



FIRE PERFORMANCE GUIDELINES

Version 207 Jan 2015

Kindle Arts Society

Fire Performance Safety Manual

This document is intended to act in two folds. First, as direction to designates of the Kindle Arts Society to setup and run fire performances. Secondly, as an indicator to other parties as to the safety protocols used and required by the society to maintain our stringent safety standards.

It is based in part on the North American Fire Artists Association (NAFAA) guidelines, as well as drawing on the experience and recommendations of other experts, committees, and associations, listed at the end of the document in the references section.

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Performance area suitability and safety considerations:

Each performance must be arranged so that the audience is never in danger of injury from the performer(s) and that the venue is safe. The following points should also be given consideration:

A. Separation

1. Depending on the nature of the audience (seated, drunk, familiar, passing by, etc), an adequate separation from the performer must be maintained. Barricades may be required for large audiences or certain venues.
2. If the performer will be spinning tools, breathing fire, or otherwise producing effects that are not entirely within their field of vision at all times, the audience must be sufficiently separated to allow guards or spotters to intercept audience members attempting to enter performance area. 15 feet is usually adequate.
3. If the performer will be using a tool that is predominantly within their field of vision, implicitly under their control (ex. Fire fingers), or the audience does not require excess management (i.e. seated or fenced), then the performer may come within a few feet keeping in mind audience flammability differences.

B. Flame toxicity

1. Petrol fuels burnt on open wicks always produce toxic fumes, smoke, or other health hazards that are augmented in an enclosed space.
2. Petrol fuel burning should be very limited indoors, even in well-ventilated venues. When possible, use high-proof alcohols in place of petrol fuels.
3. When spinning outdoor, semi-enclosed areas with low wind can be as hazardous as indoor locations.
4. Whenever petrol fuels are used, the most purified fuel is preferred. Eg: white gas or lamp oil should be used before kerosene.

C. Performance area

1. The performance area should be cleared of all flammable materials, or have flammable materials treated with approved fire retarding chemicals and tested for combustibility in a safe manner before performance.
2. Props and other terrain features should be taken into account when designing a performance. Performers should not be in danger of contact with foreign objects.
3. Careful note of fire alarm and sprinkler systems should be made to determine proximity to performance, possible accidental activation, and other similar concerns.
4. In the case of plant life, handle all flora as though untreated and flammable.

During the process of booking a venue for events which will include fire performance as part of the entertainment, the site must be evaluated for a number of considerations to determine its suitability.

Primarily, these are:

- Logistics and operating a fire performance
- Safety planning for the audience and the venue itself
- Emergency services contact and access information

A simple mapping of the area is invaluable for setting up a performance evaluation:

1. Map out the area for the fire performance and perimeter line
2. Map out the area for fueling and holding fueled performers and the perimeter lines
3. Map out the area for spinning off excess fuel and perimeter line
4. Map out the area for audience viewing and perimeter line
5. Map out any additional structural areas (i.e. stage, booths, tents)
6. Map out overhead electrical lines, overhead light standards, etc.
7. Map out proximity to road(s) for emergency vehicle access.
8. Map out Facilities (green room, security, washrooms)
9. Proximity of “flammable” structures:
 - a. Fences (wooden)
 - b. Hedges
 - c. Trees (including the height of the lowest limbs)
 - d. Buildings (including overhangs)
10. Map out terrain issues:
 - a. Uneven ground (including rocks, plant beds, electrical cord lines, walkway edges, curbs, sidewalks)
 - b. Type of terrain (metal, polished concrete, tile, and marble can all be very slippery if fuel is spilled)
11. Map out Fuel tech(s) position, Spotter position(s), Crowd Controller(s) if required, Extinguishing personnel position(s), including fire extinguisher location(s) and wet towel/duvetyne location(s).

Performance Event Information

(Refer to the Kindle Arts Society Fire Performance Worksheet - Appendix A)

1. Performance site name (ie, VEC, Gyro Park)
2. Site address or connecting road names
3. Performance time(s)
4. Safety Lead Name and Contact Information
5. Safety personnel Names and Contact Information
6. Emergency Response Phone Number
7. Venue Representative's Name and Contact Information
8. Event Promoter/Representative's Name and Contact Information
9. Performer's Roster and Tools To Be Used (any specialty tools requiring safety review?)

Fire Performer and Fire Safety Personnel Code Of Conduct

1. Performers and fire safety personnel shall be not under the influence of alcohol or drugs.
2. No smoking anywhere within the fire performance area
3. The Fire Performance Coordinator has the final say on all issues concerning the operation of the fire show.
4. All fire performers and fire safety personnel will attend the pre show safety orientation meeting with the event Fire Performance Coordinator.
5. Both the performers and the fire safety personnel will ensure their clothing/costuming material is non-flammable.
6. Both the performers and the fire safety personnel shall ensure the performance staging area is clutter free.
7. The fire performers shall ensure their fire tools have been inspected in daylight and are of sound mechanical condition
8. Fire Breathers are responsible for monitoring their fuel container. The container must have a secure cap when not in use, and must be clearly marked as to the type of fuel inside. The fire breather will also have on hand, during their act, a "wipe towel" for removing excess fuel from their person in between sprays.
9. Any unusual fire tools must be inspected and discussed with the Fire Performance Coordinator for the event to determine if any additional needs or safety considerations are necessary. (an example of an unusual fire tool might be a Fire Rope Dart, which may have need more space for deployment than the venue has available).
10. When not performing or acting in a fire safety role, those involved with the performers are still expected to be responsive and aware of what is going on around the performance area. (ie, keeping strangers out of the fueling area)
11. The Fire Performance Coordinator for the event determines the order in which performers will complete their act, and has the right to change the order of the acts as needed. All fire performers and safety personnel are expected to help clean up the performance area after the performance.

