mg/m3
		100 ppm
Xylene (o, m, p isomers) (CAS 1330-20-7)	STEL	655 mg/m3
		150 ppm
	TWA	435 mg/m3
		100 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Benzene (CAS 71-43-2)	25 µg/g	S-Phenylmercapturic acid	Creatinine in urine	*
Ethylbenzene (CAS 100-41-4)	0.7 g/g	Sum of mandelic acid and phenylglyoxylic acid	Creatinine in urine	*
n-Hexane (CAS 110-54-3)	0.4 mg/l	2,5-Hexanedi - on, without hydrolysis		*
	0.4 mg/l	2,5-Hexanedion, without hydrolysis	Urine	*
Toluene (CAS 108-88-3)	0.3 mg/g	o-Cresol, with hydrolysis	Creatinine in urine	*
	0.03 mg/l	Toluene	Urine	*
	0.02 mg/l	Toluene	Blood	*
Xylene (o, m, p isomers) (CAS 1330-20-7)	1.5 g/g	Methylhippuric acids	Creatinine in urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

Benzene (CAS 71-43-2)	Can be absorbed through the skin.
Cumene (CAS 98-82-8)	Can be absorbed through the skin.
n-Hexane (CAS 110-54-3)	Can be absorbed through the skin.
Toluene (CAS 108-88-3)	Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

Cumene (CAS 98-82-8)	Skin designation applies.
Toluene (CAS 108-88-3)	Skin designation applies.

US - Tennesse OELs: Skin designation

Cumene (CAS 98-82-8)	Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Benzene (CAS 71-43-2)	Can be absorbed through the skin.
n-Hexane (CAS 110-54-3)	Can be absorbed through the skin.

US. NIOSH: Pocket Guide to Chemical Hazards

Cumene (CAS 98-82-8)	Can be absorbed through the skin.

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

Cumene (CAS 98-82-8)	Can be absorbed through the skin.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.
Skin protection	
Hand protection	Avoid exposure - obtain special instructions before use. Wear protective gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Suitable gloves can be recommended by the glove supplier.
Other	Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.
Respiratory protection	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	Light straw to red clear liquid with characteristic strong odor of gasoline.
Physical state	Liquid.
Form	Liquid.
Color	Light straw to red clear.
Odor	Characteristic Gasoline Odor (Strong).
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	44.01 °F (6.67 °C) May start to solidify at this temperature. This is based on data for the following ingredient: Cyclohexane. Weighted average: -91.9 deg C (-133.4 deg F)
Initial boiling point and boiling range	80.06 - 440.06 °F (26.7 - 226.7 °C)
Flash point	-40.0 °F (-40.0 °C) (closed cup)
Evaporation rate	10 - 11 BuAc
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	1.3 %
Flammability limit - upper (%)	7.1 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	60.8 - 101.3 kPa (20°C)
Vapor density	3 - 4 (Air=1)
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Very slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	> 500 °F (> 260 °C)
Decomposition temperature	Not available.
Viscosity	Not available.

Other information

Flash point class	Flammable IA
VOC (Weight %)	100 %

10. Stability and reactivity

Reactivity	None known.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Swallowing or vomiting of the liquid may result in aspiration into the lungs.
Inhalation	In high concentrations, mists/vapors may irritate throat and respiratory system and cause coughing. May cause drowsiness or dizziness.
Skin contact	Causes skin irritation. Prolonged contact may cause dryness of the skin.
Eye contact	May cause eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash.

Information on toxicological effects

Acute toxicity Based on available data, the classification criteria are not met.

Components	Species	Test Results
1,2,4, Trimethylbenzene (CAS 95-63-6)		
Acute		
Dermal		
LD50	Rabbit	> 3160 mg/kg
Inhalation		
LC50	Rat	> 2000 mg/l, 48 Hours
Oral		
LD50	Rat	6 g/kg
Benzene (CAS 71-43-2)		
Acute		
Oral		
LD50	Rat	3306 mg/kg
Cumene (CAS 98-82-8)		
Acute		
Inhalation		
LC50	Mouse	2000 mg/l, 7 Hours
	Rat	8000 mg/l, 4 Hours
Oral		
LD50	Rat	1400 mg/kg
Cyclohexane (CAS 110-82-7)		
Acute		
Oral		
LD50	Rat	12705 mg/kg

Components	Species	Test Results
Ethanol (CAS 64-17-5)		
Acute		
Inhalation		
LC50	Rat	30000 mg/m3
Ethylbenzene (CAS 100-41-4)		
Acute		
Dermal		
LD50	Rabbit	> 5000 mg/kg
Oral		
LD50	Rat	5.46 g/kg
n-Heptane (CAS 142-82-5)		
Acute		
Inhalation		
LC50	Rat	103 mg/l, 4 Hours
n-Hexane (CAS 110-54-3)		
Acute		
Oral		
LD50	Rat	28710 mg/kg
Octane (All isomers) (CAS 111-65-9)		
Acute		
Inhalation		
LC50	Rat	118 mg/l, 4 Hours
Pentane (CAS 109-66-0)		
Acute		
Inhalation		
LC50	Rat	364 mg/l, 4 Hours
Toluene (CAS 108-88-3)		
Acute		
Dermal		
LD50	Rabbit	14.1 ml/kg
Inhalation		
LC50	Rat	8000 mg/l, 4 Hours
Oral		
LD50	Rat	2.6 g/kg
Xylene (o, m, p isomers) (CAS 1330-20-7)		
Acute		
Oral		
LD50	Rat	4300 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Based on available data, the classification criteria are not met.
Respiratory or skin sensitization	
Respiratory sensitization	Based on available data, the classification criteria are not met.
Skin sensitization	Based on available data, the classification criteria are not met. This substance may have a potential for sensitization which may provoke an allergic reaction among sensitive individuals.
Germ cell mutagenicity	May cause genetic defects. In in-vitro experiments, neither benzene, toluene nor xylene changed the number of sister-chromatid exchanges (SCEs) or the number of chromosomal aberrations in human lymphocytes. However, toluene and xylene caused a significant cell growth inhibition which was not observed with benzene in the same concentrations. In in-vivo experiments, toluene changed the number of sister-chromatid exchanges (SCEs) in human lymphocytes. Toluene may cause heritable genetic damage.

Carcinogenicity May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2)	1 Carcinogenic to humans.
Cumene (CAS 98-82-8)	2B Possibly carcinogenic to humans.
Ethylbenzene (CAS 100-41-4)	2B Possibly carcinogenic to humans.
Gasoline (CAS 86290-81-5)	2B Possibly carcinogenic to humans.
Toluene (CAS 108-88-3)	3 Not classifiable as to carcinogenicity to humans.
Xylene (o, m, p isomers) (CAS 1330-20-7)	3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Benzene (CAS 71-43-2)	Known To Be Human Carcinogen.

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

Benzene (CAS 71-43-2)	Cancer

Reproductive toxicity Suspected of damaging fertility or the unborn child.
Benzene, xylene and toluene have demonstrated animal effects of reproductive toxicity. Animal studies of benzene have shown testicular effects, alterations in reproductive cycles, chromosomal aberrations and embryo/fetotoxicity. Ethanol has demonstrated human effects of reproductive toxicity. Can cause adverse reproductive effects - such as birth defects, miscarriages, or infertility. Avoid exposure to women during early pregnancy. Avoid contact during pregnancy/while nursing.

Specific target organ toxicity - single exposure May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure May cause damage to the following organs through prolonged or repeated exposure: Blood. Kidneys. Liver.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Repeated exposure of laboratory animals to high concentrations of gasoline vapors has caused kidney damage and cancer in rats and cancer in mice. Gasoline was evaluated for genetic activity in assays using microbial cells, cultured mammalian cells and rat bone marrow cells. The results were all negative so gasoline was considered nonmutagenic under these conditions. Overexposure to this product or its components has been suggested as a cause of liver abnormalities in laboratory animals and humans. Lifetime studies by the American Petroleum Institute have shown that kidney damage and kidney cancer can occur in male rats after prolonged inhalation exposures at elevated concentrations of total gasoline. Kidneys of mice and female rats were unaffected. The U.S. EPA Risk Assessment Forum has concluded that the male rat kidney tumor results are not relevant for humans. Total gasoline exposure also produced liver tumors in female mice only. The implication of these data for humans has not been determined.

Further information Symptoms may be delayed.

12. Ecological information

Ecotoxicity Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Components		Species	Test Results
1,2,4, Trimethylbenzene (CAS 95-63-6)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	7.19 - 8.28 mg/l, 96 hours
Benzene (CAS 71-43-2)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	8.76 - 15.6 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	7.2 - 11.7 mg/l, 96 hours
Cumene (CAS 98-82-8)			
Aquatic			
Crustacea	EC50	Brine shrimp (Artemia sp.)	3.55 - 11.29 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	2.7 mg/l, 96 hours
Cyclohexane (CAS 110-82-7)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	3.961 - 5.181 mg/l, 96 hours
		Striped bass (Morone saxatilis)	8.3 mg/l, 96 hours

Components		Species	Test Results
Ethanol (CAS 64-17-5)			
Aquatic			
Algae	EC50	Freshwater algae	275 mg/l, 72 Hours
		Marine water algae	1970 mg/l
Fish	LC50	Fathead minnow (Pimephales promelas)	> 100 mg/l, 96 hours
		Freshwater fish	11200 mg/l, 96 Hours
Invertebrate	EC50	Freshwater invertebrate	5012 mg/l, 48 Hours
		Marine water invertebrate	857 mg/l, 48 Hours
Ethylbenzene (CAS 100-41-4)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	1 - 4 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	4 mg/l, 96 hours
n-Heptane (CAS 142-82-5)			
Aquatic			
Fish	LC50	Western mosquitofish (Gambusia affinis)	4924 mg/l, 96 hours
n-Hexane (CAS 110-54-3)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	2.101 - 2.981 mg/l, 96 hours
Toluene (CAS 108-88-3)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	5.46 - 9.83 mg/l, 48 hours
Fish	LC50	Pink salmon (Oncorhynchus gorbuscha)	6.86 - 8.48 mg/l, 96 hours
Xylene (o, m, p isomers) (CAS 1330-20-7)			
Aquatic			
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	8 mg/l, 96 Hours

Persistence and degradability Not available.

Bioaccumulative potential Not available.

Partition coefficient n-octanol / water (log Kow)

Benzene (CAS 71-43-2)	2.13
Cumene (CAS 98-82-8)	3.66
Cyclohexane (CAS 110-82-7)	3.44
Ethanol (CAS 64-17-5)	-0.31
Ethylbenzene (CAS 100-41-4)	3.15
Hexane (Other Isomers) (CAS 96-14-0)	3.6
Octane (All isomers) (CAS 111-65-9)	5.18
Pentane (CAS 109-66-0)	3.39
Toluene (CAS 108-88-3)	2.73
Xylene (o, m, p isomers) (CAS 1330-20-7)	3.2
n-Heptane (CAS 142-82-5)	4.66
n-Hexane (CAS 110-54-3)	3.9

Mobility in soil Not available.

Other adverse effects Not available.

13. Disposal considerations

Disposal instructions Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.

Hazardous waste code D001: Waste Flammable material with a flash point <140 °F
D018: Waste Benzene

	Central nervous system
	Blood
	Aspiration
	Skin
	Eye
	Respiratory tract irritation
	Flammability

CERCLA Hazardous Substance List (40 CFR 302.4)

Benzene (CAS 71-43-2)	LISTED
Cumene (CAS 98-82-8)	LISTED
Cyclohexane (CAS 110-82-7)	LISTED
Ethanol (CAS 64-17-5)	LISTED
Ethylbenzene (CAS 100-41-4)	LISTED
Gasoline (CAS 86290-81-5)	LISTED
Hexane (Other Isomers) (CAS 96-14-0)	LISTED
n-Heptane (CAS 142-82-5)	LISTED
n-Hexane (CAS 110-54-3)	LISTED
Octane (All isomers) (CAS 111-65-9)	LISTED
Pentane (CAS 109-66-0)	LISTED
Toluene (CAS 108-88-3)	LISTED
Xylene (o, m, p isomers) (CAS 1330-20-7)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Toluene	108-88-3	0-30
Xylene (o, m, p isomers)	1330-20-7	0-25
1,2,4, Trimethylbenzene	95-63-6	0-6
Cumene	98-82-8	0-5
Ethylbenzene	100-41-4	0-5
Benzene	71-43-2	0-4.9
n-Hexane	110-54-3	0-3
Cyclohexane	110-82-7	0-3

Other federal regulations

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

Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Ethylbenzene (CAS 100-41-4)
n-Hexane (CAS 110-54-3)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

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

Pentane (CAS 109-66-0)

Safe Drinking Water Act (SDWA) Not regulated.

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

Toluene (CAS 108-88-3)	6594

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

Toluene (CAS 108-88-3)	35 % weight/volumn

DEA Exempt Chemical Mixtures Code Number

Toluene (CAS 108-88-3)	594

US state regulations

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
Hexane (Other Isomers) (CAS 96-14-0)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

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

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

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

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethanol (CAS 64-17-5)
Ethylbenzene (CAS 100-41-4)
Gasoline (CAS 86290-81-5)
Hexane (Other Isomers) (CAS 96-14-0)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
Octane (All isomers) (CAS 111-65-9)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. Rhode Island RTK

1,2,4, Trimethylbenzene (CAS 95-63-6)
Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Cyclohexane (CAS 110-82-7)
Ethylbenzene (CAS 100-41-4)
n-Hexane (CAS 110-54-3)
Pentane (CAS 109-66-0)
Toluene (CAS 108-88-3)
Xylene (o, m, p isomers) (CAS 1330-20-7)

US. California Proposition 65

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

Benzene (CAS 71-43-2)
Cumene (CAS 98-82-8)
Ethylbenzene (CAS 100-41-4)
Toluene (CAS 108-88-3)

International Inventories

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

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

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

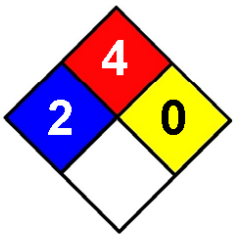
Issue date 13-May-2013

Revision date 23-May-2014

Version # 03

Further information HMIS® is a registered trade and service mark of the NPCA.

NFPA Ratings



References

ACGIH
EPA: AQUIRE database
NLM: Hazardous Substances Data Base
US. IARC Monographs on Occupational Exposures to Chemical Agents
HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use , the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

SDS 2: Diesel

SAFETY DATA SHEET

1. Identification

Product identifier	**DIESEL FUELS**
Other means of identification	
SDS number	102-GHS
Synonyms	Diesel Fuels All Grades, Diesel Fuel No.2, Fuel Oil No.2, High Sulfur Diesel Fuel, Low Sulfur Diesel Fuel, Ultra Low Sulfur Diesel Fuel, CARB (California Air Resource Board) Diesel Fuel, Off-Road Diesel Fuel, Dyed Diesel Fuel, X Grade Diesel Fuel, X-1 Diesel Fuel, R5 ULSD, B5 ULS D See section 16 for complete information.
Recommended use	Motor Fuel Refinery feedstock.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Manufacturer/Supplier	Valero Marketing & Supply Company and Affiliates One Valero Way San Antonio, TX 78269-6000
General Assistance	210-345-4593
E-Mail	CorpHSE@valero.com
Contact Person	Industrial Hygienist
Emergency Telephone	24 Hour Emergency 866-565-5220 1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 3
Health hazards	Acute toxicity, inhalation	Category 4
	Skin corrosion/irritation	Category 2
	Carcinogenicity	Category 2
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements

Signal word	Danger
Hazard statement	Flammable liquid and vapor. Harmful if inhaled. Causes skin irritation. Suspected of causing cancer. Suspected of damaging fertility or the unborn child. May cause damage to organs (blood, thymus, liver) through prolonged or repeated exposure. May be fatal if swallowed and enters airways.
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 discharges. Do not breathe mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Use only outdoors or in a well-ventilated area.

Response	If skin irritation occurs: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If exposed or concerned: Get medical advice/attention. If swallowed: Immediately call a poison center/doctor. Take off contaminated clothing and wash before reuse. In case of fire: Use foam, carbon dioxide, dry powder or water fog for extinction.
Storage	Store locked up. Store in a well-ventilated place. Keep cool.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Fuels, diesel, no. 2	68476-34-6	85 - 100
Biodiesel - Fatty acid methyl esters	67762-38-3	0 - 10
Fuels, diesel, C9-18-alkane branched and linear	1159170-26-9	0 - 5
n-Nonane	111-84-2	1 - 3
Octane (All isomers)	111-65-9	1 - 2
Hexane (Other isomers)	96-14-0	0 - 1
Naphthalene	91-20-3	0 - 1
n-Heptane	142-82-5	0 - 1
n-Hexane	110-54-3	0 - 1

4. First-aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin contact	Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.
Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.
Most important symptoms/effects, acute and delayed	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash. The toxicological properties of this product have not been thoroughly investigated. Use appropriate precautions. Hydrogen sulfide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere.
Indication of immediate medical attention and special treatment needed	In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed. The toxicological properties of this material have not been fully investigated.
General information	If exposed or concerned: get medical attention/advice. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before re-use.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards arising from the chemical	The product is flammable, and heating may generate vapors which may form explosive vapor/air mixtures. Thermal decomposition or combustion may liberate toxic gases or fumes.
Special protective equipment and precautions for firefighters	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.
Fire-fighting equipment/instructions	Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Water runoff can cause environmental damage. Use compatible foam to minimize vapor generation as needed.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Local authorities should be advised if significant spillages cannot be contained. Stop leak if you can do so without risk. This material is a water pollutant and should be prevented from contaminating soil or from entering sewage and drainage systems and bodies of water. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas. Use non-sparking tools and explosion-proof equipment. Small Spills: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste. Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment. Clean up in accordance with all applicable regulations.
Environmental precautions	If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Flammable. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Use compatible foam to minimize vapor generation as needed. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802. For highway or railways spills, contact Chemtrec at 1-800-424-9300.

7. Handling and storage

Precautions for safe handling	Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Wear personal protective equipment. Avoid breathing mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is combustible, and heating may generate vapors which may form explosive vapor/air mixtures. 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. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

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

Components	Type	Value
Naphthalene (CAS 91-20-3)	PEL	50 mg/m3
		10 ppm
n-Heptane (CAS 142-82-5)	PEL	2000 mg/m3
		500 ppm
n-Hexane (CAS 110-54-3)	PEL	1800 mg/m3
		500 ppm
Octane (All isomers) (CAS 111-65-9)	PEL	2350 mg/m3
		500 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Fuels, diesel, no. 2 (CAS 68476-34-6)	TWA	100 mg/m3	Inhalable fraction and vapor.
Hexane (Other isomers) (CAS 96-14-0)	STEL	1000 ppm	
	TWA	500 ppm	
Naphthalene (CAS 91-20-3)	STEL	15 ppm	
	TWA	10 ppm	
n-Heptane (CAS 142-82-5)	STEL	500 ppm	
	TWA	400 ppm	
n-Hexane (CAS 110-54-3)	TWA	50 ppm	
n-Nonane (CAS 111-84-2)	TWA	200 ppm	
Octane (All isomers) (CAS 111-65-9)	TWA	300 ppm	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Hexane (Other isomers) (CAS 96-14-0)	Ceiling	1800 mg/m3
		510 ppm
	TWA	350 mg/m3
		100 ppm
Naphthalene (CAS 91-20-3)	STEL	75 mg/m3
		15 ppm
	TWA	50 mg/m3
		10 ppm
n-Heptane (CAS 142-82-5)	Ceiling	1800 mg/m3
		440 ppm
	TWA	350 mg/m3
		85 ppm
n-Hexane (CAS 110-54-3)	TWA	180 mg/m3
		50 ppm
n-Nonane (CAS 111-84-2)	TWA	1050 mg/m3
		200 ppm
Octane (All isomers) (CAS 111-65-9)	Ceiling	1800 mg/m3
		385 ppm
	TWA	350 mg/m3
		75 ppm

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
n-Hexane (CAS 110-54-3)	0.4 mg/l	2,5-Hexanedion, without hydrolysis	Urine	*
	0.4 mg/l	2,5-Hexanedi - on, without hydrolysis		*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

n-Hexane (CAS 110-54-3) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Fuels, diesel, no. 2 (CAS 68476-34-6) Can be absorbed through the skin.
Naphthalene (CAS 91-20-3) Can be absorbed through the skin.
n-Hexane (CAS 110-54-3) Can be absorbed through the skin.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.

Skin protection

Hand protection Wear chemical-resistant, impervious gloves. Suitable gloves can be recommended by the glove supplier. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Other Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

Respiratory protection Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance Liquid (may be dyed red).

Physical state Liquid.

Form Liquid.

Color Clear. Straw.

Odor Kerosene (strong).

Odor threshold Not available.

pH Not available.

Melting point/freezing point -60.07 °F (-51.15 °C) Estimated

Initial boiling point and boiling range 325 - 700 °F (162.78 - 371.11 °C)

Flash point > 100.0 °F (> 37.8 °C) Closed Cup

Evaporation rate 0.02

Flammability (solid, gas) Not available.

Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	0.4 %
Flammability limit - upper (%)	8 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 1 mm Hg (20°C)
Vapor density	3 (Air = 1)
Relative density	0.82 - 0.87
Relative density temperature	60 °F (15.56 °C)
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	494.96 °F (257.2 °C)
Decomposition temperature	Not available.
Viscosity	2 - 4.5 mm^2/s

10. Stability and reactivity

Reactivity	Stable at normal conditions.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	May be fatal if swallowed and enters airways.
Inhalation	Harmful if inhaled. In high concentrations, vapors and spray mists are narcotic and may cause headache, fatigue, dizziness and nausea.
Skin contact	Causes skin irritation.
Eye contact	May cause eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash. The toxicological properties of this product have not been thoroughly investigated. Use appropriate precautions.

Information on toxicological effects

Acute toxicity Harmful if inhaled. Harmful: may cause lung damage if swallowed. The toxicological properties of this material have not been fully investigated.

Components	Species	Test Results
Fuels, diesel, no. 2 (CAS 68476-34-6)		
Acute		
Inhalation		
LC50	Rat	4.1 mg/l, 4 hours

Components	Species	Test Results
Naphthalene (CAS 91-20-3)		
Acute		
Dermal		
LD50	Rabbit	> 2 g/kg
Oral		
LD50	Rat	490 mg/kg
n-Heptane (CAS 142-82-5)		
Acute		
Inhalation		
LC50	Rat	103 mg/l, 4 Hours
n-Hexane (CAS 110-54-3)		
Acute		
Oral		
LD50	Rat	28710 mg/kg
n-Nonane (CAS 111-84-2)		
Acute		
Inhalation		
LC50	Rat	3200 mg/l, 4 Hours
Octane (All isomers) (CAS 111-65-9)		
Acute		
Inhalation		
LC50	Rat	118 mg/l, 4 Hours

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

Respiratory or skin sensitization

Respiratory sensitization Based on available data, the classification criteria are not met.

Skin sensitization Based on available data, the classification criteria are not met.

Germ cell mutagenicity Based on available data, the classification criteria are not met.

Carcinogenicity Suspected of causing cancer.
International Agency for Research on Cancer (IARC): Whole diesel engine exhaust – IARC Group 1. Exposure may cause lung cancer and also noted a positive association with an increased risk of bladder cancer.
Diesel exhaust has been reported to be an occupational hazard due to NIOSH-reported potential carcinogenic properties.

