

Attachment C3_1

Part C3 accompanying information

1 What activities are you applying to vary?

Table 1a

Schedule 1 listed activities			
Installation name	Schedule 1 references	Description of the Activity	Activity capacity
Stanlow Manufacturing Complex	Section 1.2 Part A(1)(d) – refining crude oil	Replacement of main crude distillation furnaces (F201 A/B/C) on the CDU4 plant with a single furnace (F204), which incorporates low-NOx burners to address BAT 34.	The purpose of CDU4 is to distil crude oil at rates up to 30,000 tonnes per day into its various components ranging from fuel gas (consisting of mainly methane and ethane hydrocarbons), LPG, Naphtha, Kerosene, Gas Oil and Residue. This permit application will not alter the throughput on the CDU4 plant.

2 Point source emissions to air, water and land

Table 2

Point source emissions to air

Emission point reference and location	Source	Parameter	Quantity (F204 Guaranteed Emission Concentration)	Unit
See Attachment C2_2 Table 2				

3 Operating techniques

Table 3

3a Technical Standards

Installation name	Stanlow Manufacturing Complex	
Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference)	Document reference (if appropriate)
Section 1.2 Part A(1)(d) – refining crude oil	BAT 34	“Prevent or reduce NOx emissions to air from the combustion units”
Replacement of main crude distillation furnaces (F201 A/B/C) on the CDU4 plant with a single furnace (F204), which incorporates low-NO _x burners to address BAT 34.	BAT 4	“Monitor emissions to air and key process parameters”
	BAT 2	“Use energy efficiently”
	TGN-M1	Sampling requirements for stack emission Monitoring <i>Environment Agency Version 8 August 2017</i>

Table 5

3c Types and amounts of raw materials

Name of the installation		Stanlow Manufacturing Complex, CDU4 plant		
Capacity		30,000 tonnes per day		
Schedule 1 Activity	Description of raw material and composition	Maximum amount (tonnes)	Annual throughput (tonnes each year)	Description of the use of the raw material including any main hazards (include safety data sheets)
Section 1.2 Part A(1)(d) – refining crude oil	Crude Oil	No change	No change	The purpose of CDU4 is to distil crude oil at rates up to 30,000 tonnes per day into its various components ranging from fuel gas (consisting of mainly methane and ethane hydrocarbons), LPG, Naphtha, Kerosene, Gas Oil and Residue. This permit application will not alter the throughput on the CDU4 plant. Safety Data Sheet - see ‘Attachment C3_2’

4 Monitoring

4a Describe the measures you use for monitoring emissions by referring to each emissions point in Table 2 above:

With reference to Figure 4(a), a number of CEMs certified quality instruments will be installed in the new CDU4 furnace stack. The Particulate analyser, Temperature, Pressure and Flow Sensor will all measure the stack flue directly in the stack. The Gas CEMs will send the sample 70m (via temperature controlled heated sample tubing) to the new analyser house and the multi-gas analyser will analyse for relevant gases.

Four Standard Reference Method (SRM) nozzles will be fitted to the stack on the same platform (not shown on Figure 4(a)). This will enable periodic measurements such as homogeneity testing and SRM sampling for QAL 2 and AST, etc.

Equipment details:

SICK MCS200 HW Multi-gas Analyser

SICK DH SB100 Particulate Analyser

SICK FS 100 Flow Sensor

All Equipment Mcert approved.

Essar will follow EN 14181 – QAL 1, QAL 2 and ongoing QAL 3. Service contract in place with SOCOTEC – Essar’s Stack Testers (SRM). Analyser OEM will be used to service the analytical equipment. Essar Analyser Team will be used to conduct QAL 3 checks and first line maintenance support work.