Equipment and Supplies

The following list is the minimum equipment that should be on hand before starting a show or practice.

1. Wet towels and/or Duvetyne towels for extinguishing flames
2. Fire extinguisher(s)
3. First Aid Kit (with emphasis on treating burn injuries)
4. Barricade/Audience separator
5. Spin off cans
6. Fuel Dump with lid (as air tight as possible)
7. Fueling can(s)

Fire Performance Coordinator's Safety Orientation

The Fire Performance Coordinator's orientation for fire performers and safety personnel is to include:

1. Performance area flow
 - a. Introductions and Roles: i.e. Safety Lead, Fuel Techs, Safety Techs, Crowd Control, etc.
 - b. Review of order of performance(s) i.e. who is 1st, 2nd, 3rd...
 - c. Timing of performances, i.e. choreographed to specific music, renegade flow
 - d. Location of Fire extinguishing unit(s)
 - e. Fueling area
 - f. Spin off area
 - g. Fire tool storage area(s)
 - h. Performer's preshow (prefueling) holding area
 - i. Performer's preshow (fueled) holding area
 - j. Performer's stage entry point(s)
 - k. Performer's stage exit point(s)
 - l. Review of performer's and safety personnel's role in putting out fire tools
 - m. Review of special techniques (if required) of unique tools
 - n. Post show finale (if any) and curtain call
 - o. Post show clean up

Glossary/ Terminology

1. **Poi** – At least one wick attached to a chain or cable and spun around the performer's body. The performance may include catch and release moves.
2. **Staff(s)** – pole(s) of various lengths with at least one wick attached to each end and spun around the performer's body. The performance may include catch and release moves.
3. **Fire Hoop** – A regular hula hoop with spines attached at regular intervals (facing away from the performer's body) Each spine has a wick attached to one end, and is spun around the performer's body. The performance may include catch and release moves.
4. **Fire Fans** – A hand held tool shaped like a regular hand fan, with tines (3 – 8) radiating out from the handle/grip. Each tine has a wick attached at the end. The performance may include catch and release moves.
5. **Fire Fingers** – Either attached to a glove or directly to the performer's fingers, a single tine with wick attached at the end. Although not involved with catch and release movements, special consideration must be made as they cannot be simply dropped in an emergency.
6. **Gas dump/depot** – A short height barrel with a heavy hinged lid. The concept being to have all fueling performed in the gas depot. In the unlikely event of a fire occurring, the lid can be quickly closed, smothering any flame inside.
7. **Duvetyne** – a towel chemically treated with a fire retardant material used to smother fire tool wicks and for safety coverage of fire performers. Used interchangeably with a water dampened towel.
8. **Spin Off Can** – A handled gallon (or similar) paint can where fuel soaked wicks can be placed and while spinning around, the centrifugal forces remove any excess fuel from the wick without contaminating the Spin Off Area
9. **Spin Off Area** – An area set aside from the fueling area, performance area, and staging areas, where the performers can go to remove excess fuel from their wick. Aside from Spin Off Cans, wicks can be spun against a tarp or large rock area (allowing the excess fuel to evaporate from the area). The same extra careful precautions used in the fueling area to prevent accidental ignition (no smoking, no open flame, etc) should be observed in the Spin Off Area.
10. **Fueling cans** – Usually paint cans where the wicks of the fire tools can be submerged to soak up the fuel.

References:

North American Fire Artists Association, NFPA160, Safety Guidelines,
Burn Vancouver Fire Safety Standards Discussion, correspondence Lars Hanuman Bruheim, Fire
Community Safety Planning & Discussion, March 27, 2011, 6:00PM
Calgary Fire Forum, correspondence, December 2nd 2011
Temple Of Poi, Fire Safety Guidelines, San Francisco, 2009
2012 Burning Man Summit Presentation: Events 103: Legalizing Fire Performance, April 2012.
Criteria For Official Burning Man Events
United Fire Artists: Fire Performance Safety Checklist, February 2009
United Fire Artists: Fire Performance Safety Guidelines, February 2009
International Fuel Names and Information, v70, October 2011
Los Angeles Fire Performance Safety Standards, Los Angeles Fire Safety Subcommittee, January 2008
Los Angeles Anatomy Of A Fire Performance, Los Angeles Fire Safety Subcommittee, January 2008
NAFAA Wiki, Fire Spotter Training Notes, June 2007
Fire Safety for Jugglers & Spinners, 4th Ed, Eric Bagai, 2008
Home Of Poi, Fire Safety Checklist, 2005
Fire Safety for Jugglers & Spinners, Foreworks Publications, Portland, OR, 1974

Appendix A

Kindle Arts Society

Fire Performance Worksheet

Name and Date of event: _____

Name of Venue: _____

Venue Address: _____

Show Location @ Venue: _____

Venue Contact Name and #: _____

Connecting Roads: _____

Show Time and Duration: _____

Show Liaison and Contact #: _____

Event Coordinator and # _____

Safety Personnel

Name	Contact#	Role
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Performance Area Map

Appendix B

Kindle Arts Society

Performer/Teaching Artist/Participant Liability Waiver

EVENT: _____

I agree to exercise due care and diligence while participating in this event, and to follow the explicit instructions given to me with regard to safety and procedure during the program and performance.

I hereby agree to release, waive, discharge and covenant not to sue, to hold harmless (and waive any claim or action against) the Kindle Arts Society, its agents, directors, producers and staff (the releasees) from any liability, claims, demands, fault or action whatsoever, arising out of any loss, damage, or injury, including death, that may be sustained by me or any of the property belonging to me, whether caused by the negligence of the releasees or otherwise, while participating in such activity, or while in, on, or upon the premises where the activity is being conducted.

