SAFETY DATA SHEET 1252

IKO AQUABARRIER MASTIC

SECTION 1 – SUBSTANCE IDENTITY AND COMPANY CONTACT INFORMATION

PRODUCT NAME	IKO AquaBarrier Mastic
TRADE NAME	Modified Asphalt Sealant
PRODUCT NUMBER	1850094, 1850095, 1850097
CHEMICAL FAMILY	Mixture
PRODUCT USE	Patching cement
MANUFACTURER/SUPPLIER	GH International Sealants ULC 2540 Rena Road Mississauga, ON L4T 3C9 Canada +1-905-677-5522 Website: www.icpgroup.com Email: sds@icpgroup.com
WEBSITE	www.iko.com
EMERGENCY NUMBER	CANUTEC: 1-613-996-6666 (24 hours information only)

SECTION 2 – HAZARD IDENTIFICATION

CLASSIFICATION OF THE SUBSTANCE OR MIXTURE

SIGNAL WORD	DANGER
SYMBOL(S)	
CLASSIFICATION	Carcinogenicity - Category 1A Carcinogenicity - Category 2 Flammable Liquids - Category 3 Skin Irritation - Category 2 Serious Eye Damage/Eye Irritation - Category 2A Specific Target Organ Toxicity - Single Exposure (Narcotic Effects) - Category 3 Specific Target Organ Toxicity - Repeated Exposure - Category 2 Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) - Category 3 Aspiration Hazard - Category 1
HAZARD STATEMENTS	H226 Flammable liquid and vapour. H319 Causes serious eye irritation. H336 May cause drowsiness or dizziness. H373 May cause damage to organs through prolonged or repeated exposure.

	H335 May cause respiratory irritation. H315 Causes skin irritation. H350 May cause cancer. H351 Suspected of causing cancer. H304 May be fatal if swallowed and enters airways.
PRECAUTIONARY STATEMENTS	P201 Obtain special instructions before use. P202 Do not handle until all safety precautions have been read and understood. P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P233 Keep container tightly closed. P240 Ground and bond container and receiving equipment. P241 Use explosion-proof electrical, ventilating, lighting equipment. P242 Use non-sparking tools. P243 Take action to prevent static discharge. P260 Do not breathe mist/vapours/spray. P264 Wash thoroughly after handling. P271 Use only outdoors or in a well-ventilated area. P280 Wear protective gloves/protective clothing/eye protection/face protection. P301+P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider. P331 Do NOT induce vomiting. P308+P313 IF exposed or concerned: Get medical advice/ attention. P370+P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam or normal protein foam to extinguish. P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P312 Call a POISON CENTER/doctor/physician/first aider/if you feel unwell. P337+P313 If eye irritation persists: Get medical advice/attention. P302+P352 IF ON SKIN: Wash with plenty of water and soap. P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]. P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P332+P313 If skin irritation occurs: Get medical advice/attention. P362+P364 Take off contaminated clothing and wash it before reuse. P403+P235 Store in a well-ventilated place. Keep cool. P405 Store locked up. P501 Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
NFPA	Health: 2 Flammability: 2 Reactivity: 0
HMIS	No information available.

SECTION 3 – CHEMICAL COMPOSITION AND DATA ON COMPONENTS

HAZARDOUS CHEMICAL NAME	% (w/w)	CAS NUMBER
Asphalt (Bitumen)	30-60	8052-42-4
White Spirit	10-30	8052-41-3
Silica Crystalline - Quartz	0.1-1	14808-60-7

SECTION 4 – FIRST AID

INHALATION	If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. Transport to hospital, or doctor, without delay.
INGESTION	If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus. If swallowed do NOT induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. Seek medical advice. Avoid giving milk or oils. Avoid giving alcohol.
SKIN CONTACT	If skin or hair contact occurs: Flush skin and hair with running water (and soap if available). Seek medical attention in event of irritation. Immediately drench burn area in cold running water. If hot bitumen adheres to the skin, DO NOT attempt to remove it (it acts as a sterile dressing). For burns to the head and neck and trunk, apply cold wet towels to the burn area, and change frequently to maintain cooling. Cooling should be maintained for no longer than thirty minutes. When hot bitumen completely encircles a limb, it may have a tourniquet effect and should be split as it cools. Transport to hospital or doctor. In case of burns:

	Immediately apply cold water to burn either by immersion or wrapping with saturated clean cloth. DO NOT remove or cut away clothing over burnt areas. DO NOT pull away clothing which has adhered to the skin as this can cause further injury. DO NOT break blister or remove solidified material. Quickly cover wound with dressing or clean cloth to help prevent infection and to ease pain. For large burns, sheets, towels or pillow slips are ideal; leave holes for eyes, nose and mouth. DO NOT apply ointments, oils, butter, etc. to a burn under any circumstances. Water may be given in small quantities if the person is conscious. Alcohol is not to be given under any circumstances. Reassure. Treat for shock by keeping the person warm and in a lying position. Seek medical aid and advise medical personnel in advance of the cause and extent of the injury and the estimated time of arrival of the patient.
EYE CONTACT	If this product comes in contact with eyes: Wash out immediately with water. If irritation continues, seek medical attention. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
ACUTE AND CHRONIC SYMPTOMS	Refer to section 11, Toxicological Information, for additional information.

MEDICAL ATTENTION

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:
Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO_2 50 mm Hg) should be intubated.
Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

Burns : No attempt should be made to remove the bitumen (it acts as a sterile dressing). Cover the bitumen with tulle gras and leave for two days when any detached bitumen can be removed. Re-dress and leave for a further week. If necessary refer to a burns unit. [Manufacturer]

SECTION 5 – FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA	Do NOT direct a solid stream of water or foam into burning molten material; this may cause spattering and spread the fire.
FIRE FIGHTING	Liquid and vapour are flammable. Moderate fire hazard when exposed to heat or flame. Vapour forms an explosive mixture with air. Moderate explosion hazard when exposed to heat or flame. Vapour may travel a considerable distance to source of ignition. Heating may cause expansion or decomposition leading to violent rupture of containers. On combustion, may emit toxic fumes of carbon monoxide (CO). Combustion products include: carbon monoxide (CO) carbon dioxide (CO2) nitrogen oxides (NOx) sulfur oxides (SOx) sulfur dioxide (SO2) other pyrolysis products typical of burning organic material. May emit clouds of acrid smoke
FIRE INCOMPATIBILITY	Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
FLAMMABILITY PROPERTIES:	Combustible.
FLASH POINT	46ºC
FLAMMABLE LIMITS IN AIR	Lower flammability limit (% vol): No information available. Upper flammability limit (% vol): No information available.
AUTO IGNITION TEMPERATURE	254ºC
SPECIAL PPE FOR FIRE-FIGHTERS	Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE MEASURES AND EMERGENCY PROCEDURES	See Section 8, Exposure Control and Personal Protection.
ENVIRONMENTAL PRECAUTIONS	See Section 12, Ecological Information
SPILL MANAGEMENT	Remove all ignition sources. Clean up all spills immediately. Avoid breathing vapours and contact with skin and eyes. Control personal contact with the substance, by using protective equipment. Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

SECTION 7 - HANDLING AND STORAGE

Precautions for Safe Handling

SAFE HANDLING

Hydrogen sulfide (H2S or Sour Gas) may be present when loading and unloading transport vessels. Stay upwind and away from newly opened hatches and allow to vent thoroughly before handling material. Steam may be used to vent hatches. Keep all sources of ignition away from loading area.

The conductivity of this material may make it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid.

Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.

Containers, even those that have been emptied, may contain explosive vapours.
Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
Electrostatic discharge may be generated during pumping - this may result in fire.
Ensure electrical continuity by bonding and grounding (earthing) all equipment.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<=1 m/sec until fill pipe submerged to twice itsdiameter, then <= 7 m/sec).
Avoid splash filling.
Do NOT use compressed air for filling discharging or handling operations.
Avoid all personal contact, including inhalation.

Wear protective clothing when risk of overexposure occurs.
Use in a well-ventilated area.
Prevent concentration in hollows and sumps.
DO NOT enter confined spaces until atmosphere has been checked.
Avoid smoking, naked lights or ignition sources.
Avoid generation of static electricity.
DO NOT use plastic buckets.
Earth all lines and equipment.
Use spark-free tools when handling.
Avoid contact with incompatible materials.
When handling, DO NOT eat, drink or smoke.
Keep containers securely sealed when not in use.
Avoid physical damage to containers.
Always wash hands with soap and water after handling.
Work clothes should be laundered separately.
Use good occupational work practice.
Observe manufacturer's storage and handling recommendations contained within this SDS.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

OTHER INFORMATION

Store in original containers in approved flammable liquid storage area.
Store away from incompatible materials in a cool, dry, well-ventilated area.
DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
No smoking, naked lights, heat or ignition sources.
Storage areas should be clearly identified, well illuminated, clear of obstruction and accessible only to trained and authorised personnel adequate security must be provided so that unauthorised personnel do not have access.
Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances.
Use non-sparking ventilation systems, approved explosion proof equipment and intrinsically safe electrical systems.
Have appropriate extinguishing capability in storage area (e.g. portable fire extinguishers - dry chemical, foam or carbon dioxide) and flammable gas detectors.
Keep adsorbents for leaks and spills readily available.
Protect containers against physical damage and check regularly for leaks.
Observe manufacturer's storage and handling recommendations contained within this SDS.

In addition, for tank storages (where appropriate):
Store in grounded, properly designed and approved vessels and away from incompatible materials.
For bulk storages, consider use of floating roof or nitrogen blanketed vessels; where venting to atmosphere is possible, equip storage tank vents with flame arrestors; inspect tank vents during winter conditions for vapour/ ice build-up.
Storage tanks should be above ground and diked to hold entire contents.

Conditions for Safe Storage, including any incompatibilities

SUITABLE CONTAINER

Packing as supplied by manufacturer.
Plastic containers may only be used if approved for flammable liquid.

