SAFETY DATA SHEET

Shell Fuel Oil Extra

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Shell Fuel Oil Extra
Product code	:	002D1401
CAS-No.	:	68476-33-5

Manufacturer or supplier's details

Supplier	:	The Shell Company of Thailand Ltd Klongtoey 10 Soonthornkosa Road Bangkok 10110 Thailand
Telephone	:	(+66) 26579888
Telefax	:	(+66) 26579609
Emergency telephone number	:	+66 (0) 2262-7333
Contact for Safety Data Sheet	:	If you have any enquiries about the content of this SDS please email fuelSDS@shell.com

Recommended use of the chemical and restrictions on use

Recommended use	:	Fuel for use in off-road diesel engines, boilers, furnaces and other combustion equipment.
Restrictions on use	:	This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the supplier.

2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 4
Acute toxicity (Inhalation)	:	Category 4
Reproductive toxicity	:	Category 2
Carcinogenicity	:	Category 1B
Specific target organ toxicity - repeated exposure	:	Category 2 (Blood, Liver, thymus)
Short-term (acute) aquatic hazard	:	Category 1
Long-term (chronic) aquatic hazard	:	Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:
H227 Combustible liquid.
HEALTH HAZARDS:
H332 Harmful if inhaled.
H361 Suspected of damaging fertility or the unborn child.
H350 May cause cancer.
H373 May cause damage to organs (Blood, Liver, thymus) through prolonged or repeated exposure.
ENVIRONMENTAL HAZARDS:
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statements :

Prevention:
P201 Obtain special instructions before use.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

Storage:
No precautionary phrases.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

Hydrogen sulphide is highly toxic and may be fatal if inhaled.Hydrogen sulphide (H2S), an extremely flammable and toxic gas, and other hazardous vapours may evolve and collect in the headspace of storage tanks, transport vessels and other enclosed containers.May dull the sense of smell, so do not rely on odour as an indication of hazard.May ignite on surfaces at temperatures above auto-ignition temperature.This material is a static accumulator.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.Not classified as flammable but will burn.Flammable vapours may be present even at temperatures below the flash point.Therefore it should be treated as a potentially flammable liquid.Contact with hot material can cause thermal burns which may result in permanent skin damage.Repeated exposure may cause skin dryness or cracking.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Chemical nature : Streams obtained from distillation and cracking processes and containing a mixture of saturated, aromatic and olefinic hydrocarbons with carbon numbers predominantly in the C9 to C50 range. Contains cracked components in which polycyclic aromatic compounds, mainly 3-ring but some 4 to 6 ring species, are present. Contains sulphur, oxygen, nitrogen compounds, vanadium and other metals at >10 ppm <500ppm w/w.

Hazardous components

Chemical name	CAS-No.	Classification	Concentration (% w/w)
fuel oil, residual	68476-33-5	Flam. Liq.4; H227 Acute Tox.4; H332 Carc.1B; H350 Repr.2; H361 STOT RE2; H373 Aquatic Acute1; H400 Aquatic Chronic1; H410	<= 100

Contains hydrogen sulphide, CAS # 7783-06-4.
Residues and their blends with distillates can be used as heavy fuel oils and need to be heated for use.

For explanation of abbreviations see section 16.

4. FIRST-AID MEASURES

General advice : Vapourisation of H2S that has been trapped in clothing can be dangerous to rescuers. Maintain respiratory protection to avoid contamination from the victim to rescuer. Mechanical ventilation should be used to resuscitate if at all possible.

If inhaled : Call emergency number for your location / facility.
Remove to fresh air.
Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardiopulmonary Resuscitation (CPR) as required and transport to the nearest medical facility.
Casualties suffering ill effects as a result of exposure to hydrogen sulphide should be removed to fresh air.
If inhalation of mists, fumes or vapour causes irritation to the nose or throat, remove to fresh air.

Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardiopulmonary Resuscitation (CPR) as required and transport to the nearest medical facility.

In case of skin contact : Cold product -
Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available.
If persistent irritation occurs, obtain medical attention.