It is my express intent that this Waiver of Liability and Hold Harmless Agreement shall bind the members of my family and spouse, if I am alive, and my heirs, assigns and personal representative, if I am deceased, and shall be deemed as a release, Waiver Discharge and Covenant not to sue the above named releasees. I hereby further agree that this Waiver of Liability and Hold Harmless agreement shall be construed in accordance with the laws of the Province of British Columbia.

In signing this release, I acknowledge and represent that I have read the foregoing Waiver of Liability and Hold Harmless Agreement, understand it and sign it voluntarily as my own free act and deed; and that no oral representations, statements, or inducements, apart from the foregoing written agreement, have been made.

Signed this day _____/_____/_____

Name of Performer (print) _____

Signature _____

Address _____ City _____
Province _____ Postal/Zip Code _____
Phone No. (cell) _____ (home) _____

Appendix C

MSDS/SDS and WHMIS information

White Gas/Coleman Fuel (p. 12)

Kerosene (p. 16)

Isopropyl Alcohol (p. 23)

Ultrapure Lamp Oil (p. 26)

Product: Coleman Premium Blend Camp Fuel

1. Chemical Product and Company Identification

HOC Industries

Don Poschen

3511 N. Ohio Wichita, KS 67219

(316) 838-4663 **Emergency Phone** (800) 633-8253

2. Composition and Information on Ingredients

ACGIH Light Hydrotreated Distillate 68410-97-9 100 300 ppm 500 ppm

3. Hazard Identification

*****EMERGENCY OVERVIEW*****

WARNING: Flammable Liquid and Vapor. The Flash Point is <0 degrees F.

This product is a clear, red, light hydrocarbon liquid.

It has a solvent petroleum odor. The product floats on water.

When burned the product produces carbon monoxide and other asphyxiants during combustion.

Harmful if inhaled and may cause delayed lung injury. Aspiration hazard if swallowed - can enter lungs and cause damage.

Keep away from heat, sparks, and flame.

Avoid breathing vapor. Use ventilation to keep vapor below exposure limits.

Avoid contact with eyes, skin and clothing. Material splashed into the eyes will irritate tissues. Gently flush material from eyes with clean water.

Unprotected exposure to this product will cause skin dryness.

Remove product-soaked clothing and wash with mild soap.

As with any petroleum product, avoid mixing this product with strong oxidizers.

This product is not listed on the NTP, IARC, OSHA, or ACGIH lists of suspected/confirmed carcinogens.

This product may be toxic to fish but will be toxic to birds and wildlife through ingestion during pelage cleaning.

This product is readily biodegradable in the presence of air and sunlight.

Spilled material is slippery and may cause falls.

*****END OF EMERGENCY OVERVIEW *****

POTENTIAL HEALTH EFFECTS

PRIMARY ROUTE(S) OF ENTRY: Skin

EYES Tests on similar materials suggest acute irritation can be expected.

SKIN Tests on similar materials indicate acute irritation is expected to occur upon short-term exposure and chronic dermatitis on prolonged contact.

INGESTION

ACUTE ASPIRATION HAZARD. Tests on similar materials indicate possibility of the following symptoms: headache, nausea, drowsiness, fatigue, pneumonitis, pulmonary adema, central nervous system depression, convulsions, and loss of consciousness.

INHALATION

Tests on similar material indicate the possibility of the following symptoms: headache, nasal and respiratory irritation, nausea, drowsiness, breathlessness, fatigue, central nervous system depression, convulsions, and loss of consciousness.

CHRONIC

Prolonged and/or repeated contact with this material may produce skin irritation and inflammation.

CANCER INFORMATION

Carcinogen listed by: National Toxicology Program: No I.A.R.C.: NO OSHA: NO ACGIH: NO

This product does not require a cancer hazard warning in accordance with the OSHA Hazard Communication Standard.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Personnel with pre-existing skin disorders should avoid contact with this product.

4. First Aid Information

EYES Flush eyes immediately with water for at least 15 minutes or until irritation subsides occasionally lifting lower and upper lids. Get medical attention promptly.

SKIN Wash thoroughly with soap and water. Immediately remove contaminated clothing and wash before reuse. If irritation or rash develops, obtain medical assistance. Immediately remove soaked clothing.

INGESTION CALL PHYSICIAN IMMEDIATELY. Do not induce vomiting except at the instruction of a physician. Never give anything by mouth to an unconscious person.

INHALATION Remove person to fresh air and consult a physician. If breathing is difficult, give oxygen. If not breathing give artificial respiration.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES

FLASH POINT: <0°F <-18°C Tag Closed Cup

AUTOIGNITION: not available

FLAMMABILITY CLASS: IB

LOWER EXPLOSIVE LIMIT (%): not available

UPPER EXPLOSIVE LIMIT (%): not available

FIRE AND EXPLOSION HAZARDS: Can form flammable mixtures with air and flash at room temperature or upon slight heat application. Vapors are heavier than air and may travel considerable distance. Explosion hazard in confined spaces if exposed to ignition source. Mists or sprays may be flammable below fuel's normal flash point. Keep away from heat or open flame.

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, and foam. NOTE: Water, fog, and foam may cause frothing and spattering. Water stream may spread fire.

FIRE FIGHTING INSTRUCTIONS: Use water to cool containers exposed to flames. Do not enter enclosed or a confined work space without proper protective equipment. Fire fighting personnel should wear respiratory protection (positive pressure if available). If leak or spill has not ignited, use water spray to disperse the vapors.

Products of combustion include fumes, smoke and carbon monoxide.

