

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND COMPANY/ORGANIZATION

1.1 Product identification

Name of substance/mixture:	ATZ FLUX GAS OIL
Synonyms	Gas oil (petroleum), primary distillates Gas oils (petroleum), straight-run
CAS number	64741-43-1
EC number	265-043-1
Index number	not available
Registration number	01-2119488519-20-0030
Chemical formula	The substance is an UVCB complex (prC3), and thus it is not possible to provide a molecular formula.
Molecular weight	The substance is an UVCB complex (prC3), and thus it is not possible to provide a molecular formula.

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

Common uses fuel for heating and other industrial uses

Uses identified in the chemical safety report: general list of applications:

Life cycle:

Manufacture Manufacturing of the substance

Formulation or repacking: Formulation & (re)packing of substances and mixtures

Use at industrial sites: Use as an intermediate, use in oil and gas field drilling and production operations, use in fuels

Generalised use by

professional operators: Use in fuels

Consumer use (G28): Use in fuels

Uses advised against:

Generalised use by professional operators and consumers: Professional or consumer uses of SRGO (straight run gas oils) substances (in coatings, detergents, lubricants, metalworking fluids, binders and release agents, explosives, functional fluids, road and construction applications, and other consumer uses) are not recommended. Although these uses were previously supported, the ECHA Committee for Risk Assessment (RAC) issued an opinion in 2011 stating that certain petroleum-based products in the Naphtha and Kerosene categories present a risk of chronic toxicity to the central nervous system. This opinion proposes more stringent exposure limits that are incompatible with the chemical safety assessments carried out for these uses of SRGO substances. Since SRGO substances have similarities with the substances specified in the opinion, the opinion is applied to all SRGOs.

Consult the annex for a complete list of the uses for which an exposure scenario is envisaged.

1.3 Information on the supplier of the safety data sheet:

Company name	ALMA PETROLI S.p.A.
Address	Via di Roma 67 - Via Baiona 195
City / Country	Ravenna, Italy
Phone	0039054434317-00390544696411
E-mail of competent Technician	info@almapetroli.com

ATZ FLUX GAS OIL

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1.4 Emergency telephone number:

Poison centre - Telephone consultation operative (24/7):

Niguarda Hospital Milan Tel: 02 66101029,

Poison centre Pavia: Tel. 0039 0382 24444,

Poison centre Bergamo: Tel: 800 883300,

Poison centre Foggia: Tel 0039-0881-732326,

Poison centre Florence: Tel 0039-055-7947819,

Poison centre Policlinico Umberto I Rome: Tel 0039-06-490663,

Poison centre Policlinico "A.Gemelli": Tel 0039-06-3054343,

Poison centre Cardarelli Naples: Tel: 081-5453333/7472870

Alma Petroli - Sciascia Antonino (Employer) - Mob. 0039-3461305790 (24/7)

Alma Petroli - Fabbri Maurizio (RSPP) - Mob. 0039-3461321422 (24/7)

SECTION 2. IDENTIFICATION OF THE HAZARDS

Physical-chemical hazards: flammable liquids and vapours

Health hazards: the substance is harmful if inhaled. Given its low viscosity, the product can be inhaled into the lungs either following direct swallowing or after spontaneous or induced vomiting; this can give rise to chemical pneumonia. May cause damage to organs through prolonged or repeated exposure

Environmental hazards: the substance is toxic for aquatic organisms with long-term adverse effects in the aquatic environment.

2.1 Classification of the substance or mixture

Asp. Tox. 1: H304

Flamm Liq.3; H226

Acute Tox 4: H332

STOT Rep.Exp.2: H373 (liver, spleen and bone marrow)

Aquatic Chronic 2: H411

The list of H-phrases is reported in section 16.

Note: the classification was attributed taking into account the following SRGO characteristics: Viscosity $\leq 20.5 \text{ mm}^2/\text{s}$ at $40 \text{ }^\circ\text{C}$; Flash point $\geq 23 \text{ }^\circ\text{C}$ and $\leq 75 \text{ }^\circ\text{C}$.

2.2 Elements in the label



GHS02



GHS08



GHS07



GHS09

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Signal word: HAZARD

Hazard statements:

H226: Flammable liquid and vapours
 H304: May be fatal if swallowed and enters airways
 H332: Harmful if inhaled
 H373: May cause damage to organs through prolonged or repeated exposure
 H411: Toxic to aquatic life with long lasting effects
 EUH066: Exposure may cause skin dryness and cracking

Precautionary statements:

Prevention

P210: Keep away from sources of heat, hot surfaces, sparks, open flames or other sources of ignition. Do not smoke
 P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
 P273: Avoid release to the environment
 P280: Wear protective gloves/protective clothing/eye protection/face protection

Reaction

P301+310: IF SWALLOWED: immediately call a POISON CENTRE or doctor/physician
 P332+313: If skin irritation occurs: get medical advice/attention
 P331: DO NOT induce vomiting

Disposal

P501: Dispose of contents/container in compliance with It. Leg. Dec. 152/06 and subsequent amendments and integrations

Additional information: Not available

Authorisation no.: n.a.

2.3 Other hazards

When heated the product emits vapours that may form flammable, explosive mixtures with air. The vapours are heavier than air: they can accumulate in confined or low-lying spaces, propagate at ground level and can lead to the risk of fire and explosion, even from a distance. There is the risk of thermal burns if the product comes into direct contact with the skin or eyes since it is handled at high temperatures.

The product does not meet the PBT or vPvB classification criteria as per REACH annex XIII.

SECTION 3. COMPOSITION / INFORMATION ON THE INGREDIENTS

3.1 Substances

UVCB substance: "Complex combination of hydrocarbons produced by distillation of crude oil. It is composed of hydrocarbons generally containing between C11 and C25 carbon atoms and having a boiling point in the 205°C - 400°C range approx."

Name	EC no.	CAS no.	Index no.	Registration no.
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ATZ FLUX GAS OIL

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3.2 Mixtures

n.a.

SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

- Eye contact:** Rinse cautiously with water for several minutes (814). Remove contact lenses, if this can be done easily (808). If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist (721).
- Skin contact:** remove contaminated clothing, contaminated footwear and dispose of safely (811). Wash the affected area with soap and water (849). Seek medical attention if skin irritation, swelling or redness develops and persists (817).
For minor thermal burns, cool the injured area (705). Hold the burned area under cold running water for at least five minutes, or until the pain subsides (709). Body hypothermia must be avoided (659). See sect. 2.3.
When using high-pressure equipment, injection of product can occur (850). If high-pressure injuries occur, immediately seek professional medical attention (718). Do not wait for symptoms to develop (686).
- Ingestion/aspiration:** Do not induce vomiting as there is high risk of aspiration (680). Do not give anything by mouth to an unconscious person (679).
In the event of spontaneous vomiting, keep the casualty's head down to prevent the risk of breathing vomit into the lungs.
- Inhalation:** Inhalation of vapours at ambient temperature is unlikely because of the low vapour pressure of the product. Exposure to vapours may however occur when the product is handled at high temperatures with poor ventilation (696). In case of symptoms arising from inhalation of fumes, mists or vapours (744), transfer the casualty to a quiet and well ventilated place if safe to do so (804).
If the casualty is unconscious (716) and not breathing (790), ensure that there is no obstruction to breathing and give artificial respiration by trained personnel (694). If necessary, give external cardiac massage and obtain medical advice (723).
If the casualty is breathing (660), place in the recovery position (724). Administer oxygen if necessary (649).

4.2 Primary symptoms and effects, both acute and delayed

May cause skin irritation (825), slight eye irritation (826), irritation of the respiratory tract due to excess fume, mists or vapour exposure (767). If swallowed: few or no symptoms expected (700). If any, nausea and diarrhoea might occur (711).

4.3 Indication of any immediate medical attention and special treatment needed

In case of ingestion, always assume that aspiration has occurred (740). The casualty should be sent immediately to a hospital (823). Do not wait for symptoms to develop (686).

ATZ FLUX GAS OIL

REV.: G

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SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Small scale fires: earth or sand (872), carbon dioxide (852), foam (859), dry chemical powder (856). Large scale fires: foam (859), water fog (887). Note: sprayed water (water fog) can only be used by specially trained personnel. Other inert gases (subject to regulations) (870)

Unsuitable extinguishing media: Do not use direct water jets on the burning product (855), they could cause splattering and spread the fire (881). Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam (873).

5.2 Special hazards arising from the substance or mixture

Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates, gases, including carbon monoxide (867), H₂S (Hydrogen sulphide), SO_x (sulphur oxides) or H₂SO₄ (sulphuric acid) (861) unidentified organic and inorganic compounds (886).

5.3 Recommendations for fire-fighting personnel

In case of a large fire or in confined or poorly ventilated spaces, wear full fire resistant protective clothing and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode (864).

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For those who do NOT intervene directly

Stop or contain leak at the source, if safe to do so (1006). Avoid direct contact with released material (903). Stay upwind (1003). In case of large spillages, alert occupants in downwind areas (956). Keep non-involved personnel away from the area of spillage. Alert emergency personnel (968). Except in case of small spillages (925), the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency (1007). Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares) (920).

6.1.2 For those who intervene directly

Small spillages (995): normal antistatic working clothes are usually adequate (983).

Large spillages: full body suit of chemically resistant and antistatic material (973). Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons (1028). Gloves made of PVA (polyvinyl alcohol) are not water-resistant, and are not suitable for emergency use (933). Work helmet (1030). Antistatic non-skid safety shoes or boots (899). Chemically resistant. Goggles or face shield, if splashes or contact with eyes is possible or anticipated (934). Respiratory protection: a half or full-face respirator with filter(s) for organic vapours (and when applicable for H₂S) (892) or a Self-Contained Breathing Apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure (895). If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used (951).

6.2 Environmental precautions

Prevent product from entering sewers, rivers or other bodies of water (985).