Check that containers are clearly labelled and free from leaks.
For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.
For materials with a viscosity of at least 2680 cSt. (23 deg. C)
For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C): (i) Removable head packaging; (ii) Cans with friction closures and (iii) low pressure tubes and cartridges may be used.
Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with
inner and outer packages

In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

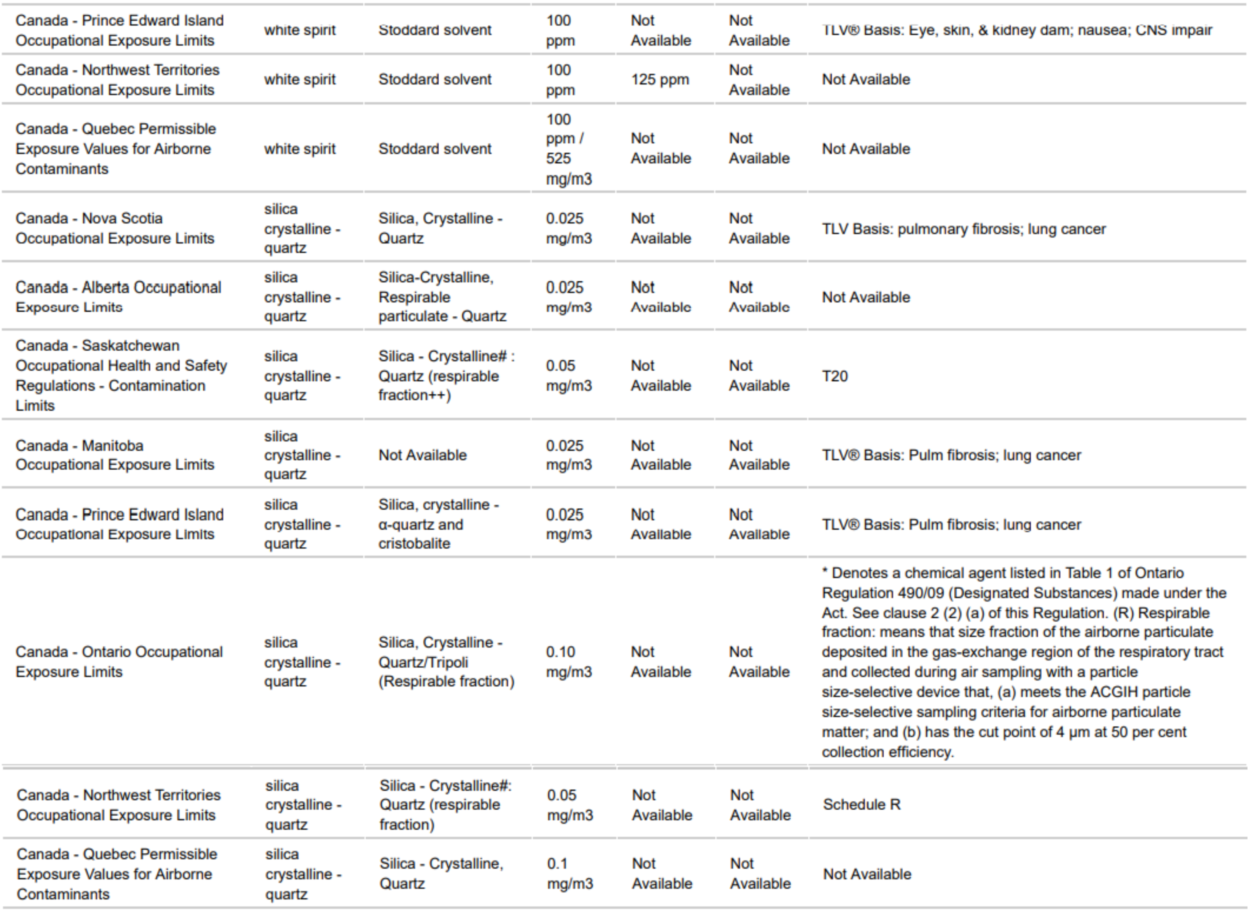
Hydrogen sulfide (H2S):
-is a highly flammable and reactive gas
-reacts violently with strong oxidisers, metal oxides, metal dusts and powders, bromine pentafluoride, chlorine trifluoride, chromium trioxide, chromyl chloride, dichlorine oxide, nitrogen trichloride, nitryl hypofluorite, oxygen difluoride, perchloryl fluoride, phospham, phosphorus persulfide, silver fulminate, soda-lime, sodium peroxide
-is incompatible with acetaldehyde, chlorine monoxide, chromic acid, chromic anhydride, copper, nitric acid, phenyldiazonium chloride, sodium
-forms explosive material with benzenediazonium salts
-attacks many metals
Flow or agitation of hydrogen sulfide may generate electrostatic charges due to low conductivity

Sulfides are incompatible with acids, diazo and azo compounds, halocarbons, isocyanates, aldehydes, alkali metals, nitrides, hydrides, and other strong reducing agents.
Many reactions of sulfides with these materials generate heat and in many cases hydrogen gas.
Many sulfide compounds may liberate hydrogen sulfide upon reaction with an acid.
Avoid reaction with oxidising agents

SECTION 8 – EXPOSURE CONTROL AND PERSONAL PROTECTION

CONTROL PARAMETERS
OCCUPATIONAL EXPOSURE LIMITS (OEL)
INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	bitumen (petroleum)	Asphalt (petroleum) fumes	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - Nova Scotia Occupational Exposure Limits	bitumen (petroleum)	Coal dust - Bituminous	0.9 mg/m3	Not Available	Not Available	TLV Basis: lung damage; pulmonary fibrosis
Canada - Nova Scotia Occupational Exposure Limits	bitumen (petroleum)	Asphalt (Bitumen; Petroleum) - Fume	0.5 mg/m3	Not Available	Not Available	TLV Basis: Upper respiratory tract & eye irritation. Measured as benzene-soluble aerosol. BEI-P
Canada - Alberta Occupational Exposure Limits	bitumen (petroleum)	Asphalt (Petroleum; Bitumen) fume	5 mg/m3	Not Available	Not Available	Not Available
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	bitumen (petroleum)	Coal dust: Bituminous (respirable fraction++)	0.9 mg/m3	2.7 mg/m3	Not Available	Not Available
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	bitumen (petroleum)	Asphalt (bitumen) fume, as benzene soluble aerosol (inhalable fraction++)	0.5 mg/m3	1.5 mg/m3	Not Available	Not Available
Canada - Manitoba Occupational Exposure Limits	bitumen (petroleum)	Not Available	0.5 mg/m3	Not Available	Not Available	TLV® Basis: URT & eye irr; BEIp
Canada - Manitoba Occupational Exposure Limits	bitumen (petroleum)	Not Available	0.9 mg/m3	Not Available	Not Available	TLV® Basis: Lung dam; pulm fibrosis
Canada - British Columbia Occupational Exposure Limits	bitumen (petroleum)	Asphalt (Bitumen) fume, as benzene-soluble aerosol, Inhalable	0.5 mg/m3	Not Available	Not Available	IARC group 2A carcinogen - Bitumens, occupational exposure to oxidized bitumens and their emissions during road paving IARC group 2B carcinogen - Bitumens, occupational exposure to straight-run bitumens and their emissions during road paving
Canada - Prince Edward Island Occupational Exposure Limits	bitumen (petroleum)	Asphalt (Bitumen) fumes, as benzene-soluble aerosol	0.5 mg/m3	Not Available	Not Available	TLV® Basis: URT & eye irr; BEIp
Canada - Prince Edward Island Occupational Exposure Limits	bitumen (petroleum)	Coal dust - Bituminous or Lignite	0.9 mg/m3	Not Available	Not Available	TLV® Basis: Lung dam; pulm fibrosis
Canada - Ontario Occupational Exposure Limits	bitumen (petroleum)	Particles (Insoluble or Poorly Soluble) Not Otherwise Specified (PNOS) (Respirable fraction)	3 mg/m3	Not Available	Not Available	(R) Respirable fraction: means that size fraction of the airborne particulate deposited in the gas-exchange region of the respiratory tract and collected during air sampling with a particle size-selective device that, (a) meets the ACGIH particle size-selective sampling criteria for airborne particulate matter; and (b) has the cut point of 4 µm at 50 per cent collection efficiency.
Canada - Ontario Occupational Exposure Limits	bitumen (petroleum)	Particles (Insoluble or Poorly Soluble) Not Otherwise Specified (PNOS) (Inhalable fraction)	10 mg/m3	Not Available	Not Available	(I) Inhalable fraction: means that size fraction of the airborne particulate deposited anywhere in the respiratory tract and collected during air sampling with a particle size-selective device that, (a) meets the ACGIH particle size-selective sampling criteria for airborne particulate matter; and (b) has the cut point of 100 µm at 50 per cent collection efficiency.
Canada - Northwest Territories Occupational Exposure Limits	bitumen (petroleum)	Asphalt (bitumen) fume, as benzene soluble aerosol (inhalable fraction)	0.5 mg/m3	1.5 mg/m3	Not Available	Not Available
Canada - Quebec Permissible Exposure Values for Airborne Contaminants	bitumen (petroleum)	Asphalt (petroleum) fumes	5 mg/m3	Not Available	Not Available	Not Available
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	white spirit	Stoddard solvent	100 ppm / 575 mg/m3	720 mg/m3 / 150 ppm	Not Available	Not Available
Canada - Nova Scotia Occupational Exposure Limits	white spirit	Stoddard solvent	100 ppm	Not Available	Not Available	TLV Basis: eye, skin & skidney damage; nausea; central nervous system impairment
Canada - Alberta Occupational Exposure Limits	white spirit	Stoddard solvent	100 ppm / 572 mg/m3	Not Available	Not Available	Not Available
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	white spirit	Stoddard solvent	100 ppm	125 ppm	Not Available	Not Available
Canada - Manitoba Occupational Exposure Limits	white spirit	Not Available	100 ppm	Not Available	Not Available	TLV® Basis: Eye, skin, & kidney dam; nausea; CNS impair
Canada - British Columbia Occupational Exposure Limits	white spirit	Stoddard solvent (mineral spirits)	290 mg/m3	580 mg/m3	Not Available	Not Available



Canada - Prince Edward Island Occupational Exposure Limits	white spirit	Stoddard solvent	100 ppm	Not Available	Not Available	TLV® Basis: Eye, skin, & kidney dam; nausea; CNS impair
Canada - Northwest Territories Occupational Exposure Limits	white spirit	Stoddard solvent	100 ppm	125 ppm	Not Available	Not Available
Canada - Quebec Permissible Exposure Values for Airborne Contaminants	white spirit	Stoddard solvent	100 ppm / 525 mg/m3	Not Available	Not Available	Not Available
Canada - Nova Scotia Occupational Exposure Limits	silica crystalline - quartz	Silica, Crystalline - Quartz	0.025 mg/m3	Not Available	Not Available	TLV Basis: pulmonary fibrosis; lung cancer
Canada - Alberta Occupational Exposure Limits	silica crystalline - quartz	Silica-Crystalline, Respirable particulate - Quartz	0.025 mg/m3	Not Available	Not Available	Not Available
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	silica crystalline - quartz	Silica - Crystalline# : Quartz (respirable fraction++)	0.05 mg/m3	Not Available	Not Available	T20
Canada - Manitoba Occupational Exposure Limits	silica crystalline - quartz	Not Available	0.025 mg/m3	Not Available	Not Available	TLV® Basis: Pulm fibrosis; lung cancer
Canada - Prince Edward Island Occupational Exposure Limits	silica crystalline - quartz	Silica, crystalline - α-quartz and cristobalite	0.025 mg/m3	Not Available	Not Available	TLV® Basis: Pulm fibrosis; lung cancer
Canada - Ontario Occupational Exposure Limits	silica crystalline - quartz	Silica, Crystalline - Quartz/Tripoli (Respirable fraction)	0.10 mg/m3	Not Available	Not Available	* Denotes a chemical agent listed in Table 1 of Ontario Regulation 490/09 (Designated Substances) made under the Act. See clause 2 (2) (a) of this Regulation. (R) Respirable fraction: means that size fraction of the airborne particulate deposited in the gas-exchange region of the respiratory tract and collected during air sampling with a particle size-selective device that, (a) meets the ACGIH particle size-selective sampling criteria for airborne particulate matter; and (b) has the cut point of 4 μm at 50 per cent collection efficiency.
Canada - Northwest Territories Occupational Exposure Limits	silica crystalline - quartz	Silica - Crystalline#: Quartz (respirable fraction)	0.05 mg/m3	Not Available	Not Available	Schedule R
Canada - Quebec Permissible Exposure Values for Airborne Contaminants	silica crystalline - quartz	Silica - Crystalline, Quartz	0.1 mg/m3	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	TEEL-1	TEEL-2	TEEL-3
Asphalt (Bitumen)	30 mg/m^3	330 mg/m^3	2000 mg/m^3
White Spirit	300 mg/m^3	1800 mg/m^3	29500** mg/m^3
Silica Crystalline Quartz	0.075 mg/m^3	33 mg/m^3	200 mg/m^3

Ingredient	Original IDLH	Revised IDLH
Asphalt (Bitumen)	Not Available	Not Available
White Spirit	20,000 mg/m^3	Not Available
Silica Crystalline Quartz	25 mg/m^3/ 50 mg/m^3	Not Available

MATERIAL DATA
WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS

The International Agency for Research on Cancer (IARC) has classified occupational exposures to respirable (<5 um) crystalline silica as being carcinogenic to humans. This classification is based on what IARC considered sufficient evidence from epidemiological studies of humans for the carcinogenicity of inhaled silica in the forms of quartz and cristobalite. Crystalline silica is also known to cause silicosis, a non-cancerous lung disease.