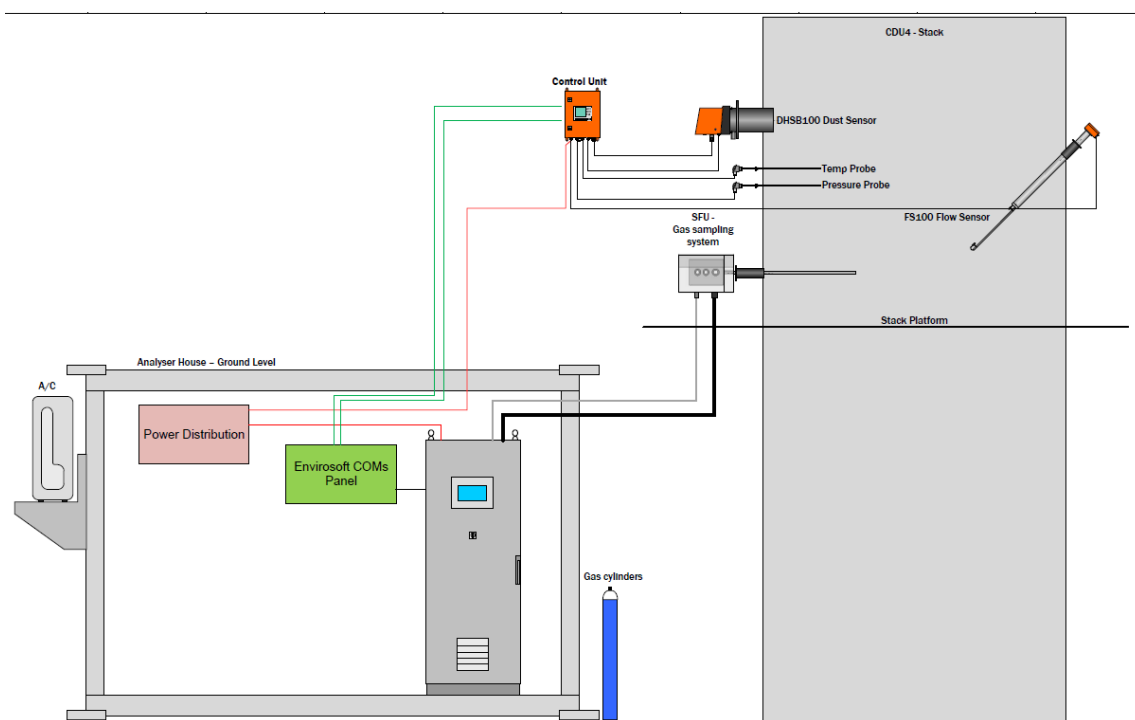


Figure 4 (a): CDU4 CEMS System

4b4

The total height of the stack is 72m. The inside diameter of the stack is 3.85m.

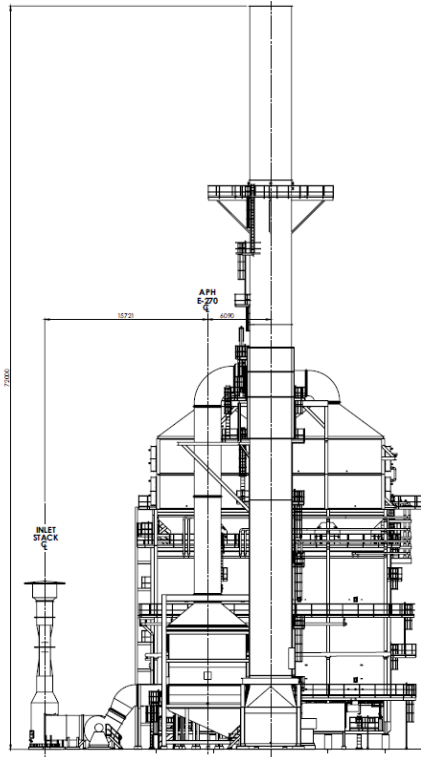


Figure 4 (b): Furnace GA

Nozzle Name	Elevation from Grade (mm)	Distance from Stack Outlet (mm)
CEMS 1 – Main Sample	54330	17670
CEMS 2 – Particulates	54130	17870
CEMS 3 – Flow Probe	53830	18170
CEMS 4 – Combined P&T	54130	17870
SRM –Sample Nozzles	54830	17170

5 HD would be 19.25m. As per the table above the CEMS nozzles vary between 4.5 and 4.7 HD from the stack outlet.

This is compliant with Annex 1 of TGN-M1 (Version 8, August 2017):

Annex 1 - Check sheet of sample facility requirements for plant designers / operators

Characteristic	Requirement	✓
Sample plane location	As far downstream or upstream from any disturbance, which could produce a change in direction of flow (e.g. bends, fans)	
	In a section of duct with constant shape and cross sectional area	
	Recommend five hydraulic diameters* upstream and two hydraulic diameters downstream (or five hydraulic diameters from the top of the stack)	

The design contractor therefore considers that this is compliant with UK regulatory requirements (as required by TGN-M1).

The contractor also considers that the purpose of the 5D from the outlet of the stack is to avoid the linear flow of the exhaust gas (required for consistent, reliable flow measurement and sampling) being disrupted by any outside influence, such as very strong wind blowing across the top of the stack. The physical distance downstream of the CEMS measurement plane is more than 17.5m (approx. 4.5 HD) for all probes. With this in mind, they consider that the likelihood of the exhaust gas flow being disrupted by an outside influence is very low.