6.3 Methods and materials for containment and cleaning

Spillages onto land: If necessary dike the product with dry earth, sand or similar non-combustible materials (940). Large spillages may be cautiously covered with foam, if available, to limit fire risk (970). Do not use direct

ATZ FLUX GAS OIL

REV.: G

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jets (918). When inside buildings or confined spaces, ensure adequate ventilation (1022). Absorb spilled product with suitable non-combustible materials (896). If it is necessary to store any contaminated materials for subsequent safe disposal, only suitable containers (airtight, sealed, waterproof, and earthed) should be used (939). In case of soil contamination, remove contaminated soil and treat in accordance with local regulations (959).

Spillage in water:

In case of small spillages in closed waters (e.g.: in ports) (957), contain product with floating barriers or other equipment (958). Collect spilled product by absorbing with specific floating absorbents (910). Large spillages (972): if possible, large spillages in open waters should be contained with floating barriers or other mechanical means (948). The use of dispersants should be advised by an expert, and, if required, approved by local authorities (1012). If possible, collect the product and contaminated materials with mechanical means, and store/dispose of according to relevant regulations (945).

Recommended measures are based on the most likely spillage scenarios for this material. Local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions (990). For this reason, local experts should be consulted when necessary (930).

6.4 Reference to other sections

For more information regarding personal protective equipment see section "Exposure control/personal protection" (1086).

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures (containment and preventive measures)

Ensure that all relevant regulations regarding handling and storage facilities of flammable products are followed (1080).

Take precautionary measures against static electricity (1140). Ground/bond containers, tanks and transfer/receiving equipment (1087). The vapour is heavier than air (1137). Beware of accumulation in pits and confined spaces (1051). Keep away from heat/sparks/open flames/hot surfaces (1097). Do not smoke. Avoid contact with skin and eyes (1041). Do not swallow (1072). Do not breathe vapours (1070).

Use and store only outdoors or in a well-ventilated area (1148). Avoid contact with the product (1045). Use adequate personal protective equipment as needed (1146). Do not use compressed air for filling, discharging or handling operations (1073). Prevent the risk of slipping (???). Avoid release to the environment.

ATZ FLUX GAS OIL

REV.: G

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7.1.2 General recommendations regarding hygiene in the workplace

Ensure that proper housekeeping measures are in place (1081). Contaminated material should not be allowed to accumulate in the workplaces and should never be kept inside the pockets (1061). Keep away from food and beverages (1096). Avoid contact with skin (1042). Do not eat, drink or smoke when using this product (1041). Wash the hands thoroughly after handling (1156). Do not reuse contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation (1127). Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills (1129). Cleaning, inspection and maintenance of internal structure of storage tanks must be performed only by properly equipped and qualified personnel as defined by national, local or company regulations (1054), after having cleaned out the tank. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content and flammability (1050). Store separately from oxidising agents (1153). Store in a well-ventilated place (1131).

Recommended materials (1117): use mild steel, stainless steel for containers, or container linings (1116). Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use (1125). Compatibility should be checked with the manufacturer (1055).

If the product is supplied in containers (1094) keep only in the original container or in a suitable container for this kind of product (1099).

Keep containers tightly closed and properly labelled (1098). Protect from the sunlight (1114).

Light hydrocarbon vapours can build up in the headspace of containers (1100). These can cause flammability / explosion hazards (1138). Empty containers may contain combustible product residues (1077). Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned (1075).

7.3 Special end uses

See attached exposure scenarios.

SECTION 8. EXPOSURE CONTROL/PERSONAL PROTECTION

8.1 Control parameters

Gas oil (Diesel fuel)

ACGIH:

TLV®-TWA: 100 mg/m³

Mineral oil:

TLV®-TWA: 5 mg/m³ (pure, highly or differently refined mineral oil)

Monitoring procedure: see It. Leg. Dec. 81/2008 and subsequent amendments and integrations or good industrial hygiene practices.

ATZ FLUX GAS OIL

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DNEL (Derived No-Effect Level) / DMEL (Derived Minimum Effect Level)

Routes of exposure	DNEL Workers				DNEL general population			
	Chronic, local effects	Chronic, systemic effects Note b	Acute, local effects	Acute, systemic effects	Chronic, local effects	Chronic, systemic effects Note e	Acute, local effects	Acute, systemic effects
oral	n.a.	n.a.	n.a.	n.a.	n.a.	1.25 mg/kg/24 hours	n.a.	n.a.
skin	Note (a) for 13 weeks Note (c) for chronic exposure	2.91 mg/kg/8 hours	Note (a)	Note (a)	Note (d)	1.25 mg/kg/24 h	Note (d)	Note (d)
inhalation	Note (a)	16.4 mg/m ³ /8 hours	Note (a)	1500.8 mg/m ³ /15 min	Note (d)	4.85 mg/m ³	Note (d)	900.48 mg/m ³

Note a: no hazard has been identified for this route of exposure

Note b: long-term systemic effects include non reproductive effects and effects on fertility or development

Note c: no information on threshold effect or dose descriptor.

Note d: A DNEL is not necessary because no exposure is envisaged

Note e: long-term systemic effects include reproductive effects and effects on fertility or development

PNEC(S) (Predicted No Effect Concentration)

PNEC(S) Water, sediment, soil
<p>The substance is a UVCB hydrocarbon posing chronic danger to the aquatic environment. The "hydrocarbon block" method is used for the environmental risk assessment (REACH R7 Guide, section 13-1). PNECs cannot be derived for UVCB substances for which the aquatic PNECs for "hydrocarbon blocks" (i.e., a library of about 1500 representative hydrocarbons that are grouped according to their physical and chemical properties, breakdown and degradation properties) were obtained using the HC5 statistical extrapolation method and the Target Lipid Model (TLM). Following specific requests from ECHA, a revision of the TLM model was carried out, which led to new results used in the 2016 edition of CSR. For details, refer to the annex to section 13 of IUCLID.PETROTRISK Product Library tab, PAH Phototoxicity, PNEC HC5, TLM Validation, PETROTOX Verification and NOS Heterocyclics.</p>

8.2 Exposure control

8.2.1 Suitable technical checks

Minimise exposure to mist/ vapours/sprays. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content.

ATZ FLUX GAS OIL

REV.: G

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8.2.2 Personal protection measures, such as personal protective equipment

(a) Eye/face protection:

In the absence of systems for containment, and if contact with the eyes/face is possible, head and facial protection (protective shield and/or safety goggles) should be used (EN 166).

(b) Skin protection:

i) Hand protection

In the absence of containment systems, and if contact with the skin is possible, use hydrocarbon-resistant gloves with long cuffs that are plush lined and, if necessary, thermally insulated. Materials assumed to be adequate: nitril, PVC or PVA (polyvinyl alcohol) with index of protection against chemical agents of at least 5 (permeation time > 240 minutes). Use gloves under the conditions and respecting the limits set by the manufacturer. If necessary, see UNI EN 374. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

ii) Other

Replace and clean clothing immediately in case of contamination.

(c) Respiratory protection:

In confined spaces:

Use approved respiratory protection equipment: full face mask with cartridge/filter type AX (brown for organic vapours with low boiling point). If exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA's should be used (EN 529).

In the absence of systems for containment:

Use approved respiratory protection equipment: full face mask with cartridge/filter type AX (brown for organic vapours with low boiling point).

(d) Thermal hazards: see previous letter b)



8.2.3 Environmental exposure control

Avoid release to the environment (1046). Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills (1129).

Prevent discharge of undissolved substance to or recover from onsite wastewater. (TRC14)

For greater details, see attached exposure scenarios.

8.3 Other

No additional information available.

ATZ FLUX GAS OIL

REV.: G

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on essential physical and chemical properties

a) Appearance	liquid
b) Odour	of petroleum
c) Olfactory threshold	n.d.
d) pH	n.a.
e) Melting/freezing point	From - 21 to +6 °C (ASTM 1999 CONCAWE 2010a)
f) Initial boiling point and boiling range	165 °C 165 °C - >375 °C (Test report GE10-01296.001)
g) Flash point	69 °C (Pensky Martens- ISO 2719; test report 15PR03975)
h) Evaporation rate	n.a.
i) Flammability (solids, gases)	n.a.
j) Upper/lower flammability or explosive limits	LEL 1% - UEL 6%
k) Vapour pressure	0,4 kPa at 40 °C (ASTM1991)
l) Vapour density	n.a.
m) Density	895 kg/m ³ at 15 °C (ASTM D1298; test report GE10-01296.001)
n) Solubility	2.69E-12 – 2000 mg/l (calculated range-QSAR)
o) Partition coefficient (n-octanol/water)	1.99-18.2 (calculated range-QSAR)
p) Auto-ignition temperature	>240 °C (CONCAWE 2010a)
q) Decomposition temperature	n.a.
r) Viscosity	3.212 mm ² /s at 40 °C (ASTM D445; test report GE10-01296.001)
s) Explosive properties	none of the chemical groups associated with the molecule have explosive properties (Ref. column 2 of the REACH in annex VII)
t) Oxidising properties	non oxidizing (on the basis of the chemical structure, the substance does not react exothermally with combustible materials. Ref. column 2 of the REACH in annex VII)

9.2 Additional information

The characteristic analysis methods are the nationally and internationally recognized methods reported, for the most part, in the product commercial specifications.

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

The substance does not present any further hazard related to reactivity, above and beyond those reported in the following subsections

10.2 Chemical stability

This substance is stable as regards its inherent properties.

ATZ FLUX GAS OIL

REV.: G

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10.3 Possibility of dangerous reactions

Contact with strong oxidizers (peroxides, chromates, etc.) may cause a fire hazard. A mixture with nitrates or other strong oxidisers (e.g. chlorates, perchlorates, liquid oxygen) may create an explosive mass (611). Sensitivity to heat, friction or shock cannot be assessed in advance (618).

10.4 Conditions to be avoided

Store separately from oxidising agents (1133).