Intermittent exposure produces; focal fibrosis, (pneumoconiosis), cough, dyspnoea, liver tumours.

* Millions of particles per cubic foot (based on impinger samples counted by light field techniques).
NOTE : the physical nature of quartz in the product determines whether it is likely to present a chronic health problem. To be a hazard the material must enter the breathing zone as respirable particles.

bitumen (asphalt) fumes [8052-42-4]
TLV* TWA: 0.5 mg/m3 A4 asphalt (petroleum, bitumen) fume, as benzene soluble aerosol
ES* TWA: 5 mg/m3 as fumes
OES* TWA: 5 mg/m3; STEL: 10 mg/m3 as fumes
Based on surveys of asphalt workers in oil refineries and in the roofing industry the TLV-TWA is thought to reduce the risk of possible carcinogenicity
Because the margin of safety of the quartz TLV is not known with certainty and given the associated link between silicosis and lung cancer it is recommended that quartz
concentrations be maintained as far below the TLV as prudent practices will allow.
Exposure to respirable crystalline silicas (RCS) represents a significant hazard to workers, particularly those employed in the construction industry where respirable dusts of cement and concrete are common. Cutting, grinding and other high speed processes, involving their finished products, may further result in dusty atmospheres. Bricks are also a potential source of RCSs under such circumstances.
It is estimated that half of the occupations, involved in construction work, are exposed to levels of RCSs, higher than the current allowable limits. Beaudry et al: Journal of Occupational and Environmental Hygiene 10: 71-77; 2013

EXPOSURE CONTROLS

APPROPRIATE ENGINEERING CONTROLS	For molten materials: Provide mechanical ventilation; in general such ventilation should be provided at compounding/ converting areas and at fabricating/ filling work stations where the material is heated. Local exhaust ventilation should be used over and in the vicinity of machinery involved in handling the molten material. Keep dry!! Processing temperatures may be well above boiling point of water, so wet or damp material may cause a serious steam explosion if used in unvented equipment. Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure. For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:

solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

PERSONAL PROTECTIVE EQUIPMENT:

RESPIRATORY PROTECTION

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A P1 Air-Line*	- -	A PAPR-P1 -
up to 50 x ES	Air-Line**	A P2	A PAPR-P2
up to 100 x ES	-	A P3	-
		Air-Line*	-
100+ x ES	-	Air-Line**	A PAPR-P3

* - Negative pressure demand ** - Continuous flow
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

For molten materials: 76a-p()

EYE AND FACE PROTECTION	Safety glasses with side shields. Chemical goggles. Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]
SKIN PROTECTION	See Hand protection below.
HANDs/FEET PROTECTION	Wear chemical protective gloves, e.g. PVC. Wear safety footwear or safety gumboots, e.g. Rubber
BODY PROTECTION	See Other protection below.
OTHER PROTECTION	Overalls. PVC Apron. PVC protective suit may be required if exposure severe. Eyewash unit. Ensure there is ready access to a safety shower. Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot an shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.
RECOMMENDED MATERIAL(S) GLOVE SELECTION INDEX	Glove selection is based on a modified presentation of the: "Forsberg Clothing Performance Index". The effect(s) of the following substance(s) are taken into account in the computer generated selection: ALL WEATHER PLASTIC CEMENT, TROWEL GRADE (ROOFPROOF)

Material	CPI

BUTYL	A
NEOPRENE	A
VITON	A
NATURAL RUBBER	C
PVA	C

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final
selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such
as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might
otherwise be unsuitable following long-term or frequent use. A qualified practitioner
should be consulted.

SECTION 9 – PHYSCAL AND CHEMICAL PROPERTIES

APPEARANCE	**Bitumen** (known as asphalt in the U.S.) "is the residuum produced from the non-destructive distillation of crude petroleum at atmospheric pressure and/ or under reduced pressures or absence of steam. Bitumens/ asphalts are composed mainly of high-molecular-weight alkylaryl hydrocarbons with high carbon to hydrogen ratios, with carbon numbers > C25, boiling points >400 "C, high viscosity, and negligible water solubility and vapor pressure. These bitumen/ asphalt alkylaryl hydrocarbons are a heterogeneous mixture of linear, branched and cyclic, saturated and unsaturated, and aromatic functional groups. Importantly, polycyclic aromatic hydrocarbons (PAH) such as benzo(a)pyrene, which are toxicologically significant, are only present in bitumen/ asphalt feedstock at very low concentrations. Bitumens/ asphalts contain much larger proportions of high-molecular-weight paraffinic and naphthenic hydrocarbons that are substituted with alkyl groups and ultimately sulfonated, which reduces their potential to exhibit PAH-like toxicity. In practice, the asphalt alkylaryl feedstocks are chemically characterised by a saturates, aromatics, resins, and asphaltenes. **Saturates** consist mainly of long chain saturated hydrocarbons with some Saturates branching, alkyl aromatics with long side chains, and cyclic paraffins (napthenes), with molecular weight of 500-1000. **Asphaltenes** consist mainly of substituted benzene and napthenic-aromatic nuclei with alkyl side chain constituents, with molecular weight of 500-900. **Resins** consist mainly of heterogeneous polar aromatic compounds with small amounts of oxygen, nitrogen, and sulfur, with molecular Resins weight range of 800-2000. Considered lower molecular weight asphaltenes. **Asphaltenes** consist mainly of highly condensed aromatic compounds with one or two chromophores containing 4 to 10 fused rings each, with a significant number of alkyl constituents. They have a molecular weight range of 500-1000.

The bitumen/ asphalt group is defined by the following six CAS Numbers: asphalt (penetration or hard) (CAS No. 8052-42-4); vacuum residues (CAS No. 64741-56-6); raffinates, residual oil decarbonization (CAS No. 64742-07-0); petroleum resins (CAS No. 64742-16-1); residues, hydrodesulfurised vacuum (CAS No. 64742-85-4); and asphalt, oxidized (CAS No. 64742-93-4). Small amounts of metals such as nickel, iron or vanadium may be present. Bitumen/ asphalt fumes must also be considered in an occupational setting and as fugitive emissions.

PHYSICAL STATE	Free-Flowing Paste
ODOR	No information available.
ODOR THRESHOLD	No information available.
PH	No information available.
MELTING POINT/FREEZING POINT	No information available.
INITIAL BOILING POINT AND BOILING RANGE	154ºC
FLASH POINT	46ºC
EVAPORATION RATE	No information available.
FLAMMABILITY	Flammable
UPPER/LOWER FLAMMABILITY/EXPLOSIVE LIMITS	Lower flammability limit (% vol): No information available. Upper flammability limit (% vol): No information available.
VAPOR PRESSURE	No information available.
VAPOR DENSITY (AIR =1)	No information available.
RELATIVE DENSITY (WATER = 1)	1.04-1.22
MOLECULAR WEIGHT	No information available.
SOLUBILITY(IES)	Immiscible
PARTITION COEFFICIENT: N-OCTANOL/WATER	No information available.
AUTO-IGNITION TEMPERATURE	254°C
SPECIFIC GRAVITY	No information available.
VISCOSITY	No information available.

% VOLATILE BY VOLUME	No information available.

SECTION 10 – STABILITY AND REACTIVITY

REACTIVITY:	Refer to Section 7 – Handling and Storage
CHEMICAL STABILITY	Extremely high temperatures. Unstable in the presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur.
POSSIBILITY OF HAZARDOUS REACTIONS	Refer to Section 7 – Handling and Storage
CONDITIONS TO AVOID	Refer to Section 7 – Handling and Storage.
INCOMPATIBLE MATERIALS	Refer to Section 7 – Handling and Storage
HAZARDOUS DECOMPOSITION PRODUCTS	Refer to Section 5 – Fire Fighting Measures

SECTION 11 – TOXICOLOGICAL INFORMATION

Information on Toxicological Effects

INHALED	Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. High inhaled concentrations of mixed hydrocarbons may produce narcosis characterised by nausea, vomiting and lightheadedness. Inhalation of aerosols may produce severe pulmonary oedema, pneumonitis and pulmonary haemorrhage. Inhalation of petroleum hydrocarbons consisting substantially of low molecular weight species (typically C2-C12) may produce irritation of mucous membranes, incoordination, giddiness, nausea, vertigo, confusion, headache, appetite loss, drowsiness, tremors and anaesthetic stupor. Massive exposures may produce central nervous system depression with sudden collapse and deep coma; fatalities have been recorded. Irritation of the brain and/or apnoeic anoxia may produce convulsions. Although recovery following overexposure is generally complete, cerebral micro-haemorrhage of focal post-inflammatory scarring may produce epileptiform seizures some months after the exposure. Pulmonary episodes may include chemical pneumonitis with oedema and haemorrhage. The lighter hydrocarbons may produce kidney and neurotoxic effects. Pulmonary irritancy increases with carbon chain length for paraffins and olefins. Alkenes produce pulmonary oedema at high concentrations. Liquid paraffins may produce anaesthesia and depressant actions leading to weakness, dizziness, slow and shallow respiration, unconsciousness, convulsions and death. C5-7 paraffins may also produce