IARC Monographs. Overall Evaluation of Carcinogenicity

Fuels, diesel, no. 2 (CAS 68476-34-6)	3 Not classifiable as to carcinogenicity to humans.
Naphthalene (CAS 91-20-3)	2B Possibly carcinogenic to humans.

NTP Report on Carcinogens

Naphthalene (CAS 91-20-3)	Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity Suspected of damaging fertility or the unborn child.
Napthalene interferes with embryo development in experimental animals at dose levels that cause maternal toxicity. In humans, excessive exposure to this agent may cause hemolytic anemia in the mother and fetus.

Specific target organ toxicity - single exposure Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure May cause damage to the following organs through prolonged or repeated exposure: Blood. Liver. Thymus.

Aspiration hazard May be fatal if swallowed and enters airways.

Chronic effects Contains organic solvents which in case of overexposure may depress the central nervous system causing dizziness and intoxication. Repeated exposure to naphthalene may cause cataracts, allergic skin rashes, destruction of red blood cells, and anemia, jaundice, kidney and liver damage. Danger of serious damage to health by prolonged exposure. Prolonged or repeated overexposure may cause central nervous system, kidney, liver, and lung damage.

Further information Symptoms may be delayed. Hydrogen sulfide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. Toxicological properties of this material have not been fully investigated.

12. Ecological information

Ecotoxicity Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Components		Species	Test Results
Fuels, diesel, no. 2 (CAS 68476-34-6)			
Aquatic			
Acute			
Crustacea	EL50	Daphnia magna	68 mg/l, 48 hours
Fish	LL50	Oncorhynchus mykiss	65 mg/l, 96 hours
Naphthalene (CAS 91-20-3)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	1.09 - 3.4 mg/l, 48 hours
Fish	LC50	Pink salmon (Oncorhynchus gorbuscha)	0.95 - 1.62 mg/l, 96 hours
n-Heptane (CAS 142-82-5)			
Aquatic			
Fish	LC50	Western mosquitofish (Gambusia affinis)	4924 mg/l, 96 hours
n-Hexane (CAS 110-54-3)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	2.101 - 2.981 mg/l, 96 hours

Persistence and degradability Not available.

Bioaccumulative potential Not available.

Partition coefficient n-octanol / water (log Kow)

Hexane (Other isomers) (CAS 96-14-0)	3.6
Octane (All isomers) (CAS 111-65-9)	5.18
n-Heptane (CAS 142-82-5)	4.66
n-Hexane (CAS 110-54-3)	3.9
n-Nonane (CAS 111-84-2)	5.46

Mobility in soil Not available.

Other adverse effects Not available.

13. Disposal considerations

Disposal instructions Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.

Hazardous waste code D001: Waste Flammable material with a flash point <140 °F

US RCRA Hazardous Waste U List: Reference

Naphthalene (CAS 91-20-3)	U165

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

Contaminated packaging Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT

UN number UN1202

UN proper shipping name Diesel fuel

Transport hazard class(es)

Class Combustible Liquid

Subsidiary risk -

Packing group III

Environmental hazards	
Marine pollutant	Yes
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	144, B1, IB3, T2, TP1
Packaging exceptions	150
Packaging non bulk	203
Packaging bulk	242
IATA	
UN number	UN1202
UN proper shipping name	Diesel fuel
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	III
Environmental hazards	Yes
ERG Code	3L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
IMDG	
UN number	UN1202
UN proper shipping name	DIESEL FUEL
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Packing group	III
Environmental hazards	
Marine pollutant	Yes
EmS	F-E, S-E
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable. However, this product is a liquid and if transported in bulk covered under MARPOL 73/78, Annex I.

15. Regulatory information

US federal regulations

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

n-Nonane (CAS 111-84-2)	1.0 % One-Time Export Notification only.

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

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Hexane (Other isomers) (CAS 96-14-0)	LISTED
Naphthalene (CAS 91-20-3)	LISTED
n-Heptane (CAS 142-82-5)	LISTED
n-Hexane (CAS 110-54-3)	LISTED
n-Nonane (CAS 111-84-2)	LISTED
Octane (All isomers) (CAS 111-65-9)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

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

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Naphthalene	91-20-3	0 - 1

Other federal regulations

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

Naphthalene (CAS 91-20-3)
n-Hexane (CAS 110-54-3)

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

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Hexane (Other isomers) (CAS 96-14-0)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

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

Fuels, diesel, no. 2 (CAS 68476-34-6)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

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

Fuels, diesel, no. 2 (CAS 68476-34-6)
Hexane (Other isomers) (CAS 96-14-0)
Naphthalene (CAS 91-20-3)
n-Heptane (CAS 142-82-5)
n-Hexane (CAS 110-54-3)
n-Nonane (CAS 111-84-2)
Octane (All isomers) (CAS 111-65-9)

US. Rhode Island RTK

Naphthalene (CAS 91-20-3)
n-Hexane (CAS 110-54-3)

US. California Proposition 65

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

Benzene (CAS 71-43-2)
Toluene (CAS 108-88-3)

International Inventories

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

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

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

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

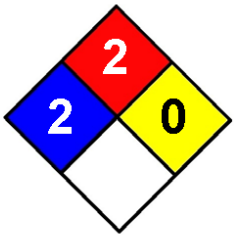
Issue date 13-May-2013

Revision date 23-May-2014

Version # 04

Further information HMIS® is a registered trade and service mark of the NPCA.

NFPA Ratings



Disclaimer This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use , the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

SDS 3: Acetylene

SAFETY DATA SHEET

Acetylene

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Acetylene

Chemical name : acetylene

Other means of identification : Ethyne; Ethine; Narcylen; C2H2; Acetylen; UN 1001; Vinylene

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : Ethyne; Ethine; Narcylen; C2H2; Acetylen; UN 1001; Vinylene

SDS # : 001001

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

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

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Fusible plugs in top, bottom, or valve melt at 98°C to 107°C (208°F to 224°F). Do not discharge at pressures above 15psig (103kpa). Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Approach suspected leak area with caution.

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

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Acetylene

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : acetylene

Other means of identification : Ethyne; Ethine; Narcylen; C2H2; Acetylen; UN 1001; Vinylene

Product code : 001001

CAS number/other identifiers

CAS number : 74-86-2

Ingredient name	%	CAS number
acetylene	100	74-86-2

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Acetylene

Section 4. First aid measures

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Acetylene

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
acetylene	**NIOSH REL (United States, 10/2016).** CEIL: 2662 mg/m³ CEIL: 2500 ppm **ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].** **California PEL for Chemical Contaminants (*Table AC-1*) (United States). Oxygen Depletion [Asphyxiant].**

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

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

Individual protection measures

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

Acetylene

Section 8. Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas.

Color : Colorless.

Odor : Mild. Ethereal.

Odor threshold : Not available.

pH : Not available.

Melting point : -81°C (-113.8°F)

Boiling point : Not available.

Critical temperature : 35.25°C (95.5°F)

Flash point : Closed cup: -18.15°C (-0.67°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.
Highly flammable in the presence of the following materials or conditions: heat.

Lower and upper explosive (flammable) limits : Lower: 2.5%
Upper: 100%

Vapor pressure : 635 (psig)

Vapor density : 0.907 (Air = 1)

Specific Volume (ft^3/lb) : 14.7058

Gas Density (lb/ft^3) : 0.0691

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 1.2 g/l

Partition coefficient: n-octanol/water : 0.37

Auto-ignition temperature : 305°C (581°F)

Date of issue/Date of revision	*: 1/18/2018*	*Date of previous issue*	*: 10/10/2017*	*Version*	*: 1.01*	*5/11*

Acetylene

Section 9. Physical and chemical properties

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 26.04 g/mole

Aerosol product

Heat of combustion : -48257522 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

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

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

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

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Acetylene

Section 11. Toxicological information

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : No known significant effects or critical hazards.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Date of issue/Date of revision	*: 1/18/2018*	*Date of previous issue*	*: 10/10/2017*	*Version*	*: 1.01*	*7/11*

Acetylene

Section 12. Ecological information

Product/ingredient name	$LogP_{ow}$	BCF	Potential
acetylene	0.37	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1001	UN1001	UN1001	UN1001	UN1001
UN proper shipping name	ACETYLENE, DISSOLVED	ACETYLENE, DISSOLVED	ACETYLENE, DISSOLVED	ACETYLENE, DISSOLVED	ACETYLENE, DISSOLVED
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 15 kg.

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).

Explosive Limit and Limited Quantity Index
0

Passenger Carrying Ship Index
75

Passenger Carrying Road or Rail Index
Forbidden

Date of issue/Date of revision : 1/18/2018 *Date of previous issue* : 10/10/2017 *Version* : 1.01 8/11

Acetylene

Section 14. Transport information

Special provisions
38

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 15 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

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

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
Clean Air Act (CAA) 112 regulated flammable substances: acetylene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Date of issue/Date of revision	*: 1/18/2018*	*Date of previous issue*	*: 10/10/2017*	*Version*	*: 1.01*	*9/11*

Acetylene

Section 15. Regulatory information

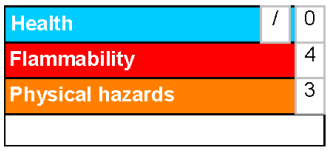
Not listed.

Inventory list

Australia	:	This material is listed or exempted.
Canada	:	This material is listed or exempted.
China	:	This material is listed or exempted.
Europe	:	This material is listed or exempted.
Japan	:	**Japan inventory (ENCS)**: This material is listed or exempted. **Japan inventory (ISHL)**: Not determined.
Malaysia	:	Not determined.
New Zealand	:	This material is listed or exempted.
Philippines	:	This material is listed or exempted.
Republic of Korea	:	This material is listed or exempted.
Taiwan	:	This material is listed or exempted.
Thailand	:	Not determined.
Turkey	:	This material is listed or exempted.
United States	:	This material is listed or exempted.
Viet Nam	:	Not determined.

Section 16. Other information

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



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

Note: The instability hazard rating for acetylene, dissolved (stabilized acetylene) is 2.

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Compressed gas	Expert judgment According to package

Date of issue/Date of revision	*: 1/18/2018*	*Date of previous issue*	*: 10/10/2017*	*Version*	*: 1.01* 10/11

Acetylene

Section 16. Other information

History

Date of printing	:	1/18/2018
Date of issue/Date of revision	:	1/18/2018
Date of previous issue	:	10/10/2017
Version	:	1.01
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United Nations
References	:	Not available.

Indicates information that has changed from previously issued version.

Notice to reader

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

SDS 4: Propane

Safety Data Sheet
Propane

SECTION 1 IDENTIFICATION

Product Name: Propane
Synonyms: Commercial Grade Propane, LPG, Propane HD-5

SDS #: F6

Product Use: Fuel
Restrictions on Use: None known.

Manufacturer:
Sinclair Oil Company
P.O. Box 30825
Salt Lake City, Utah 84130

Telephone: **General Information:** (801) 524-2777 **Fax:** (801) 524-2740
Contact person: Jeremiah Webster

Emergency Telephone: 800-424-9300 (CHEMTREC) or (703) 527-3887

SDS Date of Preparation: November 24, 2014

SECTION 2: HAZARDS IDENTIFICATION

Classification: NA

Physical	Health
Flammable Gas Category 1 Gases Under Pressure Liquefied Gas Category 1	Simple Asphyxiant

Label Elements:
Danger!

Health Phrases:
Extremely flammable gas
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary Phrases:
Keep away from heat, sparks, open flames and hot surfaces. No smoking.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Eliminate all ignition sources if safe to do so.
Protect from sunlight. Store in a well-ventilated place.

Propane
November 24, 2014

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Chemical name	CAS No.	Concentration
Propane	74-98-6	30-100%
Propylene	115-07-1	0-65%
Ethane	74-84-0	0-6%
Ethylene	74-85-1	0-3%
Butane	106-97-8	0-2.5%
Isobutane	75-28-5	0-2.5%

SECTION 4 EMERGENCY and FIRST AID PROCEDURES

Eye Contact: If contact with liquefied gas occurs, immediately flush eyes with lukewarm water for several minutes. Get immediate medical attention.

Skin Contact: Contact with liquefied gas may cause frostbite. Flush with copious amounts of lukewarm water. Get immediate medical attention.

Inhalation: If respiratory symptoms occur, remove to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult have qualified personnel administer oxygen. Get medical attention.

Ingestion: This product is a gas under normal atmospheric conditions and ingestion is unlikely.

Most important symptoms/effects, acute and delayed: Contact with liquefied gas may cause frostbite to eye and skin. High concentrations of gas may displace oxygen and cause asphyxiation. If respiratory symptoms occur, immediately remove to fresh air and get medical attention.

Indication of immediate medical attention and special treatment, if necessary: If contact with liquefied gas occurs, get immediate medical attention. If respiratory symptoms occur, immediately remove to fresh air and get medical attention.

SECTION 5 FIRE and EXPLOSION HAZARD DATA

Suitable extinguishing media: Water fog, foam, carbon dioxide, dry chemical. Water spray may be used to keep fire exposed containers cool, protect personnel attempting to stop leaks and to disperse vapors.
Specific hazards arising from the chemical: Gas is extremely flammable and may readily be ignited by static charge, sparks and flames. Gas may travel a considerable distance to a source of ignition and flash back. Gases may form explosive mixtures with air. Cylinders can burst violently when heated, due to excess pressure build-up.
Special protective equipment and precautions for fire-fighters: Firefighters should wear full emergency equipment and a NIOSH approved positive pressure self-contained breathing apparatus. Use approved gas detectors in confined spaces.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment, and emergency procedures: Wear appropriate protective equipment. Evacuate the area. Stop the leak if able to do so. Eliminate ignition sources. Ventilate the area with explosion proof equipment. Check oxygen and flammability content in confined areas before entering the spill area.
Environmental hazards: Report spill as required by local and federal regulations.
Methods and materials for containment and cleaning up: Stop the leak if it can be done safely. Use water spray to minimize and disperse vapors. Use explosion proof equipment to ventilate the area and ensure full dispersal of vapors.

Propane
November 24, 2014

SECTION 7 HANDLING and STORAGE

Precautions for safe handling: Eliminate all sources of ignition. Do not breathe gas. The gas is heavier than air and may accumulate in lowered spaces. Use non-sparking tools and explosion-proof electrical equipment. Ground container and transfer equipment to eliminate static electric sparks. Before entering storage tanks and confined areas check the atmosphere for oxygen content and flammability.

Conditions for safe storage, including any incompatibilities: Store in a cool, well-ventilated place. Keep container tightly closed. Secure cylinders in an upright position at all times and keep all valves closed when not in use. Protect from physical damage. Secure cylinders from falling or being knocked over. Separate propane cylinders form oxygen, chlorine and other oxidizers. Storage area must meet national electric codes for Class 1 hazardous areas. Store only where temperatures will not exceed 125°F (52°C).

Empty containers retain product residues. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. Outdoor or detached storage is preferred. Follow all SDS precautions in handling empty containers.

SECTION 8 EXPOSURE CONTROLS and PERSONAL PROTECTION

Exposure Guidelines:

INGREDIENTS	EXPOSURE LIMITS	NIOSH IDLH
Propane	1000 ppm TWA OSHA PEL	2100 ppm
Propylene	500 ppm TWA ACGIH TLV	None Established
Ethane	None Established	None Established
Ethylene	200 ppm TWA ACGIH TLV	None Established
Butane	1000 ppm STEL ACGIH TLV	None Established
Isobutane	1000 ppm STEL ACGIH TLV	None Established

Appropriate engineering controls: If the recommended exposure limit is exceeded increased mechanical ventilation such as local exhaust may be required. Explosion proof equipment should be used.

Respiratory protection: If exposure limits are exceeded or if oxygen levels are unknown or deficient, use a NIOSH approved supplied air respirator. Selection of respiratory protection depends on the contaminant type, form and concentration. Select in accordance with OSHA 1910.134 and good Industrial Hygiene practice.
Skin protection: Insulated work gloves are recommended for cylinder handling and prevent exposure to liquid.
Eye protection: Wear chemical safety glasses when handling cylinders.
Other: Wear protective clothing if needed to avoid prolonged skin contact. Suitable washing facilities should be available in the work area.

SECTION 9 PHYSICAL and CHEMICAL PROPERTIES

Appearance (physical state, color, etc.): Clear, colorless gas
Odor: Rotten egg odor if odorant is added.

Odor threshold: 0.001 ppm (Ethyl Mercaptain)	**pH:** Not applicable
Melting point/Pourpoint: - Not available	**Boiling Point:** -44°F / -42.2°C
Flash point: -155.2°F / -104°C	**Evaporation rate:** Not applicable
Flammability (solid, gas): Extremely flammable gas	
Flammable limits: LEL: 2.1%	**UEL:** 9.5%
Vapor pressure: 208 psia @100°F	**Vapor density (air = 1):** 1.6
Relative density: 0.51@ 60°F	**Solubility:** Insoluble in water
Partition coefficient: n-ctanol/water: Not available	**Auto-ignition temperature:** 842°F / 450°C
Decomposition temperature: Not available	**Viscosity:** Not available

Propane
November 24, 2014

SECTION 10 STABILITY and REACTIVITY

Reactivity: This product is not expected to be reactive.
Chemical stability: The product is stable.
Possibility of hazardous reactions: Heat will increase the pressure in cylinders and may cause an explosion.
Conditions to avoid: Avoid heat, spark, open flames and all sources of ignition.
Incompatible materials: Avoid oxidizing agents, alkalis and nickel carbonyl.
Hazardous decomposition products: Thermal decomposition may yield carbon monoxide and carbon dioxide.

SECTION 11 TOXICOLOGICAL INFORMATION

Health Hazards:

Inhalation: Inhalation of gas may cause irritation of the nose, throat and upper respiratory tract. Simple asphyxiant. High concentrations may cause narcotic effects causing headache, dizziness, fatigue, confusion, decreased coordination and other central nervous system effects. Continued exposure can cause hypoxia, rapid breathing, cyanosis and numbness of extremities. Gas may displace the oxygen in the air causing unconsciousness and death.

Skin Contact: Skin contact with gas may cause mild irritation. Skin contact with liquid may cause frostbite.

Eye Contact: Gas may cause mild irritation with redness and tearing. Contact with liquid my cause frostbite.

Ingestion: This product is a gas and ingestion is unlikely due to physical form.

Chronic Effects of Overexposure: None known.

Mutagenicity: None of the components have been shown to cause mutagenic activity.

Reproductive Toxicity: None of the components have been shown to cause reproductive or developmental effects.

Carcinogenicity: None of the components are listed as a carcinogen by IARC, NTP or OSHA.

Acute Toxicity Values:
Propane: Inhalation mouse LC50 520,400 ppm/2 hr.
Propylene: Inhalation NOAEC 10000 ppm
Ethane: Inhalation mouse LC50 520,400 ppm/2 hr.
Ethylene: Inhalation rat LC50 >57000 ppm/4 hr
Butane: Inhalation mouse LC50 520,400 ppm/2 hr.
Isobutane: Inhalation mouse LC50 520,400 ppm/2 hr.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:
Propane: 96 hr LC50 fish 27.98 mg/L (estimate)
Propylene: 96 hr LC50 fish 51.7 mg/L (estimate)
Ethane: 96 hr LC50 fish 27.98 mg/L (estimate)
Ethylene: 96 hr LC50 fish 126.012 mg/L (estimate)
Butane: 96 hr LC50 fish 27.98 mg/L (estimate)
Isobutane: 96 hr LC50 fish 27.98 mg/L (estimate)

Propane gases are expected to readily evaporate and not cause adverse effects on the aquatic environment.

Persistence and degradability: This product is expected to be inherently biodegradable.
Bioaccumulative potential: Bioaccumulation is expected to be low.
Mobility in soil: Not relevant due to product form.
Other adverse effects: None known.

SECTION 13: DISPOSAL INFORMATION

Waste Disposal Method: Recycle container. Dispose in accordance with all local, state and federal regulations.

SECTION 14: TRANSPORTATION INFORMATION

	UN Number	Proper shipping name	Hazard Class	Packing Group	Environmental Hazard
DOT	UN1978	Propane	2.1		
TDG	UN1978	Propane	2.1		
IMDG	UN1978	Propane	2.1		
IATA	UN1978	Propane	2.1		

Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not applicable

Special precautions: None known.

SECTION 15: REGULATORY INFORMATION

Safety, health, and environmental regulations specific for the product in question.

CERCLA Hazardous Substances (Section 103)/RQ: This product is not subject to CERCLA reporting requirements as it is sold. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

EPA SARA 311 Hazard Classification: Acute Health, Fire Hazard, Pressure Hazard

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372):

Propylene	115-07-1	0-65%
Ethylene	74-85-1	0-3%

CALIFORNIA PROPOSITION 65: This product may contain chemicals known to the State of California to cause cancer or reproductive toxicity.

WHMIS CLASSIFICATION: Class A (Compressed Gas), Class B, Division 1 (Flammable Gas)

This product has been classified in accordance with the hazard criteria in the CPR and the SDS contains all the information required by the CPR.

Australia AICS: All of the components are listed on the Australian Inventory of Chemical Substances.

Canada DSL: All of the components are listed on the Canadian Domestic Substances List.

China: All the components are listed on Inventory of Existing Chemical Substances in China.

European EINECS: All of the ingredients are listed on the EINECS inventory.

Japan: All the components are listed in the Japanese Existing and New Chemical Substances Inventory.

Korea: All the components are listed on the Korean Existing Chemical List.

New Zealand: All the components are listed on the New Zealand Inventory of Chemicals.

Philippines: All the components are listed on the Philippine Inventory of Chemical and Chemical Substances inventory.

US EPA Toxic Substances Control Act: All of the components of this product are listed on the TSCA inventory.

SECTION 16: OTHER INFORMATION

SDS Revision History: Converted to GHS format – all Sections revised
Date of current revision: November 24, 2014
Date of previous revision: July 22, 2013

National Fire Protection Association (U.S.A)

Health: 2
Flammability : 4
Instability: 0
Specific Hazard:

Disclaimer: This product material safety data sheet provides health and safety information. The product should be used in applications consistent with this product literature. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to ensure safe workplace operations.

This material safety data sheet is provided in good faith and meets the requirements of the hazardous communication provisions of SARA TITLE III and 29 CFR 1910.1200(g) of the OSHA regulations. The above information is based on review of available information Sinclair believes is reliable and is supplied for informational purposes only. Sinclair does not guarantee its completeness or accuracy. Since conditions of use are outside the control of Sinclair, Sinclair disclaims all warranties, express or implied, and any liability for damage or injury which results from the use of the above data. Nothing herein is intended to permit infringement of valid patents and licenses.

SDS 5: Solder Tin 30/70

SAFETY DATA SHEET

9730 Metallpasta

The safety data sheet is in accordance with Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

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

Date issued	15.03.2018

1.1. Product identifier

Product name	9730 Metallpasta

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

Use of the substance / preparation	Metal paste with flux.