Keep away from heat/sparks/open flames/hot surfaces (1907). Do not smoke

Prevent the formation of electrostatic charges

10.5 Non-compatible materials

Strong oxidizers

10.6 Hazardous decomposition products

The product does not decompose when used for the envisaged purposes

SECTION 11. TOXICOLOGICAL INFORMATION

No in vivo data are available on the toxicokinetics of gas oil.

Experimental studies, performed in animals, have shown absorption through the lungs. Considerations on the chemical-physical properties suggest that the highly breathable aerosols of poorly water soluble substances having log Pow values higher than zero are absorbed to a certain extent by the airways. In the absence of further information, it is assumed that 50% of the dose of gas oil aerosol inhaled is absorbed by the lungs in both animals and man.

No data are available on absorption of gas oil through the skin; however repeated toxicity studies indicate that a certain degree of absorption through the skin is possible. Application of the SPINKERM model indicates that absorption of gas oil through the skin is most likely low (estimated skin flow: 0.0001058 mg cm⁻²/hour for human skin). Nevertheless, since the reliability of this value is not known, to be on the safe side, complete absorption of gas oil through the skin is assumed.

11.1 Information on toxicological effects

a) Acute toxicity:

Oral route

Acute oral toxicity of samples belonging to the category of straight run middle gas oils has been assessed in a series of studies. All studies have shown an oral LD50 > 2000 mg/kg. Therefore, given these results, no classification under the standards for hazardous substances is possible.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
Oral Route			
RAT (F/M) ORAL (forced feeding) OECD Guideline 401	LD50: > 5000 mg/kg (M/F)	Key study reliable without restrictions CAS 64741-44-2	API (1985a)

Inhalation route

ATZ FLUX GAS OIL

REV.: G

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Some studies have been performed in the rat to evaluate acute toxicity by inhalation of straight run middle gas oils category products. Given these results, the substance requires a classification of Acute Tox. 4 H332: (Harmful if inhaled).

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
Inhalation route			
RAT (M/F) Aerosol mixture OECD Guideline 403	LC50 mg/l/4 hours: 1.78 (F) LC50 mg/l/4 hours: 1.72 (M) LC50 mg/l/4 hours: 1.82 (M/F)	Key study CAS 64741-44-2 Reliable without restrictions	API (1987)

Cutaneous route

Acute oral toxicity of samples belonging to the category of straight run middle gas oils has been assessed in a series of studies. All studies have shown a cutaneous LD50 > 2000 mg/kg. Therefore, given these results, no classification under the standards for hazardous substances is possible.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
Cutaneous route			
RABBIT OECD Guideline 402	LD50 >2000 mg/kg (M/F)	Key study CAS 64741-44-2 Reliable without restrictions	API (1985a)

b) Skin corrosion/skin irritation

No specific studies are available on the corrosiveness of said substance. Considering the information derived from studies performed in animals and the nature of the substance, no corrosive action is expected.

The skin irritation potential of samples belonging to the category of this product was tested in a large number of studies, generally performed in rabbits. Only some studies show minor skin irritation. Given these results, no classification is possible. Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
RABBIT Patch test (on each animal, two sites with intact skin and 2 sites with abraded skin) Observation at 24/72 hours OECD Guideline 404	Non irritant Average erythema score: 1.8 of max. 4 (intact skin) Average edema score: 1.58 of max. 4 (intact skin)	Key study Reliable with restrictions CAS 64741-44-2	API (1985a)

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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c) Serious eye damage / eye irritation

The eye irritation potential of samples belonging to this product category was tested in a large number of studies, generally performed in rabbits. The conclusions of these studies indicate that there is no significant irritation to the eyes and thus the substance is not classified as eye irritant under the standards on hazardous substances.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
RABBIT Observation at 24/48/72 hours OECD Guideline 405	Non irritant Average cornea score: 0 of max 80 (average) Average iris score: 0 of max 10 (average) Average conjunctiva score: 0 of max 20 (average)	Key study Reliable without restrictions CAS 64741-44-2	API (1985a)

d) Sensitization of respiratory tract and skin

Sensitization of respiratory tract

Information not available. This endpoint is not required by REACH.

Sensitization of skin

A skin sensitization study was performed for the category of straight run middle gas oils. The results obtained from this study indicate that there is no potential for skin sensitization and thus no substance classification is required under the standards on hazardous substances.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
GUINEA PIG Buehler test Guideline 406	Non sensitising	Support study Reliable without restrictions CAS 64741-44-2	API (1985a)

e) Germ cell mutagenicity

In vitro bacterial mutation tests (modified Ames test) and in vivo chromosome aberration tests were negative. Based on the tests, straight run gas oils are unlikely to be mutagenic in humans and, therefore, do not meet the criteria for classification under the CLP Regulation.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
In vitro gene mutation (Modified Ames Test) in Salmonella thyphimurium TA 98 Doses: 0, 12, 24, 36, 48, 60 µl/plate ASTM E 1687 (*)	No evidence of mutagenic activity	Key study Reliable with restrictions CAS:64741-43-1	May, K. (2013)
In vivo chromosomal	Genotoxicity: Negative	Key study Reliable without	American Petroleum

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Method	Result	Comments	Source
aberration test RAT (M/ F) Administration: Intraperitoneal Doses: 300, 1000, 3000 mg/kg OECD Guideline 475		restrictions CAS 64741-44-2	Institute (API) 1985c

(*) According to OECD Guideline 471, the standard Ames test is not applicable to UVCB petroleum-based substances, as it tends to give false positives.

f) Carcinogenicity

Prolonged exposure to straight run gas oils may cause severe skin irritation that can evolve into skin tumours (see study reported below). In the absence of irritation, onset of tumours has NOT been found. Therefore, for straight run gas oils, the standards on hazardous substances do not require any classification.

Method	Result	Comments	Source
MOUSE (male) exposure: 24 months Doses: 50 µl Exposure for half a lifetime (3 times a week) OECD 453	Result: a 22% incidence of neoplasia was found in the animals treated	Key study Reliable with restrictions CAS: 64741-44-2	API (1989)

g) Reproductive Toxicity

Fertility toxicity:

To date, the number of studies is inadequate to determine the impact of gas oils on human fertility. Therefore, it is not possible to assign a classification under the standards on substances. Nevertheless, regarding registration as per REACH regulations, a test has been proposed to study fertilization over two generations.

Toxicity for development/teratogenesis:

The studies on development have proved positive only at doses that also caused toxicity in the mother. Therefore no classification of the substance is required under the standards for hazardous substances.

Below is a summary of the most representative studies found in the registration file.

Method	Result	Comments	Source
RAT Means of exposure: skin Doses: 0, 8, 30, 125, 500 mg/kg/day Exposure: Pre- and post-natal OECD 414	NOAEL (maternal toxicity): 30 mg/kg/day reduced food intake, increased liver weight and variations in blood parameters. NOAEL (toxicity for development): 30 mg/kg/day, miscarriage, decrease foetal weight, skeletal anomalies.	Key study Reliable without restrictions (CAS 68915-97-9)	Mobil (1995)

h) Specific target organ toxicity (STOT) - single exposure:

No specific target organ toxicity following single exposure

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

i) Specific target organ toxicity (STOT) - repeated exposure:

A NOAEL of 30 mg/kg/day for skin exposure and a NOAEC of 1.75 mg/l for read-across were found.

On the basis of the results obtained, the substance is classified STOT Rep.Exp.2 H373 as per CLP Regulation; the target organs are the liver, spleen, and bone marrow

Below is a summary of the most representative studies found in the registration file.

It must be pointed out that the registration file does not contain any information regarding oral exposure (tests for repeated oral toxicity are not required because the main exposure routes in humans are skin and inhalation - ref. column 2, Annex IX of the Reach regulation)

Method	Result	Comments	Source
Inhalation			
RAT (M/F) Inhalation (aerosol) Exposure: 13 weeks (subchronic) OECD Guideline 413	NOAEC: >1.71 mg/l systemic effects (male/female) NOAEC: 0.88 mg/l local effects (lung weight) (male/female)	Key study Read-across Reliable with restrictions Diesel fuel	Lock, S., Dalbey, W. Schmoyer, R., Griesemer, K. (1984)
Skin			
RAT (M/F) Exposure: 13 weeks OECD Guideline 411	NOAEL (systemic effects): 30 ml/kg/day (M/ F) NOEL (local effects: skin irritation): 500 ml/kg/day (M/ F) LOAEL (systemic effects): 125 ml/kg/day (M/ F)	Key study Reliable with restrictions CAS 68334-30-5	Mobil (1992) Feuston, M.H., Low, L.K., Hamilton, C.E., Mackerer, C.R. (1994)

j) Aspiration hazard:

Since straight run gas oils have a viscosity of < 20.5 mm²/s at 40°C the product might be breathed into the lungs according to the criteria in annex I, part 3 of Regulation 1272/2008.

Therefore, it is classified as Asp. Tox. 1 H304 (May be fatal if swallowed and enters airways).

Additional information

No additional information available

SECTION 12. ECOLOGICAL INFORMATION

On the basis of the ecological information reported below, regarding toxicity in fish, invertebrates and algae, and on the basis of the criteria indicated in the standards on hazardous substances, straight run gas oil is classified as hazardous for the environment H411, toxic to aquatic organisms, may cause long-term adverse effects.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

12.1 Toxicity

Below is a summary of the most representative studies found in the registration file.