	polyneuropathy. Aromatic hydrocarbons accumulate in lipid rich tissues (typically the brain, spinal cord and peripheral nerves) and may produce functional impairment manifested by nonspecific symptoms such as nausea, weakness, fatigue and vertigo; severe exposures may produce inebriation or unconsciousness. Many of the petroleum hydrocarbons are cardiac sensitisers and may cause ventricular fibrillations. Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal. Symptoms of hydrogen sulfide (H2S) exposure may include profuse salivation, nausea, vomiting, diarrhoea, giddiness, headache, vertigo, amnesia, palpitations, arrhythmia, weakness, muscle cramps, confusion, sudden collapse, unconsciousness and death due to respiratory paralysis (above 300 ppm). Inhalation of (H2S) at low concentrations causes headache, dizziness and upset stomach. Higher concentrations cause olfactory fatigue, irritation to the respiratory tract, excitement, confusion, and exposure for a prolonged period may cause bronchitis and pulmonary oedema. Although hydrogen sulfide is extremely odourous, the "rotten egg" odour is not a reliable indicator for warning of exposure since odour fatigue readily occurs. Odour sensation is lost immediately at concentrations exceeding 200 ppm. Case reports suggest that toxic amounts can enter the body through a punctured ear drum, even while wearing some sorts of respiratory protection. Hydrogen sulfide is primarily a respiratory toxin which inhibits the cytochrome-oxidase system and is probably more potent than hydrogen cyanide. The lifetime of hydrogen sulfide in oxygenated blood is short and sulfmethaemoglobin is rapidly detoxified by red blood cells and the liver. Most fatalities due to hydrogen sulfide intoxication occur at the scene of exposure and immediate supportive care is imperative. Ensure such contingencies are addressed as part of the site emergency plan and that operators or other employees who may become accidentally exposed, are made aware of the existence of such a plan. Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Acute exposure to bitumen/ asphalt vapours may cause coughing, chest tightness, headache, muscle weakness, dizziness, tiredness, poor coordination, and even nausea and vomiting. Workers exposed to hot blown bitumens show bronchitis, rhinitis, oropharyngitis and laryngitis; symptoms include cough, phlegm, burning of the throat and chest, hoarseness, headache and nasal discharge. Guinea pigs, rabbits and mice exposed to blown bitumen fumes, aerosols and smoke, developed patchy regions of emphysema, bronchiolar dilation, pneumonitis, and severe localised bronchitis. Mice, exposed to aerosols of petroleum bitumens and smoke from heated petroleum bitumens, showed congestion, acute bronchitis, pneumonitis, bronchial dilation, abscess formation, epithelial atrophy, and necrosis. In health studies in the workplace, environmental measurement showed concentrations of asphalt, ranging from "non-detectable", where there was good mechanical ventilation, to 40 mg/m3, where there was very poor natural draft. Breathing zone samples, collected during drum-filling operations, ranged from 1.0 (upwind) to 5 mg/m3 (downwind) as means of 4-hour exposures. In the opinion of industrial hygienists conducting these studies, work conditions were satisfactory where asphalt fumes were kept below 10 mg/m3
INGESTION	Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result. Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).

	The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern. Swallowing pieces of bitumen may produce pyloric obstruction due to accumulation in the stomach and the formation of a stony concretion. Ingestion of petroleum hydrocarbons may produce irritation of the pharynx, oesophagus, stomach and small intestine with oedema and mucosal ulceration resulting; symptoms include a burning sensation in the mouth and throat. Large amounts may produce narcosis with nausea and vomiting, weakness or dizziness, slow and shallow respiration, swelling of the abdomen, unconsciousness and convulsions. Myocardial injury may produce arrhythmias, ventricular fibrillation and electrocardiographic changes. Central nervous system depression may also occur. Light aromatic hydrocarbons produce a warm, sharp, tingling sensation on contact with taste buds and may anaesthetise the tongue. Aspiration into the lungs may produce coughing, gagging and a chemical pneumonitis with pulmonary oedema and haemorrhage. Accidental ingestion of the material may be damaging to the health of the individual.
SKIN CONTACT	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
EYE	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn). Workers exposed to fumes of blown bitumens developed keratoconjunctivitis. Exposure to H2S may produce pain, blurred vision, and irritation. These symptoms are temporary in all but severe cases. Eye irritation may produce conjunctivitis, photophobia, pain, and at higher concentrations blurred vision and corneal blistering. Petroleum hydrocarbons may produce pain after direct contact with the eyes. Slight, but transient disturbances of the corneal epithelium may also result. The aromatic fraction may produce irritation and lachrymation.
CHRONIC	On the basis of epidemiological data, it has been concluded that prolonged inhalation of the material, in an occupational setting, may produce cancer in humans. Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Strong evidence exists that the substance may cause irreversible but non-lethal mutagenic effects following a single exposure. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub acute (28 day) or chronic (two-year) toxicity tests. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Long term exposure to coal tar dusts may produce chronic bronchitis or lung cancer. Dust, liquid or fume contact with skin may result in photosensitisation of skin areas and sunburn on frequent exposure to sunlight or ultra-violet radiation.
Workers exposed to hot tar and pitch showed abnormal serum protein levels due to liver dysfunction. Chronic exposure of mice to 0.3 mg/l of tar aerosols, for three 2 hour periods, produced necrotising tracheobronchitis and hyperplasia of the epithelium; these were occasionally accompanied by papillary infolding.

Exposed body surfaces and the scrotum of long-term coal-tar pitch workers may show kerato acanthoma ("tar mollusca"), pitch warts or tar warts, even after exposure has ceased; the head, neck and other extremities are particularly prone. Pitch keratosis and acanthomas (cancerous or precancerous skin lesions) may also develop. Hyperpigmentation of the body surfaces and scrotum may be localised or diffuse.
Corneal ulcers, conjunctivitis and papillomata of the lids have also been described in workers chronically exposed to coal tar pitches. Workers exposed to petroleum, tar or pitch appear to show an elevated risk of cancer of the renal pelvis. Millwrights and welders in a stamping plant, occupationally exposed to coal-tars and coal-tar pitch showed a greater incidence of leukaemia and cancers of the lung and digestive organs.
Coal tar fumes or dusts have been implicated in the development of occupational cancers. A minimal time of exposure (1-5 years) has been cited. Similarly occupational cancers may develop many years after exposure ceases. Deaths from cancer of the lungs and pleura of retired gas workers was approximately twice the expected rate. Pot-room workers in the aluminium smelting industries showed an increased rate of lung-cancer mortality. One report from the former Soviet Union associated such an increase with concentrations of tarry substances between 27 and 210 mg/m3 (B[a]P levels of 0.6 to 56 ug/m3). High respiratory mortality has been reported among coke oven workers in Great Britain whilst kidney and lung cancers were prevalent among American coke oven workers predominantly exposed for more than 5 years.

A UK mortality analysis (in 1946) showed an increase in scrotal cancers in patent-fuel workers. Reports of skin and scrotal cancers are frequent amongst workers exposed to coal-tar fumes in coal gasification and coke production. A small excess of bladder cancer is described in tar distillers and patent-fuel workers.
Benzene extracts of atmospheric samples from a coal tar plant, painted on the intrascapular area of black mice, three times weekly, caused tumours to appear (some occurred within 465 days). Animal studies indicate that lung and kidney tumours were induced following exposure to coal tar aerosols. The degree of lung change of rats breathing air-contaminated with polycyclic aromatic hydrocarbons (PAHs) is dose-related.
Coal-tar containing ointments have been implicated in a number of human skin cancers. Evidence exists for mutagenic action (as seen in urine samples) after application of these ointments
Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paraesthesias of the extremities, weight loss and anaemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers, to the lighter hydrocarbons, has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paraesthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localised dermatoses.
Surface cracking and erosion may also increase susceptibility to infection by microorganisms. One epidemiological study of petroleum refinery workers has reported elevations in standard mortality ratios for skin cancer along with a dose-response relationship indicating an association between routine workplace exposure to petroleum or one of its constituents and skin cancer, particularly melanoma. Other studies have been unable to confirm this finding.

Hydrocarbon solvents are liquid hydrocarbon fractions derived from petroleum processing streams, containing only carbon and hydrogen atoms, with carbon numbers ranging from approximately C5-C20 and boiling between approximately 35-370 deg C. Many of the hydrocarbon solvents have complex and variable compositions with constituents of 4 types, alkanes (normal paraffins, isoparaffins, and cycloparaffins) and aromatics (primarily alkylated one- and two-ring species). Despite the compositional complexity, most hydrocarbon solvent constituents have similar toxicological properties, and the overall toxicological hazards can be characterized in generic terms. Hydrocarbon solvents can cause chemical pneumonitis if aspirated into the lung, and those that are volatile can cause acute CNS effects and/or ocular and respiratory irritation at exposure levels exceeding occupational recommendations. Otherwise, there are few toxicologically important effects. The exceptions, n-hexane and naphthalene, have unique toxicological properties

Animal studies:
No deaths or treatment related signs of toxicity were observed in rats exposed to light alkylate naphtha (paraffinic hydrocarbons) at concentrations of 668, 2220 and 6646 ppm for 6 hrs/day, 5 days/wk for 13 weeks. Increased liver weights and kidney toxicity (male rats) was observed in high dose animals. Exposure to pregnant rats at concentrations of 137, 3425 and 6850 ppm did not adversely affect reproduction or cause maternal or foetal toxicity. Lifetime skin painting studies in mice with similar naphthas have shown weak or no carcinogenic activity following prolonged and repeated exposure. Similar naphthas/distillates, when tested at nonirritating dose levels, did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chronic irritation and not to dose. The mutagenic potential of naphthas has been reported to be largely negative in a variety of mutagenicity tests. The exact relationship between these results and human health is not known. Some components of this product have been shown to produce a species specific, sex hormonal dependent kidney lesion in male rats from repeated oral or inhalation exposure.
Subsequent research has shown that the kidney damage develops via the formation of a alpha-2u-globulin, a mechanism unique to the male rat.
Humans do not form alpha-2u-globulin, therefore, the kidney effects resulting from this mechanism are not relevant in human.

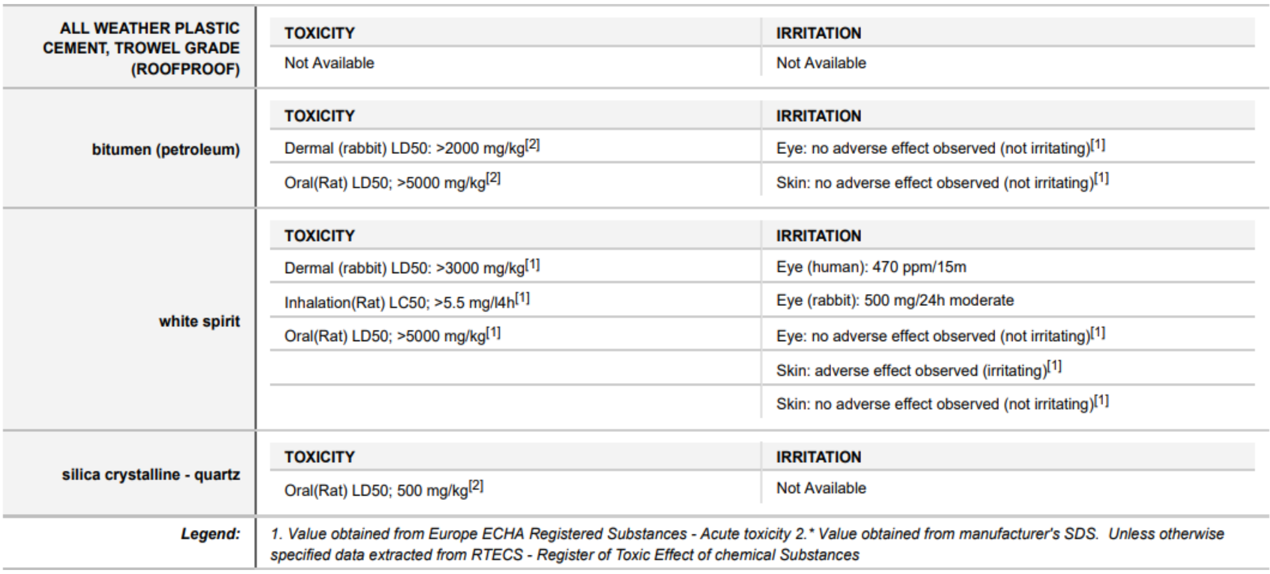
Chronic exposure to bitumen/ asphalt fumes, over extended periods, may cause central nervous system depression, and liver and kidney changes. Chronic bitumen/ asphalt poisoning may result in a decrease in the number of white and red blood cells. [ILO Encyclopedia]
Prolonged contact with bitumens may produce irritation, inflammation, dermatitis, acne-like lesions, keratoses, melanosis and photosensitisation.
Animal inhalation studies do NOT yield sufficient evidence of bitumen/ asphalt-induced lung cancer. It is generally accepted that oxidation of polycyclic aromatic hydrocarbons (PAHs) destroys their carcinogenic potential and the differing character of the polycyclic aromatic fraction of petroleum asphalt fume and those of coal tar pitch volatiles suggested a lessened potential for carcinogenicity.
Inhalation of fumes of heated bitumens by guinea pigs and rats produced chronic fibrosing pneumonitis with peribronchial adenomatosis; rats developed squamous cell metaplasias.