6. Accidental Release Measures

Evacuate area and shut off ignition source. Contain spill and keep from entering waterways or sewers. Use personal protective equipment. Advise EPA or state agency if required. Absorb with inert material. Shovel or sweep spill and place in closed container for disposal.

7. Handling and Storage

HANDLING: Keep product away from high energy ignition sources, heat, sparks, pilot lights, static electricity, and open flame. Avoid contact with skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Store in a cool area. Store as OSHA Class IB flammable liquid

SPECIAL PRECAUTIONS: To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Use the correct grounding procedures. Refer to national, state, or local regulations covering safety at petroleum handling and storage areas for this product.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous.

DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

WORK/HYGIENIC PRACTICES: Wash hands with soap and water before eating, drinking, smoking or use of toilet facilities. Do not use harsh abrasive skin cleaners for washing exposed skin areas. Take a shower after work if general contact occurs. Remove fuel-soaked clothing and launder before reuse. Launder or discard contaminated shoes and leather gloves.

8. Exposure Controls and Personal Protection

ENGINEERING CONTROLS: Use adequate ventilation to keep fuel mists of this material below applicable standard(s). See Section on occupational exposure limits.

EYE/FACE PROTECTION: Safety glasses, splash goggles, or face shield as appropriate. Have suitable eye wash water available.

SKIN PROTECTION: Avoid prolonged and/or repeated skin contact. If prolonged contact cannot be avoided, wear protective impervious gloves and clothing. Acceptable materials for gloves are neoprene, nitrile, or viton.

RESPIRATORY PROTECTION: Up to 1000 ppm, half -mask organic vapor respirator. Up to 5000 ppm, full-face organic vapor respirator or full-face supplied air respirator. Greater than 5000 ppm, fire fighting, or unknown concentration, self-contained breathing apparatus with positive pressure should be used.

OTHER/GENERAL PROTECTION: If there is a likelihood of splashing, oil-resistant clothing should be worn. Never wear oil-soaked clothing. Launder or dry clean before wearing. Discard fuel-soaked shoes. Affix warning labels on containers in accordance with 29 CFR 1910.1200 (Hazard Communication Standard). Maintain local or dilution ventilation to keep air concentration below 100 ppm. Loading, unloading, tank gauging, etc., remain upwind. Request assistance of safety and industrial hygiene personnel to determine air concentrations.

INGREDIENT NAME, CAS #, EXPOSURE LIMITS, PERCENT BY VOLUME

Hydrotreated Light Distillate, CAS # 68410-97-9, OSHA-500 ppm, 100.0

This product contains: *Cyclohexane, CAS # 110-82-7, OSHA-300 ppm, ACGIH-300 ppm

9. Physical and Chemical Properties

APPEARANCE: Clear, red liquid.

ODOR: Petroleum Naphtha.

ODOR THRESHOLD: Not determined

BASIC PHYSICAL PROPERTIES

PHYSICAL STATE: Liquid

BOILING POINT: IBP >100°F (>38°C)

MELTING POINT: Not available

VAPOR PRESSURE: (Reid) Not available

VAPOR DENSITY (AIR=1): Not available

SPECIFIC GRAVITY @ 60°F (water=1): 0.7

MOLECULAR WEIGHT: Not available

SOLUBILITY (H₂O): negligible

PERCENT VOLATILES: 100%

VISCOSITY: Not available

Physical data may vary slightly to meet specifications.

10. Stability and Reactivity

STABILITY: Stable

CONDITIONS TO AVOID: Sources of ignition

INCOMPATIBLE MATERIALS: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion may produce fumes, smoke, carbon monoxide and other asphyxiants.

HAZARDOUS POLYMERIZATION: will not occur

11. Toxicological Information

SKIN EFFECTS: May cause irritation or dermatitis with prolonged and repeated contact

ORAL EFFECTS: Tests on similar materials indicate an order of acute oral toxicity

INHALATION EFFECTS: Acute toxicity expected on inhalation

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Dermatitis and sensitive skin. This product is not listed as carcinogenic or a potential carcinogen by the National Toxicology Program, by the I.A.R.C. monographs or by OSHA. Nevertheless, good industrial hygienic practices are recommended.

12. Ecological Information

If applied to leaves, this product may kill grasses and small plants by interfering with transpiration and respiration. This product is not toxic to fish but may coat gill structures resulting in suffocation if spilled in shallow, running water. Product may be moderately toxic to amphibians by preventing dermal respiration. This product may cause gastrointestinal distress to birds and mammals through ingestion during pelage grooming. This product is rapidly biodegradable. Biodegradation is possible within 90 to 120 days in aerobic environments at temperatures above 70°F (21°C).

13. Disposal Considerations

RCRA hazardous waste if discarded in its present form. EPA hazardous waste number D001. State and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14. Transportation Information

PROPER SHIPPING NAME: Petroleum Distillates, n.o.s., Class 3, UN 1268, PG II

HAZARD CLASS: Class 3 Flammable Liquid

DOT IDENTIFICATION NUMBER: UN1268

DOT SHIPPING LABEL: DOT Hazardous material

15. Regulatory Information

U.S. FEDERAL REGULATORY INFORMATION

SARA 302 Threshold Planning Quantity: NOT APPLICABLE

SARA 304 Reportable Quantity: NOT APPLICABLE SARA TITLE III - Section 311/312 Hazard classes:

Immediate/Acute Health Effects: no

Delayed/Chronic Health Effects: yes

Fire Hazard: yes

Sudden Release of Pressure Hazard: no

Reactivity Hazard: no

EPA/TSCA Inventory: The components of this product are listed on the EPA/TSCA inventory of chemicals.