1.3. Details of the supplier of the safety data sheet

Company name	Meltolit AB
Postal address	J A Gahms gata 4
Postcode	SE-421 32
City	Västra Frölunda
Country	Sverige
Telephone number	+46 31 7485225
Fax	+46 31 286465
Email	info@meltolit.se
Website	www.meltolit.se

1.4. Emergency telephone number

Emergency telephone	Telephone number: 112 Description: In case of emergency

SECTION 2: Hazards identification

2.1. Classification of substance or mixture

Classification according to Regulation (EC) No 1272/ 2008 [CLP / GHS]	Skin Corr. 1B; H314 Eye Dam. 1; H318 STOT SE 2; H335

	Aquatic Chronic 3; H412

2.2. Label elements

Hazard pictograms (CLP)

Signal word	Danger
Hazard statements	H314 Causes severe skin burns and eye damage. H335 May cause respiratory irritation. H412 Harmful to aquatic life with long lasting effects.
Precautionary statements	P101 If medical advice is needed, have product container or label at hand. P102 Keep out of reach of children. P103 Read label before use. P280 Wear protective gloves / protective clothing / eye protection / face protection. P303+P361+P353 IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothing. Rinse skin with water / shower. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 Immediately call a POISON CENTER or doctor / physician. P403+P233 Store in a well-ventilated place. Keep container tightly closed. P405 Store locked up. P501 Dispose of contents / container to waste central

2.3. Other hazards

PBT / vPvB	Not PBT/vPvB

SECTION 3: Composition / information on ingredients

3.2. Mixtures

Substance	Identification	Classification	Contents
Tin	CAS No.: 7440-31-5 EC No.: 231-141-8		50 -100 %
Zinc chloride	CAS No.: 7646-85-7 EC No.: 231-592-0 Index No.: 030-003-00-2	Acute tox. 4; H302; Skin Corr. 1B; H314; Aquatic Acute 1; H400; M-factor 1; Aquatic Chronic 1; H410; M-factor 1;	< 10 %
Copper	CAS No.: 7440-50-8 EC No.: 231-159-6		< 2,5 %
Substance comments	The full text for all hazard statements is displayed in section 16.		

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Fresh air.
Skin contact	Cool skin rapidly with cold water after contact with molten product. Burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Continue flushing during transport to hospital. Gently wash with plenty of soap and water.
Eye contact	Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention immediately! Continue flushing during transport to hospital.
Ingestion	Rinse mouth. Drink plenty of water. Get medical attention immediately! DO NOT INDUCE VOMITING!

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

General symptoms and effects	Treat Symptomatically.

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

Medical treatment	Treat Symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	Foam, carbon dioxide or dry powder. Extinguish with water fog. Use fire fighting measures that suit the surrounding fire.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products	Hydrogen chloride (HCl).

5.3. Advice for firefighters

Personal protective equipment	Use personal protective equipment as required. Wear respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal protection measures	Ventilate well. For personal protection, see section 8.

6.2. Environmental precautions

Environmental precautionary measures	Collect spillage. Do not discharge into drains, water courses or onto the ground. Contact local authorities in case of spillage to drain/aquatic environment.

6.3. Methods and material for containment and cleaning up

Containment	Absorb in vermiculite, dry sand or earth and place into containers. Flush area clean with lots of water. Be aware of potential for surfaces to become slippery.

6.4. Reference to other sections

Other instructions	See section 7, 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Handling	Avoid contact with skin and eyes. Observe good chemical hygiene practices. When using do not eat, drink or smoke. Wash hands before breaks and before smoking, eating or drinking. Immediately change contaminated clothes.

7.2. Conditions for safe storage, including any incompatibilities

Storage	Keep away from food, drink and animal feeding stuffs. Store above freezing. Store in tightly closed original container.

7.3. Specific end use(s)

Specific use(s)	The identified uses for this product are detailed in Section 1.2.

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Substance	Identification	Value	TWA Year
Tin	CAS No.: 7440-31-5	TWA (8h) : 2 mg/m3 **OEL short term value** Value: 4 mg/m3	
Zinc chloride	CAS No.: 7646-85-7	TWA (8h) : 1 mg/m³ **OEL short term value** Value: 2 mg/m³	
Copper	CAS No.: 7440-50-8	TWA (8h) : 1 mg/m3 Source: Dust and mists TWA (8h) : 0,2 mg/m3 Source: Fume **OEL short term value** Value: 2 mg/m3 Source: Dust and mists	

8.2. Exposure controls

Safety signs

Precautionary measures to prevent exposure

Appropriate engineering controls	Well-ventilated area.

Eye / face protection

Eye protection, comments	Wear tight-fitting goggles or face shield.

Hand protection

Suitable gloves type	Nitrile gloves are recommended. EN 374
Thickness of glove material	Value: > 0,4 mm
Hand protection, comments	Wear protective gloves.

Skin protection

Skin protection remark	Wear suitable protective clothing as protection against splashing or contamination.

Respiratory protection

Respiratory protection necessary at	Wear suitable respiratory protection.
Tasks needing respiratory protection	Dust filter P2 (for fine dust).

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	Thick, cloudy fluid.
Colour	Grey.
Odour	Characteristic.
Odour limit	Comments: Not determined.
pH	Value: 6,5
Melting point / melting range	Value: 230 -250 °C
Freezing point	Comments: Not determined
Boiling point / boiling range	Comments: Not determined
Flash point	Value: 135 °C
Evaporation rate	Comments: Not determined.
Flammability (solid, gas)	Not relevant.
Explosion limit	Comments: Not explosive
Vapour pressure	Value: 23 hPa Temperature: 20 °C
Vapour density	Comments: Not relevant.
Specific gravity	Comments: No information.
Density	Value: 2,81 g/cm³ Temperature: 20 °C
Bulk density	Comments: Not relevant.
Solubility	Medium: Water Comments: Insoluble in water.

Partition coefficient: n-octanol/water	Comments: Not determined.
Spontaneous combustability	Comments: Not relevant.
Decomposition temperature	Comments: Not determined.
Viscosity	Comments: Not determined
Explosive properties	Not relevant.
Oxidising properties	No information.

9.2. Other information

Physical hazards

Content of VOC	Value: 0 %

Other physical and chemical properties

Comments	No recommendation given.

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	There are no known reactivity hazards associated with this product.

10.2. Chemical stability

Stability	Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions	None.

10.4. Conditions to avoid

Conditions to avoid	Strong oxidising agents.

10.5. Incompatible materials

Materials to avoid	No recommendation given.

10.6. Hazardous decomposition products

Hazardous decomposition products	Irritating gases/vapours/fumes of: Hydrogen chloride (HCl). Ammonia or amines. Chlorine.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	Type of toxicity: Acute Effect tested: LD50

	Route of exposure: Oral Value: 350 mg/kg Species: rat

Other information regarding health hazards

Assessment of acute toxicity, classification	No specific health warnings noted.
Assessment of skin corrosion / irritation, classification	Causes severe skin burns and eye damage.
Assessment of eye damage or irritation, classification	Strongly corrosive. Causes severe burns and serious eye damage. Immediate first aid is imperative.
Assessment of respiratory sensitisation, classification	No specific health warnings noted.
Sensitisation	Not Sensitising.
Mutagenicity	No specific health warnings noted.
Carcinogenicity, other information	No specific health warnings noted.
Assessment of reproductive toxicity, classification	No specific health warnings noted.
Assessment of specific target organ SE, classification	May cause respiratory irritation.
Assessment of specific target organ toxicity RE, classification	No recommendation given.
Assessment of aspiration hazard, classification	No specific health warnings noted.

Symptoms of exposure

In case of ingestion	May have a corrosive effect on the digestive canal.
In case of skin contact	Corrosive to skin.
In case of inhalation	Irritating.
In case of eye contact	Corrosive.

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic, fish	Toxicity type: Acute Value: 1000 mg/kg Effect dose concentration : EC50 Species: fish
Acute aquatic, algae	Toxicity type: Acute Value: 73 mg/l Effect dose concentration : ERC50 Exposure time: 72 hour(s) Species: alga
Acute aquatic, Daphnia	Toxicity type: Acute

	Value: 33 mg/l Effect dose concentration : EC50 Exposure time: 48 hour(s) Species: daphnia
Ecotoxicity	NOEC(fish)= 100 mg/l, NOEC(daphnia)= 10mg/l, NOEC(algae)= 10mg/l The product contains a substance which may cause long term adverse effects in the environment.

12.2. Persistence and degradability

Persistence and degradability description	No recommendation given.

12.3. Bioaccumulative potential

Bioaccumulative potential	No recommendation given.

12.4. Mobility in soil

Mobility	No recommendation given.

12.5. Results of PBT and vPvB assessment

PBT assessment results	Not Classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects

Other adverse effects, comments	No recommendation given.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Specify the appropriate methods of disposal	Dispose of waste and residues in accordance with local authority requirements.
EWC waste code	EWC waste code: 060313 solid salts and solutions containing heavy metals Classified as hazardous waste: Yes

SECTION 14: Transport information

Dangerous goods	Yes

14.1. UN number

ADR / RID / ADN	3260
IMDG	3260
ICAO / IATA	3260

14.2. UN proper shipping name

Proper shipping name english ADR / RID / ADN	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.
ADR / RID / ADN	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.

IMDG	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.
ICAO / IATA	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.

14.3. Transport hazard class(es)

ADR / RID / ADN	8
Classificaton code ADR / RID / ADN	C2
IMDG	8
ICAO / IATA	8

14.4. Packing group

ADR / RID / ADN	III
IMDG	III
ICAO / IATA	III

14.5. Environmental hazards

Comments	Not relevant.

14.6. Special precautions for user

Special safety precautions for user	Not relevant.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Product name	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.
Pollution category	Not relevant.

Additional information

ADR / RID / ADN hazard label	8
IMDG Hazard label	8
ICAO / IATA Hazard label	8

ADR / RID - Other information

Tunnel restriction code	E
Limited quantity	5 kg
Transport category	3
Hazard No.	80
RID other applicable information	80

IMDG / ICAO / IATA Other information

EmS	F-A, S-B
Limited quantity	1 kg

SECTION 15: Regulatory information

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

Legislation and regulations	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments. Work Environment Authority regulations and guidelines on exposure limits. The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 (S.I 2009 No. 716). The Waste (England and Wales) (Amendment) Regulations 2014

15.2. Chemical safety assessment

Chemical safety assessment performed	No

SECTION 16: Other information

Supplier's notes	The information on this data sheet represents our current data and is reliable provided that the product is used under the prescribed conditions and in accordance with the application specified on the packaging and/or in the technical guidance literature. Any other use of the product which involves using the product in combination with any other product or any other process is the responsibility of the user.
List of relevant H-phrases (Section 2 and 3)	H302 Harmful if swallowed. H314 Causes severe skin burns and eye damage. H318 Causes serious eye damage. H335 May cause respiratory irritation. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects. H412 Harmful to aquatic life with long lasting effects.
Classification according to Regulation (EC) No 1272/ 2008 [CLP / GHS]	Skin Corr. 1B; H314 Eye Dam. 1; H318 STOT SE 2; H335 Aquatic Chronic 3; H412
Key literature references and sources for data	MSDS supplied by the manufacturer.
Version	1

SDS 6: Solder Leg6

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

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

1.1. Product identifier

Trade name: Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1 , Bera Super Tin Solder, Fluks, HK)

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

Recommended uses: Soldering.

1.3. Details of the supplier of the safety data sheet

Supplier

Company:	Boliden Bergsøe A/S
Address:	Hvissingevej 116
Zip code:	2600
City:	Glostrup
Country:	DENMARK
E-mail:	metal.glostrup@boliden.com
Phone:	+45 43268300

1.4. Emergency Telephone Number

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

CLP-classification: Repr. 1A;H360FD Lact.;H362 STOT RE 1;H372

Most serious harmful effects: May damage fertility. May damage the unborn child. May cause harm to breast-fed children. Causes damage to organs through prolonged or repeated exposure. Prolonged exposure to welding smoke and particles constitutes a risk of developing asthmatic diseases, various respiratory disorders and cancer of the respiratory system. Harmful if vapours from molten metal are inhaled or if the skin comes in contact with molten metal. Prolonged or repeated exposure by skin contact or inhalation of vapours may cause damage to the central nervous system.

2.2. Label elements

H-phrases

The specific provisions on labelling laid down in section 1.3 of Annex I of the CLP Regulation apply to this product.

H360FD	May damage fertility. May damage the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure.

Supplemental information

Restricted to professional users.

2.3. Other hazards

PBT/vPvB: No assessment required, as the product contains inorganic matter only.

SECTION 3: Composition/information on ingredients

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

3.2. Mixtures

Substance	CAS No./ EC No./ REACH Reg. No.	Concentration	Notes	CLP-classification
Lead	7439-92-1 231-100-4 01-2119513221-59-0085	9 - 80%		Repr. 1A;H360FD Lact.;H362 STOT RE 1;H372
Tin	7440-31-5 231-141-8 01-2119486474-28-0024	20 - 95%		
Zinc	7440-66-6 231-175-3 01-2119467174-37-0023	0 - 25%		
Silver, metallic	7440-22-4 231-131-3 01-2119555669-21-0074	0 - 2.5%		
Antimony	7440-36-0 231-146-5 01-2119475609-24-0026	0 - 3%		
Copper	7440-50-8 231-159-6 01-2119480154-42-0184	0 - 2.5%		
Bismuth	7440-69-9 231-177-4	0 - 1.5%		

Please see section 16 for the full text of H- / EUH-phrases..

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation: Seek fresh air. Seek medical advice in case of persistent discomfort.

Ingestion: Wash out mouth thoroughly and drink 1-2 glasses of water in small sips. Seek medical advice in case of persistent discomfort.

Skin contact: Remove contaminated clothing. Wash skin with soap and water. Seek medical advice in case of persistent discomfort.

Eye contact: Flush with water (preferably using eye wash equipment) until irritation subsides. Seek medical advice if symptoms persist.

General: When obtaining medical advice, show the safety data sheet or label.

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

May cause harm to breast-fed children. May damage fertility. May damage the unborn child. Causes damage to organs through prolonged or repeated exposure. Harmful if vapours from molten metal are inhaled or if the skin comes in contact with molten metal. Prolonged or repeated exposure by skin contact or inhalation of vapours may cause damage to the central nervous system. Prolonged exposure to welding smoke and particles constitutes a risk of developing asthmatic diseases, various respiratory disorders and cancer of the respiratory system.

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

Treat symptoms. No special immediate treatment required.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: The product is not directly flammable. Choose extinguishing agents based on the

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018 Revision date: 9/17/2021
Version: 3.0.0

surrounding fire.

Unsuitable extinguishing media: Do not use water stream, as it may spread the fire.

5.2. Special hazards arising from the substance or mixture

The product is not directly flammable. Avoid inhalation of vapour and fumes - seek fresh air.

5.3. Advice for firefighters

Move containers from danger area if it can be done without risk. Avoid inhalation of vapour and flue gases - seek fresh air. Wear Self-Contained Breathing Apparatus (SCBA) with a chemical protection suit only where personal (close) contact is likely.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: Wear safety goggles if there is a risk of eye splash. In case of insufficient ventilation, wear respiratory protective equipment. Wear gloves. Stay upwind/keep distance from source.

For emergency responders: In addition to the above: Protective suit equivalent to EN 368, type 3, is recommended.

6.2. Environmental precautions

Prevent spillage from entering drains and/or surface water.

6.3. Methods and material for containment and cleaning up

Sweep up/collect spills for possible reuse or transfer to suitable waste containers.

6.4. Reference to other sections

See section 8 for type of protective equipment. See section 13 for instructions on disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Work under effective process ventilation (e.g. local exhaust ventilation). Running water and eye wash equipment must be available. Wash hands before breaks, before using restroom facilities, and at the end of work. A workplace assessment must be conducted to ensure that employees are not exposed to effects that may involve a risk during pregnancy. A workplace assessment must be conducted to ensure that employees are not exposed to effects that may involve a risk when breastfeeding.

7.2. Conditions for safe storage, including any incompatibilities

Store safely, out of reach of children and away from food, animal feeding stuffs, medicines, etc. Store in a cool, dry place. Do not store with the following: Acids/ Alkalis/ Strong oxidisers/ Chlorine-containing compounds/ Chlorine

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limit

Substance name	Time period	ppm	mg/m³	fiber/cm3	Comments	Remarks
Lead	-		0.15			

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

Measuring methods: Compliance with occupational exposure limits may be checked by occupational hygiene measurements.

Legal basis: Commission Directive 2000/39/EC (Occupational Exposure Limits) as subsequently amended. Last amended by Commission Directive 2019/1831/EU. Directive 2004/37/EC (Exposure to carcinogens or mutagens at work) as subsequently amended. Last amended by Directive 2019/983/EU.

PNEC

Lead, cas-no 7439-92-1				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC aqua (freshwater)	2,4 µg/l			
PNEC aqua (marine water)	3,3 µg/l			
PNEC sediment (freshwater)	49,7 - 186 mg/kg dw			
PNEC sediment (marine water)	168 mg/kg dw			
PNEC STP (wastewater-treatment facilities)	0,1 mg/l			

Zinc, cas-no 7440-66-6				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC sediment (freshwater)	117,8 mg/kg dw			
PNEC sediment (marine water)	56,5 mg/kg dw			
PNEC soil	35,6 mg/kg dw			
	52 µg/l			
PNEC aqua (freshwater)	20,6 µg/l			
PNEC aqua (marine water)	6,1 µg/l			

Antimony, cas-no 7440-36-0				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC aqua (freshwater)	0,113 µg/l			
PNEC aqua (marine water)	0,0113 µg/l			
PNEC sediment (freshwater)	7,8 mg/kg dw			
PNEC sediment (marine water)	1,56 mg/kg dw			
PNEC soil	37 mg/kg dw			
PNEC STP (wastewater-treatment facilities)	2,55 g/l			

Silver, metallic, cas-no 7440-22-4				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC aqua (freshwater)	0,04 µg/l			
PNEC aqua (marine water)	0,86 µg/l			
PNEC sediment (freshwater)	438 mg/kg			
PNEC sediment (marine water)	438 mg/kg			
PNEC soil	0,794 mg/kg			

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018 Revision date: 9/17/2021
Version: 3.0.0

PNEC STP (wastewater-treatment facilities)	0,025 mg/l			

Copper, cas-no 7440-50-8				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC aqua (freshwater)	7,8 µg/l			
PNEC aqua (marine water)	5,2 µg/l			
PNEC sediment (freshwater)	87 mg/kg dw			
PNEC sediment	288 mg/kg dw			
PNEC sediment (marine water)	676 mg/kg dw			
PNEC soil	65,5 mg/kg dw			
PNEC STP (wastewater-treatment facilities)	230 g/l			

Bismuth, cas-no 7440-69-9				
Exposure	Value	Assessment Factor	Extrapolation Method	Note
PNEC STP (wastewater-treatment facilities)	17,5 mg/l			

DNEL - workers

Zinc, cas-no 7440-66-6					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Oral DNEL (long-term exposure - systemic effects)	50 mg/kg bw/day				
Dermal DNEL (long-term exposure - systemic effects)	5000 mg/kg bw/day				
Inhalation DNEL (long-term exposure - systemic effects)	5 mg/kg bw/day				

Antimony, cas-no 7440-36-0					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Dermal DNEL (long-term exposure - systemic effects)	281 mg/kg bw/day				
Inhalation DNEL (long-term exposure - local effects)	0,5 mg/m³				

Silver, metallic, cas-no 7440-22-4					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Inhalation DNEL (long-term exposure - systemic effects)	0,1 mg/kg bw/day				
Oral DNEL (long-term exposure - systemic effects)	0,12 mg/kg bw/day				

Copper, cas-no 7440-50-8					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

Dermal DNEL (long-term exposure - systemic effects)	0,041 mg/kg bw/day				
Inhalation DNEL (long-term exposure - systemic effects)	0,041 mg/kg bw/day				
Oral DNEL (long-term exposure - systemic effects)	0,041 mg/kg bw/day				
Dermal DMEL (acute/short-term exposure - systemic effects)	0,082 mg/kg bw/day				
Inhalation DNEL (acute/short-term exposure - systemic effects)	0,082 mg/kg bw/day				
Oral DMEL (acute/short-term exposure - systemic effects)	0,082 mg/kg bw/day				
Bismuth, cas-no 7440-69-9					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Inhalation DNEL (long-term exposure - systemic effects)	13,1 mg/m³				

DNEL - general population

Zinc, cas-no 7440-66-6					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Oral DNEL (long-term exposure - systemic effects)	50 mg/kg bw/day				
Dermal DNEL (long-term exposure - systemic effects)	5000 mg/kg bw/day				
Inhalation DNEL (long-term exposure - systemic effects)	2,5 mg/kg bw/day				
Silver, metallic, cas-no 7440-22-4					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Inhalation DNEL (long-term exposure - systemic effects)	0,04 mg/kg bw/day				
Oral DNEL (long-term exposure - systemic effects)	0,12 mg/kg bw/day				
Bismuth, cas-no 7440-69-9					
Exposure	Value	Assessment Factor	Dose Descriptor	Main Impact Parameter	Note
Oral DNEL (long-term exposure - systemic effects)	13,3 mg/kg bw/day				

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

8.2. Exposure controls

Appropriate engineering controls: Wear the personal protective equipment specified below.

Personal protective equipment, eye/face protection: Wear safety goggles if there is a risk of eye splash. Eye protection must conform to EN 166.

Personal protective equipment, skin protection: Wear protective gloves which protect against contact and splashing from molten metal. Gloves must conform to EN 12477.

Personal protective equipment, respiratory protection: In case of heating/use of the product in an area with inadequate ventilation, wear respiratory protection with filter B/P3. Respiratory protection must conform to one of the following standards: EN 136/140/145.

Environmental exposure controls: Ensure compliance with local regulations for emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Parameter	Value/unit
State	Solid substance
Colour	Grey
Odour	Characteristic
Solubility	No data

Parameter	Value/unit	Remarks
Odour threshold	No data	
Melting point	179 - 325 °C	
Freezing point	179 - 325 °C	
Initial boiling point and boiling range	No data	
Flammability (solid, gas)	No data	
Flammability limits	No data	
Explosion limits	No data	
Flash Point	No data	
Auto-ignition temperature	No data	
Decomposition temperature	No data	
pH (solution for use)	No data	
pH (concentrate)	No data	
Kinematic viscosity	No data	
Viscosity	No data	
Partition coefficient n-octonol/water	No data	
Vapour pressure	No data	
Density	No data	
Relative density	8 - 11.1	
Vapour density	No data	
Relative density (sat. air)	No data	
Particle characteristics	No data	

9.2. Other information

Other Information: None.

SECTION 10: Stability and reactivity

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

10.1. Reactivity

Reacts with the following: Strong oxidisers/ Acids/ Alkalis/ Chlorine-containing compounds/ Chlorine

10.2. Chemical stability

The product is stable when used in accordance with the supplier's directions.

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

Strong oxidisers/ Acids/ Alkalis/ Chlorine-containing compounds/ Chlorine

10.6. Hazardous decomposition products

Product decomposes in fire conditions or when heated to high temperatures, and inflammable and toxic gases may be released.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity - oral

Tin, cas-no 7440-31-5

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 2000mg/kg		OECD 423	

Silver, metallic, cas-no 7440-22-4

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 2000mg/kg			

Copper, cas-no 7440-50-8

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 300mg/kg bw			

Bismuth, cas-no 7440-69-9

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 2000mg/kg			

Ingestion may cause discomfort. The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

Acute toxicity - dermal

Tin, cas-no 7440-31-5

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 2000mg/kg		OECD 402	

The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

Acute toxicity - inhalation

Tin, cas-no 7440-31-5

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rat	LD50		> 5mg/l		OECD 403	

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met. The product does not release hazardous vapours in metallic form. Metallic oxides which are hazardous to inhale are formed during soldering/welding.