6 Resource efficiency and climate change

F204 has a design energy efficiency of 91.7%, which is an improvement on the design energy efficiency of the existing crude furnaces F201A/B/C (87.1%). This increase in energy efficiency is due to the following design factors:

- Energy efficient burners
- Improved control systems and instrumentation – which enable the furnace to operate at optimised fuel/air ratios
- Electrically-driven fans (used to supply combustion air)
- Improved design for energy recovery – the furnace is designed to optimise air-preheating etc.

There will be no change to the use of raw and other materials / substances and water that will be used on the CDU4 plant following installation of the new furnace.

Safety Data Sheet

Crude oil (Equinor, Norwegian continental shelf)

Replaces date: 15/08/2018

Revision date: 14/09/2021

Version: 2.3.0

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

1.1. Product identifier

Trade name:	Crude oil (Equinor, Norwegian continental shelf)
Substance name:	Crude oil
CAS No:	8002-05-9
EC No:	232-298-5
Synonyms:	Glitne; Grane; Gullfaks; Vigdis; Visund; Tordis; Smørbukk; Midgard; Mikkel; Kristin; Yttergryta; Tyrihans; Heidrun; Njord; Norne; Urd; Alve; Oseberg; Statfjord; Snorre; Sygna; Troll; Fram; Kvitebjørn; Volve; Brage; Huldra/Veslefrikk; Morvin; Asgard; Gimle; Gudrun; Gina Krog, Johan Sverdrup; Martin Linge.
Other Information:	Exempted from REACH registration according to REACH Annex V.

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

Recommended uses:	Drilling and production operations. Raw material used for refining of petroleum products.
Inadvisable uses:	None.

1.3. Details of the supplier of the safety data sheet

Supplier

Company:	Equinor ASA (CLP)
Address:	Forusbeen 50
Zip code:	4035
City:	Stavanger
Country:	NORWAY
E-mail:	chem@equinor.com
Phone:	+47 56 34 40 00

1.4. Emergency Telephone Number

Members of the public: 111 (NHS 111 (Scotland: NHS 24))

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

CLP-classification:	Flam. Liq. 1;H224 Asp. Tox. 1;H304 Skin Irrit. 2;H315 Eye Irrit. 2;H319 STOT SE 3;H336 Muta. 1B;H340 Carc. 1A;H350 Repr. 2;H361f STOT RE 1;H372 Aquatic Chronic 2;H411
Most serious harmful effects:	Extremely flammable liquid and vapour. May be fatal if swallowed and enters airways. Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness. May cause genetic defects. May cause cancer. Suspected of damaging fertility. Causes damage to organs through prolonged or repeated exposure. Toxic to aquatic life with long lasting effects. This hazard is relevant to Glitne, Grane, Heidrun, Gullfaks and Volve, where the sulphur content is >0,50 % : Risk of H2S development especially in confined areas with low air ventilation. H2S is a toxic gas.. Prolonged or repeated exposure by skin contact or inhalation of vapours may cause damage to the central nervous system.

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2.2. Label elements

Pictograms



Signal word: Danger

Contains

Substance: Crude oil

CAS No: 8002-05-9

H-phrases

H224 Extremely flammable liquid and vapour.
 H304 May be fatal if swallowed and enters airways.
 H315 Causes skin irritation.
 H319 Causes serious eye irritation.
 H336 May cause drowsiness or dizziness.
 H340 May cause genetic defects.
 H350 May cause cancer.
 H361f Suspected of damaging fertility.
 H372 Causes damage to organs through prolonged or repeated exposure.
 H411 Toxic to aquatic life with long lasting effects.

P-phrases

P201 Obtain special instructions before use.
 P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 P308+313 IF exposed or concerned: Get medical advice/attention.
 P403+235 Store in a well-ventilated place. Keep cool.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P301+310+331 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Do NOT induce vomiting.
 P391 Collect spillage.

Supplemental information

Restricted to professional users. Restricted to professional users.

2.3. Other hazards

The product does not contain any PBT or vPvB substances.