Hot product -
If contact with hot product, immediately cool the burn area by flushing with large amounts of water for at least 15 minutes.
Do not attempt to remove anything from the burn area.
Do not apply burn creams or ointments.
Cover the burn area loosely with a sterile dressing, if available.
Transport to the nearest medical facility for additional treatment.
All burns should receive medical attention.

In case of eye contact : Cold product -
Flush eye with copious quantities of water.
Remove contact lenses, if present and easy to do. Continue rinsing.
If persistent irritation occurs, obtain medical attention.

Hot product -
If contact with hot product, immediately cool the burn area by flushing with large amounts of water.
Do not attempt to remove anything from the burn area.
Do not apply burn creams or ointments.
Remove contact lenses, if present and easy to do. Continue rinsing.
Cover the burn area loosely with a sterile dressing, if available.
Transport to the nearest medical facility for additional treatment.
All burns should receive medical attention.

If swallowed : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

Most important symptoms and effects, both acute and delayed : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Skin irritation signs and symptoms may include a burning sensation, redness, or swelling.
Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance.
Hot product - Contact with the skin can cause severe burns, redness, swelling, blisters and/or tissue damage.
Eye irritation signs and symptoms may include a burning

sensation, redness, swelling, and/or blurred vision.
Hot product - Contact with the eye can cause severe burns, redness, swelling, blurred vision, and may result in permanent loss of vision.
Ingestion may result in nausea, vomiting and/or diarrhoea.
Liver damage may be indicated by loss of appetite, jaundice (yellowish skin and eye colour), fatigue, bleeding or easy bruising and sometimes pain and swelling in the upper right abdomen.

Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.

Notes to physician : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
Call a doctor or poison control center for guidance.
Treat symptomatically.
Hydrogen sulphide (H2S) - CNS asphyxiant. May cause rhinitis, bronchitis and occasionally pulmonary oedema after severe exposure. CONSIDER: Oxygen therapy. Consult a Poison Control Center for guidance.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media : Do not use direct water jets on the burning product as they could cause a steam explosion and spread of the fire.
Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific hazards during firefighting : Hazardous combustion products may include:
A complex mixture of airborne solid and liquid particulates and gases (smoke).
Oxides of nitrogen
Oxides of sulphur.
Unidentified organic and inorganic compounds.
Flammable vapours may be present even at temperatures below the flash point.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Sinks in fresh water, floats on sea water and may be reignited on surface water.
Hydrogen sulphide (H2S) and toxic sulphur oxides may be given off when this material is heated. Do not depend on sense of smell for warning.
Carbon monoxide may be evolved if incomplete combustion occurs.

Specific extinguishing methods	:	Use water spray to cool unopened containers. Keep adjacent containers cool by spraying with water. If possible remove containers from the danger zone. If the fire cannot be extinguished the only course of action is to evacuate immediately. Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways.
Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	May ignite on surfaces at temperatures above auto-ignition temperature. Do not breathe fumes, vapour. Do not operate electrical equipment.
Environmental precautions	:	Take measures to minimise the effects on groundwater. Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Methods and materials for containment and cleaning up	:	Take precautionary measures against static discharges. For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Observe all relevant local and international regulations.
Remove contaminated clothing.
Evacuate the area of all non-essential personnel.
Avoid contact with skin, eyes and clothing.
Ventilate contaminated area thoroughly.

Additional advice	:	For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Notify authorities if any exposure to the general public or the environment occurs or is likely to occur. For guidance on disposal of spilled material see Section 13 of

this Safety Data Sheet.
Local authorities should be advised if significant spillages cannot be contained.
Maritime spillages should be dealt with using a Shipboard Oil Pollution Emergency Plan (SOPEP), as required by MARPOL Annex 1 Regulation 26.