Endpoint	Result	Comments
Aquatic toxicity		
Invertebrates Daphnia magna Short term OECD 202 (Immobilization tests for Daphnia sp) Method EU C.2 (Acute toxicity for Daphnia)	EL50 (24 h): > 1000 EL50 (48 h): 210 mg/l NOEL (48 h): 46 mg/l	Key study Reliable without restrictions CAS 68334-30-5 Read-Across Girling A and Cann, B (1996b)
Invertebrates Daphnia magna Long term QSAR modelled data	NOEL 21/days: 0.167 mg/l	Key study Reliable with restrictions QSAR Redman, et al.(2010b)
Algae Raphidocelis subcapitata Short term OECD 201 (Algal growth inhibition test) Method EU C.3. (Algal inhibition test)	EbL50 (72 h): 25 mg/l ErL50 (72 h): 78 mg/l NOEL (72 h): 3 mg/l	Key study Girling, A and Cann, B (1996a) Reliable with restrictions Read-across CAS 68334-30-5
Fish Oncorhynchus mykiss Short term	LL50 96/hours: 1.301 mg/l	Key study Reliable with restrictions QSAR Redman, et al.(2010b)
Fish Oncorhynchus mykiss Long term	NOEL 14 days: 0.068 mg/l	Key study Reliable with restrictions QSAR Redman, et al.(2010b)

12.2 Persistence and degradability

Abiotic degradability

Hydrolysis: straight run gas oils are resistant to hydrolysis because they lack a hydrolytically reactive functional group. Therefore, this process does not lead to any measurable degradation substance losses in the environment.

Photolysis in air: endpoint not required by REACH

Photolysis in water and soil: endpoint not required by REACH

Biotic degradability:

the standard tests for this endpoint are not applicable to UVCB substances.

The following biodegradation values were calculated for UVCB constituents using QSAR:

Water: range of 1.02-165496 days.

Sediment: range of 4.07-661986 days

Soil: range of 1.02-165496 days

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

12.3 Bioaccumulation potential

The standard tests for this endpoint are not applicable to UVCB substances.

A BCF for aquatic species-fish of 0.4-6280 L/kg was calculated for UVCB constituents using QSAR.

12.4 Mobility in the soil

Koc absorption: the standard tests for this endpoint are not applicable to UVCB substances

A Log Koc of 1.71-14.70 was calculated for UVCB constituents using QSAR.

12.5 Results of PBT and vPvB evaluation

Comparison with the criteria established in annex XIII of REACH regulation

Persistence evaluation: some hydrocarbon structures contained in this category show characteristics deemed P (Persistent) or vP (very Persistent).

Bioaccumulation potential evaluation: the structure of most hydrocarbons contained in this category do NOT present characteristics deemed vB (very Bioaccumulative) although some components do present characteristics deemed B (Bioaccumulative).

Toxicity evaluation: for the structures with characteristics of P and B, toxicity was evaluated although none of the main components met the toxicity criteria except anthracene which has been confirmed to be PBT. Since anthracene is present in concentrations < 0.1%, the product is not deemed PBT/vPvB.

12.6 Other adverse effects

None.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not discharge on the ground or in sewers, tunnels or waterways.

To dispose of waste derived from this product, including empty uncleaned containers, comply with It. Leg. Dec. 152/06 and subsequent amendments and integrations

European Waste Catalogue Code: 13 07 03* (It. legislative decree no. 152/06 and subsequent amendments and integrations), the code indicated provides only general indication, based on the original composition of the product and the envisaged uses thereof.

The user (producer of the wastes) is responsible for choosing the most appropriate code to apply according to the real use of the product, any alterations and contaminations. The product 'as is' does not contain halogenated compounds.

Disposal of containers: Do not dispose of the containers in the environment. Dispose of them in compliance with current local standards.

Do not drill, cut, grind, weld, solder, burn or incinerate empty containers or drums, unless they have been drained and cleaned.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

SECTION 14. TRANSPORT INFORMATION

14.1 UN number:

1202

14.2 UN shipping name:

GAS OIL

14.3 Hazard classes related to transport:

Land/rail transport (ADR/RID)

Class 3

Classification code: F1

Hazard ID number: 30

Tunnel restriction code (ADR): D/E

Maritime transport (IMDG)

Class 3

Air transport (IATA):

Class 3, Flamm liquid

14.4 Packaging group:

III, Label 3 + Environmental Hazard mark

14.5 Environmental hazard:

Substance dangerous for the environment as per ADR, RID, ADN and IMDG regulations

14.6 Special precautions for users (transport operations):

Wear chemically resistant gloves (tested to EN374) (PPE15).

14.7 Bulk transport as per annex II of the MARPOL Convention 73/78 and IBC code

Not applicable

SECTION 15. REGULATORY INFORMATION

15.1 Specific health, safety, and environmental regulations and legislation for the substance or mixture

- Title VII Authorization as per REACH (Reg. EC no. 1907/2006 and subsequent amendments and integrations): substance not subject to authorization
- Title VIII Restrictions as per REACH (Reg. EC n. 1907/2006 and subsequent amendments and integrations): item 3, annex XVII: hazardous substances/liquid mixtures

Other EU regulations and national transpositions:

- Seveso category (Dir. 2012/18/EU) It. legislative decree no. 105/2015):
Annex I part 1:
category P5c- Flammable liquids

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

category E2- Hazardous for the aquatic environment, chronic toxicity category 2

Annex I part 2:

category 34-Petroleum products and alternative fuels

- Title IX (transposition of Dir. 98/24/EC) of It. Leg. Decree 81/08 and subsequent amendments and integrations: dangerous chemical agent
- Title IX (transposition of Dir. 97/42/EC and 99/38/EC and It. Leg. Dec 81/08: not applicable because not carcinogenic

For waste disposal, see It. leg. Dec. 152/06 and subsequent amendments and integrations

15.2 Chemical safety assessment

A chemical safety assessment has been performed.

SECTION 16. OTHER INFORMATION

List of pertinent hazard statements (H):

H226:	Flammable liquid and vapours
H304:	May be fatal if swallowed and enters airways
H332:	Harmful if inhaled
H373:	May cause damage to organs through prolonged or repeated exposure.
H411:	Toxic to aquatic life with long lasting effects
EUH066:	Exposure may cause skin dryness and cracking

Indications for training:

Provide workers who may be exposed to the substance with adequate training as outlined in this safety data sheet.

Main bibliography and sources of data:

Registration file

CSR 2016

CSR 2017

CSR 2018

CSR 2019

CSR 2020

Key to abbreviations and acronyms:

ACGIH	=	American Conference of Governmental Industrial Hygienists
CSR	=	Chemical Safety Report
EC50	=	Effective concentration, 50%
IC50	=	Inhibitory concentration , 50%
Klimisch	=	Criterion for assessing reliability of method used.
LC50	=	Lethal Concentration, 50%
LD50	=	Lethal Dose, 50%
n.a.	=	Not applicable
n.d.	=	Not available

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

PBT = Persistent, bioaccumulative, toxic substance
s.m.i. = Subsequent amendments and integrations
CNS = Central nervous system
STOT = Specific target organ toxicity
(STOT) RE = Repeated exposure
(STOT) SE = Single exposure
Key Study= Most pertinent study
TLV®TWA = Threshold Limit Value – Time Weighted Average
TLV®STEL = Threshold Limit Value – Short Term Exposure Limit
UVCB = substances of Unknown or Variable Composition
vPvB = Very Persistent and Very Bioaccumulative

Drafted on 29/11/2010

Revision date 01/10/2014

Reason for Rev00 of 01/10/2014: Update to comply with Annex I of EU Regulation 453/2010, of EC CLP Regulation 1272/2008 including the 4th ATP (Adaptations to Technical Progress) envisaged for substances since 1.12.14, of DSD Regulation (67/548/EEC) including the 31th ATP.

Revision date 04/05/2015

Reason for Rev. A of 04/05/2015: Update emergency telephone numbers. Update to 5th ATP

Revision date 21/12/2015

Reason for Rev.B of 21/12/2015: Update the following sections: 2, 8, 11, 14, 15, 16 and exposure scenarios

Revision date 14/07/2016

Reason for Rev. C of 14/07/2016: Update the following sections: 1, 8, 16; some exposure scenarios were removed, and new scenarios for professional and consumer use were added.

Revision date 05/11/2018

Reason for Rev. D of 05/11/2018: Update the following sections: 1, 16 and exposure scenarios.

Revision date 20/12/2019

Reason for Rev. E of 20/12/2019: Update the following sections: 8 (changes to DNELs), 9 (calculated values for solubility and Log-Pow are included), 11 (changes to the mutagenicity end-point, for inclusion of the new Ames test), 12 (calculated values for biodegradation, bioaccumulation, and mobility in soil are included) and exposure scenarios for the environmental part.

Revision date 20/04/2020

Reason for Rev. F of 20/04/2020: Update of the safety data sheet format (all sections).

Update of section 8 (replacement of pictograms in accordance with UNI EN 7010 Safety Signs 2019).

Revision date 20/11/2020

Reason for Rev. G of 20/11/2020: Update of sections 1 (uses), 14 (section 14.8 removed), and 16 (literature source added) and exposure scenarios as per CSR 2020.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

ANNEX 1

EXPOSURE SCENARIOS STRAIGHT RUN GAS OIL

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Identified uses	Life cycle	Sector of Use (SU)	Product Category (PC)	Process category (PROC)	Environmental release category (ERC)	Specific environmental release category (SpERC)
01 - Manufacturing of the substance (classified)	Manufacturing	n.a.	n.a.	1, 2, 3, 4, 8a, 8b, 9, 15, 28	1	ESVOC SpERC, 1.1.v1
02 - Formulation and (re)packing of substances and mixtures (classified)	Formulation	n.a.	n.a.	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15, 28	2	ESVOC SpERC 2.2.v1
01b - Use as an intermediate (classified)	Industrial	8, 9	n.a.	1, 2, 3, 4, 8a, 8b, 9, 15, 28	6a	ESVOC SpERC 6.1a.v1
05a - Use in Oil and Gas field drilling and production operations: industrial sector (classified)	industrial	n.a.	n.a.	1, 2, 3, 4, 8a, 8b, 9, 28	4	environmental quality assessment
12a - Use in fuels (classified)	Industrial	n.a.	n.a.	1, 2, 8a, 8b, 16, 28	7	ESVOC SpERC 7.12a.v1
12b - Use in fuels (classified)	Professional	n.a.	n.a.	1, 2, 8a, 8b, 16, 28	9a, 9b	ESVOC SpERC 9.12b.v1
12c - Use in fuels (classified)	Consumers	13	n.a.	n.a.	9a, 9b	ESVOC SpERC 9.12c.v1