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance	CAS No./ EC No./ REACH Reg. No.	Concentration	Notes	CLP-classification
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Crude oil	8002-05-9 232-298-5	100 %		Flam. Liq. 1;H224 Asp. Tox. 1;H304 Skin Irrit. 2;H315 Eye Irrit. 2;H319 STOT SE 3;H336 Muta. 1B;H340 Carc. 1A;H350 Repr. 2;H361f STOT RE 1;H372 Aquatic Chronic 2;H411
n-hexane	110-54-3 203-777-6	0.02 - 5%		Flam. Liq. 2;H225 Asp. Tox. 1;H304 Skin Irrit. 2;H315 STOT SE 3;H336 Repr. 2;H361f STOT RE 2;H373 Aquatic Chronic 2;H411
benzene	71-43-2 200-753-7	0.06 - 1.50%		Flam. Liq. 2;H225 Asp. Tox. 1;H304 Skin Irrit. 2;H315 Eye Irrit. 2;H319 Muta. 1B;H340 Carc. 1A;H350 STOT RE 1;H372
sulfur *	7704-34-9 231-722-6	< 0.50%		Skin Irrit. 2;H315

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

Ingredient comments: *At Glitne, Grane, Heidrun, Gullfaks and Volve, the sulphur content is > 0,50 %.

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation:** Seek fresh air. Seek medical advice in case of persistent discomfort.
- Ingestion:** Wash out mouth thoroughly and drink 1-2 glasses of water in small sips. Do not induce vomiting. If vomiting occurs, keep head low so that stomach contents do not enter lungs. Immediately call a POISON CENTER or doctor/physician.
- Skin contact:** Remove contaminated clothing. Wash skin with soap and water. Immediately remove contaminated clothing. Seek medical advice in case of persistent discomfort.
- Eye contact:** Flush immediately with water (preferably using eye wash equipment) for at least 5 minutes. Open eye wide. Remove any contact lenses. Seek medical advice.
- Burns:** Flush with water until pain ceases. Remove clothing that is not stuck to the skin - seek medical advice/transport to hospital. If possible, continue flushing until medical attention is obtained.
- General:** When obtaining medical advice, show the safety data sheet or label.

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

Irritating to eyes. Causes a burning sensation and tearing. Irritating to skin - may cause reddening. The product releases organic solvent vapours which may cause lethargy and dizziness. At high concentrations, the vapours may cause headache and intoxication. May cause chemical pneumonia if ingested or vomited. Degreases and dries the skin. Repeated exposure may cause skin dryness or cracking. Causes damage to organs through prolonged or repeated exposure. Suspected of damaging fertility or the unborn child. May cause genetic defects. May cause cancer.

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

Ensure that medical personnel are aware of the material involved, and take precautions to protect themselves.

SECTION 5: Firefighting measures

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5.1. Extinguishing media

Suitable extinguishing media: Extinguish with powder, foam, carbon dioxide or water mist. Use water or water mist to cool non-ignited stock.

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

5.2. Special hazards arising from the substance or mixture

Can generate harmful flue gases containing carbon monoxide in the event of fire.

5.3. Advice for firefighters

Wear Self-Contained Breathing Apparatus (SCBA) with a chemical protection suit. Wear Self-Contained Breathing Apparatus (SCBA) with a chemical protection suit only where personal (close) contact is likely.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: Take precautionary measures against static discharges. Use spark-free tools and explosion proof equipment. Smoking and naked flames prohibited. Wear gloves. Stay upwind/keep distance from source. Keep unnecessary personnel away. Provide good ventilation. Wear suitable protective clothing. Wear safety goggles.

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

6.2. Environmental precautions

Stop leak if this can be done without risk. Prevent spillage from entering drains and/or surface water. Notify proper authorities in case of contamination of soil or aquatic environment or discharge to drains.

6.3. Methods and material for containment and cleaning up

Contain and absorb spill with sand or other absorbent, non-combustible material and transfer to suitable waste containers.

6.4. Reference to other sections

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

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Running water and eye wash equipment should be available. A safety shower should be available. Do not store, use and/or consume foods, beverages or tobacco products in the work room. Store personal protective equipment separately from other clothing. Smoking and naked flames prohibited. Permanent workplaces must have effective process ventilation, e.g. local exhaust ventilation.

Where this is not possible, wear respiratory protective equipment as indicated below. Make sure the room is well ventilated. A workplace assessment must be conducted to ensure that employees are not exposed to effects that may involve a risk during pregnancy.

7.2. Conditions for safe storage, including any incompatibilities

Store safely, out of reach of children and away from food, animal feeding stuffs, medicines, etc. Store locked up. Keep in tightly closed original packaging. Store in a well-ventilated area.

7.3. Specific end use(s)

None.