SARA TITLE III - Section 313 Supplier notification:

The following chemicals are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

* Cyclohexane 110-82-7 up to 10%

Comprehensive Environmental Response Compensation and Liability Act (CERCLA): The following chemicals in this product are subject to the reporting requirements of CERCLA Section 101(14)(F): Cyclohexane

When this product is used in a mixture, or as an ingredient in another product, or in a manufacturing operation, an accidental spill may require reporting to the National Response Center.

STATE LIST DATA - This product contains chemicals which are on the following state lists:

Florida Toxic Substance

Massachusetts Hazardous Substance

Pennsylvania Hazardous Substance

Minnesota Hazardous Substance

New Jersey RTK Hazardous Substance

New York List of Hazardous Substances

Washington Air Contaminant

CANADIAN REGULATORY INFORMATION: The components of this product are listed on the Canadian Domestic Substances List (DSL).

16. Other Information

Date Made: 11/6/06

Revised: 4/08/09 (Section1)

The information contained herein is based upon data available to us and reflects our best professional judgment. However, no warranty of merchantability, fitness for any use, or other warranty is expressed or implied regarding the accuracy of such data, the results to be obtained from the use thereof, or that any such use does not infringe any patent. Since the information contained herein may be applied under conditions of use beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of such application. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose

KEROSENE

PRODUCT

Product Name: (see Section 16 for Synonyms) **KEROSENE**

Product Description: Hydrocarbons and Additives

MSDS Number: 4566

Intended Use: Fuel

COMPANY IDENTIFICATION

Supplier: Imperial Oil Products Division

240 4th Avenue, Calgary, ALBERTA. T2P 3M9 Canada

24 Hour Environmental / Health Emergency Telephone 519-339-2145

Transportation Emergency Phone Number 519-339-2145

Product Technical Information 1-800-268-3183

Supplier General Contact 1-800-567-3776

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name CAS# Concentration* Acute Toxicity

KEROSENE 8008-20-6 100% Dermal Lethality: LD50 > 2000 mg/kg (Rabbit);
Inhalation Lethality: LC50 > 5.0 mg/l (Rat); Oral Lethality: LD50 > 5000 mg/kg (Rat)

Hazardous Constituent(s) Contained in Complex Substance(s)

Name CAS# Concentration* Acute Toxicity

NAPHTHALENE 91-20-3 0.1 - 1% Dermal Lethality: LD50 > 20 g/kg (Rabbit); Oral Lethality: LD50 0.49 g/kg (Rat)

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

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

PHYSICAL/CHEMICAL EFFECTS

Combustible. Material can release vapours that readily form flammable mixtures. Vapour accumulation could flash and/or explode if ignited. Material can accumulate static charges which may cause an ignition.

HEALTH EFFECTS

Irritating to skin. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat, and lungs. Breathing of high vapour concentrations may cause dizziness, light-headedness, headache, nausea and loss of co-ordination. Continued inhalation may result in unconsciousness. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID: Health: 2 Flammability: 2 Reactivity: 0

HMIS Hazard ID: Health: 2 Flammability: 2 Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a

surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

Hydrocarbon Solvents/Petroleum Hydrocarbons- Skin contact may aggravate an existing dermatitis.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight streams of water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Combustible. Vapour is flammable and heavier than air. Vapour may travel across the ground and reach remote ignition sources, causing a flashback fire danger. Hazardous material: Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulphur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: 40C (104F) [ASTM D-56]

Flammable Limits (Approximate volume % in air): LEL: 0.7 UEL: 5.0

Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for Personal Protective Equipment.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapour, but may not prevent ignition in enclosed spaces.

Water Spill: Stop leak if you can do so without risk. Eliminate sources of ignition. If the Flash Point exceeds the Ambient Temperature by 10 deg C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants. Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be

consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dyke far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Do not siphon by mouth. Do not use as a cleaning solvent or other non-motor fuel uses. For use as a motor fuel only. It is dangerous and/or unlawful to put petrol into unapproved containers. Do not fill container while it is in or on a vehicle. Static electricity may ignite vapour and cause fire. Place container on ground when filling and keep nozzle in contact with container. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers or other electronic devices etc) in or around any fuelling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100×10^{-12} Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be earthed and bonded. Drums must be earthed and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Substance Name Form Limit/Standard Note Source

KEROSENE Stable Aerosol.

TWA 5 mg/m³ Supplier

KEROSENE Vapour. TWA 200 mg/m³ Supplier

KEROSENE [as total hydrocarbon vapor]

Non-Aerosol TWA 200 mg/m³ Skin ACGIH

NAPHTHALENE STEL 15 ppm Skin ACGIH

NAPHTHALENE TWA 10 ppm Skin ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider: Use explosion-proof ventilation equipment to stay below exposure limits.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator

selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include: No special requirements under ordinary conditions of use and with adequate ventilation. For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapour warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include: Chemical resistant gloves are recommended.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include: Chemical / oil resistant clothing if contact with material is likely.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid

Colour: Clear (May Be Dyed)

Odour: Petroleum/Solvent

Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.81

Flash Point [Method]: 40C (104F) [ASTM D-56]

Flammable Limits (Approximate volume % in air): LEL: 0.7 UEL: 5.0

Autoignition Temperature: N/D

Boiling Point / Range: 125C (257F) - 292C (558F)

Vapour Density (Air = 1): 4 at 101 kPa

Vapour Pressure: [N/D at 20°C] | 1.4 kPa (10.5 mm Hg) at 38C

Evaporation Rate (n-butyl acetate = 1): N/D

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: 1.45 cSt (1.45 mm²/sec) at 40°C

Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -39°C (-38°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Avoid heat, sparks, open flames and other ignition sources.