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Contents

01 - Manufacturing of the substance (classified).....	24
02 - Formulation and (re)packing of substances and mixtures (classified)	
01b - Use as an intermediate (classified)	22
05a - Use in Oil and Gas field drilling and production operations: industrial sector (classified)	22
12a - Use in fuels (classified)	22
12b - Use in fuels (classified)	22
12c - Use in fuels (classified).....	22
02 - Formulation and (re)packing of substances and mixtures (classified)	34
01b - Use as an intermediate (classified)	47
12a - Use in fuels; Industrial	68
12b - Use in fuels; Professional.....	75
12c - Use in fuels; Consumers.....	83

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

01 - Manufacturing of the substance (classified)

Section 1	
Title	
01 - Manufacturing of the substance	
Use descriptor	
Sector of use	
Process categories	1, 2, 3, 4, 8a, 8b, 9, 15, 28
Environmental release categories	1
Specific environmental release categories	ESVOC SpERC 1.1.v1
Processes, tasks, activities covered	
Manufacture of the substance or use as a process chemical or extraction agent. It includes recycling/recovery, material transfers, storage, maintenance and loading (including on marine vessels/barges, road/rail cars, and bulk containers), sampling, and associated laboratory activities.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP. With potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	
Specific risk management measures and operational conditions	
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
General exposures; Closed systems (PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes a process temperature of up to 800.0 °C. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

<p>General exposures; Closed systems (PROC_2)</p>	<p>Provide extract ventilation at points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes a process temperature of up to 800.0 °C. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>General exposures; Closed systems (PROC_3)</p>	<p>Provide extract ventilation at points where emissions occur. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperatures of up to 800.0 °C. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>General exposures; Open systems (PROC_4)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Process sampling (PROC_9)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>Laboratory activities (PROC_15)</p>	<p>No other specific measures identified. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Put lids on containers immediately after use If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Bulk transfers; Closed systems (PROC_8b)	<p>Handle substance within a closed system.</p> <p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
Bulk transfers; Open systems (PROC_8b)	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Ensure that no splashing occurs during transfer.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
Cleaning and maintenance of equipment (PROC_8a, PROC_28)	<p>Drain and rinse system prior to equipment break-in or maintenance.</p> <p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Wear suitable overalls to avoid skin exposure.</p> <p>Clear spills immediately.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
Storage (PROC_2, PROC_1)	<p>Store substance within a closed system.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
Section 2.2 Environmental exposure control	
Product Characteristics	
Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]	
Amounts used	
Fraction of EU tonnage used in region:	0.6

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Regional use tonnage (tonnes/year)	3.5E+06
Fraction of Regional tonnage used locally	1.0E+00
Annual site tonnage (tonnes/year)	3.5E+06
Maximum daily site tonnage (kg/day)	1.2E+07
Frequency and duration of use	
Continuous release. [FD2]	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operating conditions affecting environmental exposure	
Fraction released to air by process (initial release prior to RMM)	1.0E-03
Fraction released to wastewater by process (initial release prior to RMM)	5.5E-07
Fraction released to soil by process (initial release prior to RMM)	0.0001
Technical measures and conditions at the process level (source) to prevent release	
Common practices vary between sites, so conservative process release estimates are used. [TCS1]	
On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil	
Risk from environmental exposure is driven by freshwater sediment. [TCR1b]	
Prevent discharge of undissolved substance to, or recover it from, on-site wastewater. [TCR14]	
If discharging to domestic sewage treatment plant, no on-site wastewater treatment is required [TCR9]	
Treat air emissions to provide a typical removal efficiency of (%)	9.0E+01
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of \geq (%)	92.3
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of \geq (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply Industrial sludge to natural soils. [OMS2] Sludge should be incinerated, contained, or reclaimed. [OMS3]	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1]	
Estimated substance removal from wastewater via domestic sewage treatment (%)	93.0
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)	93.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)	1.3E+07
Assumed flow rate of the domestic sewage treatment plant (m3/day)	1.0E+04
Conditions and measures related to external treatment of waste for disposal	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

During manufacturing no waste of the substance is generated [ETW4]

Conditions and measures related to external recovery of waste

During manufacturing no waste of the substance is generated [ERW2]

Section 3 Exposure estimate

3.1. Health

The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.

3.2. Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]

Section 4 Guidance to check compliance with the exposure scenario

4.1. Health

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.

RCR Workers CS 1: General exposures; Closed systems (PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	Final RCR < 0.01
Inhalation, systemic, acute	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	Final RCR < 0.01
Combined routes of exposure, systemic, long term			Final RCR < 0.01
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 2: General exposures; Closed systems (PROC 2)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour > 10,000 Pa	8.771 mg/m ³ (TRA Workers) RCR = 0.535	Final RCR = 0.535
Inhalation, systemic, acute	Vapour > 10,000 Pa	35.08 mg/m ³ (TRA Workers) RCR = 0.023	Final RCR = 0.023
Combined routes of exposure, systemic, long term			Final RCR = 0.535
Combined routes of exposure, systemic, acute			Final RCR = 0.023

RCR Workers CS 3: General exposures; Closed systems (PROC 3)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour > 10,000 Pa	12.28 mg/m ³ (TRA Workers) RCR = 0.749	Final RCR = 0.749

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Inhalation, systemic, acute	Vapour > 10,000 Pa	49.12 mg/m ³ (TRA Workers) RCR = 0.033	Final RCR = 0.033
Combined routes of exposure, systemic, long term			Final RCR = 0.749
Combined routes of exposure, systemic, acute			Final RCR = 0.033

RCR Workers CS 4: General exposures; Open systems (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.398
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.017
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
Inhalation, systemic, acute	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	
Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.87
Combined routes of exposure, systemic, acute			Final RCR = 0.017

RCR Workers CS 5: Process sampling (PROC 9)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.433
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.28E-3	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.019
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.281 mg/m ³ (TRA Workers) RCR = 1.87E-4	
Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.905
Combined routes of exposure, systemic, acute			Final RCR = 0.019

RCR Workers CS 6: Laboratory activities (PROC 15)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.48 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.123
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 1.28E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Combined routes of exposure, systemic, long term			Final RCR = 0.24
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 7: Bulk transfers; Closed systems (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.112

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10000 Pa	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.583
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 8: Bulk transfers; Open systems (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.642
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 9: Cleaning and maintenance of equipment (PROC 8a, PROC 28)

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	Final RCR = 0.224
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.695
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 10: Storage (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000 Pa	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

4.2. Environment

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1] Required removal efficiency for wastewater can be achieved using on-site/off-site technologies, either alone or in combination. [DSU2] Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3] Further details on scaling and control technologies can be found in the SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>). [DSU4]

Maximum risk characterisation ratio for air emissions RCR _{air}	5.6E-02
Maximum risk characterisation ratio for wastewater emissions RCR _{water}	9.0E-01

ATZ FLUX GAS OIL

REV.: G

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02 - Formulation and (re)packing of substances and mixtures (classified)

Section 1	
Title	
02 - Formulation and (re)packing of substances and mixtures	
Use descriptor	
Sector of use	
Process categories	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15, 28
Environmental release categories	2
Specific environmental release categories	ESVOC SpERC 2.2.v1
Processes, tasks, activities covered	
Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance, and associated laboratory activities.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP, with potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	Specific risk management measures and operational conditions
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
General exposures; Closed systems (PROC_2, PROC_1, PROC_3)	Manage substance within a closed system. Sample via a closed loop or other system to avoid exposure. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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<p>General exposures; Open systems (PROC_4)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Batch processes; High temperatures; Use in closed systems (PROC_3)</p>	<p>Provide extract ventilation at points where emissions occur. Manage substance within a closed system. Assumes a process temperature of up to 60.0 °C Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Process sampling (PROC_9)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Laboratory activities (PROC_15)</p>	<p>No other specific measures have been identified. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. Put lids on containers immediately after use. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Bulk transfers; Dedicated facility (PROC_8b)</p>	<p>Manage substance within a closed system. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

<p>Mixing operations; Open systems (PROC_5)</p>	<p>Provide extract ventilation at points where emissions occur. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC_8a)</p>	<p>Use drum pumps. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Drum/batch transfers; Dedicated facility (PROC_8b)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Tabletting, compression, extrusion or pelletisation (PROC_14)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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<p>Drum and small package filling (PROC_9)</p>	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Cleaning and maintenance of equipment (PROC_8a, PROC_28)</p>	<p>Drain and rinse the system prior to equipment cleaning or maintenance. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. Wear suitable overalls to prevent skin exposure. Collect spills immediately. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Storage (PROC_2, PROC_1)</p>	<p>Store substance within a closed system. Further advice on good practice. Obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Section 2.2 Environmental exposure control</p>	
<p>Product Characteristics</p>	
<p>Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]</p>	
<p>Amounts used</p>	
<p>Fraction of EU tonnage used in region:</p>	<p>0.1</p>
<p>Regional use tonnage (tonnes/year)</p>	<p>6.6E+04</p>
<p>Fraction of Regional tonnage used locally</p>	<p>4.5E-01</p>
<p>Annual site tonnage (tonnes/year)</p>	<p>3.0E+04</p>
<p>Maximum daily site tonnage (kg/day)</p>	<p>1.0E+05</p>
<p>Frequency and duration of use</p>	
<p>Continuous release. [FD2]</p>	
<p>Emission days (days/year)</p>	<p>300</p>
<p>Environmental factors not influenced by risk management</p>	
<p>Local freshwater dilution factor</p>	<p>10</p>
<p>Local marine water dilution factor</p>	<p>100</p>
<p>Other given operating conditions affecting environmental exposure</p>	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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Fraction released to air by process (after typical on-site RMMs, in line with the requirements of the European Solvents Emissions Directive)	5.0E-03
Fraction released to wastewater by process (initial release prior to RMM)	1.3E-05
Fraction released to soil by process (initial release prior to RMM)	0.0001
Technical measures and conditions at the process level (source) to prevent release	
Common practices vary between sites, so conservative process release estimates are used. [TCS1]	
On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil	
Risk from environmental exposure is driven by freshwater sediment. [TCR1b]	
Prevent discharge of undissolved substance to, or recover it from, on-site wastewater. [TCR14]	
If discharging to domestic sewage treatment plant, no on-site wastewater treatment is required [TCR9]	
Treat air emissions to provide a typical removal efficiency of (%)	0.0E+00
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%)	92.3
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of ≥ (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply Industrial sludge to natural soils. [OMS2] Sludge should be incinerated, contained, or reclaimed. [OMS3]	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1]	
Estimated substance removal from wastewater via domestic sewage treatment (%)	93.0
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)	93.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)	1.1E+05
Assumed flow rate of the domestic sewage treatment plant (m3/day)	2.0E+03
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Section 3 Exposure estimate	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]	
Section 4 Guidance to check compliance with the exposure scenario	
4.1. Health	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.