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SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limit:	Contains no substances subject to reporting requirements
Measuring methods:	Compliance with the stated occupational exposure limits may be checked by occupational hygiene measurements.
Legal basis:	Directive 2000/39/EC as subsequently amended. EH40/2005 Workplace exposure limits. Last amended January 2020.

8.2. Exposure controls

Appropriate engineering controls:	Wear the personal protective equipment specified below.
Personal protective equipment, eye/face protection:	Wear safety goggles if there is a risk of eye splash. Eye protection must conform to EN 166.
Personal protective equipment, skin protection:	Wear suitable protective clothing.
Personal protective equipment, hand protection:	Light use (small volume, shortterm contact (below 10 min.)): Use disposable gloves of nitrile rubber. Change gloves immediately if contaminated, and wash hands with soap and water. Medium use (medium volume, medium contact (1-2 hours)): Wear gloves. Type of material: Nitrile rubber. Heavy use (high volume, longterm contact (more than 2 hours)): Wear gloves. Type of material: Nitrile rubber. Gloves must conform to EN 374. Breakthrough time has not been determined for the product. Change gloves often.
Personal protective equipment, respiratory protection:	Light use (small volume, shortterm contact (below 10 min.)): Not required. Medium use (medium volume, medium contact (1-2 hours)): In case of insufficient ventilation, wear respiratory protective equipment. Filter type: A. Respiratory protection must conform to one of the following standards: EN 136/140/145.
Environmental exposure controls:	Ensure compliance with local regulations for emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Parameter	Value/unit
State	Liquid
Colour	Dark brown
Odour	Crude oil.
Solubility	Not miscible with the following: Water.

Parameter	Value/unit	Remarks
Odour threshold		N/A
Melting point	No data	
Freezing point	No data	
Initial boiling point and boiling range	< 35 °C	
Flammability (solid, gas)		Extremely flammable
Flammability limits	No data	

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Explosion limits	No data	
Flash Point	< 23 °C	
Auto-ignition temperature	No data	
Decomposition temperature	No data	
pH (solution for use)	No data	
pH (concentrate)	No data	
Kinematic viscosity	No data	
Viscosity	< 20.50 mm ² /s	40°C
Partition coefficient n-octanol/water	No data	
Vapour pressure	No data	
Density	No data	
Relative density	0.8 - 0.9 g/cm ³	
Vapour density	No data	
Relative density (sat. air)	No data	
Particle characteristics	No data	

9.2. Other information

Parameter	Value/unit	Remarks
Explosive properties		N/A
Oxidising properties		N/A

Other Information: None.

SECTION 10: Stability and reactivity

10.1. Reactivity

Not reactive.

10.2. Chemical stability

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

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Avoid heating and contact with ignition sources.

10.5. Incompatible materials

Avoid contact with the following: Strong oxidisers.

10.6. Hazardous decomposition products

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

SECTION 11: Toxicological information

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

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Acute toxicity - oral:	Ingestion may cause discomfort. The product does not have to be classified. Test data are not available.
Acute toxicity - dermal:	The product does not have to be classified. Test data are not available.
Acute toxicity - inhalation:	The product does not have to be classified. Test data are not available.
Skin corrosion/irritation:	Irritating to skin - may cause reddening. Test data are not available.
Serious eye damage/eye irritation:	Irritating to eyes. Causes a burning sensation and tearing. Test data are not available.
Respiratory sensitisation or skin sensitisation:	The product does not have to be classified. Test data are not available.
Germ cell mutagenicity:	The product may cause heritable genetic damage. Test data are not available.
Carcinogenic properties:	May cause cancer. Test data are not available.
Reproductive toxicity:	Suspected of damaging fertility. Test data are not available.
Single STOT exposure:	The product releases organic solvent vapours which may cause lethargy and dizziness. At high concentrations, the vapours may cause headache and intoxication. Test data are not available.
Repeated STOT exposure:	May cause damage to organs through prolonged or repeated exposure. Test data are not available.
Aspiration hazard:	May cause chemical pneumonia if ingested or vomited. Test data are not available.

11.2. Information on other hazards

Other toxicological effects: None known.

SECTION 12: Ecological information

12.1. Toxicity

Toxic to aquatic life with long lasting effects. Test data are not available.

12.2. Persistence and degradability

The substance which is insoluble in water, and it will consequently spread on water surfaces. Slow degradation. Expected to be biodegradable.

12.3. Bioaccumulative potential

Test data are not available.

12.4. Mobility in soil

Test data are not available.

12.5. Results of PBT and vPvB assessment

No assessment has been made.