7. HANDLING AND STORAGE

General Precautions	:	Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Prevent spillages. Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse. Ensure that all local regulations regarding handling and storage facilities are followed.
General Precautions		Maintenance and Fuelling Activities - Avoid inhalation of vapours and contact with skin.
Advice on safe handling	:	Ensure that all local regulations regarding handling and storage facilities are followed. The inherent toxic and olfactory (sense of smell) fatiguing properties of hydrogen sulphide require that air monitoring alarms be used if concentrations are expected to reach harmful levels such as in enclosed spaces, heated transport vessels and spill or leak situations. If the air concentration exceeds 10 ppm, the area should be evacuated unless respiratory protection is in use. Avoid prolonged or repeated contact with skin. When using do not eat or drink. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Earth all equipment. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. 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. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and

filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements.
These activities may lead to static discharge e.g. spark formation.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling.

Avoidance of contact : Strong oxidising agents.

Product Transfer : Avoid splash filling Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Keep containers closed when not in use. Refer to guidance under Handling section.

Storage

Other data : Drum and small container storage:
Drums should be stacked to a maximum of 3 high.
Use properly labeled and closable containers.
Prevent ingress of water.
Tank storage:
Tanks must be specifically designed for use with this product.
Bulk storage tanks should be diked (bunded).
Locate tanks away from heat and other sources of ignition.
Tanks should be fitted with heating coils.
Ensure heating coils are always covered with product (minimum 15 cm).
Electrostatic charges will be generated during pumping.
Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.
Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

Packaging material	:	Suitable material: For containers, or container linings use mild steel, stainless steel., Aluminium may also be used for applications where it does not present an unnecessary fire hazard., Examples of suitable materials are: high density polyethylene (HDPE) and Viton (FKM), which have been specifically tested for compatibility with this product., For container linings, use amine-adduct cured epoxy paint., For seals and gaskets use: graphite, PTFE, Viton A, Viton B. Unsuitable material: Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Examples of materials to avoid are: natural rubber (NR), nitrile rubber (NBR), ethylene propylene rubber (EPDM), polymethyl methacrylate (PMMA), polystyrene, polyvinyl chloride (PVC), polyisobutylene., However, some may be suitable for glove materials.
Container Advice	:	Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
Specific use(s)	:	Not applicable See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity). IEC/TS 60079-32-1: Electrostatic hazards, guidance Consult the technical guidelines for the use of this substance/mixture.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrogen sulfide	7783-06-4	CEIL	20 ppm	TH OEL
Hydrogen sulfide		PEAK	50 ppm	TH OEL
Hydrogen sulfide	7783-06-4	TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Further information: Central Nervous System impairment, Upper Respiratory Tract irritation			
Hydrogen sulfide		STEL	5 ppm	USA. ACGIH Threshold Limit Values (TLV)

	Further information: Central Nervous System impairment, Upper Respiratory Tract irritation			
Hydrogen sulfide		TWA	5 ppm 7 mg/m3	Shell Internal Standard (SIS) for 8-12 hour TWA.
Hydrogen sulfide		STEL	10 ppm 14 mg/m3	Shell Internal Standard (SIS) for 15 min (STEL)
Hydrogen sulfide	7783-06-4	CEIL	20 ppm	OSHA Z-2
Hydrogen sulfide		Peak	50 ppm	OSHA Z-2
Hydrogen sulfide		TWA	1 ppm	ACGIH
Hydrogen sulfide		STEL	5 ppm	ACGIH

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/
Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

Engineering measures : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:
Use sealed systems as far as possible.
Firewater monitors and deluge systems are recommended.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Eye washes and showers for emergency use.

General Information:

Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities

and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely.Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.
Do not ingest. If swallowed, then seek immediate medical assistance.

Personal protective equipment

Protective measures

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.

Select a filter suitable for organic gases and vapours [Type A boiling point >65°C (149°F)].

In areas where hydrogen sulphide vapours may accumulate, a positive-pressure air-supplied respirator is advised.

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Hand protection
Remarks : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. When prolonged or frequent repeated contact occurs, Nitrile gloves may be suitable. (Breakthrough time of > 240 minutes.) For incidental contact/splash protection Neoprene, PVC gloves may be suitable. When handling heated product wear heat resistant gloves.