Skin corrosion/irritation

Tin, cas-no 7440-31-5

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rabbit				Non-irritating		

May cause slight irritation. The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

Serious eye damage/eye irritation

Tin, cas-no 7440-31-5

Organism	Test Type	Exposure time	Value	Conclusion	Test method	Source
Rabbit				Non-irritating		

May cause eye irritation. The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

Respiratory sensitisation or skin sensitisation: The product does not have to be classified. Test data are not available.

Germ cell mutagenicity: The product does not have to be classified. Test data are not available.

Carcinogenic properties: The product does not have to be classified. Test data are not available.

Reproductive toxicity: May damage fertility. May damage the unborn child. May cause harm to breast-fed children.

Single STOT exposure: The product does not have to be classified. Test data are not available. Inhalation of smoke from the soldering / welding process may cause irritation to the upper airways. May cause a burning sensation in the nose, mouth and throat, as well as headaches, coughing and discomfort.

Repeated STOT exposure: Causes damage to organs through prolonged or repeated exposure. Prolonged inhalation may cause water in the lungs. Prolonged or repeated exposure by skin contact or inhalation of vapours may cause damage to the central nervous system. Prolonged exposure to welding smoke and particles constitutes a risk of developing asthmatic diseases, various respiratory disorders and cancer of the respiratory system.

Aspiration hazard: The product does not have to be classified. Test data are not available.

11.2. Information on other hazards

Other toxicological effects: None known.

SECTION 12: Ecological information

12.1. Toxicity

Tin, cas-no 7440-31-5

Organism	Species	Exposure time	Test Type	Value	Conclusion	Test method	Source
Fish	Pimephales promelas		96hLC50	> 12.4µg/l		OECD 203	
Crustacea	Daphnia magna		7dEC50	> 3200µg/l			

BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

Algae	Pseudokirchneriella subcapitata		72hEC50	> 19.2µg/l		OECD 201	

Antimony, cas-no 7440-36-0

Organism	Species	Exposure time	Test Type	Value	Conclusion	Test method	Source
Fish	Pimephales promelas		96hLC50	14.4mg/l			
Algae	Pseudokirchneriella subcapitata		72hErC50	> 36.6mg/l			
Fish	Pimephales promelas		28dNOEC	1.13 - 2.31mg/l			
Crustacea	Daphnia magna		21dNOEC	1.74 - 3.13mg/l			
Algae	Pseudokirchneriella subcapitata		72hNOEC	2.11 - 4.00mg/l			
Crustacea	Chlorohydra viridissima		96hEC50	1.77mg/l			
Fish	Pagrus major		96hLC50	6.9mg/l			
Algea or other acquatic plants	Lemna minor		4dEC50	> 25.5mg/l			

Silver, metallic, cas-no 7440-22-4

Organism	Species	Exposure time	Test Type	Value	Conclusion	Test method	Source
Fish	Pimephales promelas		96hLC50	1.2mg/l			
Fish	Oncorhynchus mykiss	196 d	EC10	0.17mg/l			
Fish	Pimephales promelas	32 d	EC10	0.44mg/l			
Crustacea	Daphnia magna		48hLC50	0.22mg/l			
Fish	Pimephales promelas	32 d	NOEC	0.351mg/l	Permanent dammage		
Crustacea	Daphnia magna	21 d	EC10	2.14mg/l	Permanent dammage		
Algae	Chlamydomonas reinhardtii	24 h	EC10	0.54mg/l			
Algae	Pseudokirchneriella subcapitata	24 h	EC10	0.41mg/l			
Crustacea	Ceriodaphnia dubia		48hLC50	0.76mg/l			
Crustacea	Ceriodaphnia dubia	7 d	EC10	2.48mg/l	Reproduction		
Fish	Salmo trutta	217 d	EC10	0.19mg/l			
Fish	Oncorhynchus mykiss		96hLC50	1.48mg/l			
Fish	Pimephales promelas	32 d	EC10	0.39mg/l	Permanent dammage		
Crustacea	Ceriodaphnia reticulata	7 d	NOEC	1mg/l	Reproduction		

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018 Revision date: 9/17/2021
Version: 3.0.0

Fish	Salmo gairdneri		96hLC50	6.5g/l		Soft water	
Fish	Salmo gairdneri		96hLC50	13mg/l		Hard water	
Fish	Salmo trutta	217 d	EC10	1.23mg/l			

The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

12.2. Persistence and degradability

The concept of biodegradability is not relevant, as the substance is inorganic.

12.3. Bioaccumulative potential

Tin, cas-no 7440-31-5

Organism	Species	Exposure time	Test Type	Value	Conclusion	Test method	Source
			Log Kd:	2.1 - 4.3			

Antimony, cas-no 7440-36-0

Organism	Species	Exposure time	Test Type	Value	Conclusion	Test method	Source
			Log Kp	2.07			

Test data are not available.

12.4. Mobility in soil

Test data are not available.

12.5. Results of PBT and vPvB assessment

No assessment required, as the product contains inorganic matter only.

12.6. Endocrine disrupting properties

12.7. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Avoid discharge to drain or surface water.
If this product as supplied becomes a waste, it meets the criteria of a hazardous waste (Dir. 2008/98/EU). Collect spills and waste in closed, leak-proof containers for disposal at the local hazardous waste site.
Empty, cleansed packaging should be disposed of for recycling. Uncleansed packaging is to be disposed of via the local waste-removal scheme.

Category of waste: EWC code: Depends on line of business and use, for instance 06 04 05* wastes containing other heavy metals
Absorbent/cloth contaminated with the product: EWC code: 15 02 02 absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances.

SECTION 14: Transport information

14.1. UN number or ID number: Not applicable.
14.2. UN proper shipping name: Not applicable.
14.3. Transport hazard class(es): Not applicable.
14.4. Packing group: Not applicable.
14.5. Environmental hazards: Not applicable.

NEW BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

14.6. Special precautions for user

None.

14.7. Maritime transport in bulk according to IMO instruments

Not included.

SECTION 15: Regulatory information

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

Special Provisions:

Regulation (EU) of the European Parliament and of the Council concerning the export and import of hazardous chemicals.
Special care should be applied for employees under the age of 18. Young people under the age of 18 may not carry out any work causing harmful exposure to this product.

Covered by:
The product is comprised by Regulation 1907/2006/EC, Annex XVII concerning restrictions.

Council Directive (EC) on the protection of young people at work.
Council Directive (EC) on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding.

15.2. Chemical Safety Assessment

REACH Reg. No.	Substance name
01-2119467174-37-0023	Zinc
01-2119475609-24-0026	Antimony
01-2119480154-42-0184	Copper
01-2119486474-28-0024	Tin
01-2119513221-59-0085	Lead
01-2119555669-21-0074	Silver, metallic

SECTION 16: Other information

Version history and indication of changes

Version	Revision date	Responsible	Changes
3.0.0	9/17/2021	Bureau Veritas HSE / MPE	1 - 16

Abbreviations:

STOT: Specific Target Organ Toxicity
PBT: Persistent, Bioaccumulative and Toxic
vPvB: Very Persistent and Very Bioaccumulative
DNEL: Derived No Effect Level
PNEC: Predicted No Effect Concentration

Other Information:

This safety data sheet has been prepared for and applies to this product only. It is based on our current knowledge and the information that the supplier was able to provide about the product at the time of preparation. The safety data sheet complies with applicable law on preparation of safety data sheets in accordance with 1907/2006/EC (REACH) as subsequently changed.

Training advice:

A thorough knowledge of this safety data sheet should be a prerequisite condition.

Classification method:

Calculation based on the hazards of the known components.

List of relevant H-statements

BOLIDEN

Safety Data Sheet

Solder tin with lead (Hafnia, Starli, Starli HQ/X/Refresher, 90Sn, Sn60Pb38Cu2, Sn60Pb38Cu2P, Sn62Pb36Ag2, Sn39Pb60Bi1, Bera Super Tin Solder, Fluks, HK)

Replaces date: 5/7/2018
Revision date: 9/17/2021
Version: 3.0.0

H360FD	May damage fertility. May damage the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure.

SDS is prepared by

Company:	Bureau Veritas HSE Denmark A/S
Address:	Oldenborggade 25-31
Zip code:	7000
City:	Fredericia
Country:	DENMARK
E-mail:	infohse@bureauveritas.com
Phone:	+45 77 31 10 00
Homepage:	https://www.bvhse.dk/

Document language: EU

SDS 7: Cold Asphalt

SAFETY DATA SHEET
Cold Asphalt

The safety data sheet is in accordance with Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

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

Date issued	18.09.2017
Revision date	02.12.2020

1.1. Product identifier

Product name	Cold Asphalt
UFI	4R40-50VK-3007-0GSY
Article no.	10900

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

Use of the substance / preparation	Moisture barrier on building sites and concrete surfaces above and below ground.
Relevant identified uses	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites SU19 Building and construction work SU21 Consumer uses: Private households (= general public = consumers) PC1 Adhesives, Sealants PC9 Coatings and Paints, Fillers, Putties, Thinners

1.3. Details of the supplier of the safety data sheet

Manufacturer

Company name	Auson AB
Postal address	Verkstadsgatan 3
Postcode	S-434 42
City	KUNGSBACKA
Country	SVERIGE
Telephone number	+46 300-562000
Fax	+46 300-562021
Email	nina.nyth@auson.se
Website	http://www.auson.se/
Contact person	Nina Nyth

Emergency telephone	Telephone number: 112 Description: SOS Alarm

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP / GHS]	Flam. Liq. 3; H226 STOT SE 3; H336 EUH 066
Additional information on classification	See section 16 for explanation of hazard statements (H) listed above.

2.2. Label elements

Hazard pictograms (CLP)

Composition on the label	Naphtha (petroleum), hydrotreated heavy, benzene < 0,1% 35 – 45 %, Oxidized bitumen 55 – 65 %
Signal word	Warning
Hazard statements	H226 Flammable liquid and vapour. H336 May cause drowsiness or dizziness.
Precautionary statements	P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. 261 Avoid breathing vapours. P271 Use only outdoors or in a well-ventilated area. P280 Wear protective gloves. P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor / physician. P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P403+P235 Store in a well-ventilated place. Keep cool. P501 Dispose of contents at hazardous or special waste collection point.
Supplemental label information	EUH 066 Repeated exposure may cause skin dryness or cracking.
VOC	Product subcategory : Binding primers Relevant VOC limit values: 750 g/l Maximum content of VOC: 364 g/l

2.3. Other hazards

Hazard description, general	Flammable
Other hazards	Not relevant.

SECTION 3: Composition / information on ingredients

3.2. Mixtures

Substance	Identification	Classification	Contents	Notes
Naphtha (petroleum) ,	CAS No.: 64742-48-9	Flam. Liq. 3; H226	35 – 45 %	1

hydrotreated heavy, benzene < 0,1%	EC No.: 919-857-5 Index No.: 649-327-00-6 REACH Reg. No.: 01-2119463258-33-xxxx	Asp. Tox. 1; H304 STOT SE 3; H336 EUH 066	
Oxidized bitumen	CAS No.: 64742-93-4 EC No.: 265-196-4 REACH Reg. No.: 01-2119498270-36-0027		55 – 65 %

[1]Substance classified with a health or environmental hazard

Remarks, substance	See section 16 for explanation of hazard statements (H) listed above.
Substance comments	H304 is not required on the label due to the product's viscosity.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Fresh air and rest.
Skin contact	Wash the skin with water and soap. Remove contaminated clothing. Get medical advice if discomfort develops.
Eye contact	Flush immediately with water for at least 5 minutes. Keep eye wide open while flushing. Get medical attention if any discomfort continues.
Ingestion	Never give anything by mouth to an unconscious person. DO NOT INDUCE VOMITING! Immediately consult a doctor.

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

General symptoms and effects	No further relevant information available.

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

Specific details on antidotes	No information available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	Dry chemical, foam or carbon dioxide (CO2).
Improper extinguishing media	Do not use a direct water jet that could spread the fire.

5.2. Special hazards arising from the substance or mixture

Fire and explosion hazards	Burning material may cause toxic vapours.

5.3. Advice for firefighters

Personal protective equipment	Breathing apparatus should be used in fire fighting.
Other information	Containers close to fire should be removed immediately or cooled with water.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal protection measures	Use the specified protective equipment. Keep unauthorized personnel away.

6.2. Environmental precautions

Environmental precautionary measures	Do not allow spill to enter sewers or watercourses. Inform appropriate authorities if large amounts are involved.

6.3. Methods and material for containment and cleaning up

Clean up	Collect with absorbent, non-combustible material into suitable containers. Destroy according to applicable regulations.

6.4. Reference to other sections

Additional information	See Section 8 and section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Handling	Wear prescribed personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

Storage	Keep container tightly closed. Keep away from ignition sources. Store in original container.
Conditions to avoid	Heating forms toxic gases.

7.3. Specific end use(s)

Specific use(s)	See Section 1.2

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Substance	Identification	Exposure limits	TWA Year
Naphtha (petroleum) , hydrotreated heavy, benzene < 0,1%	CAS No.: 64742-48-9	Limit value (8 h) : 50 ppm Limit value (8 h) : 300 mg/m³ **Limit value (short term)** Value: 100 ppm **Limit value (short term)** Value: 600 mg/m³	TWA Year: 2011

Control parameters comments	List source(s): EU – Commission Directive 2006/15/EC of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

DNEL / PNEC

Summary of risk management measures, human	No information available.
Summary of risk management measures, environment	No information available.

8.2. Exposure controls

Safety signs

Precautionary measures to prevent exposure

Appropriate engineering controls	No smoking, fire, sparks or welding. Provide good ventilation. Eyewash facilities should be available at the workplace. Keep containers closed, as much as possible.

Eye / face protection

Suitable eye protection	Wear approved, tight fitting safety glasses where splashing is probable.

Hand protection

Skin- / hand protection, short term contact	Protective gloves must be used if there is a risk of direct contact or splashes.
Suitable materials	Nitrile rubber.
Breakthrough time	Value: > 8 hour(s) Comments: Change protective gloves regularly in order to avoid penetration problems.
Thickness of glove material	Value: ≥ 0,38 mm

Skin protection

Skin protection remark	Protective clothing as needed.

Respiratory protection

Respiratory protection necessary at	In case of inadequate ventilation wear respiratory protection.
Recommended respiratory protection	Filter apparatus type: Respirator with A filter (brown).

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	High viscosity liquid.
Colour	Black.
Odour	Characteristic.
Odour limit	Comments: Not applicable.

Melting point / melting range	Comments: Not applicable.
Boiling point / boiling range	Value: > 150 °C
Flash point	Value: 40 °C
Explosion limit	Value: 1 – 7 %
Density	Value: 900 kg/m³ Temperature: 20 °C
Solubility	Comments: Soluble in organic solvents.
Partition coefficient: n-octanol/ water	Comments: No data available

9.2. Other information

Other physical and chemical properties

Comments	No further relevant information available.

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	Keep away from heat / sparks / open flames / hot surfaces. — No smoking.

10.2. Chemical stability

Stability	Stable with normal handling.

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions	No hazardous reactions known.

10.4. Conditions to avoid

Conditions to avoid	No information available.

10.5. Incompatible materials

Materials to avoid	No hazardous reactions known.

10.6. Hazardous decomposition products

Hazardous decomposition products	No formation of hazardous decomposition products are expected under normal conditions.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Substance	Naphtha (petroleum), hydrotreated heavy, benzene < 0,1%
Acute toxicity	**Effect tested:** LD50 **Route of exposure:** Oral **Value:** > 2000 mg/kg

	Animal test species: Rat **Effect tested:** LD50 **Route of exposure:** Dermal **Value:** > 2000 mg/kg **Animal test species:** Rabbit **Effect tested:** LC50 **Route of exposure:** Inhalation. **Duration:** 4h **Value:** > 5000 mg/m³ **Animal test species:** Rat

Other information regarding health hazards

Acute toxicity, human experience	No aspiration hazards known.
Skin corrosion / irritation, human experience	Repeated exposure may cause skin dryness or cracking.
Eye damage or irritation, human experience	Based on available data, the classification criteria are not met.
General	Solvent vapours may evaporate from the product.
Inhalation	Headache. Dizziness. Indisposition.
Skin contact	Defats the skin. Prolonged or repeated contact may cause irritation.
Eye contact	May cause irritation.
Ingestion	Abdominal pains. Vomiting. Causes similar symptoms as by inhalation.
Assessment of germ cell mutagenicity, classification	The chemical structure does not suggest a mutagenic effect.
Carcinogenicity, other information	Does not present any cancer or reproductive hazards.
Reproductive toxicity	The chemical structure does not suggest such an effect.
Specific target organ toxicity - single exposure, human experience	May cause drowsiness or dizziness.

SECTION 12: Ecological information

12.1. Toxicity

Substance	Naphtha (petroleum), hydrotreated heavy, benzene < 0,1%
Aquatic toxicity, fish	**Value:** > 100 mg/L **Test duration:** 96h **Method:** LC50
Substance	Naphtha (petroleum), hydrotreated heavy, benzene < 0,1%
Aquatic toxicity, algae	**Value:** > 100 mg/L **Test duration:** 72h **Method:** EC50
Substance	Naphtha (petroleum), hydrotreated heavy, benzene < 0,1%
Aquatic toxicity, crustacean	**Value:** > 100 mg/L

	Test duration: 48h **Method:** EC50
Ecotoxicity	Exhibits low toxicity to water organisms.

12.2. Persistence and degradability

Persistence and degradability description/evaluation	Not readily degradable.

12.3. Bioaccumulative potential

Bioaccumulation, comments	Has the potential to bioaccumulate.

12.4. Mobility in soil

Mobility	Expected to have relatively low mobility in soil.

12.5. Results of PBT and vPvB assessment

Results of PBT and vPvB assessment	The product does not contain any PBT or vPvB substance.

12.6. Other adverse effects

Additional ecological information	Does not cause long term adverse effects in the aquatic environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Appropriate methods of disposal for the chemical	Dispose of in compliance with local regulations. Do not allow outlets to sewer or watercourse.
Appropriate methods of disposal for the contaminated packaging	Empty containers should be transported to local recycling facility or waste treatment facility. Containers with liquid residues are hazardous waste.
EWC waste code	EWC waste code: 170302 bituminous mixtures other than those mentioned in 17 03 01 Classified as hazardous waste: Yes
EWL packing	Classified as hazardous waste: No
Other information	EWC code is only a suggestion, final consumer selects a suitable EWC code.

SECTION 14: Transport information

Dangerous goods	Yes

14.1. UN number

ADR/RID/ADN	1139
IMDG	1139
ICAO/IATA	1139

14.2. UN proper shipping name

Proper shipping name English ADR/RID/ADN	COATING SOLUTION
Technical name/Danger releasing substance English ADR/RID/ADN	Petroleum products
ADR/RID/ADN	COATING SOLUTION
Technical name/danger releasing substance ADR/RID/ADN	Petroleum products
IMDG	COATING SOLUTION
Technical name/danger releasing substance IMDG	Petroleum products
ICAO/IATA	COATING SOLUTION
Technical name/danger releasing substance ICAO/IATA	Petroleum products

14.3. Transport hazard class(es)

ADR/RID/ADN	3
Classificaton code ADR/RID/ADN	F1
IMDG	3
ICAO/IATA	3

14.4. Packing group

ADR/RID/ADN	III
IMDG	III
ICAO/IATA	III

14.5. Environmental hazards

ADR/RID/ADN	No
IMDG	No

14.6. Special precautions for user

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Product name	COATING SOLUTION

Additional information

Hazard label ADR/RID/ADN	3
Hazard label IMDG	3
Hazard label ICAO/IATA	3

ADR/RID Other information

Tunnel restriction code	D/E
Limited quantity	ADR-S: The products are not comprised by the regulations in ADR-S according

	to section 2.2.3.1.5 or IMDG according to section 2.3.2.5.
Transport category	3
Hazard No.	30
Other applicable information ADR/ RID	30

IMDG Other information

EmS	F-E, S-E

SECTION 15: Regulatory information

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

EEC-directive	2006/121/2006
Biocides	No
Nanomaterial	No
References (laws/regulations)	The product is classified and labelled in accordance with EEC guidelines or national legislation.
Legislation and regulations	Regulation (EC) nr. 2015/830 Regulation (EC) nr. 1272/2008.

15.2. Chemical safety assessment

Chemical safety assessment performed	No

SECTION 16: Other information

Supplier's notes	These data are based on our best knowledge to date, however they do not imply any guarantee on the properties or quality of the product. In case of uncertainties we advise you to make own tests or ask for written directions from us.
List of relevant H-phrases (Section 2 and 3)	EUH 066 Repeated exposure may cause skin dryness or cracking. H226 Flammable liquid and vapour. H304 May be fatal if swallowed and enters airways. H336 May cause drowsiness or dizziness.
Version	9
Expired date	02.12.2023

SDS 8: Ecosolv A

According to EC-Regulation 2015/830

SAFETY DATA SHEET

ECOSOLV A

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

1.1. Product identifier

Trade name

ECOSOLV A

▼REACH registration number

-

▼Other means of identification

-

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

Relevant identified uses of the substance or mixture

Solvent - Industrial purposes.

▼Relevant identified uses of the substance or mixture (REACH)

No special

▼Uses advised against

No special

1.3. Details of the supplier of the safety data sheet

Company and address

Solveco AB
Tallbacksgatan 10
S-195 72 Rosersberg
Sverige
T: +46 (0)8 732 72 75
F: +46 (0)8 732 72 76
http://www.solveco.se

Contact person

Habib Hourani

E-mail

info@solveco.se

SDS date

2020-02-24

SDS Version

2.0

1.4. Emergency telephone number

Contact The National Poisons Information Service (dial 111, 24 h service). See section 4 "First aid measures".

SECTION 2: Hazards identification

▼2.1. Classification of the substance or mixture

Flam. Liq. 2; H225, Highly flammable liquid and vapour.

Eye Irrit. 2; H319, Causes serious eye irritation.

STOT SE 3; H336, May cause drowsiness or dizziness.

▼

2.2. Label elements

▼

Hazard pictogram(s)

Signal word

Danger

Hazard statement(s)

Highly flammable liquid and vapour.
Causes serious eye irritation.
May cause drowsiness or dizziness.

Safety statement(s)

General

Prevention

P280, Wear eye protection.
P210, Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response

P337+P313, If eye irritation persists: Get medical advice/attention.
P370+P378, In case of fire: Use carbonic acid/water mist/carbon dioxide/alcohol-resistant foam to extinguish.

Storage

P403+P235, Store in a well-ventilated place. Keep cool.

Disposal

P501, Dispose of contents/container to an approved waste disposal plant.

▼Hazardous substances

Isopropanol

2.3. Other hazards

▼Additional labelling

Not applicable

▼Additional warnings

This mixture/product does not contain any substances considered to meet the criteria classifying them as PBT and/or vPvB.

SECTION 3: Composition/information on ingredients

▼3.2 Mixtures

Product/Ingredient name	Identifiers	% w/w	Classification	Note
Ethanol	CAS No.: 64-17-5 EC No.: 200-578-6 REACH No.: Index No.: 603-002-00-5	60 - 70%	Flam. Liq. 2, H225 Eye Irrit. 2, H319	
Isopropanol	CAS No.: 67-63-0 EC No.: 200-661-7 REACH No.: Index No.: 603-117-00-0	30 - 40%	Flam. Liq. 2, H225 Eye Irrit. 2, H319 STOT SE 3, H336	

See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

Other information

No special

SECTION 4: First aid measures

▼4.1. Description of first aid measures

General information

In the case of accident: Contact a doctor or casualty department – take the label or this safety data sheet. Contact a doctor if in doubt about the injured person's condition or if the symptoms persist. Never give an unconscious person water or other drink.