RCR Workers CS 1: General exposures; Closed systems (PROC 2, PROC 1; PROC 3)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 2: General exposures; Open systems (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.398
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.017
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	

ATZ FLUX GAS OIL

REV.: G

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Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.87
Combined routes of exposure, systemic, acute			Final RCR = 0.017

RCR Workers CS 3: Batch process; High temperature; Use in closed systems (PROC 3)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.326 mg/m ³ (TRA Workers) RCR = 0.02	Final RCR = 0.025
	Vapour 500-10,000	0.072 mg/m ³ (TRA Workers) RCR = 4.4E-3	
	Vapour > 10,000 Pa	0.012 mg/m ³ (TRA Workers) RCR = 7.49E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.305 mg/m ³ (TRA Workers) RCR = 8.7E-4	Final RCR < 0.01
	Vapour 500-10,000	0.288 mg/m ³ (TRA Workers) RCR = 1.92E-4	
	Vapour > 10,000 Pa	0.049 mg/m ³ (TRA Workers) RCR = 3.27E-5	
Combined routes of exposure, systemic, long term			Final RCR = 0.025
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 4: Process sampling (PROC 9)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.433
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.28E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.019
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.281 mg/m ³ (TRA Workers) RCR = 1.87E-4	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.905
Combined routes of exposure, systemic, acute			Final RCR = 0.019

RCR Workers CS 5: Laboratory activities (PROC 15)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.48 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.123
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 1.28E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Combined routes of exposure, systemic, long term			Final RCR = 0.24
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 6: Bulk transfers; Dedicated facility (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.112
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.583
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 7: Mixing operations; Open systems (PROC 5)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.48 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.043
	Vapour 10-500 Pa	0.134 mg/m ³ (TRA Workers) RCR = 8.16E-3	
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 1.28E-3	Final RCR < 0.01
	Vapour 10-500 Pa	0.535 mg/m ³ (TRA Workers) RCR = 3.57E-4	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.515
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 8: Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.48 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.052
	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 1.28E-3	Final RCR < 0.01
	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.523
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 9: Drum/batch transfers; Dedicated facility (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.642
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 10: Tableting, compression, extrusion, or pelletisation (PROC 14)

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.142
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236
Combined routes of exposure, systemic, long term			Final RCR = 0.378
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 11: Drum and small package filling (PROC 9)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.433
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.28E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.019
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.281 mg/m ³ (TRA Workers) RCR = 1.87E-4	
Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.905

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, acute			Final RCR = 0.019
RCR Workers CS 12: Cleaning and maintenance of equipment (PROC 8a, PROC 28)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	Final RCR = 0.224
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.695
Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 13: Storage (PROC 2, PROC 1)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

4.2. Environment

Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1] Required removal efficiency for wastewater can be achieved using on-site/off-site technologies, either alone or in combination. [DSU2] Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3] Further details on scaling and control technologies can be found in the SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>). [DSU4]

Maximum risk characterisation ratio for air emissions RCR _{air}	2.4E-02
Maximum risk characterisation ratio for wastewater emissions RCR _{water}	9.1E-01

ATZ FLUX GAS OIL

REV.: G

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01b - Use as an intermediate (classified)

Section 1	
Title	
01b - Use as an intermediate	
Use descriptor	
Sector of use	8, 9
Process categories	1, 2, 3, 4, 8a, 8b, 9, 15, 28
Environmental release categories	6a
Specific environmental release categories	ESVOC SpERC 6.1a.v1
Processes, tasks, activities covered	
Use of substance as an intermediate (not related to strictly controlled conditions). It includes recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including on marine vessels/barges, road/rail cars, and bulk containers).	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP, with potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	
Specific risk management measures and operational conditions	
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
General exposures; Closed systems (PROC_2, PROC_1, PROC_3)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.
General exposures; Open systems (PROC_4)	Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

	<p>the SDS for further information.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Process sampling (PROC_9)	<p>Wear suitable gloves tested to EN374. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Laboratory activities (PROC_15)	<p>No other specific measures have been identified.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Put lids on containers immediately after use.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Bulk transfers; Closed systems (PROC_8b)	<p>Handle substance within a closed system.</p> <p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Bulk transfers; Open systems (PROC_8b)	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Ensure that no splashing occurs during transfer.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

<p>Cleaning and maintenance of equipment (PROC_8a, PROC_28)</p>	<p>Drain and rinse the system prior to equipment break-in or maintenance. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Wear suitable overalls to avoid skin exposure. Collect spills immediately. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Storage (PROC_2, PROC_1)</p>	<p>Store substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Section 2.2 Environmental exposure control</p>	
<p>Product Characteristics</p>	
<p>Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]</p>	
<p>Amounts used</p>	
<p>Fraction of EU tonnage used in region:</p>	<p>0.1</p>
<p>Regional use tonnage (tonnes/year)</p>	<p>6.0E+05</p>
<p>Fraction of Regional tonnage used locally</p>	<p>2.5E-02</p>
<p>Annual site tonnage (tonnes/year)</p>	<p>1.5E+04</p>
<p>Maximum daily site tonnage (kg/day)</p>	<p>5.0E+04</p>
<p>Frequency and duration of use</p>	
<p>Continuous release. [FD2]</p>	
<p>Emission days (days/year)</p>	<p>300</p>
<p>Environmental factors not influenced by risk management</p>	
<p>Local freshwater dilution factor</p>	<p>10</p>
<p>Local marine water dilution factor</p>	<p>100</p>
<p>Other given operating conditions affecting environmental exposure</p>	
<p>Fraction released to air by process (initial release prior to RMM)</p>	<p>1.0E-04</p>
<p>Fraction released to wastewater by process (initial release prior to RMM)</p>	<p>2.5E-05</p>
<p>Fraction released to soil by process (initial release prior to RMM)</p>	<p>0.001</p>
<p>Technical measures and conditions at the process level (source) to prevent release</p>	
<p>Common practices vary between sites, so conservative process release estimates are used. [TCS1]</p>	
<p>On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil</p>	

ATZ FLUX GAS OIL

REV.: G

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Risk from environmental exposure is driven by freshwater sediment. [TCR1b]			
Prevent discharge of undissolved substance to, or recover it from, on-site wastewater. [TCR14]			
If discharging to domestic sewage treatment plant, no on-site wastewater treatment is required [TCR9]			
Treat air emissions to provide a typical removal efficiency of (%)		8.0E+01	
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%)		92.0	
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of ≥ (%)		0.0	
Organisation measures to prevent/limit release from site			
Do not apply Industrial sludge to natural soils. [OMS2] Sludge should be incinerated, contained, or reclaimed. [OMS3]			
Conditions and measures related to municipal sewage treatment plant			
Not applicable as there is no release to wastewater [STP1]			
Estimated substance removal from wastewater via domestic sewage treatment (%)		93.0	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)		93.0	
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)		5.7E+04	
Assumed flow rate of the domestic sewage treatment plant (m3/day)		2.0E+03	
Conditions and measures related to external treatment of waste for disposal			
This substance is consumed during use and no waste of the substance is generated. [ETW5]			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated. [ERW3]			
Section 3 Exposure estimate			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]			
Section 4 Guidance to check compliance with the exposure scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.			
RCR Workers CS 1: General exposures; Closed systems (PROC 2, PROC 1; PROC 3)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	

ATZ FLUX GAS OIL

REV.: G

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	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 2: General exposures; Open systems (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.398
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.017
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	
Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.87
Combined routes of exposure, systemic, acute			Final RCR = 0.017

RCR Workers CS 3: Process sampling (PROC 9)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.433

ATZ FLUX GAS OIL

REV.: G

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FOR: ALMA PETROLI S.p.A.