MATERIALS TO AVOID: Halogens, Strong Acids, Alkalies, Strong oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure Conclusion / Remarks

Inhalation

Toxicity (Rat): LC50 > 5000 mg/m³ Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data. Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs. Based on assessment of the components.

Ingestion

Toxicity (Rat): LD50 > 2000 mg/kg Minimally Toxic. Based on test data for structurally similar materials.

Skin

Toxicity (Rabbit): LD50 > 2000 mg/kg Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available. Moderately irritating to skin with prolonged exposure. Based on test data for structurally similar materials.

Eye

Irritation (Rabbit): Data available. May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Vapour/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anaesthesia, drowsiness, unconsciousness and other central nervous system effects including death. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Contains:

KEROSENE: Carcinogenic in animal tests. Lifetime skin painting tests produced tumours, but the mechanism is due to repeated cycles of skin damage and restorative hyperplasia. This mechanism is considered unlikely in humans where such prolonged skin irritation would not be tolerated. Did not cause mutations in-vitro. Inhalation of vapours did not result in reproductive or developmental effects in laboratory animals. Inhalation of high concentrations in animals resulted in respiratory tract irritation, lung changes and some reduction in lung function. Non-sensitizing in animal tests. NAPHTHALENE: Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain. Additional information is available by request.

CMR Status:

Chemical Name CAS Number List Citations

KEROSENE 8008-20-6 4

NAPHTHALENE 91-20-3 3, 4

--REGULATORY LISTS SEARCHED--

1 = IARC 1 3 = IARC 2B 5 = ACGIH A1

2 = IARC 2A 4 = ACGIH ALL 6 = ACGIH A2

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Expected to be toxic to aquatic organisms.

MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids. High molecular wt. component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation: Majority of components -- Expected to be inherently biodegradable

Atmospheric Oxidation: More volatile component -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL

Majority of components -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (TDG)

Proper Shipping Name: KEROSENE

Hazard Class & Division: 3

UN Number: 1223

Packing Group: III

Footnote: In containers of 454 litres or less this material is exempt from TDG regulations.

LAND (DOT)

Proper Shipping Name: KEROSENE

Hazard Class & Division: 3

ID Number: 1223

Packing Group: III

ERG Number: 128

Label(s): 3

Transport Document Name: KEROSENE, 3, UN1223, PG III

Footnote: The flash point of this material is greater than 38°C/100°F. Regulatory classification of this material varies. DOT: Flammable liquid or combustible liquid. OSHA: Combustible liquid. IATA/IMO: Flammable liquid.

SEA (IMDG)

Proper Shipping Name: KEROSENE

Hazard Class & Division: 3

EMS Number: F-E, S-E

UN Number: 1223

Packing Group: III

Label(s): 3

Transport Document Name: KEROSENE, 3, UN1223, PG III, (40°C c.c.)

AIR (IATA)

Proper Shipping Name: KEROSENE

Hazard Class & Division: 3

UN Number: 1223

Packing Group: III

Label(s) / Mark(s): 3

Transport Document Name: KEROSENE, 3, UN1223, PG III

SECTION 15 REGULATORY INFORMATION

WHMIS Classification: Class B, Division 3: Combustible Liquids Class D, Division 2, Subdivision B: Toxic Material. This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the (M)SDS contains all the information required by the Controlled Products Regulations.

CEPA: All components of this material are either on the Canadian Domestic Substances List (DSL), exempt, or have been notified under CEPA.

NATIONAL CHEMICAL INVENTORY LISTING: AICS, IECSC, DSL, EINECS, ENCS, KECI, PICCS, TSCA

The Following Ingredients are Cited on the Lists Below:

Chemical Name CAS Number List Citations

NAPHTHALENE 91-20-3 1, 6

--REGULATORY LISTS SEARCHED--

1 = TSCA 4 3 = TSCA 5e 5 = TSCA 12b 2 = TSCA 5a2 4 = TSCA 6 6 = NPRI

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

SYNONYMS: KEROSENE, ESSO KEROSENE, KEROSENE DYED, KEROSENE 2-K, KEROSENE FET

APPLICABLE, KEROSENE DYED FET APPLICABLE

PRECAUTIONARY LABEL TEXT:

WHMIS Classification: Class B, Division 3: Combustible Liquids Class D, Division 2, Subdivision B: Toxic Material

HEALTH HAZARDS

Irritating to skin. If swallowed, may be aspirated and cause lung damage. May cause central nervous system depression.

PHYSICAL HAZARDS

In use, may form flammable/explosive vapour-air mixture. Combustible. Material can accumulate static charges which may cause an ignition.

PRECAUTIONS

Avoid contact with skin. Do not siphon by mouth. Use proper bonding and/or earthing Procedures. However, bonding and earthing may not eliminate the hazard from static accumulation.

FIRST AID

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention. Do not induce vomiting.

Skin: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

FIRE FIGHTING MEDIA

Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

SPILL/LEAK

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do so without risk. Prevent entry into waterways, sewer, basements or confined areas. A vapour-suppressing foam may be used to reduce vapour. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Water Spill: Stop leak if you can do so without risk. Eliminate sources of ignition. Report spills as required to appropriate authorities. If the Flash Point exceeds the Ambient Temperature by 10 deg C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

Use: Not intended or suitable for use in or around a household or dwelling.