▼Inhalation

Upon breathing difficulties or irritation of the respiratory tract: Bring the person into fresh air and stay with him/her.

Skin contact

Immediately remove contaminated clothing and shoes. Ensure that skin, which has been exposed to the material, is washed thoroughly with water and soap. Skin cleanser can be used. DO NOT use solvents or thinners.

▼Eye contact

Upon irritation of the eye: Remove contact lenses. Flush eyes immediately with plenty of water or isotonic water (20-30°C) for at least 5 minutes and continue until irritation stops. Make sure to flush under upper and lower eyelids. If irritation continues, contact a doctor. Continue flushing during transport.

Ingestion

Provide plenty of water for the person to drink and stay with him/her. In case of malaise, seek medical advice immediately and bring the safety data sheet or label from the product. Do not induce vomiting, unless recommended by the doctor. Have the victim lean forward with head down to avoid inhalation of- or choking on vomited material.

Burns

Rinse with water until pain stops then continue to rinse for 30 minutes.

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

Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

Neurotoxic effects: This product contains organic solvents, which may cause adverse effects to the nervous system. Symptoms of neurotoxicity include: loss of appetite, headache, dizziness, ringing in ears, tingling sensations of skin, sensitivity to the cold, cramps, difficulty in concentrating, tiredness, etc. Repeated exposure to solvents can result in the breaking down of the skin's natural fat layer and may result in an increased absorption potential of other hazardous substances at the area of exposure.

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

If eye irritation persists: Get medical advice/attention.

Information to medics

Bring this safety data sheet.

SECTION 5: Firefighting measures

▼5.1. Extinguishing media

Extinguish fire with carbonic acid, powder or foam. Do not use water, as this will spread the fire.

▼5.2. Special hazards arising from the substance or mixture

Fire will result in dense black smoke. Exposure to combustion products may harm your health. Closed containers, which are exposed to fire, should be cooled with water. Do not allow fire-extinguishing water to enter the sewage system and nearby surface waters.

If the product is exposed to high temperatures, e.g. in the event of fire, dangerous decomposition compounds are produced. These are:

Carbon oxides.

5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective clothing to prevent contact. Upon direct exposure contact The National Poisons Information Service (dial 111, 24 h service) in order to obtain further advice.

SECTION 6: Accidental release measures

▼6.1. Personal precautions, protective equipment and emergency procedures

Storages not yet ignited must be cooled by water mist. Remove flammable materials if conditions allow it. Ensure sufficient ventilation.
Avoid inhalation of vapours from spilled material.

▼6.2. Environmental precautions

Avoid discharge to lakes, streams, sewers, etc.

6.3. Methods and material for containment and cleaning up

Limit spillage and collect using granular absorbent or similar materials, and dispose of it in accordance with the regulations on dangerous waste.
Use sand, sawdust, earth, vermiculite, diatomaceous earth to contain and collect non-combustible absorbent materials and place in container for disposal, according to local regulations.
To the extent possible cleaning is performed with normal cleaning agents. Avoid use of solvents.

6.4. Reference to other sections

See section on “Disposal considerations” in regard of handling of waste.
See section on 'Exposure controls/personal protection' for protective measures.

SECTION 7: Handling and storage

▼7.1. Precautions for safe handling

Ground and bond container and receiving equipment.
Use explosion-proof [electrical/lighting/ventilating]equipment.
Use non-sparking tools.
The product should be tested for peroxides before distillation or evaporation and tested for peroxide formation or discarded after 1 year.
Peroxide formation may be present anywhere in the container, including the sides, bottom, exterior and threaded cap. Peroxide formation in ppm concentrations may not be visually observable and must be identified through the use of appropriate testing procedures. If any of the following conditions exist, the material may be explosively unstable and will require stabilization prior to use:
1. Material appears to be degraded and or contaminated.
2. Material appears to be discolored.
3. Deterioration or distortion of storage container.
4. Thermal shock (sunlight).
5. Age of material exceeds recommended storage time.
Smoking, drinking and consumption of food is not allowed in the work area.
See section on 'Exposure controls/personal protection' for information on personal protection.

▼7.2. Conditions for safe storage, including any incompatibilities

Always store in containers of the same material as the original container.
Store in tightly closed containers and store protected from moisture and light. Containers should be dated when opened and tested periodically for the presence of peroxides. Do not exceed storage time limits.
Containers that have been opened must be carefully resealed and kept upright to prevent leakage.
Must be stored in a cool and well-ventilated area, away from possible sources of ignition.
Take action to prevent static discharges.

Storage temperature

Dry, cool and well ventilated

7.3. Specific end use(s)

This product should only be used for applications quoted in section 1.2

SECTION 8: Exposure controls/personal protection

▼8.1. Control parameters

—

Ethanol
Long term exposure limit (8 hours): 1000 ppm
Long term exposure limit (8 hours): 1920 mg/m³

—
Isopropanol
Long term exposure limit (8 hours): 400 ppm
Long term exposure limit (8 hours): 999 mg/m³
Short term exposure limit (15 minutes): 500 ppm
Short term exposure limit (15 minutes): 1250 mg/m³

The Control of Substances Hazardous to Health Regulations 2002. SI 2002/2677 The Stationery Office 2002.

▼DNEL

Product/Ingredient name	DNEL	Route of exposure	Duration
Isopropanol	500 mg/m3	Inhalation	Long term – Systemic effects
Isopropanol	888 mg/kg kroppsvikt	Dermal	Long term – Systemic effects - Workers

▼PNEC

Product/Ingredient name	PNEC	Route of exposure	Duration of Exposure
Isopropanol	28 mg/kg	Soil	No data available
Isopropanol	140,9 mg/L	Freshwater	No data available
Isopropanol	552 mg/kg	Freshwater sediment	No data available
Isopropanol	140,9 mg/L	Marine water	No data available
Isopropanol	552 mg/kg	Marine water sediment	No data available
Isopropanol	2251 mg/L	Sewage Treatment Plant	No data available
Isopropanol	140,9 mg/L	Intermittent release	No data available

8.2. Exposure controls

Compliance with the given occupational exposure limits values should be controlled on a regular basis.

General recommendations

Smoking, eating and drinking are not allowed in the work premises

▼Exposure scenarios

There are no exposure scenarios implemented for this product.

Exposure limits

Professional users are subjected to the legally set maximum concentrations for occupational exposure. See occupational hygiene limit values above.

Appropriate technical measures

Airborne gas and dust concentrations must be kept at a minimum and below current limit values (see above). Installation of an exhaust system if normal air flow in the work room is not sufficient is recommended. Ensure emergency eyewash and -showers are clearly marked.

Hygiene measures

In between use of the product and at the end of the working day all exposed areas of the body must be washed thoroughly. Always wash hands, forearms and face.

Measures to avoid environmental exposure

No specific requirements

Individual protection measures, such as personal protective equipment

According to EC-Regulation 2015/830

Generally

Use only CE marked protective equipment.

Respiratory Equipment

Work situation	Recommended Filter type	Class	Colour	Standards	
If ventilation at the work place is insufficient, use a half- or full mask with an appropriate filter or an air-supplied breathing apparatus.	A	-	Brown	EN14387	

Skin protection

Work situation	Recommended	Type/Category	Standards	
	Dedicated work clothing should be worn.	-	-	

▼Hand protection

Work situation	Material	Glove thickness (mm)	Breakthrough time (min.)	Standards	
	Nitrile	-	-	EN374-2	
	Butyl	-	-	EN374-2, EN374-3, EN388, EN421	

Eye protection

Work situation	Recommended	Standards	
	Use face protection or safety glasses with side shields.	EN166	

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

▼Form

Liquid

▼Colour

Colourless

▼Odour

Characteristic

▼Odour threshold (ppm)

Testing not relevant or not possible due to nature of the product.

▼pH

Testing not relevant or not possible due to nature of the product.

▼Density (g/cm³)

0.78

▼Viscosity

Testing not relevant or not possible due to nature of the product.

Phase changes

▼Melting point (°C)

Testing not relevant or not possible due to nature of the product.

Boiling point (°C)

~ 78 °C

(CAS: 64-17-5)

Vapour pressure

5.90 kPa (20.00 °C)

(CAS: 64-17-5)

▼Vapour density

Testing not relevant or not possible due to nature of the product.

▼Decomposition temperature (°C)

Testing not relevant or not possible due to nature of the product.

▼Evaporation rate (n-butylacetate = 100)

Testing not relevant or not possible due to nature of the product.

Data on fire and explosion hazards

Flash point (°C)

~ 12.0 °C

(CAS: 67-63-0)

▼Ignition (°C)

Testing not relevant or not possible due to nature of the product.

▼Auto flammability (°C)

Testing not relevant or not possible due to nature of the product.

▼Explosion limits (% v/v)

2.00 - 19.00 v/v%

▼Explosive properties

Testing not relevant or not possible due to nature of the product.

▼Oxidizing properties

Testing not relevant or not possible due to nature of the product.

Solubility

▼Solubility in water

Soluble

n-octanol/water coefficient

-0.32

(CAS: 64-17-5)

▼Solubility in fat (g/L)

Testing not relevant or not possible due to nature of the product.

9.2. Other information

SECTION 10: Stability and reactivity

10.1. Reactivity

No data available

10.2. Chemical stability

The product is stable under the conditions, noted in the section “Handling and storage”.

10.3. Possibility of hazardous reactions

No special

10.4. Conditions to avoid

Avoid static electricity.

Do not expose to any forms of heat (e.g. solar radiation). May lead to excess pressure.

10.5. Incompatible materials

Strong acids, strong bases, strong oxidizing agents, and strong reducing agents.

10.6. Hazardous decomposition products

The product is not degraded when used as specified in section 1.

According to EC-Regulation 2015/830

SECTION 11: Toxicological information

11.1. Information on toxicological effects

▼Acute toxicity

Product/Ingredient name	Species	Test	Route of exposure	Result
Ethanol	Rat	LD50	Oral	6200.00 mg/kg
Ethanol	Rat	LC50 (4 hours)	Inhalation	124.70 mg/l
Ethanol	Rabbit	LD50	Dermal	>20000.00 mg/kg
Isopropanol	Rat	LD50	Oral	4396.00 mg/kg
Isopropanol	Rat	LC50 (4 hours)	Inhalation	46.5-72.0 mg/l
Isopropanol	Rabbit	LD50	Dermal	12800.00 mg/kg

▼Skin corrosion/irritation

Based on available data, the classification criteria are not met.

▼Serious eye damage/irritation

Causes serious eye irritation.

▼Respiratory or skin sensitisation

Based on available data, the classification criteria are not met.

▼

▼Germ cell mutagenicity

Based on available data, the classification criteria are not met.

▼Carcinogenicity

Based on available data, the classification criteria are not met.

▼Reproductive toxicity

Based on available data, the classification criteria are not met.

STOT-single exposure

May cause drowsiness or dizziness.

▼STOT-repeated exposure

Based on available data, the classification criteria are not met.

▼Aspiration hazard

Based on available data, the classification criteria are not met.

Long term effects

Irritation effects: This product contains substances, which may cause irritation upon exposure to skin, eyes or lungs. Exposure may result in an increased absorption potential of other hazardous substances at the area of exposure.

Neurotoxic effects: This product contains organic solvents, which may cause adverse effects to the nervous system. Symptoms of neurotoxicity include: loss of appetite, headache, dizziness, ringing in ears, tingling sensations of skin, sensitivity to the cold, cramps, difficulty in concentrating, tiredness, etc. Repeated exposure to solvents can result in the breaking down of the skin's natural fat layer and may result in an increased absorption potential of other hazardous substances at the area of exposure.

▼Other information

Ethanol has been classified by IARC as a group 1 carcinogen.

Isopropanol has been classified by IARC as a group 3 carcinogen.

SECTION 12: Ecological information

▼12.1. Toxicity

Product/Ingredient	Species	Test	Duration	Result

name				
Ethanol	Fish (Pimephales promelas)	LC50	96 hours	13480.00 mg/l
Ethanol	Algae	IC50	72 hours	>10.9 mg/l
Ethanol	Daphnia (Daphnia magna)	EC50	48 hours	5400.00 mg/l
Ethanol	Algae (Scenedesmus subspicatus)	IC50	7 days	5000.00 mg/l
Isopropanol	Fish	LC50	96 hours	4200.00 mg/l
Isopropanol	Algae (Scenedesmus subspicatus)	IC50	96 hours	>1000.00 mg/l
Isopropanol	Daphnia	EC50	48 hours	13299.00 mg/l

12.2. Persistence and degradability

Product/Ingredient name	Biodegradability	Test	Result
Ethanol	Yes	BOD5/COD	0.4 - 0.8
Isopropanol	Yes	OECD 301 C (Modified MITI Test)	84 %

▼12.3. Bioaccumulative potential

Product/Ingredient name	Potential bioaccumulation	LogPow	BCF
Ethanol	No	No data available	< 10
Isopropanol	No	No data available	No data available

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

This mixture/product does not contain any substances considered to meet the criteria classifying them as PBT and/or vPvB.

12.6. Other adverse effects

No special

SECTION 13: Disposal considerations

▼13.1. Waste treatment methods

To the extent the material has not been subject to regular tests of peroxide formation the waste shall be treated as explosive waste.

Product is covered by the regulations on hazardous waste.

EWC code

Not applicable

Specific labelling

Not applicable

Contaminated packing

Packaging containing residues of the product must be disposed of similarly to the product.

SECTION 14: Transport information

According to EC-Regulation 2015/830

14.1 - 14.4

This product is within scope of the regulations of transport of dangerous goods.

▼ADR/RID

UN number	Proper Shipping Name	Class	Packing group	Tunnel restriction code
1987	ALCOHOLS, N.O.S.	3	II	2 (D/E)

▼IMDG

UN number	Proper Shipping Name	Class	Packing group	EmS
1987	ALCOHOLS, N.O.S.	3	II	F-E, S-D

▼IATA

Not applicable

▼Marine pollutant

No

14.5. Environmental hazards

Not applicable

14.6. Special precautions for user

Not applicable

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable

SECTION 15: Regulatory information

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

Restrictions for application

Pregnant women and women breastfeeding must not be exposed to this product. The risk, and possible technical precautions or design of the workplace needed to eliminate exposure, must be considered.

▼Demands for specific education

No specific requirements

SEVESO - Categories / dangerous substances:

▼

P5c

▼

Additional information

Not applicable

▼Sources

Council Directive 92/85/EEC on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding.
The Control of Major Accident Hazards (COMAH) Regulations 2015.
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (CLP).
Regulation (EC) 1907/2006 (REACH).

15.2. Chemical safety assessment

No

SECTION 16: Other information

Full text of H-phrases as mentioned in section 3

H225, Highly flammable liquid and vapour.
H319, Causes serious eye irritation.
H336, May cause drowsiness or dizziness.

Abbreviations and acronyms

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
CAS = Chemical Abstracts Service
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
CSA = Chemical Safety Assessment
CSR = Chemical Safety Report
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
EINECS = European Inventory of Existing Commercial chemical Substances
ES = Exposure Scenario
EUH statement = CLP-specific Hazard statement
EWC = European Waste Catalogue
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer (IARC)
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
OECD = Organisation for Economic Co-operation and Development
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
RRN = REACH Registration Number
SVHC = Substances of Very High Concern
STOT-RE = Specific Target Organ Toxicity - Repeated Exposure
STOT-SE = Specific Target Organ Toxicity - Single Exposure
TWA = Time weighted average
UN = United Nations
UVCB = Complex hydrocarbon substance
VOC = Volatile Organic Compound
vPvB = Very Persistent and Very Bioaccumulative

Additional information

In accordance with Regulation (EC) No. 1272/2008 (CLP) the evaluation of the classification of the mixture is based on:
The classification of the mixture in regard of health hazards are in accordance with the calculation methods given by Regulation (EC) No. 1272/2008 (CLP)
The classification of the mixture in regard of physical hazards has been based on experimental data.

The safety data sheet is validated by

Habib Hourani

Other

A change (in proportion to the last essential change (first cipher in SDS version, see section 1)) is marked with a blue triangle.
The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.
It is recommended to hand over this safety data sheet to the actual user of the product. Information in this safety data sheet cannot be used as a product specification.

SDS 9: PF Solvent

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Safety Data Sheet dated 26/11/2020, version 5

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

1.1. Product identifier

Trade name: PF Solvent
SDS code: P20301
UFI: 8DKN-SGJP-0V1G-GKSE

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

Recommended use:
Cleaner
Industrial uses

Uses advised against:
No uses advised against are identified.

1.3. Details of the supplier of the safety data sheet

Manufacturers:
Socomore SASU
Zone Industrielle du Prat - CS 23707 - 56037 VANNES CEDEX - France
Tel : +33 (0)2 97 43 76 83 - Fax : +33 (0)2 97 54 50 26
Socomore Ireland Ltd. - Meenane, Watergrasshill, Co. Cork, Ireland - Tel +353 21 4889922 / Fax +353 21 4889923 / ireland@socomore.com

Distributors:
SOCOMORE SASU
Zone Industrielle du Prat - CS 23707 - 56037 VANNES CEDEX - France
Tel : +33 (0)2 97 43 76 83 - Fax : +33 (0)2 97 54 50 26
Socomore Ireland Ltd. - Meenane, Watergrasshill, Co. Cork, Ireland - Tel +353 21 4889922 / Fax +353 21 4889923 / ireland@socomore.com
Socomore GmbH - c/o MAZARS GmbH - Theodor-Stern-Kai 1 - 60596 Frankfurt am Main - Deutschland - Tel: +49 (0)89 20 70 28 83 - Fax: +49 (0) 89 88 91 98 16
Socomore Iberia - Calle Diputació, 260 - 08007 Barcelona - Espana - Tel: +34 917 693 962 - Fax: +34 902 908 966
SOCOMORE SPzoo - Ul. Piekna 18, 00-549 Warszawa Polska - Tel : +48 608 454 114 - Fax : +48 (22) 621 61 09

Competent person responsible for the safety data sheet:
techdirsocomore@socomore.com

1.4. Emergency telephone number

France : ORFILA (INRS) +33 (0)1 45 42 59
International : CHEMTEL +1-813-248-0585.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

EC regulation criteria 1272/2008 (CLP)

Warning, Skin Sens. 1, May cause an allergic skin reaction.
Danger, Asp. Tox. 1, May be fatal if swallowed and enters airways.
Aquatic Chronic 2, Toxic to aquatic life with long lasting effects.

Adverse physicochemical, human health and environmental effects:
No other hazards

2.2. Label elements

Hazard pictograms:

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Danger
Hazard statements:
H317 May cause an allergic skin reaction.
H304 May be fatal if swallowed and enters airways.
H411 Toxic to aquatic life with long lasting effects.
Precautionary statements:
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P273 Avoid release to the environment.
P280 Wear protective gloves and eye/face protection.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P331 Do NOT induce vomiting.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P391 Collect spillage.
Special Provisions:
None
Contains
HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS
ORANGE, SWEET, EXTRACT
Special provisions according to Annex XVII of REACH and subsequent amendments:
None

2.3. Other hazards

vPvB Substances: None - PBT Substances: None
Other Hazards:
No other hazards

SECTION 2: Hazards identification
If brought into contact with the skin, the product may cause sensitisation of the skin.
The product is harmful: may cause lung damage if swallowed.
Repeated exposure to the product may cause skin dryness or cracking.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

SECTION 3: Composition/information on ingredients

3.1. Substances

N.A.

3.2. Mixtures

Hazardous components within the meaning of the CLP regulation and related classification:

Qty	Name	Ident. Number	Classification
>= 90%	HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS	EC: 920-901-0 REACH No.: 01-2119456810-40	3.10/1 Asp. Tox. 1 H304 EUH066
>= 7% - < 10%	ORANGE, SWEET, EXTRACT	CAS: 8028-48-6 EC: 232-433-8 REACH No.: 01-2119493353	2.6/3 Flam. Liq. 3 H226 3.2/2 Skin Irrit. 2 H315 3.4.2/1 Skin Sens. 1 H317

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

		-35	3.10/1 Asp. Tox. 1 H304 4.1/A1 Aquatic Acute 1 H400 4.1/C1 Aquatic Chronic 1 H410

SECTION 4: First aid measures

4.1. Description of first aid measures

In case of skin contact:

Immediately take off all contaminated clothing.
Areas of the body that have - or are only even suspected of having - come into contact with the product must be rinsed immediately with plenty of running water and possibly with soap.
Wash thoroughly the body (shower or bath).
Remove contaminated clothing immediately and dispose of safely.

In case of eyes contact:

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

In case of Ingestion:

Do NOT induce vomiting.

In case of Inhalation:

Remove casualty to fresh air and keep warm and at rest.

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

Eye contact : Burning feeling and temporary redness.
Repeated exposure may cause skin dryness or cracking.
Vapours inhaled in strong concentration have a narcotic effect on the central nervous system.
Inhalation of vapours or aerosols may be irritating to the respiratory tract and mucous membranes.
If swallowed, aspiration into the lungs may occur and cause a chemical pneumonia.
Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea, abdominal pain.

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

In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).
Treatment:
No particular treatment.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water.
Carbon dioxide (CO_2).
Extinguishing media which must not be used for safety reasons:
None in particular.

5.2. Special hazards arising from the substance or mixture

Do not inhale explosion and combustion gases.
Burning produces heavy smoke.

5.3. Advice for firefighters

Use suitable breathing apparatus .
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Move undamaged containers from immediate hazard area if it can be done safely.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Wear personal protection equipment.
Remove persons to safety.
See protective measures under point 7 and 8.

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

6.2. Environmental precautions
Do not allow to enter into soil/subsoil. Do not allow to enter into surface water or drains.
Retain contaminated washing water and dispose it.
In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.
Suitable material for taking up: absorbing material, organic, sand

6.3. Methods and material for containment and cleaning up
Wash with plenty of water.

6.4. Reference to other sections
See also section 8 and 13

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Avoid contact with skin and eyes, inhalation of vapours and mists.
Don't use empty container before they have been cleaned.
Before making transfer operations, assure that there aren't any incompatible material residuals in the containers.
See also section 8 for recommended protective equipment.
Advice on general occupational hygiene:
Contamined clothing should be changed before entering eating areas.
Do not eat or drink while working.

7.2. Conditions for safe storage, including any incompatibilities
Avoid vapor emissions.
Keep away from food, drink and feed.
Incompatible materials:
None in particular.
Instructions as regards storage premises:
Adequately ventilated premises.

7.3. Specific end use(s)
None in particular

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limit values
HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS
- OEL Type: National - TWA: 1200 mg/m3, 171 ppm - Notes: vapour, ExxonMobil

DNEL Exposure Limit Values
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
Worker Professional: 8.89 mg/kg b.w./day - Consumer: 4.44 mg/kg b.w./day - Exposure: Human Dermal - Frequency: Long Term, systemic effects
Worker Professional: 185.8 µg/cm2 - Consumer: 92.9 µg/cm2 - Exposure: Human Dermal - Frequency: Short Term, local effects
Worker Professional: 31.1 mg/m3 - Consumer: 7.78 mg/m3 - Exposure: Human Inhalation - Frequency: Long Term, systemic effects
Consumer: 4.44 mg/kg b.w./day - Exposure: Human Oral - Frequency: Long Term, systemic effects

PNEC Exposure Limit Values
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
Target: Fresh Water - Value: 5.4 mg/l
Target: Marine water - Value: 0.54 mg/l
Target: PNEC01 - Value: 5.77 mg/l

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Target: Freshwater sediments - Value: 1.3 mg/kg
Target: Marine water sediments - Value: 0.13 mg/kg
Target: Soil (agricultural) - Value: 0.261 mg/kg
Target: Microorganisms in sewage treatments - Value: 2.1 mg/l
Target: PNEC02 - Value: 13.3 mg/l

Biological Exposure Index
N.A.