	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.28E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.019
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
Inhalation, systemic, acute	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.281 mg/m ³ (TRA Workers) RCR = 1.87E-4	
Dermal, systemic, long term	Skin	1.372 mg/kg bw/day (TRA Workers) RCR = 0.472	Final RCR = 0.472
Combined routes of exposure, systemic, long term			Final RCR = 0.905
Combined routes of exposure, systemic, acute			Final RCR = 0.019

RCR Workers CS 4: Laboratory activities (PROC 15)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.48 mg/m ³ (TRA Workers) RCR = 0.029	Final RCR = 0.123
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 1.28E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Combined routes of exposure, systemic, long term			Final RCR = 0.24

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 5: Bulk transfers; Closed systems (PROC 8b)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.112
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.583
Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 6: Bulk transfer; Open systems (PROC 8b)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.642
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 7: Cleaning and maintenance of equipment (PROC 8a, PROC 28)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	Final RCR = 0.224
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour >10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.695
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 8: Storage (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01
4.2. Environment			
Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1] Required removal efficiency for wastewater can be achieved using on-site/off-site technologies, either alone or in combination. [DSU2] Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3] Further details on scaling and control technologies can be found in the SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). [DSU4]			
Maximum risk characterisation ratio for air emissions RCRair	4.8E-04		
Maximum risk characterisation ratio for wastewater emissions RCRwater	8.7E-01		

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

05a - Use in Oil and Gas field drilling and production operations: industrial sector (classified)

Section 1	
Title	
05a - Use in Oil and Gas field drilling and production operations: industrial sector	
Use descriptor	
Sector of use	
Process categories	1, 2, 3, 4, 8a, 8b, 9, 28
Environmental release categories	4
Specific environmental release categories	environmental quality assessment
Processes, tasks, activities covered	
Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities, and related maintenance.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP, with potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	Specific risk management measures and operational conditions
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
Bulk transfers; Dedicated facility (PROC_8b)	Handle substance within a closed system. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

<p>Filling of equipment from drums or containers; Dedicated facility (PROC_8b)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Ensure that no splashing occurs during transfer.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Drilling mud (re-)formulation; Use in contained batch processes (PROC_3)</p>	<p>Handle substance within a closed system.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>Drilling floor operations (PROC_4)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Use of solids filtering equipment; High temperature (PROC_4)</p>	<p>Dedicate a correctly positioned receiving hood to the operation.</p> <p>Assumes a process temperature of up to 60.0 °C.</p> <p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>Cleaning of solids filtering equipment; Non-dedicated facility (PROC_8a)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply.</p> <p>Wear suitable overalls to avoid skin exposure.</p> <p>Clear spills immediately.</p> <p>If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

<p>Treatment and disposal of filtered solids; Use in closed systems (PROC_3)</p>	<p>Handle substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>Process sampling (PROC_9)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
<p>General exposures; Closed systems (PROC_2, PROC_1)</p>	<p>Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>Pouring from small containers; Non-dedicated facility (PROC_8a)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>General exposures; Open systems (PROC_4)</p>	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body must also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes</p>
<p>Cleaning and maintenance of equipment (PROC_8a, PROC_28)</p>	<p>Drain and rinse system prior to equipment break-in or maintenance. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. For further specifications, refer to section 8 of the SDS. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Wear suitable overalls to avoid skin exposure. Clear spills immediately. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves</p>

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

	tested to EN374. Provide employees with skin care programmes.
Storage (PROC_2, PROC_1)	Store substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.
Section 2.2 Environmental exposure control	
Product Characteristics	
Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]	
Amounts used	
Fraction of EU tonnage used in region:	1.0
Regional use tonnage (tonnes/year)	1.7E+04
Fraction of Regional tonnage used locally	N/A
Annual site tonnage (tonnes/year)	N/A
Maximum daily site tonnage (kg/day)	N/A
Frequency and duration of use	
Emission days (days/year)	N/A
Environmental factors not influenced by risk management	
Local freshwater dilution factor	N/A
Local marine water dilution factor	N/A
Other given operating conditions affecting environmental exposure	
Fraction released to air by process (initial release prior to RMM)	N/A
Fraction released to wastewater by process (initial release prior to RMM)	N/A
Technical measures and conditions at the process level (source) to prevent release	
Discharge into the aquatic environment is restricted (see Section 4.2). [TCS2]	
On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil	
Treat air emissions to provide a typical removal efficiency of (%)	N/A
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of \geq (%)	N/A
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of \geq (%)	N/A
Organisation measures to prevent/limit release from site	
Prevent environmental discharge in line with requirements in the standards. [OMS4]	
Conditions and measures related to municipal sewage treatment plant	
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)	N/A

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)	N/A		
Assumed flow rate of the domestic sewage treatment plant (m3/day)	N/A		
Conditions and measures related to external treatment of waste for disposal			
External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3] Cuttings and process water are disposed of according to local and/or national regulations.			
Conditions and measures related to external recovery of waste			
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1] Waste and process water are re-injected according to local and/or national regulations.			
Section 3 Exposure estimate			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.			
3.2. Environment			
Quantitative exposure and risk assessment not possible due to lack of emissions to aquatic environment. [EE7] A qualitative approach was used to conclude that the use is safe. [EE8]			
Section 4 Guidance to check compliance with the exposure scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.			
RCR Workers CS 1: Bulk transfers; Dedicated facility (PROC 8b)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.112
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.583
Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 2: Filling equipment from drums or containers; Dedicated facility (PROC 8b)			

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.642
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 3: Drilling mud (re-)formulation; Use in contained batch processes (PROC 3)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.803 mg/m ³ (TRA Workers) RCR = 0.049	Final RCR = 0.061
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	3.213 mg/m ³ (TRA Workers) RCR = 2.14E-3	Final RCR < 0.01
	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.69 mg/kg bw/day (TRA Workers) RCR = 0.237	Final RCR = 0.237
Combined routes of exposure, systemic, long term			Final RCR = 0.298
Combined routes of exposure, systemic, acute			Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

RCR Workers CS 4: Drilling floor operations (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.398
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.017
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	
Dermal, systemic, long term	Skin	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236
Combined routes of exposure, systemic, long term			Final RCR = 0.634
Combined routes of exposure, systemic, acute			Final RCR = 0.017

RCR Workers CS 5: Use of solids filtering equipment; High temperature (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.418 mg/m ³ (TRA Workers) RCR = 0.025	Final RCR = 0.069
	Vapour 10-500 Pa	0.544 mg/m ³ (TRA Workers) RCR = 0.033	
	Vapour 500-10,000	0.144 mg/m ³ (TRA Workers) RCR = 8.79E-3	
Inhalation, systemic, long term	Vapour > 10,000 Pa	0.025 mg/m ³ (TRA Workers) RCR = 1.5E-3	
Inhalation, systemic, acute	Aerosol	1.671 mg/m ³ (TRA Workers) RCR = 1.11E-3	Final RCR < 0.01
	Vapour 10-500 Pa	2.176 mg/m ³ (TRA Workers) RCR = 1.45E-3	
	Vapour 500-10,000	0.577 mg/m ³ (TRA Workers) RCR = 3.84E-4	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

	Vapour > 10,000 Pa	0.098 mg/m ³ (TRA Workers) RCR = 6.55E-5	
Combined routes of exposure, systemic, long term			Final RCR = 0.069
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 6: Cleaning of solids filtering equipment; Non-dedicated facility (PROC 8a)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.516
	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.023
	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.987
Combined routes of exposure, systemic, acute			Final RCR = 0.023

RCR Workers CS 7: Treatment and disposal of filtered solids; Use in closed systems (PROC 3)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.803 mg/m ³ (TRA Workers) RCR = 0.049	Final RCR = 0.061
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	3.213 mg/m ³ (TRA Workers) RCR = 2.14E-3	Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.69 mg/kg bw/day (TRA Workers) RCR = 0.237	Final RCR = 0.237
Combined routes of exposure, systemic, long term			Final RCR = 0.298
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 8: process sampling (PROC 9)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.433
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.28E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.019
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.281 mg/m ³ (TRA Workers) RCR = 1.87E-4	
Dermal, systemic, long term	Skin	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236
Combined routes of exposure, systemic, long term			Final RCR = 0.669
Combined routes of exposure, systemic, acute			Final RCR = 0.019

RCR Workers CS 9: General exposures; Closed systems (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 10: Pouring from small containers; Non-dedicated facility (PROC 8a)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.516
	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.023
	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.987
Combined routes of exposure, systemic, acute			Final RCR = 0.023

RCR Workers CS 11: General exposures; Open systems (PROC 4)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.398

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.017
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	
Dermal, systemic, long term	Skin	0.686 mg/kg bw/day (TRA Workers) RCR = 0.236	Final RCR = 0.236
Combined routes of exposure, systemic, long term			Final RCR = 0.634
Combined routes of exposure, systemic, acute			Final RCR = 0.017

RCR Workers CS 12: Cleaning and maintenance of equipment (PROC 8a, PROC 28)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	Final RCR = 0.224
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.695
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 13: Storage (PROC 2, PROC 1)

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

4.2. Environment

Offshore drilling: discharge into the aquatic environment is restricted by law, and industry prohibits release. [DSU9] Commission OSPAR 2009. Discharges, spills, and emissions from offshore oil and gas installations in 2007, including the assessment of data reported in 2006 and 2007.

Ground drilling: environmental discharges are minimised during ground drilling operations; the recycling and disposal of waste is managed according to national and/or local regulations. International Finance Corporation 2007. Guidelines on the environment, health, and safety: onshore oil and gas development. Mining Waste Directive (2006/21/EC), European Waste Directive (2008/98/EC) and national transpositions, e.g. Novelle des Kreislaufwirtschaftsgesetzes (KrWG) in Germany.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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12a - Use in fuels; Industrial