For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Eye protection : If material is handled such that it could be splashed into eyes, protective eyewear is recommended.
Wear safety glasses and face shield (preferably with a chin guard) if splashes are likely to occur.
If a local risk assessment deems it so then chemical splash goggles may not be required and safety glasses may provide adequate eye protection.

Skin and body protection : Wear chemical and heat resistant gloves and boots. Where risk of splashing, also wear an apron.

Thermal hazards : When handling heated product, wear heat resistant gloves, safety hat with chin strap, face shield (preferably with a chin guard), safety glasses, heat resistant coveralls (with cuffs over gloves and legs over boots), neck protection and heavy duty boots, e.g. leather for heat resistance.

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

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.
Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.
Information on accidental release measures are to be found in section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	Not applicable
Odour	:	Not applicable
Odour Threshold	:	Data not available
pH	:	Not applicable
Melting point/freezing point	:	Data not available
Initial boiling point and boiling range	:	150 - 400 °C / 302 - 752 °F
Flash point	:	> 60 °C / 140 °F
Evaporation rate	:	Data not available
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	Typical 5 %(V)
Lower explosion limit	:	Typical 0.5 %(V)
Vapour pressure	:	<= 0.4 kPa (38.0 °C / 100.4 °F) Method: Unspecified
Relative vapour density	:	Data not available
Relative density	:	Data not available
Density	:	985 - 991 kg/m3 (15.0 °C / 59.0 °F)
Solubility(ies)		
Water solubility	:	negligible
Solubility in other solvents	:	Data not available
Auto-ignition temperature	:	> 250 °C / 482 °F
Viscosity		
Viscosity, kinematic	:	81 - 180 mm2/s (50 °C / 122 °F)
Explosive properties	:	Classification Code: Not classified.
Oxidizing properties	:	Not applicable
Conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material

		makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semiconductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Particle size	:	Data not available

10. STABILITY AND REACTIVITY

Reactivity	:	Stable under recommended storage conditions.
Chemical stability	:	Stable under normal conditions of use.
Possibility of hazardous reactions	:	No hazardous reaction is expected when handled and stored according to provisions
Conditions to avoid	:	Avoid heat, sparks, open flames and other ignition sources. In certain circumstances product can ignite due to static electricity.
Incompatible materials	:	Strong oxidising agents.
Hazardous decomposition products	:	Hazardous decomposition products are not expected to form during normal storage. Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation. Hydrogen sulphide. Hydrogen sulphide.

11. TOXICOLOGICAL INFORMATION

Basis for assessment	:	Information given is based on product data, a knowledge of the components and the toxicology of similar products.Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
Information on likely routes of exposure	:	Skin and eye contact are the primary routes of exposure although exposure may occur through inhalation or following accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity	:	LD50 Oral Rat: > 5,000 mg/kg Remarks: Low toxicity
Acute inhalation toxicity	:	LC 50 Rat: >1 - <=5 mg/l Exposure time: 4 h Remarks: Harmful if inhaled.
Acute dermal toxicity	:	LD 50 Rabbit: > 2,000 mg/kg Remarks: Low toxicity

Components:

fuel oil, residual:

Acute inhalation toxicity	:	LC 50 Rat, male and female: 4.1 mg/l Exposure time: 4 h Method: Test(s) equivalent or similar to OECD Test Guideline 403 Remarks: Based on data from similar materials Harmful if inhaled.

Skin corrosion/irritation

Product:

Remarks: Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis., Contact with hot material can cause thermal burns which may result in permanent skin damage., Slightly irritating to skin., Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation

Product:

Remarks: Hot product may cause severe eye burns and/or blindness., Slightly irritating to the eye., Based on available data, the classification criteria are not met.

Remarks: Irritating to eyes. (Hydrogen Sulfide)

Remarks: Irritating to eyes. (Hydrogen Sulfide)

Respiratory or skin sensitisation

Product:

Test Method: Respiratory sensitisation
Remarks: Not a sensitiser.
Based on available data, the classification criteria are not met.