8.2. Exposure controls
See below, example of PPE to use.
Eye protection:
Safety goggles (EN 166)
Protection for skin:
Chemical protection clothing. (type 3 - EN14605)
Chemical protection clothing. (type 5 - EN13982-1)
Chemical protection clothing. (type 6 - EN13034)
Protection for hands:
Suitable gloves type: NF EN374
NBR (nitrile rubber).
PVA (Polyvinyl alcohol).
Respiratory protection:
Use adequate protective respiratory equipment.
Filtering Half-face mask (EN 149).
Thermal Hazards:
None
Environmental exposure controls:
None
Appropriate engineering controls:
None
Other conditions affecting workers exposure:
None

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Method:	Notes
Appearance and colour:	FLUID LIQUID	--	--
Odour:	N.A.	--	--
Odour threshold:	N.A.	--	--
pH:	N.A.	--	--
Melting point / freezing point:	Not Relevant	--	--
Initial boiling point and boiling range:	193 °C	--	--
Flash point (°C):	> 60°C	--	--

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Flash Point (°F):	> 140°F	--	--
Evaporation rate:	N.A.	--	--
Solid/gas flammability:	N.A.	--	liquid
Upper/lower flammability or explosive limits:	0.6-7%	--	--
Vapour pressure:	N.A.	--	--
Vapour density:	N.A.	--	--
Relative density:	0.765	--	--
Solubility in water:	INSOLUBLE	--	--
Solubility in oil:	N.A.	--	--
Partition coefficient (n-octanol/water):	N.A.	--	--
Auto-ignition temperature:	>200°C	--	--
Decomposition temperature:	N.A.	--	--
Viscosity:	v < 7 mm2/s (40°C)	--	--
Explosive properties:	N.A.	--	--
Oxidizing properties:	N.A.	--	--

9.2. Other information

Properties	**Value**	**Method:**	**Notes**
Miscibility:	N.A.	--	--
Fat Solubility:	N.A.	--	--
Conductivity:	N.A.	--	--
Substance Groups relevant properties	N.A.	--	--

Volatile Organic compounds - VOCs = 100 %
Volatile Organic compounds - VOCs = 765 g/l

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

10.2. Chemical stability
Stable under normal conditions
10.3. Possibility of hazardous reactions
None
10.4. Conditions to avoid
Stable under normal conditions.
10.5. Incompatible materials
None in particular.
10.6. Hazardous decomposition products
None.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Toxicological information of the product:
N.A.

Toxicological information of the main substances found in the product:
HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS
Acute toxicity:
Test: Genotoxicity - Route: Inhalation Vapour - Species: Rat > 5000 mg/m3 - Duration: 8h
Test: LD50 - Route: Oral - Species: Rat > 5000 mg/kg
Test: LD50 - Route: Skin - Species: Rabbit > 5000 mg/kg
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
Acute toxicity:
Test: LD50 - Route: Oral - Species: Rat > 5000 mg/kg
Test: LD50 - Route: Skin - Species: Rat > 5000 mg/kg
STOT-repeated exposure:
Test: LOAEL
- Species: Mouse = 1000 MGKGBWDAY

If not specified in other sections, the information required in Regulation (EU)2015/830 listed below must be considered as not relevant.:
Acute toxicity;
Skin corrosion/irritation;
Serious eye damage/irritation;
Respiratory or skin sensitisation;
Germ cell mutagenicity;
Carcinogenicity;
Reproductive toxicity;
STOT-single exposure;
STOT-repeated exposure;
Aspiration hazard.

Other toxicological information:
ORANGE, SWEET, EXTRACT
Skin contact:
May cause skin irritation. May cause skin allergy.

SECTION 12: Ecological information

12.1. Toxicity
Adopt good working practices, so that the product is not released into the environment.
HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

a) Aquatic acute toxicity:
Endpoint: DSEO-R (NOELR) - Species: Algae = 1000 mg/l - Duration h: 72 - Notes: Pseudokirchneriella subcapitata
Endpoint: EL0 - Species: Algae = 1000 mg/l - Duration h: 72 - Notes: Pseudokirchneriella subcapitata
Endpoint: EL0 - Species: Daphnia = 1000 mg/l - Duration h: 48 - Notes: Daphnia magna
Endpoint: LL0 - Species: Fish = 1000 mg/l - Duration h: 96 - Notes: Onchohynchus mykiss
b) Aquatic chronic toxicity:
Endpoint: DSEO-R (NOELR) - Species: Daphnia = 1 mg/l - Duration h: 504 - Notes: Daphnia magna
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
a) Aquatic acute toxicity:
Endpoint: EC50 - Species: Daphnia = 0.67 mg/l - Duration h: 48
Endpoint: LC50 - Species: Fish = 0.7 mg/l - Duration h: 96
Endpoint: EC50 - Species: Algae = 150 mg/l - Duration h: 72 - Notes: GrünalgeDesmodesmusSub

12.2. Persistence and degradability
HYDROCARBONS, C11-C13, , ISOALKANES, <2% AROMATICS
Biodegradability: Biodegradability rate - Duration: 28 days - %: 31.3
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
Biodegradability: Biodegradability rate - Test: OECD 301B - Duration: 28 days - %: 72 - 83.4

12.3. Bioaccumulative potential
ORANGE, SWEET, EXTRACT - CAS: 8028-48-6
BCF 1.502 - 2.597

12.4. Mobility in soil
N.A.

12.5. Results of PBT and vPvB assessment
vPvB Substances: None - PBT Substances: None

12.6. Other adverse effects
No harmful effects expected.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Recover, if possible. Send to authorised disposal plants or for incineration under controlled conditions. In so doing, comply with the local and national regulations currently in force.
Codes of wastes (Décision 2001/573/EC, Directive 2006/12/EEC, Directive 94/31/EEC on hazardous waste):
14 06 03* Other solvents and solvent mixtures

SECTION 14: Transport information

14.1. UN number

ADR-UN Number:	3082
IATA-UN Number:	3082
IMDG-UN Number:	3082

14.2. UN proper shipping name

ADR-Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ORANGE, SWEET, EXTRACT, HYDROCARBONS, C11-C13, ISOALKANES, <2% AROMATICS)
IATA-Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ORANGE, SWEET, EXTRACT, HYDROCARBONS, C11-C13, ISOALKANES, <2% AROMATICS)

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

IMDG-Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ORANGE, SWEET, EXTRACT, HYDROCARBONS, C11-C13, ISOALKANES, <2% AROMATICS)

14.3. Transport hazard class(es)

ADR-Class: 9
ADR - Hazard identification number: 90
IATA-Class: 9
IATA-Label: 9
IMDG-Class: 9

14.4. Packing group

ADR-Packing Group: III
IATA-Packing group: III
IMDG-Packing group: III

14.5. Environmental hazards

ADR-Enviromental Pollutant: Yes
IMDG-Marine pollutant: Yes
Most important toxic component: ORANGE, SWEET, EXTRACT

14.6. Special precautions for user

ADR-Subsidiary hazards: -
ADR-S.P.: 274 335 375 601
ADR-Transport category (Tunnel restriction code): 3 (E)
IATA-Passenger Aircraft: 964
IATA-Subsidiary hazards: -
IATA-Cargo Aircraft: 964
IATA-S.P.: A97 A158 A197
IATA-ERG: 9L
IMDG-EmS: F-A , S-F
IMDG-Subsidiary hazards: -
IMDG-Stowage and handling: Category A
IMDG-Segregation: -
Q.L.: 5L
Q.E.: E1

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

N.A.

SECTION 15: Regulatory information

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

Dir. 98/24/EC (Risks related to chemical agents at work)
Dir. 2000/39/EC (Occupational exposure limit values)
Regulation (EC) n. 1907/2006 (REACH)
Regulation (EC) n. 1272/2008 (CLP)
Regulation (EC) n. 790/2009 (ATP 1 CLP) and (EU) n. 758/2013
Regulation (EU) 2015/830
Regulation (EU) n. 286/2011 (ATP 2 CLP)
Regulation (EU) n. 618/2012 (ATP 3 CLP)
Regulation (EU) n. 487/2013 (ATP 4 CLP)
Regulation (EU) n. 944/2013 (ATP 5 CLP)
Regulation (EU) n. 605/2014 (ATP 6 CLP)
Regulation (EU) n. 2015/1221 (ATP 7 CLP)
Regulation (EU) n. 2016/918 (ATP 8 CLP)
Regulation (EU) n. 2016/1179 (ATP 9 CLP)
Regulation (EU) n. 2017/776 (ATP 10 CLP)
Regulation (EU) n. 2018/669 (ATP 11 CLP)

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Regulation (EU) n. 2018/1480 (ATP 13 CLP)
Regulation (EU) n. 2019/521 (ATP 12 CLP)

Restrictions related to the product or the substances contained according to Annex XVII Regulation (EC) 1907/2006 (REACH) and subsequent modifications:
Restrictions related to the product:
Restriction 3
Restriction 40
Restrictions related to the substances contained:
No restriction.

Listed or in compliance with the following international inventories:
N.A.

The following substance(s) in this product has/have an identification by CAS number either in countries not affected by the REACH regulation or in regulations not yet updated to reflect the new naming convention for hydrocarbon solvents:
HYDROCARBONS, C11-C13, ISOALKANES, <2% AROMATICS (CAS: 90622-58-5)

Labelling of detergents (EC Regulations 648/2004 and 907/2006):
PF Solvent
aliphatic hydrocarbons >= 30%

Labelling of biocides (Regulations 1896/2000, 1687/2002, 2032/2003, 1048/2005, 1849/2006, 1451/2007 and Directive 98/8/EC):
N.A.

Where applicable, refer to the following regulatory provisions :
Directive 2003/105/CE ('Activities linked to risks of serious accidents') and subsequent amendments.
1999/13/EC (VOC directive)
Dir. 2004/42/EC (VOC directive)

Provisions related to directive EU 2012/18 (Seveso III):
Seveso III category according to Annex 1, part 1
Product belongs to category: E2

15.2. Chemical safety assessment
No

SECTION 16: Other information

N.A.: Not Applicable or Not Available

Full text of phrases referred to in Section 3:
H304 May be fatal if swallowed and enters airways.
EUH066 Repeated exposure may cause skin dryness or cracking.
H226 Flammable liquid and vapour.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

Hazard class and hazard category	Code	Description
Flam. Liq. 3	2.6/3	Flammable liquid, Category 3
Asp. Tox. 1	3.10/1	Aspiration hazard, Category 1
Skin Irrit. 2	3.2/2	Skin irritation, Category 2
Skin Sens. 1	3.4.2/1	Skin Sensitisation, Category 1
Aquatic Acute 1	4.1/A1	Acute aquatic hazard, category 1
Aquatic Chronic 1	4.1/C1	Chronic (long term) aquatic hazard, category 1
Aquatic Chronic 2	4.1/C2	Chronic (long term) aquatic hazard, category 2

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]:

Classification according to Regulation (EC) Nr. 1272/2008	Classification procedure
Skin Sens. 1, H317	Calculation method
Asp. Tox. 1, H304	Calculation method
Aquatic Chronic 2, H411	Calculation method

This document was prepared by a competent person who has received appropriate training.
Main bibliographic sources:

ECDIN - Environmental Chemicals Data and Information Network - Joint Research Centre, Commission of the European Communities
SAX's DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS - Eight Edition - Van Nostrand Reinold
CCNL - Appendix 1
Insert further consulted bibliography

socomore

Safety Data Sheet (Regulation (EC) n. 1907/2006 (REACH))
PF Solvent

The information is considered correct, but it is not exhaustive and it shall be used only as a guide which is based on the current knowledge of the substance or mixture and it is applicable to the safety precautions appropriate for the product.

ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road.
ATE:	Acute Toxicity Estimate
ATEmix:	Acute toxicity Estimate (Mixtures)
CAS:	Chemical Abstracts Service (division of the American Chemical Society).
CLP:	Classification, Labeling, Packaging.
DNEL:	Derived No Effect Level.
EINECS:	European Inventory of Existing Commercial Chemical Substances.
GefStoffVO:	Ordinance on Hazardous Substances, Germany.
GHS:	Globally Harmonized System of Classification and Labeling of Chemicals.
IATA:	International Air Transport Association.
IATA-DGR:	Dangerous Goods Regulation by the "International Air Transport Association" (IATA).
ICAO:	International Civil Aviation Organization.
ICAO-TI:	Technical Instructions by the "International Civil Aviation Organization" (ICAO).
IMDG:	International Maritime Code for Dangerous Goods.
INCI:	International Nomenclature of Cosmetic Ingredients.
KSt:	Explosion coefficient.
LC50:	Lethal concentration, for 50 percent of test population.
LD50:	Lethal dose, for 50 percent of test population.
LTE:	Long-term exposure.
PNEC:	Predicted No Effect Concentration.
RID:	Regulation Concerning the International Transport of Dangerous Goods by Rail.
STE:	Short-term exposure.
STEL:	Short Term Exposure limit.
STOT:	Specific Target Organ Toxicity.
STOT SE:	May cause drowsiness or dizziness
TLV:	Threshold Limiting Value.
TWA:	Time-weighted average
TWATLV:	Threshold Limit Value for the Time Weighted Average 8 hour day. (ACGIH Standard).
WGK:	German Water Hazard Class.

SDS 10: White Spirit

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

EPISODE 1 THE NAME OF THE SUBSTANCE/MIXTURE AND THE COMPANY/COMPANY

1.1. Product designation

Product name	:	KEMETHYL T-LOW AROMATIC LACNAPHTA
Article no.	:	1293, 3088
Chemical name	:	Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclic, <2% aromatic
Registration no.	:	01-2119457273-39
EC number	:	918-481-9
UFI	:	75G0-9A1S-C008-2CQW

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

Areas of use : SU21 Consumer product. PC35 Cleaning agent.

1.3. More information about the supplier of safety data sheets

Supplier	:	Kemetyl AB Rörvägen 7 13650 Jordbro, Sweden
Phone	:	+ 46 8 504 10100
E-mail	:	msds@kemetyl.com
Web page	:	www.kemetyl.com

FO number (Finland) : 2202835-4

1.4. Telephone number for emergencies

EMERGENCY TELEPHONE NUMBER, for DOCTOR/FIRE DEPARTMENT/POLICE only:
SE - Phone : +46 8 504 10100 (Only during office hours)

EMERGENCY TELEPHONE NUMBER:
The poison information centre 112 – request poison information (Around the clock)

SECTION 2 DANGEROUS TRAITS

2.1. Classification of the substance or mixture

CLP classification (1272/2008/EC) : Aspiration hazard, category 1.

Health hazard : May be fatal if swallowed if inhaled. Repeated exposure may cause skin dryness or cracking.

Physical/chemical risks : Not classified as dangerous according to the current EC Directive. Combustible. Not
Environmental hazard : classified as dangerous according to the current EC Directive.

2.2. Labeling information

Labeling information (1272/2008/EC):
Hazard pictograms :

Signal word : Danger

H and P phrases : H304 May be fatal if swallowed if inhaled.

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

	EUH066	Repeated exposure may cause skin dryness or cracking.
	P101	Have the package or label handy if you need to seek medical attention.
	P102	Keep out of reach of children.
	P301+P310	IF SWALLOWED: Immediately contact a POISON CENTER/physician. DO NOT
	P331	induce vomiting.
	P405	Stored locked up.
	P501	The contents/container are handed over to an approved waste recipient.

Labeling of packages whose content does not exceed 125 ml and where it is technically impossible to list all phrases: The hazard pictograms :

Signal word : Danger

H and P phrases :	H304	May be fatal if swallowed if inhaled. Repeated exposure may
	EUH066	cause skin dryness or cracking.
	P101	Have the package or label handy if you need to seek medical attention.
	P102	Keep out of reach of children.
	P301+P310	IF SWALLOWED: Immediately contact a POISON CENTER/physician. DO NOT
	P331	induce vomiting.
	P405	Stored locked up.
	P501	The contents/container are handed over to an approved waste recipient.

Additional labeling (for all pack sizes)
: Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatic EC
: number: 918-481-9

Contents declaration in accordance with Regulation no. 648/2004:

Contains:	Concentration (%)
Aliphatic hydrocarbons	> 30

Other information : According to Regulation (EC) No. 1272/2008, Annex II, Part 3, containers must be provided with a recognizable warning label and child-proof closures.

2.3. Other hazards

Other information : Not classified as PBT or vPvB.

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Product description : Subject. Not classified as PBT or vPvB. Not included in the EU list of SVHC substances.

Information on subjects:

Subject name	Concentration (w/w) (%)	CAS no.	EC number	Remark	REACH no.
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatics	100	-----	918-481-9		01-2119457273-39

Hygienic limit value(s), if relevant, can be found under section 8.

Subject name	Hazard class	H phrases	The pictograms	
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatics	Aspen. Tox. 1	H304; EUH066	GHS08	

See also section 16 for the full text of each relevant H-phrase.

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

SECTION 4 FIRST AID MEASURES

4.1. Description of first aid measures

First aid measures

Inhalation	:	Move the exposed person to fresh air. Contact a doctor if nausea occurs.
Skin contact	:	Remove contaminated clothing. Wash the skin with plenty of water and soap before the product dries. Contact a doctor if irritation persists.
Eye contact	:	Rinse with plenty of (lukewarm) water. Take out any Contact lenses. Contact a doctor if irritation persists. Do
Ingestion	:	not induce vomiting. Give nothing to drink. Rinse your mouth. Possibly give 1 or 2 tablespoons of laxative (Sodium sulfate). Never give an unconscious person anything to eat or drink. Contact a doctor immediately.

4.2. The most important symptoms and effects, both acute and delayed

Effects and symptoms

Inhalation	:	May cause headache, dizziness and nausea. Repeated
Skin contact	:	exposure may cause skin dryness or cracking. May
Eye contact	:	cause slight eye irritation and redness.
Ingestion	:	May cause nausea, vomiting and diarrhoea. Can cause lung damage, sore throat and shortness of breath.

4.3. Indication of immediate medical attention and special treatment that may be required

Information for doctors	:	
General	:	Call the Poisons Information Center for advice on treatment.

SECTION 5 FIRE FIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media

Appropriate	:	CO2. Foam. Powder. Water mist.
Inappropriate	:	Water jet. Use of a strong water jet can spread the fire.

5.2. Special hazards that the substance or mixture may present

Special risks at exposure	:	Floats and can accumulate on the water surface.
Hazardous thermal decomposition or combustion products	:	Carbon monoxide can be evolved during incomplete combustion.

5.3. Advice for firefighting personnel

Special protective equipment for fire fighting personnel : Use suitable respiratory protection in case of insufficient ventilation.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal protective measures, protective equipment and measures in emergency situations

Personal protective measures : Risk of slipping. Remove any spillage immediately. Use shoes with non-slip soles. Avoid contact with spilled or released material. The vapors are heavier than air.

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

6.2. Environmental protection measures

Environmental protection measures : Prevent discharge into drains, surface water and/or groundwater. Larger spills: dig in.
Other information : Notify authorities if the public or the environment is, or is likely to be, exposed to any type of exposure.

6.3. Methods and materials for containment and cleanup

Cleaning methods : Collect spilled material in containers. Absorb residues in sand or other inert material. Hand over to an approved waste recipient. Clean dirty surfaces with plenty of soap and water.

6.4. Reference to other sections

Reference to other sections : See also section 8.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

Management : Handled in accordance with good hygiene and safety standards in a well-ventilated area. Store away from sources of ignition — No smoking. Avoid inhalation of vapour. Avoid contact with skin and eyes. Avoid splashes. Use protective clothing.

7.2. Conditions for safe storage, including any incompatibilities

Storage : Store in a cool, dry and well-ventilated place. Store away from oxidizing substances. Stored separately from food and animal feed.
Recommended packaging : Store only in the original packaging.
Not recommended packaging : PE and PP.
Fire class : Not applicable.

7.3. Specific end use

Areas of use : Only according to the instructions for use. Do not mix with other products.

SECTION 8 EXPOSURE LIMITATION/PERSONAL PROTECTION

8.1. Control parameters

Limit values for occupational exposure (mg/m³):

Chemical name	Country	NGV 8 hours (mg/m3)	KTV 15 min. (mg/m3)	Task	Source
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclic, <2% aromatic	FI	500	-	-	
		1200	-	-	CEFIC-HSPA
	SEE	300	600	-	

8.2. Limitation of exposure

Technical measures : Ensure good ventilation. Usual protective measures when handling chemicals.
Hygienic steps : Do not eat, drink or smoke during handling.

Personal protective equipment:
The effect of the personal protective equipment depends, among other things, on temperature and ventilation. Always seek professional help for advice on specific local situations.

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

Body protection	:	Not required in normal use. In case of greater exposure, use suitable protective clothing, overalls or protective clothing and similar boots. Suitable materials: nitrile. Indication of penetration time: approx. 6 hours.
Respiratory protection	:	Ensure adequate ventilation. For greater exposure, use appropriate respiratory protection. Suitable: gas filter type A (brown), class I or higher on face mask in accordance with EN 140.
Hand protection	:	Special gloves are not required for normal use. For frequent or long-term use and for greater exposure use suitable gloves Suitable materials: nitrile. ± 0.5 mm. Indication of penetration time: approx. 6 hours.
Eye protection	:	Use suitable safety glasses, as there is a risk of eye contact.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical condition	:	Liquid.	
Color	:	Colorless.	
Smell	:	Characteristic.	
Odor threshold	:	Not known.	
pH	:	Not applicable.	Anhydrous product.
Solubility in water	:	Not soluble.	
Partition coefficient (noctanol/water)	:	> 3	
Flash-point	:	> 60 °C	Closed cup.
Flammability (solid, gas)	:	Not applicable.	Liquid. See flash point.
Auto-ignition temperature	:	> 200 °C	
Boiling point/boiling range	:	175 °C	
Melting point/melting range	:	< -20 °C	
Explosive properties	:	Not explosive.	Does not contain explosive substances.
Explosive range (% in air) :		0.6 - 7	
Oxidising properties	:	Non-oxidizing.	
Ignition temperature	:	Not applicable.	
Viscosity (20°C)	:	Not known.	
Viscosity (40°C)	:	< 7 mm2/sec	
Vapor pressure (20°C)	:	50 Pa	
Relative vapor density	:	> 1	(air = 1)
Relative density (20°C)	:	0.8 g/ml	
Particle properties	:	Not applicable.	Liquid.

9.2. Other information

Other information : Irrelevant.

SECTION 10 STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity : See subsection below.

10.2. Chemical stability

Stability : Stable under normal conditions.

10.3. The risk of dangerous reactions

Reactivity : No other dangerous reactions known.

10.4. Conditions to avoid

Conditions to : See section 7. be avoided

10.5. Incompatible materials

Materials to avoid : Store away from oxidizing substances.

10.6. Hazardous decomposition products

Dangerous decomposition products : Not known.