Various extracts of steam-refined and air-refined bitumens and their mixtures, undiluted steam refined bitumens and cracking residue bitumens, produced skin tumours following application to mouse skin. Subcutaneous injection in mice and rats, of steam- and air- reined bitumens, produced sarcomas at the sites of injection. Application of air-refined bitumens, in toluene, to the skin of mice, produced skin tumours. No tumours were produced by the undiluted bitumen. A pooled mixture of steam- and air-blown petroleum bitumen in benzene, produced tumours at the site of application to mouse skin.
No significant difference was found in the health of asphalt workers and of groups of controls in a study conducted in 25 oil refineries. Other studies have not demonstrated health defects in paving and roofing operations (using asphalt-based products) and interstate trucking over asphalt highways.

NOTE: The term bitumen and asphalt are often used interchangeably and have been used to describe products derived from petroleum and/ or coal. Asphalt is a native mixture of hydrocarbons which occurs as an amorphous, brownish-black solid or semisolid and results from the evaporation of the lighter hydrocarbons from petroleum and partial oxidation of the residue. Petroleum asphalts (bitumens) should therefore be differentiated from coal pitch bitumens which result from the destructive distillation of coal.
The term "asphalt" originally applied to "Trinidad asphalt" which is a mined solid and is closely related to gilsonite.
On occasion there are reports of epidemiological studies which have found an increased cancer mortality in workers exposed to heated bitumens and bitumen fumes. There are reports of significantly increased incidence of cancers of the mouth, oesophagus, rectum and lung. The

bitumens, used by this cohort, are likely to have their origin in coal and should be distinguished from materials derived from the petroleum industry (the asphalts).
Hardened bitumens/ asphalts do not normally constitute a health hazard. Mined sources of bitumens/ asphalts may present an additional hazard related to their naturally occurring content of quartz. Chronic inhalation of high levels of quartz dusts may produce silicosis, a disabling form of pneumoconiosis which may lead to scarring of the lining of the air-sacs of the lung.

Chronic low level exposures to hydrogen sulfide may produce headache, fatigue, dizziness, irritability and loss of libido. These symptoms may also result from damage produced by isolated or repeated unmeasured peak high level exposures in healthy persons or those suffering from pre-existing neurological diseases. A study on long term effects showed that H2S apparently can cause continuing, sometimes unrecognized olfactory deficits. [Hirsch, A.R. - Occ. Env. Med.,1999, Vol 5, Iss 4, pp 284-287]
On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.



ALL WEATHER PLASTIC CEMENT, TROWEL GRADE (ROOFPROOF)	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
bitumen (petroleum)	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >2000 mg/kg[2]	Eye: no adverse effect observed (not irritating)[1]
	Oral(Rat) LD50; >5000 mg/kg[2]	Skin: no adverse effect observed (not irritating)[1]
white spirit	**TOXICITY**	**IRRITATION**
	Dermal (rabbit) LD50: >3000 mg/kg[1]	Eye (human): 470 ppm/15m
	Inhalation(Rat) LC50; >5.5 mg/l4h[1]	Eye (rabbit): 500 mg/24h moderate
	Oral(Rat) LD50; >5000 mg/kg[1]	Eye: no adverse effect observed (not irritating)[1]
		Skin: adverse effect observed (irritating)[1]
		Skin: no adverse effect observed (not irritating)[1]
silica crystalline - quartz	**TOXICITY**	**IRRITATION**
	Oral(Rat) LD50; 500 mg/kg[2]	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

ALL WEATHER PLASTIC CEMENT, TROWEL GRADE (ROOFPROOF)

Exposure to the material may result in a possible risk of irreversible effects. The material may produce mutagenic effects in man. This concern is raised, generally, on the basis of appropriate studies using mammalian somatic cells in vivo. Such findings are often supported by positive results from in vitro mutagenicity studies.
Studies indicate that normal, branched and cyclic paraffins are absorbed from the mammalian gastrointestinal tract and that the absorption of n-paraffins is inversely proportional to the carbon chain length,with little absorption above C30. With respect to the carbon chain lengths likely to be present in mineral oil, n-paraffins may be absorbed to a greater extent that iso- or cyclo-paraffins.
The major classes of hydrocarbons have been shown to be well absorbed by the gastrointestinal tract in various species. In many cases, the hydrophobic hydrocarbons are ingested in association with dietary lipids. The dependence of hydrocarbon absorption on concomitant triglyceride digestion and absorption,is known as the "hydrocarbon continuum hypothesis", and asserts that a series of solubilising phases in the intestinal lumen, created by dietary triglycerides and their digestion products, afford hydrocarbons a route to the lipid phase of the intestinal absorptive cell (enterocyte) membrane. While some hydrocarbons may traverse the mucosal epithelium unmetabolised and appear as solutes in lipoprotein particles in intestinal lymph, there is evidence that most hydrocarbons partially separate from nutrient lipids and undergo metabolic transformation in the enterocyte. The enterocyte may play a major role in determining the proportion of an absorbed hydrocarbon that, by escaping initial biotransformation, becomes available for deposition in its unchanged form

in peripheral tissues such as adipose tissue, or in the liver.
The production of wood creosote, coal tar creosote, coal tar, coal tar pitch, and coal tar pitch volatiles, stems from the incomplete combustion or pyrolysis of carbon-containing materials. Creosotes, coal tar, coal tar pitch, and coal tar pitch volatiles are composed of many individual compounds of varying physical and chemical characteristics. In addition, the composition of each, although referred to by specific name (e.g., wood creosote or coal tar creosote) is not consistent. Coal tars are by-products of the carbonization of coal to produce coke or natural gas.

Physically, they are usually viscous liquids or semisolids that are black or dark brown with a naphthalene-like odor. The coal tars are complex combinations of polycyclic aromatic hydrocarbons (PAHs), phenols, heterocyclic oxygen, sulfur, and nitrogen compounds. By comparison, coal tar creosotes are distillation products of coal tar. They have an oily liquid consistency and range in color from yellowish-dark green to brown. At least 75% of the oal tar creosote mixture is PAHs. Unlike the coal tars and coal tar creosotes, coal tar pitch is a residue produced during the distillation of coal tar. (Beech)wood creosote consists mainly of phenol, cresols, guaiacol, xylenol, and creosol. Creosote bush resin consists of phenolic (e.g., flavonoids and nordihydroguaiaretic acid), neutral (e.g., waxes), basic (e.g., alkaloids), and acidic (e.g., phenolic acids) compounds. The phenolic portion comprises 83-91% of the total resin. Nordihydroguaiaretic acid accounts for 5-10% of the dry weight of the leaves.
It is likely that the toxicity of wood creosote, coal tar creosote, coal tar, coal tar pitch, and coal tar pitch volatiles is due largely to the major individual components, phenols, PAHs and others.

For "distillates of coal tar" or 'creosotes.
Critical Health Effects
The critical health effects for risk characterisation are systemic long-term effects including carcinogenicity, mutagenicity, reproductive toxicity and developmental toxicity. The chemicals are also considered to be phototoxic and have the potential to cause skin irritation and sensitisation and mild respiratory irritation.
Toxicokinetics
Limited data are available. Toxicological data indicate that the chemicals are absorbed via all routes of exposure (WHO, 2004). The PAHs can be absorbed through the respiratory tract, the gastrointestinal tract and the skin. Following absorption, PAHs are widely distributed throughout the body to all internal organs. During metabolism, the parent compounds are converted via intermediate epoxides to phenols, diols, and tetrols, which then conjugate with sulfate or glucuronic acids or with glutathione (IPCS, 1998).
Observation in humans
Evidence of skin, eye and respiratory irritation in humans following exposure to creosote have been reported (ATSDR, 2002).
Skin irritation, eczema and folliculitis were noted when an industrial health survey was conducted of workers exposed to coal tar creosote (ATSDR, 2002). In these workers, the effects of dermal irritation were reported as being exacerbated by exposure to ultraviolet (UV) light.
The phototoxic effects of several PAHs were compared by treating human fibroblasts with these PAHs and then irradiating them with ultraviolet light (<400 nm). A good correlation was found between the phototoxic effects and known carcinogenic potential (IPCS, 1998).
Studies involving workers included reported instances of irritation to superficial ocular tissues after being exposed to coal tar creosote; this was exacerbated after exposure to the sun (ATSDR, 2002).
Skin Sensitisation
Limited data are available. Distillates, coal tar, naphthalene oils (CAS No. 84650-04-4), gave positive results in a single local lymph node assay (LLNA). Creosote (CAS No. 8001-58-9) was found to induce dermal sensitisation when tested according to OECD TG 406 in a guinea pig maximisation test (GPMT) using Dunkin-Hartley guinea pigs (REACH). Overall, the available data support classification for all the chemicals in this group.

An LLNA study (OECD TG 429) was conducted in female BALB/c mice (n = 5/concentration) with coal tar distillates, naphthalene oils (CAS No. 84650-04-4), using a

40 % dimethylacetamide, 30 % acetone and 30 % ethanol (DAE 433) mixture as a vehicle. The test concentrations of 0.3, 3 and 30 % had a simulation index (SI) of 1.36, 1.41 and 5.88 respectively. The positive control, dinitrochlorobenzene at a 0.5 % concentration, gave an SI of 11.55. The three-fold increase in lymphocyte proliferation (EC3 value) could not be calculated (REACHc).
In a GPMT (OECD TG 406) with creosote (CAS No. 8001-58-9), positive skin reactions were reported in 17/19 animals after 24 hours (average Draize score = 1.2) and 6/19 animals after 48 hours (average Draize score = 0.4) (REACHb).