Test Method: Skin sensitisation
Remarks: Not a skin sensitiser.

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

Germ cell mutagenicity

Product:

: Remarks: Positive in in-vitro, but negative in in-vivo mutagenicity assays.

Germ cell mutagenicity- Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity

Product:

Remarks: Causes cancer in laboratory animals.

Carcinogenicity - Assessment : Category 1B

Components:

fuel oil, residual:
Species: Mouse
Application Route: Dermal
Method: Test(s) equivalent or similar to OECD Test Guideline 451
Remarks: Based on data from similar materials, May cause cancer.

Material	GHS/CLP Carcinogenicity Classification
fuel oil, residual	Carcinogenicity Category 1B
Hydrogen sulfide	No carcinogenicity classification.

Reproductive toxicity

Product:

: Remarks: Causes foetotoxicity at doses which are maternally toxic.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Components:

fuel oil, residual:

: Species: Rat

Method: Test(s) equivalent or similar to OECD Test Guideline 414

Remarks: Based on data from similar materials, Suspected of damaging fertility or the unborn child.

STOT - single exposure

Product:

Remarks: Inhalation of vapours or mists cause irritation to the respiratory system. (Hydrogen Sulfide)

STOT - repeated exposure

Product:

Remarks: May cause damage to organs or organ systems through prolonged or repeated exposure.

Target Organs: Blood, Liver, thymus

Repeated dose toxicity

Components:

fuel oil, residual:

Rat:
Application Route: Skin contact
Exposure time: 90 d
Method: Test(s) equivalent or similar to OECD Test Guideline 411
Remarks: Based on data from similar materials

Aspiration toxicity

Product:

Not an aspiration hazard.

Further information

Product:

Remarks: H2S has a broad range of effects dependent on the airborne concentration and length of exposure: 0.02 ppm odour threshold, smell of rotten eggs; 10 ppm eye and respiratory tract irritation; 100 ppm coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes; 200 ppm potential for pulmonary oedema after >20-30 minutes; 500 ppm loss of consciousness after short exposures, potential for respiratory arrest; >1000ppm immediate loss of consciousness, may lead rapidly to death, prompt cardiopulmonary resuscitation may be required. Do not depend on sense of smell for warning. H2S causes rapid olfactory fatigue (deadens sense of smell). There is no evidence that H2S will accumulate in the body tissue after repeated exposure., Classifications by other authorities under varying regulatory frameworks may exist.

12. ECOLOGICAL INFORMATION

Basis for assessment : Fuels are typically made from blending several refinery streams. Ecotoxicological studies have been carried out on a variety of hydrocarbon blends and streams but not those containing additives.
Information given is based on a knowledge of the components and the ecotoxicology of similar products.Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity) :
Remarks: Harmful
LL/EL/IL50 >10 <= 100 mg/l

Toxicity to crustacean (Acute toxicity) :
Remarks: Toxic
LL/EL/IL50 > 1 <= 10 mg/l

Toxicity to algae/aquatic plants (Acute toxicity) :
Remarks: Very toxic.
LL/EL/IL50 < 1 mg/l

Toxicity to fish (Chronic toxicity) : Remarks: NOEC/NOEL > 0.01 - <=0.1 mg/l

Toxicity to crustacean (Chronic toxicity) : Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l

Toxicity to microorganisms (Acute toxicity) : Remarks: LL/EL/IL50 > 100 mg/l
Practically non toxic:
Based on available data, the classification criteria are not met.

Components:
fuel oil, residual :

Toxicity to fish (Acute toxicity) : LL50 (Oncorhynchus mykiss (rainbow trout)): 79 mg/l
Exposure time: 96 h
Method: Test(s) equivalent or similar to OECD Guideline 203
Remarks: Very toxic to fish.