SECTION 11 TOXICOLOGICAL INFORMATION

11.1. Information on hazard classes according to Regulation (EC) No. 1272/2008

Inhalation

Acute toxicity	:	ATE: > 5 mg/l. Low toxicity. Not classified - the criteria for classification cannot be considered on the basis of available data to be met. May cause headache, dizziness and nausea.
Corrosive/irritant	:	Not classified due to missing information. Not
Sensitization	:	classified due to missing information.
Carcinogenicity	:	Not expected to be carcinogenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Mutagenicity	:	Not expected to be mutagenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Toxic for reproduction	:	Development: Not classified due to lack of data. Fertility: Not classified due to lack of data.

Skin contact

Acute toxicity	:	ATE: > 2000 mg/kg.bw. Low toxicity. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Corrosive/irritant	:	Mild irritation possible. Repeated exposure may cause skin dryness or cracking. Prolonged contact can dry out and degrease the skin. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Sensitization	:	Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Carcinogenicity	:	Not expected to be carcinogenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Mutagenicity	:	Not expected to be mutagenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Toxic for reproduction	:	Not classified due to missing data.

Eye contact

Corrosive/irritant	:	Mild irritation possible. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.

Ingestion

Acute toxicity	:	ATE: > 2000 mg/kg.bw. Low toxicity. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Aspiration	:	Aspiration into the lungs when the substance is swallowed or when vomited can cause chemical pneumothorax, which can lead to death. If the substance is swallowed, if any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest hospital is arranged: fever over 38.3 °C, shortness of breath, chest tightness, persistent cough or wheezing.
Corrosive/irritant	:	May cause nausea, vomiting, stomach pain and diarrhoea.

Kemetyl

Safety data sheet

According to Regulation (EU) No. 2020/878

Carcinogenicity	:	Not expected to be carcinogenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Mutagenicity	:	Not expected to be mutagenic. Not classified - the criteria for classification cannot be considered on the basis of available data to be met.
Toxic for reproduction	:	Development: Not expected to be toxic to reproduction. Development: Not classified - the criteria for classification cannot be considered to be met on the basis of available data. Fertility: Not expected to be toxic to reproduction. Fertility: Not classified - based on available data, the classification criteria cannot be considered met.

Toxicological information:

Chemical name	Property		Method	Experimental animals
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclic, <2% aromatic	Eye irritation - appreciation	Non irritating	-----	-----
	LD50 (oral) - appreciation	> 5000 mg/kg bw	OECD 401	Rat
	LD50 (dermal) - appreciation	> 5000 mg/kg bw	OECD 402	Rabbit
	Skin irritation	Mildly irritating	-----	-----
	Mutagenicity	Non mutagenic	-----	-----
	NOEL (carcinogenicity) - appreciation	Non-carcinogenic	-----	-----
	Irritation i respiratory system - appreciation	Non irritating	-----	-----
	NOAEL (development) - appreciation	Not teratogenic	-----	-----
	NOAEL (fertility) - appreciation	Not toxic to reproduction	-----	-----
	LC50 (inhalation)	> 5610 mg/m3	OECD 403	Rat
	NOAEL (oral) - appreciation	> 5000 mg/kg bw/d	Read across	Rat
	NOAEL (inhalation) - appreciation	> 1160 mg/m3	Read across	Rat
	Skin sensitization - appreciation	Non sensitizing	Read across	Guinea pig

11.2. Information on other hazards

Hormone disruptor characteristics	:	Not applicable.
Other information	:	Not applicable.

SECTION 12 ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity : Calculated LC50 (fish): 913 mg/l. Calculated EC50 (daphnia): 952 mg/l. Contains 0% ingredients whose danger to the aquatic environment is unknown. Not classified - the criteria for classification cannot be considered on the basis of available data to be met. Can form an oil film on the water surface which causes a decrease in the oxygen content with possible negative effects for aquatic organisms.

12.2. Persistence and degradability

Persistence and degradability : No specific information known.

12.3. Bioaccumulative potential

Bioaccumulation : No BCF available. Has the potential to bioaccumulate.

12.4. Movement in soil

Mobility : Adsorbs to soil and has low mobility. Floats on water.

12.5. Results of the PBT and vPvB assessment

The PBT/vPvB assessment : Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

Hormone disruptor characteristics : Not applicable.

12.7. Other adverse effects

Other harmful effects : Not applicable.

SECTION 13 WASTE DISPOSAL

13.1. Waste treatment methods

Product residues : Do not put empty packaging in the household waste. Packaging can be reused. Treat product residues and uncleaned packaging as hazardous waste.

Additional warning : No.

Discharge of waste water : Do not dispose of in the environment, drains, sewers or waterways.

European waste the directory : Leave hazardous waste, in accordance with Directive 91/689/EEC with the correct waste code according to Commission Decision 2000/532/EC, to an approved waste recipient.

Local regulations : Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more binding than regional or national requirements and must be followed.

SECTION 14 TRANSPORT INFORMATION

14.1. UN number or ID number

UN number : None.

14.2. Official shipping name

Shipping name : Not regulated.

14.3/14.4/14.5. Hazard class for transport/Hazard class for transport/Environmental hazards

ADR/RID/ADN (road/rail/inland waterways)

Class : This product is not classified according to ADR/RID/ADN.

IMDG (maritime)

Class : This product is not classified according to IMDG.

Water pollutant subject : No

IATA (air transport)

Class : This product is not classified according to IATA.

14.6. Special precautions

Other information : Different rules may apply in different countries.

14.7. Bulk transport at sea according to IMO instruments

Marpol : Not intended for bulk transport in accordance with IMO instruments. Packaged liquids are not considered bulk.

SECTION 15 APPLICABLE REGULATIONS

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

EU regulations : Regulation (EU) No. 2020/878 (REACH), Regulation (EC) No. 1272/2008 (CLP), and other regulations. Regulation (EC) No 648/2004 (cleaning agents). directive 2008/98/EC (waste).

15.2. Chemical safety assessment

chemical safety assessment : Not available.

SECTION 16 OTHER INFORMATION

16.1. Other information

The information in this safety data sheet is in accordance with Regulation (EU) No. 2020/878 of 18 June 2020 and is based on knowledge and experience at the time of issue. It is the user's responsibility to use this product safely and to comply with all applicable laws and regulations regarding the use of the product. This safety data sheet supplements the technical information sheets, but does not replace them and does not provide any guarantees for the properties of the products.

The user should be aware that the use of the product for purposes other than those for which it was produced, poses a potential risk.

Changed or new information in relation to the previous version is marked with an asterisk (*).

List of abbreviations and acronyms that may be used (but not necessarily present) on this MSDS:

ADR	:	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	:	Estimated acute toxicity
CLP	:	Classification, labeling and packaging Carcinogenic,
CMR	:	Mutagenic or toxic for reproduction European
EEG	:	Economic Community
GHS	:	Globally Harmonized System of Classification and Labeling of Chemicals
IATA	:	International Air Transport Association
The IBC Code	:	International Code for the Construction and Equipment of Ships Carrying Hazardous Chemicals in Bulk
IMDG	:	International Code for the Carriage of Dangerous Goods by
LD50/LC50	:	Sea Dose/concentration killing 50% of test animals
MAC	:	Maximum Allowable Concentration
MARPOL	:	The International Convention for the Prevention of Pollution from Ships Level
NO(A)EL	:	where no (harmful) effect is observed
OECD	:	Organization for Economic Co-operation and
PBT	:	Development Persistent, bioaccumulative and toxic
PC	:	Chemical product category
PT	:	Product type
REACH	:	Registration, evaluation, approval and restriction of chemicals Regulations on
RIDE	:	the international carriage of dangerous goods by rail Wastewater treatment
STP	:	plant
SU	:	Sector of use
NGV/KTV	:	Level limit value/Short-term value

UN	:	United Nations
UFI	:	Unique formulation identifier
VOCs	:	Volatile organic compound
vPvB	:	Very long-lived and highly bioaccumulating substances

Important data used in the compilation of the data sheet is taken from, but not limited to, one or more information sources, e.g. toxicological data of material suppliers, CONCAWE, IFRA, CESIO, EC 1272/2008-ordinance etc.

Procedure used to derive the classification in accordance with Regulation (EC) No. 1272/2008:

Aspen. Tox. 1	: Based on test data. Calculation method.

Explanations for hazard classes in Section 3:

Aspen. Tox. 1	: Aspiration hazard, category 1.

Explanations of H-phrases in section 3:

H304	May be fatal if swallowed if inhaled. Repeated exposure may
EUH066	cause skin dryness or cracking.

Advice on appropriate training for employees: none.

End of document.

Print date : 2022-11-25

SDS 11: Red Ethanol

Kemetyl

Safety data sheet

According to Regulation (EU) No 2020/878

SECTION 1 IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING *

1.1. Product identifier

Product name : KEMETYL T-RÖD RED ETHANOL
Product code : 1276, 3111

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

Application : SU21 Consumer product. PC35 Cleaning agent. All-purpose (or multi-purpose) non-abrasive cleaners.

1.3. Details of the supplier of the safety data sheet

Supplier : Kemetyl AB
Rörvägen 7
13650 Jordbro, Sweden
Telephone : +46 8 504 10100
E-mail : msds@kemetyl.com
Website : www.kemetyl.com

1.4. Emergency telephone number

EMERGENCY TELEPHONE NUMBER, for DOCTORS/FIRE BRIGADE/POLICE only:
SE - Telephone : +46 8 504 10100 (During office hours only)

SECTION 2 HAZARDS IDENTIFICATION *

2.1. Classification of the substance or mixture

CLP classification (1272/2008/EC) : Flammable liquid, category 2. Eye irritation, category 2.

Human health hazards : Causes serious eye irritation.
Physical/chemical hazards : Highly flammable. Keep away from sources of ignition — No smoking.
Environmental hazards : Not classified as dangerous according to statutory EC-Directives.

2.2. Label elements

Label elements (1272/2008/EC):
Hazard pictograms :

Signal word : Danger

H- and P-phrases :

H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233	Keep container tightly closed.
P280 eyes only	Wear eye protection.

	P305+P351 +P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
	P337+P313	If eye irritation persists: Get medical advice/attention.
	P501	Dispose of contents/container to an official chemical waste depot.

Labelling of packagings where the contents do not exceed 125 ml and it is technically impossible to list all phrases:

Hazard pictograms :

Signal word : Danger

H- and P-phrases :

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.

Other information : According to Regulation (EC) No 1272/2008, the packaging of this product shall carry a tactile warning of danger.

2.3. Other hazards

Other information : Does not contain PBT or vPvB substances.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS *

3.2. Mixtures

Product description : Mixture.

Information on hazardous substances:

Substance name	Concentration (w/w) (%)	CAS nr.	EC number	Remark	REACH nr.
Ethanol	> 75	64-17-5	200-578-6		01-2119457610-43
Propan-2-ol	10 - < 20	67-63-0	200-661-7		01-2119457558-25
Acetone	0,1 - < 1	67-64-1	200-662-2		01-2119471330-49
Butanone	0,1 - < 1	78-93-3	201-159-0		01-2119457290-43

Substance name	Hazard Class	H-phrases	Pictograms	
Ethanol	Flam. Liq. 2; Eye Irrit. 2	H225; H319	GHS02; GHS07	H319 : C >= 50 %
Propan-2-ol	Flam. Liq. 2; Eye Irrit. 2; STOT SE 3	H225; H319; H336	GHS02; GHS07	
Acetone	Flam. Liq. 2; Eye Irrit. 2; STOT SE 3	H225; H319; H336; EUH066	GHS02; GHS07	
Butanone	Flam. Liq. 2; Eye Irrit. 2; STOT SE 3	H225; H319; H336; EUH066	GHS02; GHS07	

Occupational exposure limit(s), if relevant, are listed in section 8.

Reference is made to chapter 16 for full text of each relevant H phrase.

SECTION 4 FIRST-AID MEASURES

4.1. Description of first aid measures

First aid measures

Inhalation : Move victim into fresh air. Consult a doctor if victim feels unwell.

Kemetyl

Safety data sheet

According to Regulation (EU) No 2020/878

Skin contact	:	Take off contaminated clothing. Wash off skin with plenty of water and soap before product dries up.
Eye contact	:	Wash out with (lukewarm) water. Remove contact lenses. Consult a doctor.
Ingestion	:	Do not induce vomiting. Do rinse the mouth. Give one glass of water. Never give anything by mouth to an unconscious person. Consult a doctor if victim feels unwell.

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

Effects and symptoms

Inhalation	:	May cause headache, dizziness and a feeling of sickness.
Skin contact	:	May cause dry skin.
Eye contact	:	Irritant. May cause redness and pain.
Ingestion	:	May cause a feeling of sickness, vomiting and diarrhoea.

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

Note to physicians : None known.

SECTION 5 FIRE-FIGHTING MEASURES *

5.1. Extinguishing media

Extinguishing media

Suitable	:	Carbondioxide (CO_2). Alcohol resistant foam. Dry chemical. Water fog.
Not suitable	:	Water jet. Use of heavy stream of water may spread fire.

5.2. Special hazards arising from the substance or mixture

Special exposure hazards	:	None known.
Hazardous thermal decomposition products	:	Carbon monoxide may be evolved if incomplete combustion occurs.

5.3. Advice for firefighters

Special protective equipment for fire-fighters	:	Use adequate respiratory equipment in case of insufficient ventilation.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Danger of slipping. Clean up spills immediately. Wear shoes with non-slip soles. Avoid contact with spilled or released material. Keep away from sources of ignition — No smoking. Vapours are heavier than air. Build up (of gasses) in low areas involves risk of suffocation.

6.2. Environmental precautions

Environmental precautions	:	Avoid release of product into sewers, surface water and/or ground water. In case of large spills: contain with dike.
Other information	:	Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up	:	Collect spilled material in containers. Absorb residues in sand or other inert material. Dispose at an authorised waste collection point. Wash away remainder with plenty of water and soap.

6.4. Reference to other sections

Kemetyl

Safety data sheet

According to Regulation (EU) No 2020/878

Reference to other sections : See also section 8.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

Handling : Handle in accordance with good occupational hygiene and safety practices in well-ventilated areas. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Do not breathe vapour. Avoid contact with skin and eyes.

7.2. Conditions for safe storage, including any incompatibilities

Storage : Keep in a cool, dry and well-ventilated place (< 35 °C). Protect from sunlight. Keep away from oxidizing agents.

Recommended packaging : Keep only in the original container.

Non recommended packaging : Steel (except stainless steel).

7.3. Specific end use(s)

Use : Use only as directed. Do not mix with other products.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION *

8.1. Control parameters

Occupational exposure limits : Occupational exposure limits have not been established for this product. Derived no-effect levels (DNEL) have not been established for this product. Predicted no-effect concentrations (PNEC) have not been established for this product.

Workplace exposure limits (mg/m³):

Chemical name	Country	TWA 8 hour (mg/m3)	STEL 15 min (mg/m3)	Comments	Source
Ethanol		260	1900	-	MAC: NL
Ethanol	GB	1920	-	-	
Propan-2-ol	GB	999	1250	-	
Acetone	EC	1210	-	-	Directive 2000/39/EC
Acetone	GB	1210	3620	-	
Butanone	EC	600	900	-	Directive 2000/39/EC
Butanone	GB	600	899	Skin; BMGV	

Biological limit values (BMGV):

Substance	Country	Determinant	BMG-value	Specimen/Sampling Time/Remarks
			None known.	

Abbreviations BMG-list : B = Blood. U = Urine. b = At the end of the period of exposure. d = pre-shift.

Source : EH40/2005 (Fourth edition, 2020).

Derived no-effect level (DNEL) for workers:

Chemical name	Route of exposure	DNEL, short-term		DNEL, long-term	
		Local effect	Systemic effect	Local effect	Systemic effect
Ethanol	Inhalation Dermal	1900 mg/m3			950 mg/m3 343 mg/kg bw/day

Kemetyl

Safety data sheet

According to Regulation (EU) No 2020/878

Propan-2-ol	Dermal				888 mg/kg bw/day
	Inhalation				500 mg/m3
Acetone	Dermal				186 mg/kg bw/day
	Inhalation			2420 mg/m3	1210 mg/m3
Butanone	Dermal				1161 mg/kg bw/day
	Inhalation				600 mg/m3

Derived no-effect level (DNEL) for consumers:

Chemical name	Route of exposure	DNEL, short-term		DNEL, long-term	
		Local effect	Systemic effect	Local effect	Systemic effect
Ethanol	Inhalation	950 mg/m3			114 mg/m3
	Dermal				206 mg/kg bw/day
	Oral				87 mg/kg bw/day
Propan-2-ol	Dermal				319 mg/kg bw/day
	Inhalation				89 mg/m3
	Oral				26 mg/kg bw/day
Acetone	Dermal				62 mg/kg bw/day
	Inhalation				200 mg/m3
	Oral				62 mg/kg bw/day
Butanone	Dermal				412 mg/kg bw/day
	Inhalation				106 mg/m3
	Oral				31 mg/kg bw/day

Predicted no-effect concentration (PNEC):

Chemical name	Route of exposure	Fresh water	Marine water	
Ethanol	Water	0,96 mg/l	0,79 mg/l	
	Sediment	3,6 mg/kg	2,9 mg/kg	
	Intermittent water			2,75 mg/l
	STP			580 mg/l
	Soil			0,63 mg/kg
	Oral			0,72 mg/kg food
Propan-2-ol	Water	140,9 mg/l	140,9 mg/l	
	Sediment	552 mg/kg	552 mg/kg	
	Intermittent water			140,9 mg/l
	STP			2251 mg/l
	Soil			28 mg/kg
	Oral			160 mg/kg food
Acetone	Water	10,6 mg/l	1,06 mg/l	
	Sediment	30,4 mg/kg	3,04 mg/kg	
	Intermittent water			21 mg/l
	STP			100 mg/l
	Soil			29,5 mg/kg
Butanone	Water	55,8 mg/l	55,8 mg/l	
	Sediment	284,74 mg/kg	284,7 mg/kg	
	Intermittent water			55,8 mg/l
	STP			709 mg/l
	Soil			22,5 mg/kg
	Oral			1000 mg/kg food

8.2. Exposure controls

Engineering measures : Use only in well-ventilated areas. Comply with standard precautionary measures for working with chemicals.

Hygienic measures : When using do not eat, drink or smoke.

Personal protective equipment:

The efficiency of personal protective equipment depends among other things on temperature and degree of ventilation. Always get professional advice for the particular local situation.

Body protection	:	Use of specific protective industrial clothing is not required under normal conditions of use.
Respiratory protection	:	Take care of sufficient ventilation. Wear suitable respiratory protection in case of large scale exposure. Suitable: gas filter type A (brown), class I or higher on e.g. a facemask in accordance with EN 140.
Hand protection	:	Under normal conditions of use specific gloves are not required.
Eye protection	:	Wear appropriate safety glasses with side shields, in accordance with EN 166, when there is danger of possible eye contact.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES *

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid.	
Colour	:	Pink.	
Odour	:	Characteristic.	
Odour threshold	:	Not known.	
pH	:	7	10% solution.
Solubility in water	:	Soluble.	
Partition coefficient (n-octanol/water)	:	Not known.	Not measured. Not relevant for mixtures.
Flash point	:	12 °C	Closed Cup (ISO 2719, EN 11, DIN 51758, ASTM D 93).
Flammability (solid, gas)	:	Not applicable.	Liquid. See flashpoint.
Auto ignition temperature	:	> 399 °C	
Boiling point/boiling range	:	78 °C	
Melting point/melting range	:	-114 °C	
Explosive properties	:	Not an explosive.	
Explosion limits (% in air)	:	Not known.	Lower explosion limit in air (%): 2 (Propan-2-ol)
	:		Upper explosion limit in air (%): 19 (Ethanol)
Oxidising properties	:	Not applicable.	Does not contain oxidizing substances.
Decomposition temperature	:	Not applicable.	
Viscosity (20°C)	:	1 mm2/sec	(1 mm2/sec = 1cSt)
Viscosity (40°C)	:	1 mm2/sec	
Vapour pressure (20°C)	:	> 2300 Pa	
Relative vapour density	:	> 1	(air = 1)
Relative density (20°C)	:	0,8 g/ml	
Particle characteristics	:	Not applicable.	Liquid.

9.2. Other information

Other information	:	Not relevant.

SECTION 10 STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity	:	See sub-sections below.

10.2. Chemical stability

Stability	:	Stable under normal conditions.

10.3. Possibility of hazardous reactions

Reactivity	:	No other hazardous reactions known.

10.4. Conditions to avoid

Conditions to avoid : See section 7.

10.5. Incompatible materials

Materials to avoid : Keep away from oxidizing agents.

10.6. Hazardous decomposition products

Hazardous decomposition products : Not known.

SECTION 11 TOXICOLOGICAL INFORMATION *

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

No toxicological research has been carried out on this product.

Inhalation

- Acute toxicity : Calculated LC50: > 10 mg/l. Ingredients of unknown toxicity: < 1 %. ATE: > 5 mg/l. Low toxicity. Not classified - based on available data, the classification criteria are not met. May cause headache, dizziness and a feeling of sickness.
- Corrosion/irritation : Not classified - based on available data, the classification criteria are not met.
- Sensitisation : Does not contain substances classified as respiratory sensitiser. Not classified - based on available data, the classification criteria are not met.
- Carcinogenicity : Not classified - based on available data, the classification criteria are not met.
- Mutagenicity : Not expected to be mutagenic. Not classified - based on available data, the classification criteria are not met.

Skin contact

- Acute toxicity : Calculated LD50: > 5000 mg/kg.bw. Ingredients of unknown toxicity: < 1 %. ATE: > 5000 mg/kg.bw. Low toxicity. Not classified - based on available data, the classification criteria are not met.
- Corrosion/irritation : Prolonged contact may dry out and defat the skin. Not classified - based on available data, the classification criteria are not met.
- Sensitisation : Not classified - based on available data, the classification criteria are not met.
- Mutagenicity : Does not contain mutagenic substances. Not classified - based on available data, the classification criteria are not met.

Eye contact

- Corrosion/irritation : Irritant.

Ingestion

- Acute toxicity : Calculated LD50: > 5000 mg/kg.bw. Ingredients of unknown toxicity: < 1 %. ATE: > 2000 mg/kg.bw. Low toxicity. Not classified - based on available data, the classification criteria are not met. May cause hampered eyesight.
- Aspiration : Not classified - based on available data, the classification criteria are not met. Does not contain substances with an aspiration hazard.
- Corrosion/irritation : May cause a feeling of sickness, vomiting and diarrhoea.
- Carcinogenicity : Not classified - based on available data, the classification criteria are not met.
- Mutagenicity : Not expected to be mutagenic. Not classified - based on available data, the classification criteria are not met.
- Reprotoxicity : Development: Not expected to be reprotoxic. Development: Not classified - Based on available data, the classification criteria are not met. Fertility: not expected to be reprotoxic. Fertility: Not classified - based on available data, the classification criteria are not met.