Repeated Dose Toxicity
Oral
Limited data are available regarding the non-cancer effects of the chemicals.
The chemicals in this group are not considered to cause serious damage to health through repeated oral exposure based on the no observed adverse effect levels (NOAELs) (generally >100 mg/kg bw/day) reported for the following 2–4-ring PAHs:
-naphthalene;
-acenaphthene;
-fluorene;
-fluoranthene; and
- pyrene.
Effects on the liver, kidney and blood were observed at higher doses (IPCS, 1998).
Dermal
Limited data are available regarding the non-cancer effects of the chemicals.
Inhalation
Limited data are available regarding the non-cancer effect of the chemicals.
Male Fischer 344 rats were exposed to high-boiling coal liquid (heavy distillate) via inhalation (700 mg/m3) for six hours/day, five days/week for six weeks. A 20 % increase in arterial blood pressure and heart rate was reported, although it was not determined if the response was exposure related. The growth rate of the rats was reported as suppressed during the time of the study (ATSDR, 2002).
Repeated dose toxicity (inhalation) was determined by exposing 20 (sex/dose) Charles River (CD) rats to CAS No. 90640-86-1 (as distilled coal tar) (5.4, 49 and 106 mg/m3) for six hours/day, five days/week for 13 weeks. A decrease in body weight was recorded as significant in both sexes in the mid- and high-range dose groups during the sixth week of exposure. A treatment related increase in weight was reported in the lung/trachea/body weight ratio and was consistent with macroscopic observation of grey discolouration of the lungs and microscopic observation of macrophages in the lungs. Increases in liver weight (mid-dose group) and liver/body weight ratio (mid- and high-dose group) were recorded in male animals. Increases in the liver weight (high-dose group), liver/body weight ratio and liver/brain weight ratio (mid- and high-dose group) were recorded in the female animals. Reversible hypertrophy of the thyroid follicular cells reported as related to a reduction of colloid was reported at all dose levels. A NOAEL of 5.4 mg/m3 was reported for this study (REACHb).
Observation in humans
Mild respiratory effects, including reduced lung function, have been reported in workers using coal tar creosote in wood preservative plants.
Genotoxicity
Several of the chemicals (CAS No. 73665-18-6, CAS No. 84650-03-3 and CAS No. 84650-04-4) are classified as hazardous—Category 2 mutagenic substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia). The available data support this classification for all the chemicals in this group, although the associated annotations will differ for each chemical (refer Recommendation section).

For the chemicals CAS No. 84650-03-3 and CAS No. 84650-04-4, in vitro data using the reverse mutation assays with various strains of Salmonella typhimurium were negative for genotoxicity (REACH). No compositional information was available but these chemicals are lower boiling point distillate fractions that are likely to contain aromatics, tar bases and acids (see Grouping rationale). The classification of these chemicals is dependent on benzene concentration (refer to Existing Worker Health and Safety Controls: Hazard Classification section). Benzene is classified as hazardous—Category 2 mutagenic

substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia).
The chemical, CAS No. 90640-86-1 was positive in a reverse mutation assay in Salmonella typhimurium strains TA98 and TA1537 in the presence of metabolic activation. Weakly positive responses were also observed in strains TA100 and TA102. The sample was reported to contain >50 ppm B[a]P.
Various creosotes have been reported to produce a positive response in vitro. Almost all creosotes tested showed mutagenic activity after metabolic activation (S9 mix) in the conventional Ames assay with S. typhimurium TA98. Positive results were also obtained with several other S. typhimurium TA or YG strains, or with the mouse lymphoma cell assay and the sister chromatid exchange test with Chinese hamster ovary cells.
A common feature in the tests with Salmonella strains TA98 and TA100 (plus S9 mix) was that the mutagenicity appeared in the distillation fractions having the highest boiling point ranges (>290 °C) and high concentrations of known mutagenic PAHs (WHO, 2004). A creosote reported to contain <50 ppm B[a]P was tested according to OECD 476 (in vitro mouse lymphoma gene mutation assay). The chemical showed a weak positive mutagenic activity in the presence of metabolic activation. A creosote containing <50 ppm B[a]P did not induce chromosome aberrations in human lymphocytes cultures in the presence and absence of metabolic activation (REACHb).

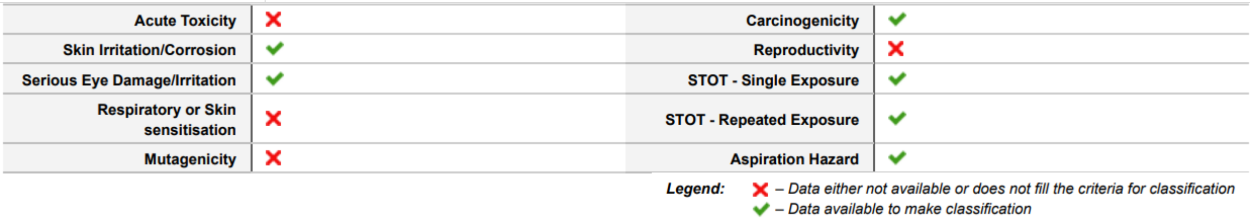
DNA adduct formation in mammalian systems has been observed following exposure to creosote, with adducts in rats (liver) and mice (lungs, forestomach and spleen) (ATSDR, 2002). A commercially available coal tar creosote was positive in an in vivo mouse micronucleus assay. The CD-1 male mice received two intraperitoneal (i.p.)injections (with an interval of 24 hours) of creosote (in olive oil) at concentrations of 92.5, 185, or 370 mg/kg bw. Dose-dependent increases in the frequency of micronucleated polychromatic erythrocytes in bone marrow were observed. A single intraperitoneal treatment of 370 mg/kg body weight also induced micronuclei (WHO, 2004). A creosote reported to contain <50 ppm B[a]P was reported to be negative in an in vivo mouse micronucleus test (REACHb).
Genotoxicity of PAHs
The chemicals have the potential to contain fluoranthene and chrysene as well as higher molecular weight PAHs that are genotoxic, including benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene (IARC, 2010; IARC, 2012; NICNAS). Positive effects were seen in most assays for the mutagenicity of B[a]P, including induced sperm abnormalities in mice (IPCS, 1998). Data for B[a]P are considered sufficient to indicate that the chemicals could induce mutations in germ cells.
Carcinogenicity
The chemicals are classified as hazardous—Category 2 carcinogenic substances—with the risk phrase ‘May cause cancer’ (T; R45) in the HSIS (Safe Work Australia). The available data support this classification for all the chemicals in this group, although the associated notes will differ for each chemical (refer Recommendation section).
Several creosote or cresosote oils produced skin tumours in mice following dermal application. Lung tumours were also reported in one study.
Worker exposure to creosotes has been associated with an increased risk of testicular cancer. The only available cohort study was considered limited by its small size (IARC, 1985; IARC, 2010).
The International Agency for Research on Cancer (IARC) concluded that creosotes are probably carcinogenic to humans (Group 2A). This was based on limited evidence of carcinogenicity in humans and sufficient evidence in experimental animals (IARC, 2010).
There are a number of potential carcinogenic components of the chemicals. There is sufficient evidence in experimental animals for the carcinogenicity of four membered PAHs such as chrysene and pyrene and also several higher molecular weight PAHs (IARC, 2010; IARC 2012).
The classification of a number of chemicals in this group is subject to note M (refer to Existing Worker Health and Safety Controls: Hazard Classification section), which exempts classification if it can be shown that the substance contains <0.005 % w/w B[a]P (50 ppm). No data have been identified regarding the rationale for note M. However, in the absence of detailed composition details, this is considered reasonable as, whilst several

carcinogenic PAHs might be present as constituents in these chemicals at levels similar or higher than B[a]P, the cut-off concentration for mixtures containing category 1 carcinogens is 0.1 % (several orders of magnitude higher than 0.005 %).
The classification of some of the lower boiling point distillate fractions are subject to note J (refer to Existing Worker Health and Safety Controls: Hazard Classification section), which exempts classification if it can be shown that the substance contains <0.1% w/w benzene. Benzene is classified as hazardous, a Category 1 carcinogenic substance, with the risk phrase 'May cause cancer' (T; R45) in the HSIS (Safe Work Australia).

Reproductive and Developmental Toxicity
Overall, the reproductive and developmental data are limited for chemicals in the group, although the data for higher molecular weight PAHs are considered sufficient for classification for all chemicals except the lower boiling point distillate fractions (CAS Nos. 84650-03-3 and 84650-04-4).
The associated notes will differ for each chemical.
In a two-generation study, the chemical, distillates, coal tar, heavy oils (CAS No. 90640-86-1), was administered via oral gavage (25, 75 and 150 mg/kg bw/day) to male and female CD rats (26/sex/dose). At all dose levels, decrease in body weight during the pre-mating period was observed and recorded as dose-related. Decreased fertility and pregnancy indices in the F1 female parental rats were recorded at all dose levels (25, 75, 150 mg/kg bw/d). There was a significant dose-related reduction in the number of live F1 offspring at doses ^{3}75 mg/kg bw/d. A dose-related decrease in growth of the F1 offspring was reported, starting at 25 mg/kg bw/d. Although the NOAEL is reported as 25 mg/kg bw/d (REACHb), reproductive effects were indicated at all doses.
In a developmental toxicity study, the chemical, distillates, coal tar, heavy oils (CAS No. 90640-86-1), was administered via oral gavage (25, 50 and 175 mg/kg bw/day) to 30 (per dose) mated female CD rats, during gestation day(GD) 6–15. Increases in post implantation loss, resorptions and a reduction in live foetuses were observed in 175 mg/kg bw/day group. Developmental toxicity was not observed at doses of 50 mg/kg bw/day or lower. Malformations were observed in all dose groups, although the incidences were significantly higher in the mid- and high-dose groups. These were historically common malformations and not considered by the study authors to be treatment related. There were no adverse effects observed for late intrauterine development of live foetuses in any dose group. The NOAEL for maternal toxicity was reported as 50 mg/kg bw/d and for teratogenicity 175 mg/kg bw/d (REACHb).
Coal tar creosote was tested for oestrogenic activity using an assay in ovariectomised (OVX) ICR and DBA/2 mice. The animals received oral doses (by gavage) once every 24 hours for four days and were euthanised on day five. No increase in absolute or relative uterine wet weight or vaginal cornification was observed.
A decrease in mean foetal body weight was observed in the offspring of female ICR mice dosed by gavage with 400 mg/kg petroleum creosote in DMSO on GD 5–9. Moderate maternal toxicity in the form of reduced body weight gain was observed for both creosote-treated and vehiclecontrol mice compared with untreated controls. (ATSDR, 2002; WHO, 2004).
Embryotoxicity of petroleum creosote has been studied in a mouse preimplantation embryo culture system. The ICR mice embryos (n = 15) collected on day 3.5 of gestation (blastocyst stage) were exposed for 1 hour to different concentrations of creosote in a serum-supplemented culture medium with and without rodent hepatic S9 microsomal fractions, and subsequently cultured in a control medium for 24–72 hours.
Embryonic viability was inversely related to petroleum creosote concentration (WHO, 2004).
An experiment with pregnant pigs, held on wooden platforms treated with coal tar creosote, resulted in adverse developmental effects. A significant number (24/41) of piglets died at birth and 11 piglets died by day three post farrowing.
The chemicals may contain several higher molecular weight PAHs that are embryotoxic. B[a]P also had adverse effects on female fertility, reproduction and postnatal development (IPCS, 1998).
The chemicals are recommended for classification and labelling under the current approved criteria and adopted GHS as below. This assessment does not consider classification of physical and environmental hazards.