12.6. Endocrine disrupting properties

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12.7. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Avoid release to the environment. Collect spills and waste in closed, leak-proof containers for disposal at the local hazardous waste site.

Category of waste: EWC code: Depends on line of business and use, for instance 16 07 08* wastes containing oil
If this product as supplied becomes a waste, it meets the criteria of a hazardous waste (Dir. 2008/98/EU). Collect spills and waste in closed, leak-proof containers for disposal at the local hazardous waste site.

Absorbent/cloth contaminated with the product: EWC code: 15 02 02 absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances.

SECTION 14: Transport information

Land transport (ADR/RID)

14.1. UN number or ID number:	1267	14.4. Packing group:	I
14.2. UN proper shipping name:	PETROLEUM CRUDE OIL	14.5. Environmental hazards:	The product must be labelled as an environmental hazard (symbol: fish and tree) in packaging sizes of more than 5 kg/l.
14.3. Transport hazard class(es):	3		
Hazard label(s):	3		
Hazard identification number:	33	Tunnel restriction code:	D/E
Other Information:	-		

Inland water ways transport (ADN)

14.1. UN number or ID number:	1267	14.4. Packing group:	I
14.2. UN proper shipping name:	PETROLEUM CRUDE OIL	14.5. Environmental hazards:	The product must be labelled as an environmental hazard (symbol: fish and tree) in packaging sizes of more than 5 kg/l.
14.3. Transport hazard class(es):	3		
Hazard label(s):	3		
Transport in tank vessels:	-	Other Information:	-

Sea transport (IMDG)

14.1. UN number or ID number:	1267	14.4. Packing group:	I
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14.2. UN proper shipping name:	PETROLEUM CRUDE OIL	14.5. Environmental hazards:	The product must be labelled as a Marine Pollutant (MP) in packaging sizes of more than 5 kg/l.
14.3. Transport hazard class(es):	3	Environmental Hazardous Substance Name(s):	Crude oil
Hazard label(s):	3	IMDG Code segregation group:	- None -
EmS:	F-E, S-E		
Other Information:	-		

Air transport (ICAO-TI / IATA-DGR)

14.1. UN number or ID number:	1267	14.4. Packing group:	I
14.2. UN proper shipping name:	PETROLEUM CRUDE OIL	14.5. Environmental hazards:	The product should not be labelled as an environmental hazard (symbol: fish and tree).
14.3. Transport hazard class(es):	3	Other Information:	-
Hazard label(s):	3		

14.6. Special precautions for user

This hazard is relevant to Glitne, Grane, Heidrun, Gullfaks and Volve, where the sulphur content is > 0,50 % : Risk of H2s development especially in confined areas with low air ventilation. H2S is a toxic gas. None.

14.7. Maritime transport in bulk according to IMO instruments

Product name: Petrolatum; Ship type: 3; Pollution category: Z Not included.

SECTION 15: Regulatory information

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

Special Provisions: Special care should be applied for employees under the age of 18. Young people under the age of 18 may not carry out any work causing harmful exposure to this product. Directive 2012/18/EU (Seveso), E2 Hazardous to the Aquatic Environment in Category Chronic 2 : Column 2: 200 t, Column 3: 500 t. Directive 2012/18/EU (Seveso), P5a FLAMMABLE LIQUIDS: Column 2: 10 t, Column 3: 50 t.

Covered by:

15.2. Chemical Safety Assessment

Other Information: Chemical safety assessment has not been performed.

SECTION 16: Other information

Version history and indication of changes

Version	Revision date	Responsible	Changes
2.3.0	14/09/2021	Bureau Veritas HSE/ SRU	1, 8, 16
2.2.0	15/08/2018	Bureau Veritas HSE/ SRU	1, 16
2.1.0	10/11/2017	CGJ/Bureau Veritas HSE Denmark A/S	1, 9, 16
2.0.0	08/04/2016	Kim Due Clemmensen	1-16

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Abbreviations:
DNEL: Derived No Effect Level
PBT: Persistent, Bioaccumulative and Toxic
PNEC: Predicted No Effect Concentration
STOT: Specific Target Organ Toxicity
vPvB: Very Persistent and Very Bioaccumulative

Training advice: A thorough knowledge of this safety data sheet should be a prerequisite condition.

Classification method: Calculation based on the hazards of the known components.

List of relevant H-statements

H224	Extremely flammable liquid and vapour.
H225	Highly flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H350	May cause cancer.
H361f	Suspected of damaging fertility.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.

SDS is prepared by

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