Isopropyl Alcohol

In case of Emergency call CHEMTREC 1-800-424-9300

Supplier Simchem Corporation, 311 Sarasota Center Blvd., P.O. Box 697, Osprey, Florida, 34229-0697
(941) 377-9935 Fax (941) 377-9539

CAS Number 67-63-0

Synonyms Isopropanol; sec-propyl alcohol; sec-propanol; dimethylcarbinol

Formula (CH₃)₂CHOH

US Department of Transportation – 49 CFR

Proper Shipping Name: Isopropanol

UN Number UN1219

Hazard Class 3

Packing Group II

Labels Flammable Liquid

Appearance Clear, colorless liquid

Odor Rubbing alcohol

Boiling Point 82 ° C

Melting Point -89 ° C

Vapor Pressure 44 @ 25 ° C (mm Hg)

Vapor Density (Air = 1) 2.1

Specific Gravity 0.79 @ 20 ° C / 4 ° C

Solubility in Water Miscible in water

Volatile by Volume 100% @ 21 ° C

Evaporation Rate 2.83 (BuAc =1)

Stability Stable

Incompatibility Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, isocyanates.

Hazardous Decomposition Products

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Conditions to Avoid Heat, flame, ignition sources and incompatibles.

Hazardous Polymerization Will not occur.

Kinetronics Corporation Phone: (941) 951-2432

4363 Independence Ct. Fax: (941) 955-5992

Sarasota, FL 34234 Web Site: www.Kinetronics.com

Isopropyl Alcohol: Material Safety Data Sheet

Flash Point 12 ° C

Auto Ignition Temperature 399 ° C

Flammable Limits LEL: 2.0

UEL: 12.7

Fire Extinguishing Spray Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills and nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Explosion Above flash point, vapor air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Special Information In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand for other positive pressure mode.

Steps to be Taken in Case Material is Spilled or Released Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified on section 5. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

Disposal Method Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

Handling and Storage Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues.

Potential Health Effects:

Inhalation Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death. Ingestion Ingestion can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).

Skin Contact May cause skin irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact Vapors cause eye irritation. Splashes caused severe irritation, possible corneal burns and eye damage.

First Aid Measures:

Inhalation In case of Inhalation, remove to fresh air. In not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Eye Contact Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Personal Protective Equipment:

Skin Protection Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

Eye Protection Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Always comply with all applicable international, federal, state and local regulations regarding the transportation, storage, use and disposal of this chemical. Due to the changing nature of regulatory requirements, the regulatory information listed in this document should not be considered all-inclusive or authoritative. International, Federal, State Local regulations should be consulted to determine with all required reporting requirements. The information in this MSDS was obtained from sources, which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use, and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, MSDS information may not be applicable

Ultrapure Lamp Oil

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: ULTRA PURE LAMP OIL

SYNONYMS: LINPAR, 1416-V NORMAL PARAFFIN

Mixture of Tetradecane, Pentadecane, and Hexadecane.

EINECS # 265-233-4

MANUFACTURER: Lamplight Farms

ADDRESS: 4900 North Lilly Road, Menomonee Falls, WI 53051

(800) 645-5267 262-781-9590 (8:00 AM- 4:30 PM CST) M-F

EMERGENCY NUMBER: 1-800-308-7141 (Prosar)

For non-emergency and all other information call: 1-800-645-5267

2. COMPOSITION / INFORMATION ON INGREDIENTS

Components CAS Number Weight %

C₁₄-C₁₆ Paraffins 90622-46-1 100

See Section 8 for Exposure Guidelines and Section 15 for OSHA Classification

3. HAZARDS IDENTIFICATION

Potential Health Effects

EYES: Irritation may occur with exposure to concentrated vapors or contact with product.

SKIN: Repeated or prolonged contact can cause redness, irritation, and scaling of the skin (dermatitis). Normal care and personal hygiene should prevent skin effects.

INHALATION: Exposure to high concentration of vapors may result in headache and stupor.

INGESTION: Lung exposure to this product either by prolonged breathing of a mist or vomiting following ingestion, can lead to serious lung injury and possibly death.

(See section 11 for Toxicological Information).

Emergency Overview

Water white, oily liquid. Mild hydrocarbon odor.

HEALTH HAZARD: MAY CAUSE EYE OR SKIN IRRITATION. High vapor concentrations may cause headache, stupor, dizziness, or irritation of throat and eyes

4. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists, seek medical attention.

SKIN: Immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash affected area with mild soap. Call a physician if irritation occurs.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration and seek medical attention immediately. Oxygen should only be administered by trained personnel.

INGESTION: DO NOT INDUCE VOMITING. Seek medical advice immediately.

5. FIRE FIGHTING MEASURES

Flammable Properties

FLASH POINT / METHOD: 250°F (121° C) / PM

AUTOIGNITION TEMPERATURE: 420°F (216° C)

FLAMMABLE LIMITS IN AIR % BY VOLUME: None Expected.

FIRE AND EXPLOSION HAZARD: None Expected.

FIRE FIGHTING INSTRUCTIONS: Water spray, carbon dioxide, dry chemical, or alcohol compatible foam is recommended.

6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE OF A SPILL OR LEAK: Evacuate the area and eliminate all sources of ignition. Contain the spill if possible. Material may be picked up with a solid sorbent. Dispose of only in accordance with local, state, and federal regulations.

CERCLA HAZARDOUS SUBSTANCE: Contains no chemicals on the CERCLA Hazardous Substance List.

7. HANDLING AND STORAGE

ELECTROSTATIC ACCUMULATION HAZARD: Yes – ground all equipment.

USUAL SHIPPING CONTAINERS: Tank cars, tank trucks.

STORAGE / TRANSPORT TEMPERATURE: Ambient. (Product will freeze at 47° F (8° C))

STORAGE / TRANSPORT PRESSURE: Ambient. (Product will freeze at 47° F (8° C))

LOAD / UNLOAD TEMPERATURE: Ambient, above freezing point. (Product will freeze at 47° F (8° C))

STORAGE AND HANDLING MATERIALS: Carbon steel is suitable.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Air contaminant levels should be controlled below the PEL or TLV for this product (see Exposure Guidelines of this section). Mechanical ventilation may be necessary if working with this product in enclosed areas and at elevated temperatures.