Toxicity to crustacean (Acute toxicity) : EL50 (Daphnia magna (Water flea)): 0.22 mg/l
Exposure time: 48 h
Method: Test(s) equivalent or similar to OECD Guideline 202

Toxicity to algae/aquatic plants (Acute toxicity) : EL50 (Raphidocelis subcapitata (freshwater green alga)): 0.32 mg/l
Exposure time: 72 h
Method: Test(s) equivalent or similar to OECD Test Guideline 201

NOEL (Raphidocelis subcapitata (freshwater green alga)): 0.05 mg/l

Exposure time: 72 h
Method: Test(s) equivalent or similar to OECD Test Guideline 201

M-Factor (Short-term (acute) aquatic hazard)	:	1
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to crustacean(Chronic toxicity)	:	Remarks: Data not available
M-Factor (Long-term (chronic) aquatic hazard)	:	1

Persistence and degradability

Product:

Biodegradability	:	Remarks: The volatile constituents will oxidize rapidly by photochemical reactions in air., Major constituents are inherently biodegradable.

Components:
fuel oil, residual :

Biodegradability	:	Remarks: Data not available

Bioaccumulative potential

Product:

Bioaccumulation	:	Remarks: Contains constituents with the potential to bioaccumulate.

Components:
fuel oil, residual :

Bioaccumulation	:	Remarks: Data not available

Mobility in soil

Product:

Mobility	:	Remarks: Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day., Large volumes may penetrate soil and could contaminate groundwater., Contains volatile components., Sinks in fresh water, but will float on sea water and form a slick.

Other adverse effects

no data available

Product:

Additional ecological information	:	Films formed on water may affect oxygen transfer and damage organisms.

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses. Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination. Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand. MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.
Contaminated packaging	:	Send to drum recoverer or metal reclaimer. Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard if heated above the flash point. Do not puncture, cut or weld uncleaned drums. Do not pollute the soil, water or environment with the waste container. Comply with any local recovery or waste disposal regulations.
Local legislation Remarks	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.

14. TRANSPORT INFORMATION

International Regulations

ADR

UN number	:	3082
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuel oil, residual, Heavy fuel oil)
Class	:	9
Packing group	:	III
Labels	:	9
Hazard Identification Number	:	90
Environmentally hazardous	:	yes

IATA-DGR

UN/ID No.	:	UN 3082

Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuel oil, residual, Heavy fuel oil)
Class	:	9
Packing group	:	III
Labels	:	9

IMDG-Code

UN number	:	UN 3082
Proper shipping name	:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuel oil, residual, Heavy fuel oil)
Class	:	9
Packing group	:	III
Labels	:	9
Marine pollutant	:	yes

Maritime transport in bulk according to IMO instruments

MARPOL Annex 1 rules apply for bulk shipments by sea.

Special precautions for user

Remarks	:	Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

15. REGULATORY INFORMATION

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

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Hazardous Substance Act. B.E. 2535

Notification of Ministry of Industry on Hazard Classification and Communication System of Hazardous Substances B.E. 2555

Notification of the Ministry of Industry on the Transport of Hazardous Substances Responsible by the Department of Industrial Works B.E. 2558 (2015)

Notification of the Ministry of Industry Re: Registration of Containers Used to Transport Hazardous Materials Responsible by the Department of Industrial Works B.E. 2558 (2015)

Notification of the Department of Land Transport Re: Transport Documents that Must Be Provided for Vehicles Used in the Transport of Dangerous Goods B.E. 2563 (2020)

16. OTHER INFORMATION

Full text of H-Statements

H227	Combustible liquid.
H332	Harmful if inhaled.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Full text of other abbreviations

Acute Tox.	Acute toxicity
Aquatic Acute	Short-term (acute) aquatic hazard
Aquatic Chronic	Long-term (chronic) aquatic hazard
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
Repr.	Reproductive toxicity
STOT RE	Specific target organ toxicity - repeated exposure

Abbreviations and Acronyms

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Further information

Training advice	:	Provide adequate information, instruction and training for operators.
Other information	:	This product is intended for use in closed systems only.
Other information		A vertical bar (|) in the left margin indicates an amendment from the previous version.
Sources of key data used to compile the Safety Data Sheet	:	The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

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

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