Toxicological information:

Chemical name	Property		Method	Test animal
Ethanol	Mutagenicity	Negative	OECD 471	Salmonella typhimurium

Kemetyl

Safety data sheet

According to Regulation (EU) No 2020/878

	Genotoxicity - in vitro	Not genotoxic	OECD 476	
	Genotoxicity - in vivo	Not genotoxic	OECD 478	Mouse
	NOEL (carcinogenicity, oral)	> 4400 mg/kg bw/d		Mouse
	Eye irritation	Irritant	OECD 405	Rabbit
	LC50 (inhalation)	> 99999 mg/m3	OECD 403	Rat
	LD50 (oral)	10470 mg/kg bw	OECD 401	Rat
	NOAEL (development, oral)	6400 mg/kg bw/d		
	Skin sensitisation	Not sensitizing	OECD 406	Guinea pig
	NOAEL (fertility, oral)	20000 mg/kg bw/d	OECD 415	Rat
	NOAEL (oral)	2400 mg/kg bw/d		Rat
	NOAEL (inhalation)	23000 mg/m3		Rat
	LD50 (dermal)	15800 mg/kg bw	-----	Rabbit
	Skin irritation	Non-irritant	-----	Rabbit
Propan-2-ol	LD50 (oral)	5840 mg/kg bw	OECD 401	Rat
	LD50 (dermal)	12800 mg/kg bw	-----	Rat
	LC50 (inhalation)	46600 mg/m3	-----	Rat
	Skin irritation	Slightly irritant	OECD 404	Rabbit
	Eye irritation	Irritant	OECD 405	Rabbit
	NOAEL (fertility, oral)	853 mg/kg bw/d	OECD 415	Rat
	NOAEL (development, oral)	596 mg/kg bw/d	OECD 414	Rat
	NOEL (carcinogenicity, oral)	Not carcinogenic	OECD 416	Rat
	Skin sensitisation	Not sensitizing	OECD 406	Guinea pig
	Mutagenicity	Negative	OECD 471	
	NOAEL (inhalation)	12500 mg/m3	OECD 451	Rat
	Genotoxicity - in vivo	Not genotoxic	OECD 474	Mouse
	NOEL (carcinogenicity, inh.)	12500 mg/m3		Mouse
	Genotoxicity - in vitro	Not genotoxic	OECD 476	
	NOAEL (oral)	870 mg/kg bw/d	-----	Rat

11.2. Information on other hazards

Endocrine disrupting properties : Not applicable.

Other information : Not applicable.

SECTION 12 ECOLOGICAL INFORMATION *

12.1. Toxicity

No ecotoxicological research has been carried out on this product.

Ecotoxicity : Calculated LC50 (fish): 12627 mg/l. Calculated EC50 (waterflea): 4992 mg/l. Contains 0 % of components with unknown hazards to the aquatic environment. Not classified - based on available data, the classification criteria are not met.

12.2. Persistence and degradability

Persistence – degradability : No specific information known.

12.3. Bioaccumulative potential

Bioaccumulative potential : No specific information known.

12.4. Mobility in soil

Mobility : If product enters soil, it will be highly mobile and may contaminate groundwater.

12.5. Results of PBT and vPvB assessment

PBT/vPvB assessment : Does not contain PBT or vPvB substances.

12.6. Endocrine disrupting properties

Endocrine disrupting properties : Not applicable.

12.7. Other adverse effects

Other adverse effects : Not applicable.

SECTION 13 DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product residues : Do not dispose empty pack with waste produced by households. Containers may be recycled. Treat product residues and non-empty pack as hazardous waste.
Additional warning : Residues may cause an explosion hazard. Do not puncture, cut or weld uncleaned drums.
Waste water discharge : Do not dispose of into the environment, drains, sewers or water courses.
European waste catalogue : Dispose hazardous waste in accordance with Directive 91/689/EEC under acknowledgement of a waste code according to Commission Decision 2000/532/EC to an official chemical waste depot.
Local legislation : Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.

SECTION 14 TRANSPORT INFORMATION *

14.1. UN number or ID number

UN nr. : UN 1993

14.2. UN proper shipping name

Transport name : FLAMMABLE LIQUID, N.O.S. (Ethanol ; Propan-2-ol)
Transport name (IMDG, IATA) : FLAMMABLE LIQUID, N.O.S. (Ethanol ; Propan-2-ol)

14.3/14.4/14.5. Transport hazard class(es)/Packing group/Environmental hazards

ADR/RID/ADN (road/railway/inland waterways)
Class : 3
Classification code : F1
Packaging group : II
Danger label : 3
Tunnel restriction code : D/E

:

Other information : Not intended for carriage by tank-vessels on inland waterways.

IMDG (sea)
- Class : 3
- Packaging group : II
- EmS (fire / spill) : F - E / S - E
- Marine pollutant : No

IATA (air)
- Class : 3
- ERG code : 3H
- Packaging group : II

14.6. Special precautions for user

Other information : Country specific variations may apply. It is possible that a "Limited Quantity" exemption applies to the transport of this product.

14.7. Maritime transport in bulk according to IMO instruments

Marpol : Not intended to be carried in bulk according to International Maritime Organisation (IMO) instruments. Packaged liquids are not considered bulk.

SECTION 15 REGULATORY INFORMATION *

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

Community regulations : Regulation (EU) No 2020/878 (REACH), Regulation (EC) No 1272/2008 (CLP) and other regulations. Regulation (EC) No 648/2004 (detergents). Directive 2008/98/EC (waste).

15.2. Chemical safety assessment

Chemical safety assessment : Not applicable.

SECTION 16 OTHER INFORMATION *

16.1. Other information

The information in this safety data sheet is compiled in compliance with Regulation (EU) No 2020/878 dated 18 June 2020 and accurate to the best of our knowledge and experience at the date of issue specified. It is the user's obligation to use this product safely and to comply with all applicable laws and regulations concerning the use of the product. This safety data sheet complements the technical information sheets but does not replace them and offers no warranty with regard to product properties.

Users are also forewarned for any hazards involved when the product is used for other purposes than those for which it is designed.

Changed or new information with regard to the previous release is indicated with an asterisk (*).

List of abbreviations and acronyms that could be (but not necessarily are) used in this safety data sheet:
- ADR : European Agreement concerning the International Carriage of Dangerous Goods by Road
- ATE : Acute Toxicity Estimate
- CLP : Classification, Labeling & Packaging
- CMR : Carcinogenic, Mutagenic or toxic for Reproduction
- EEC : European Economic Community
- GHS : Globally Harmonized System of Classification and Labelling of Chemicals
- IATA : International Air Transport Association
- IBC code : International Bulk Chemical Code

IMDG	:	International Maritime Dangerous Goods Code
LD50/LC50	:	Lethal Dose/Concentration for 50% of a population
MAC	:	Maximum Allowable Concentration
MARPOL	:	International Convention for the Prevention of Pollution From Ships
NO(A)EL	:	No Observed (Adverse) Effect Level
OECD	:	Organisation for Economic Co-operation and Development
PBT	:	Persistent, Bioaccumulative and Toxic
PC	:	Chemical product category
PT	:	Product type
REACH	:	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	:	Regulations concerning the International Carriage of Dangerous Goods by Rail
STP	:	Sewage Treatment Plant
SU	:	Sector of Use
TWA/STEL	:	Time-Weighted Average/Short Term Exposure Limit
UN	:	United Nations
UFI	:	Unique formula identifier
VOC	:	Volatile Organic Compounds
vPvB	:	Very Persistent and Very Bioaccumulative

Key data used to compile the Safety Data Sheet are from, but not limited to, one or more sources of information e.g. toxicological data from material suppliers, CONCAWE, IFRA, CESIO, Regulation EG 1272/2008, etc.

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008:

Flam. Liq. 2	:	On basis of test data.
Eye Irrit. 2	:	Calculation method.

Full text of hazard classes mentioned in section 3:

Flam. Liq. 2	:	Flammable liquid, category 2.
Eye Irrit. 2	:	Eye irritation, category 2.
STOT SE 3	:	Specific target organ toxicity after single exposure, category 3.

Full text of H-phrases mentioned in section 3:

H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
EUH066	Repeated exposure may cause skin dryness or cracking.

Advice on any training appropriate for workers: none.

Number format : "," used as decimal separator.

End of safety data sheet.

Print date : 2022-10-12

SDS 12: Lead

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 12/15/2014 Revision date: 12/15/2014 Version: 1.1

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

1.1. Product identifier

Product form	:	Substance
CAS No	:	7439-92-1
Formula	:	Pb
Synonyms	:	C.I. 77575, in massive state / elemental lead, in massive state / glover, in massive state
BIG no	:	10073

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

Use of the substance/mixture	:	Solder Battery: component Construction Electrodes

1.3. Details of the supplier of the safety data sheet

GSC International, Inc.
1747 N. Deffer Drive
Nixa,
MO 65714
United States of America

Tel: 417-374-7431
Fax: 417-374-7442
Email: info@gscinternationalinc.com

1.4. Emergency telephone number

Country	Organization/Company	Address	Emergency number
MEXICO	Servicio de Informacion Toxicologica Sintox	Tintoreto #32 Edif. a Desp. Col. Nochebuena Mixcoac México, D.F.	1 800 009 2800 +52 55 5611 2634 /+52 55 5598 9095
UNITED STATES OF AMERICA	American Association of Poison Control Centers		1-800-222-1222

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Acute Tox. 4 (Oral)	H302
Acute Tox. 4 (Inhalation)	H332
Carc. 1B	H350
Repr. 1A	H360
STOT RE 2	H373
Aquatic Acute 1	H400
Aquatic Chronic 1	H410

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS07 GHS08 GHS09

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) : H302+H332 - Harmful if swallowed or if inhaled
H350 - May cause cancer
H360 - May damage fertility or the unborn child
H373 - May cause damage to organs through prolonged or repeated exposure

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects

Precautionary statements (GHS-US) : P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust, fume
P264 - Wash hands thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P273 - Avoid release to the environment
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P308+P313 - If exposed or concerned: Get medical advice/attention
P314 - Get medical advice/attention if you feel unwell
P501 - Dispose of contents/container to a licensed hazardous-waste disposal contractor or collection site except for empty clean containers which can be disposed of as non-hazardous waste

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name	Product identifier	%	Classification (GHS-US)
Lead (Main constituent)	(CAS No) 7439-92-1	> 99,9	Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Inhalation), H332 Carc. 1B, H350 Repr. 1A, H360 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice. IF exposed or concerned: Get medical advice/attention. Call a poison center/doctor/physician if you feel unwell.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. Not applicable. Call a poison center/doctor/physician if you feel unwell.

First-aid measures after skin contact : Not applicable. Wash skin with plenty of water.

First-aid measures after eye contact : Not applicable. Rinse eyes with water as a precaution.

First-aid measures after ingestion : Not applicable. Rinse mouth. Call a poison center/doctor/physician if you feel unwell.

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

Symptoms/injuries after inhalation : No effects known.

Symptoms/injuries after skin contact : No effects known.

Symptoms/injuries after eye contact : No effects known.

Symptoms/injuries after ingestion : No effects known.

Chronic symptoms : No effects known.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Adapt extinguishing media to the environment.

Unsuitable extinguishing media : No unsuitable extinguishing media known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : DIRECT FIRE HAZARD. Non combustible.

Lead
Safety Data Sheet
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Explosion hazard	:	DIRECT EXPLOSION HAZARD. No data available on direct explosion hazard. INDIRECT EXPLOSION HAZARD. No data available on indirect explosion hazard.
Reactivity	:	On burning: formation of metallic fumes. Oxidizes on exposure to air.

5.3. Advice for firefighters

Precautionary measures fire	:	Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to heat: have neighborhood close doors and windows.
Firefighting instructions	:	Dilute toxic gases with water spray. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.
Protection during firefighting	:	Heat/fire exposure: compressed air/oxygen apparatus. Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment	:	Gloves. Protective clothing. See "Material-Handling" to select protective clothing.
Emergency procedures	:	Mark the danger area. No naked flames.

6.1.2. For emergency responders

Protective equipment	:	Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Prevent soil and water pollution. Prevent spreading in sewers. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment	:	Not applicable. Collect spillage.
Methods for cleaning up	:	Recover mechanically the product. Pick-up the material. Take collected spill to manufacturer/competent authority. Notify authorities if product enters sewers or public waters.
Other information	:	Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Meet the legal requirements. Do not discharge the waste into the drain. Handle unclean empty containers as full ones. Observe strict hygiene. Measure the concentration in the atmosphere. Carry out operations in the open/under local exhaust/ventilation or with respiratory protection. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust, fume. Use only outdoors or in a well-ventilated area. Take all necessary technical measures to avoid or minimize the release of the product on the workplace. Limit quantities of product at the minimum necessary for handling and limit the number of exposed workers. Provide local exhaust or general room ventilation. Wear personal protective equipment. Floors, walls and other surfaces in the hazard area must be cleaned regularly.
Hygiene measures	:	Separate working clothes from town clothes. Launder separately. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	:	Does not require any specific or particular technical measures. Comply with applicable regulations.
Storage conditions	:	Store locked up. Store in a well-ventilated place. Keep cool.
Incompatible materials	:	Strong acids, strong bases and oxidation agents.
Heat-ignition	:	KEEP SUBSTANCE AWAY FROM: heat sources.
Prohibitions on mixed storage	:	KEEP SUBSTANCE AWAY FROM: oxidizing agents. Strong acids. Strong bases.
Storage area	:	Meet the legal requirements.
Special rules on packaging	:	SPECIAL REQUIREMENTS: closing. correctly labeled. meet the legal requirements. Secure fragile packaging in solid containers.

Lead
Safety Data Sheet
according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Lead (7439-92-1)		
ACGIH	ACGIH TWA (mg/m³)	0,05 mg/m³
ACGIH	Remark (ACGIH)	CNS & PNS impair
OSHA	Not applicable	

8.2. Exposure controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Ensure good ventilation of the work station.

Personal protective equipment : Protective goggles. Gloves.

Materials for protective clothing : GIVE EXCELLENT RESISTANCE: No data available. GIVE GOOD RESISTANCE: butyl rubber. PVC. GIVE LESS RESISTANCE: No data available. GIVE POOR RESISTANCE: No data available.

Hand protection : protective gloves.

Eye protection : Safety glasses.

Skin and body protection : Not required for normal conditions of use.

Respiratory protection : Wear respiratory protection.

Environmental exposure controls : Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Solid

Appearance : Metal.

Molecular mass : 207,20 g/mol

Color : White to blue-grey

Odor : Odorless

Odor threshold : No data available

pH : No data available

Relative evaporation rate (butyl acetate=1) : No data available

Melting point : 327 °C

Freezing point : No data available

Boiling point : 1740 °C

Flash point : Not applicable

Auto-ignition temperature : No data available

Decomposition temperature : No data available

Flammability (solid, gas) : No data available

Vapor pressure : < 0,1 hPa

Relative vapor density at 20 °C : No data available

Relative density : 11,3

Specific gravity / density : 11340 kg/m³

Solubility : insoluble in water. Substance sinks in water. Soluble in nitric acid. Insoluble in organic solvents. Water: < 0,1 g/100ml

Log Pow : 0,73 (Estimated value)

Log Kow : No data available

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Viscosity, kinematic	:	Not applicable
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidizing properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

VOC content : Not applicable (inorganic)

SECTION 10: Stability and reactivity

10.1. Reactivity

On burning: formation of metallic fumes. Oxidizes on exposure to air.

10.2. Chemical stability

Unstable on exposure to air.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

No additional information available

10.5. Incompatible materials

Acids. Bases.

10.6. Hazardous decomposition products

Thermal decomposition generates : fume.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Oral: Harmful if swallowed. Inhalation: Harmful if inhaled.

Lead (\f)7439-92-1	
LD50 oral rat	> 2000 mg/kg body weight (Rat; Weight of evidence)
LD50 dermal rat	> 2000 mg/kg body weight (Rat; Experimental value; OECD 402: Acute Dermal Toxicity)
ATE US (oral)	500,000 mg/kg body weight
ATE US (gases)	4500,000 ppmV/4h
ATE US (vapors)	11,000 mg/l/4h
ATE US (dust, mist)	1,500 mg/l/4h
Additional information	Lead massive metal is not considered to be acutely toxic. It is not easily inhaled or ingested, and if it is accidentally ingested normally passes through the gastrointestinal system without significant absorption into the body. Lead is not easily absorbed through the skin.

Skin corrosion/irritation : Not classified
(Based on available data, the classification criteria are not met)

Serious eye damage/irritation : Not classified
(Based on available data, the classification criteria are not met)

Respiratory or skin sensitization : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)

Carcinogenicity : May cause cancer.

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Lead (7439-92-1)	
Additional information	There is some evidence that inorganic lead compounds may have a carcinogenic effect, and they have been classified by IARC as probably carcinogenic to humans. However, it is considered that this classification does not apply to lead in articles, given the very low bioavailability of metallic lead. Carcinogenicity studies of lead metal powder have been negative. Epidemiology studies of workers exposed to inorganic lead compounds have found a limited association with stomach cancer. IARC has concluded that lead metal is possibly carcinogenic to humans (Group aB).
IARC group	2B - Possibly carcinogenic to humans
National Toxicology Program (NTP) Status	3 - Reasonably anticipated to be Human Carcinogen

Reproductive toxicity : May damage fertility or the unborn child.

Specific target organ toxicity (single exposure) : Not classified

(Based on available data, the classification criteria are not met)

Specific target organ toxicity (repeated exposure) : May cause damage to organs through prolonged or repeated exposure.

Lead (7439-92-1)	
Additional information	Lead is a cumulative poison and may be absorbed into the body through ingestion or inhalation. Although inhalation and ingestion of lead in massive form are unlikely, poor hygiene practises may result in hand to mouth transfer which maybe significant over a prolonged period of time. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haemotopoetic (blood) system, kidney function, reproductive function and the central nervous system.

Aspiration hazard : Not classified

(Based on available data, the classification criteria are not met)

Symptoms/injuries after inhalation : No effects known.

Symptoms/injuries after skin contact : No effects known.

Symptoms/injuries after eye contact : No effects known.

Symptoms/injuries after ingestion : No effects known.

Chronic symptoms : No effects known.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Dangerous for the environment. Very toxic to aquatic life with long lasting effects.

Ecology - air : Not dangerous for the ozone layer (Regulation (EC) No 1005/2009). Not included in the list of fluorinated greenhouse gases (Regulation (EC) No 842/2006). TA-Luft Klasse 5.2.2/II.

Ecology - water : No water pollutant (surface water). Maximum concentration in drinking water: 0.010 mg/l (lead) (Directive 98/83/EC). Highly toxic to aquatic organisms.

Lead (7439-92-1)	
LC50 fish 1	2,8 (0,44 - 542) mg/l (96h) Coughlan, D.J., S.P. Gloss, and J. Kubota 1986. Acute and Sub-Chronic Toxicity of Lead to the Early Life Stages of Small mouth Bass (Micropterus dolomieui). Water Air Soil Pollut. 28(3/4):265-275
EC50 Daphnia 1	4,46 (0,53 - 5,1) mg/l (48h) Govindarajan, S., C.P. Valsaraj, R. Mohan, V. Hariprasad, and R. Ramasubramanian 1993. Toxicity of Heavy Metals in Aquaculture Organisms: Penaeus indicus, Perna viridis, Artemia salina and Skeletonema costatum. Pollut.Res. 12(3):187-189

12.2. Persistence and degradability

Lead (7439-92-1)	
Persistence and degradability	Biodegradability: Not applicable. No (test)data available on mobility of the substance.
ThOD	Not applicable (inorganic)

12.3. Bioaccumulative potential

Lead (7439-92-1)	
Log Pow	0,73 (Estimated value)
Bioaccumulative potential	Low bioaccumulation potential (Log Kow < 4).

12.4. Mobility in soil

No additional information available

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

12.5. Other adverse effects

Effect on ozone layer :

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Reuse or recycle following decontamination. Remove to an authorized dump (Class I). Do not discharge into surface water (2000/60/EC, Council decision 2455/2001/EC, O.J. L331 of 15/12/2001).

Additional information : LWCA (the Netherlands): KGA category 05. Hazardous waste according to Directive 2008/98/EC.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN3077 Environmentally hazardous substances, solid, n.o.s. Lead(7439-92-1), 9, III

UN-No.(DOT) : UN3077

Proper Shipping Name (DOT) : Environmentally hazardous substances, solid, n.o.s. Lead(7439-92-1)

Department of Transportation (DOT) Hazard Classes : 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140

Hazard labels (DOT) : 9 - Class 9 (Miscellaneous dangerous materials)

DOT Symbols : G - Identifies PSN requiring a technical name

Packing group (DOT) : III - Minor Danger

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

DOT Special Provisions (49 CFR 172.102)	:	8 - A hazardous substance that is not a hazardous waste may be shipped under the shipping description "Other regulated substances, liquid or solid, n.o.s.", as appropriate. In addition, for solid materials, special provision B54 applies. 146 - This description may be used for a material that poses a hazard to the environment but does not meet the definition for a hazardous waste or a hazardous substance, as defined in 171.8 of this subchapter, or any hazard class as defined in Part 173 of this subchapter, if it is designated as environmentally hazardous by the Competent Authority of the country of origin, transit or destination. 335 - Mixtures of solids that are not subject to this subchapter and environmentally hazardous liquids or solids may be classified as "Environmentally hazardous substances, solid, n.o.s," UN3077 and may be transported under this entry, provided there is no free liquid visible at the time the material is loaded or at the time the packaging or transport unit is closed. Each transport unit must be leak-proof when used as bulk packaging. A112 - Notwithstanding the quantity limits shown in Column (9A) and (9B) for this entry, the following IBCs are authorized for transportation aboard passenger and cargo-only aircraft. Each IBC may not exceed a maximum net quantity of 1,000 kg: a. Metal: 11A, 11B, 11N, 21A, 21B and 21N b. Rigid plastics: 11H1, 11H2, 21H1 and 21H2 c. Composite with plastic inner receptacle: 11HZ1, 11HZ2, 21HZ1 and 21HZ2 d. Fiberboard: 11G e. Wooden: 11C, 11D and 11F (with inner liners) f. Flexible: 13H2, 13H3, 13H4, 13H5, 13L2, 13L3, 13L4, 13M1 and 13M2 (flexible IBCs must be sift-proof and water resistant or must be fitted with a sift-proof and water resistant liner). B54 - Open-top, sift-proof rail cars are also authorized. IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2). IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner. N20 - A 5M1 multi-wall paper bag is authorized if transported in a closed transport vehicle. T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2) TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.
DOT Packaging Exceptions (49 CFR 173.xxx)	:	155
DOT Packaging Non Bulk (49 CFR 173.xxx)	:	213
DOT Packaging Bulk (49 CFR 173.xxx)	:	240
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	:	No limit
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	:	No limit
DOT Vessel Stowage Location	:	A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

UN-No. (IMDG)	:	3077
Proper Shipping Name (IMDG)	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Class (IMDG)	:	9 - Miscellaneous dangerous compounds
Packing group (IMDG)	:	III - substances presenting low danger

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Air transport

UN-No.(IATA)	:	3077
Proper Shipping Name (IATA)	:	Environmentally hazardous substance, solid, n.o.s.
Class (IATA)	:	9 - Miscellaneous Dangerous Goods
Packing group (IATA)	:	III - Minor Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Lead (7439-92-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313 Not listed on the United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	10 lb

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Repr. 1A	H360Df
Acute Tox. 4 (Inhalation)	H332
Acute Tox. 4 (Oral)	H302
STOT RE 2	H373
Aquatic Acute 1	H400
Aquatic Chronic 1	H410

Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Repr.Cat.1; R61
Repr.Cat.3; R62
Xn; R20/22
R33
N; R50/53

Full text of R-phrases: see section 16

15.2.2. National regulations

Lead (7439-92-1)
Listed on IARC (International Agency for Research on Cancer) Listed as carcinogen on NTP (National Toxicology Program)

15.3. US State regulations

No additional information available

SECTION 16: Other information

Revision date	:	12/15/2014

Flammability	: 0 Minimal Hazard
Physical	: 0 Minimal Hazard
Personal Protection	: B

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product