Personal Protective Equipment

EYES: When contact with liquid is possible, use a face shield and chemical goggles. Otherwise use safety glasses or goggles.

SKIN: Chemical gloves should be worn to prevent repeated contact. If potential for significant exposure to liquid exists, use full protective clothing and chemical boots.

RESPIRATORY PROTECTION: NIOSH-approved organic vapor air-purifying respirator, self contained breathing apparatus, or air-supplied respirators dependent on concentration.

Exposure Guidelines:

No exposure limit has been set for exposure to vapors for this product. However, Lamplight and its suppliers recommend the ACGIH/OSHA/NIOSH – recommended limit of 5 mg/m³ (8-hour TWA) for exposure to mists of this product.

Component OSHA PEL ACGIH TLV : None Established.

PEL = Permissible Exposure Limits TWA = Time Weighted Average (8hr.)

TLV = Threshold Limit Value STEL = Short Term Exposure Limit (15 min.)

Carcinogenicity: No carcinogenic ingredients.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: VISCOCITY: Water white, oily liquid 2.5 – 2.7 cSt @ 104° F (40° C).

ODOR: Mild hydrocarbon odor.

PHYSICAL STATE: Liquid.

VAPOR PRESSURE (mm Hg.): 0.05 @ 68° F (20° C).

BOILING POINT: 490 - 592° F (254 – 283° C).

VAPOR DENSITY (Air=1): 7 - 8

MELTING POINT: 48 - 50° F (8 - 10° C).

SOLUBILITY IN WATER: Negligible

SPECIFIC GRAVITY (H₂O = 1): 0.773 @ 60°F/60°F (16°C/16°C).

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: High Temperatures.

INCOMPATIBILITY WITH OTHER MATERIALS: Strong Oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion products include carbon dioxide, carbon monoxide and possibly other unidentified organic compounds.

HAZARDOUS POLYMERIZATION: Stable.

11. TOXICOLOGICAL INFORMATION

EYES: Primary Eye Irritation Index (Rabbits): 5.7 for nonwashed eyes after 1 hour, 6 for washed eyes after 1 hour. (Maximum score is 110).

SKIN: Acute Dermal LD₅₀ (Rabbits): >2 g/kg

Primary Skin Irritation Index (Rabbits): 4.4 (Maximum score is 8.0)

INHALATION: LC₅₀ (Rats): >5.8 mg/l (nominal) with four-hour exposure.

INGESTION: Acute Oral LD₅₀ (Rat): > 5 g/kg.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Not Available.

CHEMICAL FATE INFORMATION: Not Available.

13. DISPOSAL CONSIDERATIONS

SPECIAL INSTRUCTIONS: Evacuate the area and eliminate all sources of ignition. Contain the spill if possible. Material may be picked up with solid sorbent. Dispose of only in accordance with local state, and federal regulations.

WASTE CLASSIFICATION: If discarded in its purchased form, this product is not a RCRA hazardous waste. Re-evaluation of the product may be required by the user at the time of disposal, since the product uses, transforms, and mixtures may change the classification.

EMPTY CONTAINERS: Empty containers retain product residue (liquid and/or vapor) can be dangerous. DO NOT PRESSURIZE, CUT WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner, or properly disposed of.

(See Section 6 for CERCLA Reporting Requirements).

14. TRANSPORT INFORMATION

DOT DESCRIPTION: This product is not a hazardous material according to DOT regulations for ground transportation.

ICAO / IATA DESCRIPTION: This product is not a dangerous good as defined by IATA for air transportation.

IMO DESCRIPTION (IMDG CODE): This product is not a dangerous good as defined by IMO in the IMDG Code for water transportation.

15. REGULATORY INFORMATION

U.S. Federal Regulations

OSHA HAZARD COMMUNICATION STANDARD CLASSIFICATION: Nonhazardous as defined by the OSHA Hazard Communication Standard.

TSCA INVENTORY LISTING: Alkanes (C₁₄-C₁₆) CAS Number: 90622-46-1

SARA 302 STATUS: Contains no chemicals subject to SARA 302 reporting.

SARA 311/312 CLASSIFICATION: Nonhazardous according to SARA 311/312.

SARA 313 CHEMICALS: Contains no chemicals subject to SARA 313 reporting.

International Regulations

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) CLASSIFICATION: This material is not a controlled product as defined by Canada's Workplace Hazardous Materials Information System (WHMIS).

CANADIAN DOMESTIC SUBSTANCE LIST (DSL) INVENTORY LISTING:

<u>Chemical Name</u>	<u>CAS Number</u>
C ₁₄ Tetradecane	629-59-4
C ₁₅ Pentadecane	629-62-9
C ₁₆ Hexadecane	544-76-3

State Regulations

CALIFORNIA SAFE DRINKING WATER ACT (PROP 65) LISTING: **No ingredients listed in this section**

CALIFORNIA AIR RESOURCES BOARD Title 17, Article 2, Section 94510 Consumer Products: This product is VOC exempt by 94510 (d)(1) as it has a vapor pressure below 0.1 mm Hg at 20°C.

16. OTHER INFORMATION

Hazard Ratings NFPA HMIS

Health: 1 1

FLAMMABILITY: 1 1

REACTIVITY: 0 0

Revision Summary

Date Description

Jan 10, 2002 Document created.

June 28, 2002 Added Emergency numbers (Prosar) and Non emergency contact number.

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