	The classification criteria for mixtures should be applied to known components based on their concentrations in these UVCB substances. In the absence of detailed composition data the following notes should be applied. Information on notes A note should be added for the acute toxicity classification. The acute toxicity R23 classification need not apply if it can be shown that the chemical contains <8 % pyrene; however, R20 classification applies if the chemicals contains >1 % pyrene. The current HSIS classification for carcinogenicity of the chemicals indicated Note H. Note H is no longer considered relevant for these chemicals as the acute, systemic and local effects of the chemicals have been evaluated. The classification for CAS Nos. 61789-28-4, 65996-91-0, 65996-92-1, 68188-48-7, 73665-18-6, 84650-04-4 and 91995-51-6 are subject to Note M (refer to Existing Worker Health and Safety Controls: Hazard Classification section), which exempts classification if it can be shown that the substance contains <0.005 % w/w B[a]P (50 ppm). Given that Note M for carcinogenicity is considered appropriate for these chemicals and the cut-off concentration for mixtures is similar for the mutagenicity, reproductive/developmental and carcinogenicity classifications, a similar note for the proposed genotoxicity and reproductive/developmental classification is considered appropriate. Therefore, Note M should be slightly modified as follows: 'Note M: The classification (with the exception of classification for acute toxicity and sensitisation) need not apply if it can be shown that the substance contains less than 0.005% w/w benzo[a]pyrene (EINECS no. 200-028-5). This note only applies to certain complex coal-derived substances in Annex I.' The classification for CAS Nos. 84650-03-3, 84650-04-4 and 73665-18-6 are subject to Note J (refer to Existing Worker Health and Safety Controls: Hazard Classification section), which exempts classification if it can be shown that the substance contains <0.1% w/w benzene. These chemicals are described as including lower boiling point distillation fractions and therefore Note J is considered appropriate. Based on the description of CAS No. 65996-92-1 ('The distillate from coal tar having an approximate distillation range of 100 deg C to 450 deg C (212 deg F to 842 deg F). Composed primarily of two to four membered condensed ring aromatic hydrocarbons, phenolic compounds, and aromatic nitrogen bases.' (NCI)). Note J is also considered applicable to this chemical. The classification for CAS Nos. 8001-58-9 and 90640-86-1 are not subject to any notes. The lack of a note may be because the chemicals under these CAS Nos. might not be available in sufficiently purified forms. In the absence of further information, the addition of note M is not recommended. NICNAS HUMAN HEALTH TIER II ASSESSMENT FOR Coal Tar Distillates http://www.nicnas.gov.au/chemical-information/imap-assessments/imap-group-assessment-report?assessment_id=1442
BITUMEN (PETROLEUM)	No significant acute toxicological data identified in literature search. WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.
WHITE SPIRIT	for petroleum: Altered mental state, drowsiness, peripheral motor neuropathy, irreversible brain damage (so-called Petrol Sniffer's Encephalopathy), delirium, seizures, and sudden death have been reported from repeated overexposure to some hydrocarbon solvents, naphthas, and gasoline This product may contain benzene which is known to cause acute myeloid leukaemia and n-hexane which has been shown to metabolize to compounds which are neuropathic. This product contains toluene. There are indications from animal studies that prolonged exposure to high concentrations of toluene may lead to hearing loss. This product contains ethyl benzene and naphthalene from which there is evidence of tumours in rodents

	Carcinogenicity: Inhalation exposure to mice causes liver tumours, which are not considered relevant to humans. Inhalation exposure to rats causes kidney tumours which are not considered relevant to humans. **Mutagenicity**: There is a large database of mutagenicity studies on gasoline and gasoline blending streams, which use a wide variety of endpoints and give predominantly negative results. All in vivo studies in animals and recent studies in exposed humans (e.g. petrol service station attendants) have shown negative results in mutagenicity assays. **Reproductive Toxicity**: Repeated exposure of pregnant rats to high concentrations of toluene (around or exceeding 1000 ppm) can cause developmental effects, such as lower birth weight and developmental neurotoxicity, on the foetus. However, in a two-generation reproductive study in rats exposed to gasoline vapour condensate, no adverse effects on the foetus were observed. **Human Effects:** Prolonged/ repeated contact may cause defatting of the skin which can lead to dermatitis and may make the skin more susceptible to irritation and penetration by other materials. Lifetime exposure of rodents to gasoline produces carcinogenicity although the relevance to humans has been questioned. Gasoline induces kidney cancer in male rats as a consequence of accumulation of the alpha2-microglobulin protein in hyaline droplets in the male (but not female) rat kidney. Such abnormal accumulation represents lysosomal overload and leads to chronic renal tubular cell degeneration, accumulation of cell debris, mineralisation of renal medullary tubules and necrosis. A sustained regenerative proliferation occurs in epithelial cells with subsequent neoplastic transformation with continued exposure. The alpha2-microglobulin is produced under the influence of hormonal controls in male rats but not in females and, more importantly, not in humans. white spirit, as CAS RN 8052-41-3
SILICA CRYSTALLINE - QUARTZ	WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS The International Agency for Research on Cancer (IARC) has classified occupational exposures to respirable (<5 um) crystalline silica as being carcinogenic to humans . This classification is based on what IARC considered sufficient evidence from epidemiological studies of humans for the carcinogenicity of inhaled silica in the forms of quartz and cristobalite. Crystalline silica is also known to cause silicosis, a non-cancerous lung disease. Intermittent exposure produces; focal fibrosis, (pneumoconiosis), cough, dyspnoea, liver tumours. * Millions of particles per cubic foot (based on impinger samples counted by light field techniques). NOTE : the physical nature of quartz in the product determines whether it is likely to present a chronic health problem. To be a hazard the material must enter the breathing zone as respirable particles.
ALL WEATHER PLASTIC CEMENT, TROWEL GRADE (ROOFPROOF) & BITUMEN (PETROLEUM)	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.



Acute Toxicity	✗	**Carcinogenicity**	✓
Skin Irritation/Corrosion	✓	**Reproductivity**	✗
Serious Eye Damage/Irritation	✓	**STOT - Single Exposure**	✓
Respiratory or Skin sensitisation	✗	**STOT - Repeated Exposure**	✓
Mutagenicity	✗	**Aspiration Hazard**	✓

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 – ECOLOGICAL INFORMATION

TOXICITY

ALL WEATHER PLASTIC CEMENT, TROWEL GRADE (ROOFPROOF)

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

BITUMEN (PETROLEUM)

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

WHITE SPIRIT

Endpoint	Test Duration (hr)	Species	Value	Source
NOEC(ECx)	720h	Crustacea	0.024mg/l	2
LC50	96h	Fish	0.14mg/l	2
EC50	96h	Algae or other aquatic plants	0.277mg/l	2

SILICA CRYSTALLINE – QUARTZ

Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Available	Not Available	Not Available	Not Available

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) – Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

When spilled this product may act as a typical oil, causing a film, sheen, emulsion or sludge at or beneath the surface of the body of water. The oil film on water surface may physically affect the aquatic organisms, due to the interruption of the oxygen transfer between the air and the water
Oils of any kind can cause:
-drowning of water-fowl due to lack of buoyancy, loss of insulating capacity of feathers, starvation and vulnerability to predators due to lack of mobility
-lethal effects on fish by coating gill surfaces, preventing respiration
-asphyxiation of benthic life forms when floating masses become engaged with surface debris and settle on the bottom and
-adverse aesthetic effects of fouled shoreline and beaches

In case of accidental releases on the soil, a fine film is formed on the soil, which prevents the plant respiration process and the soil particle saturation. It may cause deep water infestation.

Sulfide ion is very toxic to aquatic life, threshold concentration for fresh or saltwater fish is 0.5ppm. The product therefore is very toxic to aquatic life. The major decomposition product, hydrogen sulfide, is damaging to vegetation at 5ppm for 24 hours

for bitumens/ asphalts:

This family of hydrocarbon is expected to have similar boiling points, vapor pressures, log Kow values (>10), and water solubilities. Limited environmental fate data also support the grouping of bitumens/ asphalts under one category. Bitumen/ asphalts contain complex hydrocarbon mixtures with molecular weights ranging from 500-2000 and carbon numbers predominantly higher than C25, vapor pressures are negligible. The high molecular weights and similar hydrocarbon distributions among the bitumens/ asphalts support the conclusion that the toxicity of this group, in general, is not expected to vary significantly across members.

Environmental fate:

Upon release to the environment, bitumens/ asphalts are expected to distribute similarly because of their low volatility and limited water solubility. Bitumen/ asphalts are expected to be resistant to biodegradation, and those components that are soluble in water are expected to be resistant to hydrolysis. When bitumen/ asphalts are heated to facilitate paving or roofing applications, the lighter, more volatile components are distilled into the atmosphere. They condense as they cool, forming small droplets of liquid known as bitumen or asphalt fume condensate. The majority of hydrocarbons in bitumen/ asphalts are not susceptible to direct photolysis, since they do not have functional groups that absorb sunlight greater than 290 nm. However, certain aromatic and unsaturated compound members have the potential to undergo photolysis because they absorb light in the environmental UV region. Since bitumens/ asphalts contain high molecular weight hydrocarbons, partitioning to the atmosphere is not considered to be important.

When compositionally analysing bitumens/ asphalts for certain toxicity endpoints the percentage of 3- to 7-ring polyaromatic hydrocarbons (PAHs) is important. The levels of 3- to 7-ring PAHs are expected to be low considering the processes used to manufacture these substances. Fumes generated experimentally at high temperatures are more likely to contain carcinogenic PAHs than fumes generated at the lower temperatures usually seen in field samples. Therefore, generating conditions are expected to significantly affect toxicity.

Ecotoxicity:

Bitumens/ asphalts by analogy with other high molecular weight hydrocarbons are not likely to show adverse acute or chronic ecological effects in aquatic species.

Drinking Water Standards: hydrocarbon total: 10 ug/l (UK max.).

For hydrocarbons:

Environmental fate:

The lower molecular weight hydrocarbons are expected to form a "slick" on the surface of waters after release in calm sea conditions. This is expected to evaporate and enter the atmosphere where it will be degraded through reaction with hydroxy radicals.

Some hydrocarbon will become associated with benthic sediments, and it is likely to be spread over a fairly wide area of sea floor. Marine sediments may be either aerobic or anaerobic. The material, in probability, is biodegradable, under aerobic conditions (isomerised olefins and alkenes show variable results). Evidence also suggests that the hydrocarbons may be degradable under anaerobic conditions although such degradation in benthic sediments may be a relatively slow process.

Under aerobic conditions hydrocarbons degrade to water and carbon dioxide, while under anaerobic processes they produce water, methane and carbon dioxide.

Alkenes have low log octanol/water partition coefficients (Kow) of about 1 and estimated bioconcentration factors (BCF) of about 10; aromatics have intermediate values (log Know values of 2-3 and BCF values of 20-200), while C5 and greater alkanes have fairly high values (log Kow values of about 3-4.5 and BCF values of 100-1,500

The estimated volatilisation half-lives for alkanes and benzene, toluene, ethylbenzene, xylene (BTEX) components were predicted as 7 days in ponds, 1.5 days in rivers, and 6 days in lakes. The volatilisation rate of naphthalene and its substituted derivatives were estimated to be slower.

Indigenous microbes found in many natural settings (e.g., soils, groundwater, ponds) have been shown to be capable of degrading organic compounds. Unlike other fate processes that disperse contaminants in the environment, biodegradation can eliminate the contaminants without transferring them across media.

The final products of microbial degradation are carbon dioxide, water, and microbial biomass. The rate of hydrocarbon degradation depends on the chemical composition of the product released to the environment as well as site-specific environmental factors. Generally the straight chain hydrocarbons and the aromatics are degraded more readily than the highly branched aliphatic compounds. The n-alkanes, n-alkyl aromatics, and the aromatics in the C10-C22 range are the most readily biodegradable; n-alkanes, n-alkyl aromatics, and aromatics in the C5-C9 range are biodegradable at low concentrations by some microorganisms, but are generally preferentially removed by volatilisation and thus are unavailable in most environments; n-alkanes in the C1-C4 ranges are biodegradable only by a narrow range of specialised hydrocarbon degraders; and n-alkanes, n-alkyl aromatics, and aromatics above C22 are generally not available to degrading microorganisms. Hydrocarbons with condensed ring structures, such as PAHs with four or more rings, have been shown to be relatively resistant to biodegradation. PAHs with only 2 or 3 rings (e.g., naphthalene, anthracene) are more easily biodegraded. In almost all cases, the presence of oxygen is essential for effective biodegradation of oil. The ideal pH range to promote biodegradation is close to neutral (6-8). For most species, the optimal pH is slightly alkaline, that is, greater than 7.

All biological transformations are affected by temperature. Generally, as the temperature increases, biological activity tends to increase up to a temperature where enzyme denaturation occurs.

Atmospheric fate: Alkanes, isoalkanes, and cycloalkanes have half-lives on the order of 1-10 days, whereas alkenes, cycloalkenes, and substituted benzenes have half-lives of 1 day or less. Photochemical oxidation products include aldehydes, hydroxy compounds, nitro compounds, and peroxyacyl nitrates. Alkenes, certain substituted aromatics, and naphthalene are potentially susceptible to direct photolysis

Ecotoxicity:

Hydrocarbons are hydrophobic (high log Kow and low water solubility). Such substances produce toxicity in aquatic organisms by a mechanism referred to as "non-polar narcosis" or "baseline" toxicity. The hydrophobicity increases and water solubility decreases with increasing carbon number for a particular class of hydrocarbon. Substances with the same carbon number show increased hydrophobicity and decreased solubility with increasing saturation. Quantitative structure activity relationships (QSAR), relating both solubility and toxicity to Kow predict that the water solubility of single chemical substances decreases more rapidly with increasing Kow than does the acute toxicity.

Based on test results, as well as theoretical considerations, the potential for bioaccumulation may be high. Toxic effects are often observed in species such as blue mussel, daphnia, freshwater green algae, marine copepods and amphipods.

The values of log Kow for individual hydrocarbons increase with increasing carbon number within homologous series of generic types. Quantitative structure activity relationships (QSAR), relating log Kow values of single hydrocarbons to toxicity, show that water solubility decreases more rapidly with increasing Kow than does the concentration causing effects.

This relationship varies somewhat with species of hydrocarbon, but it follows that there is a log Kow limit for hydrocarbons, above which, they will not exhibit acute toxicity; this limit is at a log Kow value of about 4 to 5. It has been confirmed experimentally that for fish and invertebrates, paraffinic hydrocarbons with a carbon number of 10 or higher (log Kow >5) show no acute toxicity and that alkylbenzenes with a carbon number of 14 or greater (log Kow >5) similarly show no acute toxicity.

QSAR equations for chronic toxicity also suggest that there should be a point where hydrocarbons with high log Kow values become so insoluble in water that they will not cause chronic toxicity, that is, that there is also a solubility cut-off for chronic toxicity. Thus, paraffinic hydrocarbons with carbon numbers of greater than 14 (log Kow >7.3) should show no measurable chronic toxicity. Experimental support for this cut-off is demonstrated by chronic toxicity studies on lubricant base oils and one “heavy” solvent grade (substances composed of paraffins of C20 and greater) which show no effects after exposures to concentrations well above solubility.

The initial criteria for classification of substances as dangerous to the aquatic environment are based upon acute toxicity data in fish, daphnids and algae. However, for substances that have low solubility and show no acute toxicity, the possibility of a long-term or chronic hazard to the environment is recognised in

the R53 phrase or so-called "safety net". The R53 assignment for possible long-term harm is a surrogate for chronic toxicity test results and is triggered by substances that are both bioaccumulative and persistent. The indicators of bioaccumulation and persistence are taken as a BCF > 100 (or log Kow > 3 if no BCF data) and lack of ready biodegradability. For low solubility substances which have direct chronic toxicity data demonstrating no chronic toxicity at 1 mg/L or higher, these data take precedence such that no classification for long term toxicity is required.
DO NOT discharge into sewer or waterways.

PERSISTENCE AND DEGRADABILITY

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

BIOACCUMULATION POTENTIAL

Ingredient	Bioaccumulation
	No Data available for all ingredients

MOBILITY IN SOIL

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 – DISPOSAL CONSIDERATIONS

DISPOSAL RECOMMENDATIONS

Containers may still present a chemical hazard/ danger when empty.
Return to supplier for reuse/ recycling if possible.
Otherwise:
If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
Where possible retain label warnings and SDS and observe all notices pertaining to the product.
DO NOT allow wash water from cleaning or process equipment to enter drains.
It may be necessary to collect all wash water for treatment before disposal.
In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
Where in doubt contact the responsible authority.
Recycle wherever possible.
Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
Dispose of by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material).
Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

SECTION 14 – TRANSPORT INFORMATION

Labels Required

Marine Pollutant NO

Land transport (TDG)

UN number 1999

UN proper shipping name TARS, LIQUID, including road oils, and cutback bitumens

Transport hazard class(es)

Class	3
Subrisk	Not Applicable

Packing group III

Environmental hazard Not Applicable

Special precautions for user

Special provisions	Not Applicable
Explosive Limit and Limited Quantity Index	5 L
ERAP Index	Not Applicable

Air transport (ICAO-IATA / DGR)

UN number 1999

UN proper shipping name Tars, liquid including road asphalt and oils, bitumen and cut backs

Transport hazard class(es)

ICAO/IATA Class	3
ICAO/ IATA Subrisk	Not Applicable
ERG Code	3L

Packing group III

Environmental hazard Not Applicable

Special precautions for user

Special provisions	A3
Cargo Only Packing Instructions	366
Cargo Only Maximum Qty / Pack	220 L
Passenger and Cargo Packing Instructions	355
Passenger and Cargo Maximum Qty / Pack	60 L
Passenger and Cargo Limited Quantity Packing Instructions	Y344
Passenger and Cargo Limited Maximum Qty / Pack	10 L

Sea transport (IMDG-Code / GGVSee)

UN number 1999

UN proper shipping name TARS, LIQUID including road oils, and cutback bitumens

Transport hazard class(es)

IMDG Class	3
IMDG Subrisk	Not Applicable

Packing group III

Environmental hazard Not Applicable

Special precautions for user

EMS Number	F-E, S-E
Special provisions	955
Limited Quantities	5 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
bitumen (petroleum)	Not Available
white spirit	Not Available
silica crystalline - quartz	Not Available

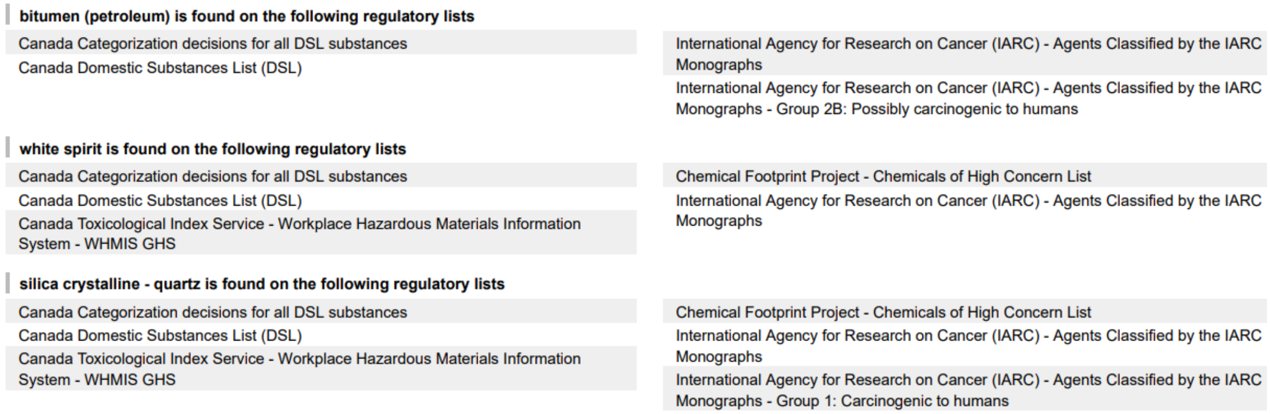
Transport in bulk in accordance with the ICG Code

Product name	Ship Type
bitumen (petroleum)	Not Available
white spirit	Not Available
silica crystalline - quartz	Not Available

SECTION 15 - REGULATIONS

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

WHMIS REGULATORY STATUS	This product has been classified in accordance with the hazard criteria of the Canadian Hazardous Products Regulations and the Safety Data Sheet contains all the information required by the Hazardous Products Regulations (WHMIS 2015). This product is WHMIS 2015 controlled.



bitumen (petroleum) is found on the following regulatory lists

Canada Categorization decisions for all DSL substances
Canada Domestic Substances List (DSL)

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 2B: Possibly carcinogenic to humans

white spirit is found on the following regulatory lists

Canada Categorization decisions for all DSL substances
Canada Domestic Substances List (DSL)
Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS GHS

Chemical Footprint Project - Chemicals of High Concern List
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

silica crystalline - quartz is found on the following regulatory lists

Canada Categorization decisions for all DSL substances
Canada Domestic Substances List (DSL)
Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS GHS

Chemical Footprint Project - Chemicals of High Concern List
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs
International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 1: Carcinogenic to humans

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada – NDSL	No (bitumen (petroleum); white spirit; silica crystalline - quartz)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (bitumen (petroleum)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes

Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.*

SECTION 16 – OTHER INFORMATION

REVISION DATE OF SDS	June 28 2024
REPLACES THE MSDS/SDS FROM	March 18, 2022
PREPARED BY	Research department
GENERAL INFORMATION	1-888-766-2468
WEBSITE	www.iko.com
OTHER INFO/DISCLAMERS	Read this Safety Data Sheet before handling or disposing of this product. This product safety information is provided to help our customers with health, safety and/or environmental matters. We have taken reasonable effort to ensure that the test methods and sources for this data are correct and reliable, however, we give no warranty, expressed or implied, regarding its correctness. Since conditions or methods of handling and using this product are beyond our control, we do not assume responsibility and expressly disclaim liability for damages resulting from or connected with the handling, storage, use or disposal of the product.