Section 1	
Title	
12a - Use in fuels; Industrial	
Use descriptor	
Sector of use	
Process categories	1, 2, 8a, 8b, 16, 28
Environmental release categories	7
Specific environmental release categories	ESVOC SpERC 7.12a.v1
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance, and waste management.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP, with potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	Specific risk management measures and operational conditions
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
Bulk transfers; Dedicated facility (PROC_8b)	Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.
Drum/batch transfers; Dedicated facility (PROC_8b)	Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	<p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
General exposures; Closed systems (PROC_2, PROC_1)	<p>Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Use of fuels; Closed systems (PROC_16)	<p>Handle substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Cleaning and maintenance of equipment (PROC_8a, PROC_28)	<p>Drain and rinse the system prior to equipment break-in or maintenance. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Wear suitable overalls to avoid skin exposure. Collect spills immediately. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Storage (PROC_2, PROC_1)	<p>Store substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Section 2.2 Environmental exposure control	
Product Characteristics	
Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]	
Amounts used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year)	4.7E+04
Fraction of Regional tonnage used locally	1.0E+00
Annual site tonnage (tonnes/year)	4.7E+04
Maximum daily site tonnage (kg/day)	1.6E+05
Frequency and duration of use	
Continuous release. [FD2]	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operating conditions affecting environmental exposure	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Fraction released to air by process (initial release prior to RMM)	5.0E-03		
Fraction released to wastewater by process (initial release prior to RMM)	8.0E-06		
Fraction released to soil by process (initial release prior to RMM)	0		
Technical measures and conditions at the process level (source) to prevent release			
Common practices vary between sites, so conservative process release estimates are used. [TCS1]			
On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil			
Risk from environmental exposure is driven by freshwater sediment. [TCR1b]			
If discharging to domestic sewage treatment plant, no on-site wastewater treatment is required [TCR9]			
Treat air emissions to provide a typical removal efficiency of (%)	9.5E+01		
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of ≥ (%)	92.0		
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of ≥ (%)	0.0		
Organisation measures to prevent/limit release from site			
Do not apply Industrial sludge to natural soils. [OMS2] Sludge should be incinerated, contained, or reclaimed. [OMS3]			
Conditions and measures related to municipal sewage treatment plant			
Not applicable as there is no release to wastewater [STP1]			
Estimated substance removal from wastewater via domestic sewage treatment (%)	93.0		
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)	93.0		
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)	1.8E+05		
Assumed flow rate of the domestic sewage treatment plant (m3/day)	2.0E+03		
Conditions and measures related to external treatment of waste for disposal			
Combustion emissions limited by mandatory exhaust emission testing. [ETW1] Combustion emissions considered in regional exposure assessment. [ETW2] External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated. [ERW3]			
Section 3 Exposure estimate			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]			
Section 4 Guidance to check compliance with the exposure scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.			
RCR Workers CS 1: Bulk transfers; Dedicated facility (PROC 8b)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.642
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 2: Drum/batch transfers; Dedicated facility (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.171
	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.451 mg/m ³ (TRA Workers) RCR = 0.027	
	Vapour > 10,000 Pa	0.053 mg/m ³ (TRA Workers) RCR = 3.21E-3	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.802 mg/m ³ (TRA Workers) RCR = 1.2E-3	
	Vapour > 10,000 Pa	0.211 mg/m ³ (TRA Workers) RCR = 1.4E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, long term		Final RCR = 0.642
Combined routes of exposure, systemic, acute		Final RCR < 0.01

RCR Workers CS 3: General exposures; Closed systems (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000 Pa	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
Inhalation, systemic, acute	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 4: Use of fuels; Closed systems (PROC 16)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Combined routes of exposure, systemic, long term			Final RCR = 0.139

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 5: Cleaning and maintenance of equipment (PROC 8a, PROC 28)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	Final RCR = 0.224
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	Final RCR < 0.01
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.695
Combined routes of exposure, systemic, acute			Final RCR < 0.01
RCR Workers CS 6: Storage (PROC 2, PROC 1)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.022
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.493
Combined routes of exposure, systemic, acute			Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

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4.2. Environment

Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1] Required removal efficiency for wastewater can be achieved using on-site/off-site technologies, either alone or in combination. [DSU2] Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3] Further details on scaling and control technologies can be found in the SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>). [DSU4]

Maximum risk characterisation ratio for air emissions RCRair	1.9E-03
Maximum risk characterisation ratio for wastewater emissions RCRwater	8.7E-01

ATZ FLUX GAS OIL

REV.: G

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12b - Use in fuels; Professional

Section 1	
Title	
12b - Use in fuels; Professional	
Use descriptor	
Sector of use	
Process categories	1, 2, 8a, 8b, 16, 28
Environmental release categories	9a, 9b
Specific environmental release categories	ESVOC SpERC 9.12b.v1
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance, and waste management.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at STP, with potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless otherwise indicated)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless otherwise indicated)
Other operating conditions affecting exposure	Requires implementation of a good basic occupational hygiene standard Covers use at ambient temperature. (unless otherwise indicated)
Contributing Scenarios	Specific risk management measures and operational conditions
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
Bulk transfers; Dedicated facility (PROC_8b)	Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.
Drum/batch transfers; Dedicated facility (PROC_8b)	Use drum pumps. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information.

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	<p>Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Refuelling (PROC_8b)	<p>Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Ensure that no splashing occurs during transfer. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
General exposures; Closed systems (PROC_2, PROC_1)	<p>Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Use of fuels; Closed systems (PROC_16)	<p>Handle substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Cleaning and maintenance of equipment (PROC_8a, PROC_28)	<p>Drain and rinse the system prior to equipment break-in or maintenance. Wear chemical-resistant gloves (tested to EN374) in conjunction with "basic" employee training. If skin contamination is expected to spread to other parts of the body, these parts of the body should also be protected with impermeable clothing equivalent to that described for the hands. Refer to section 8 of the SDS for further information. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. Wear suitable overalls to avoid skin exposure. Collect spills immediately. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>
Storage (PROC_2, PROC_1)	<p>Store substance within a closed system. Further advice on good practice. The obligations under Article 37(4) of REACH shall not apply. If repeated and/or prolonged skin exposure to the substance is likely, wear suitable gloves tested to EN374. Provide employees with skin care programmes.</p>

Section 2.2 Environmental exposure control

Product Characteristics

Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]

Amounts used

Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year)	3.2E+03
Fraction of Regional tonnage used locally	5.0E-04
Annual site tonnage (tonnes/year)	1.6E+00

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Maximum daily site tonnage (kg/day)	4.4E+00
Frequency and duration of use	
Continuous release. [FD2]	
Emission days (days/year)	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operating conditions affecting environmental exposure	
Fraction released to air by wide dispersive use (regional use only)	1.0E-04
Fraction released to wastewater by wide dispersive use	1.0E-05
Fraction released to soil by wide dispersive use (regional use only)	0.00001
Technical measures and conditions at the process level (source) to prevent release	
Common practices vary between sites, so conservative process release estimates are used. [TCS1]	
On-site technical conditions and measures to reduce or minimise discharges, air emissions, and releases into the soil	
Risk from environmental exposure is driven by freshwater sediment. [TCR1b]	
Wastewater treatment not required [TCR6]	
Treat air emissions to provide a typical removal efficiency of (%)	N/A
Treat wastewater on site (prior to receiving water discharge) to provide the required removal efficiency of \geq (%)	0.0
If discharging to domestic sewage treatment plant, provide the required on-site wastewater removal efficiency of \geq (%)	0.0
Organisation measures to prevent/limit release from site	
Do not apply Industrial sludge to natural soils. [OMS2] Sludge should be incinerated, contained, or reclaimed. [OMS3]	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater [STP1]	
Estimated substance removal from wastewater via domestic sewage treatment (%)	93.0
Total efficiency of removal from wastewater after on-site and off-site (domestic treatment plant) RMMs (%)	93.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)	9.7E+02
Assumed flow rate of the domestic sewage treatment plant (m ³ /day)	2.0E+03
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by mandatory exhaust emission testing. [ETW1] Combustion emissions considered in regional exposure assessment. [ETW2] External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated. [ERW3]	
Section 3 Exposure estimate	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposure unless otherwise indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]	
Section 4 Guidance to check compliance with the exposure scenario	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

4.1. Health

Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.

RCR Workers CS 1: Bulk transfers; Dedicated facility (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.516
	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.023
	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.987
Combined routes of exposure, systemic, acute			Final RCR = 0.023

RCR Workers CS 2: Drum/batch transfers; Dedicated facility (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.96 mg/m ³ (TRA Workers) RCR = 0.059	Final RCR = 0.081
	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	
	Vapour 500-10,000	0.09 mg/m ³ (TRA Workers) RCR = 5.49E-3	
	Vapour > 10,000 Pa	8.77E-3 mg/m ³ (TRA Workers) RCR = 5.35E-4	
Inhalation, systemic, acute	Aerosol	3.838 mg/m ³ (TRA Workers) RCR = 2.56E-3	Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 2.4E-4	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.34E-5	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.552
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 3: Refuelling (PROC 8b)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.798 mg/m ³ (TRA Workers) RCR = 0.293	Final RCR = 0.516
	Vapour 10-500 Pa	2.678 mg/m ³ (TRA Workers) RCR = 0.163	
	Vapour 500-10,000	0.901 mg/m ³ (TRA Workers) RCR = 0.055	
	Vapour > 10,000 Pa	0.088 mg/m ³ (TRA Workers) RCR = 5.35E-3	
Inhalation, systemic, acute	Aerosol	19.19 mg/m ³ (TRA Workers) RCR = 0.013	Final RCR = 0.023
	Vapour 10-500 Pa	10.71 mg/m ³ (TRA Workers) RCR = 7.14E-3	
	Vapour 500-10,000	3.604 mg/m ³ (TRA Workers) RCR = 2.4E-3	
	Vapour > 10,000 Pa	0.351 mg/m ³ (TRA Workers) RCR = 2.34E-4	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.987
Combined routes of exposure, systemic, acute			Final RCR = 0.023

RCR Workers CS 4: General exposures; Closed systems (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.105

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.576
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 5: use as fuel; Closed systems (PROC 16)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.268 mg/m ³ (TRA Workers) RCR = 0.016	Final RCR = 0.028
	Vapour 500-10,000	0.18 mg/m ³ (TRA Workers) RCR = 0.011	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	1.071 mg/m ³ (TRA Workers) RCR = 7.14E-4	Final RCR < 0.01
	Vapour 500-10,000	0.721 mg/m ³ (TRA Workers) RCR = 4.8E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	0.34 mg/kg bw/day (TRA Workers) RCR = 0.117	Final RCR = 0.117
Combined routes of exposure, systemic, long term			Final RCR = 0.145
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 6: Cleaning and maintenance of equipment (PROC 8a, PROC 28)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.919 mg/m ³ (TRA Workers) RCR = 0.117	Final RCR = 0.223

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.035 mg/m ³ (TRA Workers) RCR = 2.14E-3	
Inhalation, systemic, acute	Aerosol	7.677 mg/m ³ (TRA Workers) RCR = 5.12E-3	Final RCR < 0.01
	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.14 mg/m ³ (TRA Workers) RCR = 9.35E-5	
Dermal, systemic, long term	Skin	1.371 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.694
Combined routes of exposure, systemic, acute			Final RCR < 0.01

RCR Workers CS 7: Storage (PROC 2, PROC 1)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	1.339 mg/m ³ (TRA Workers) RCR = 0.082	Final RCR = 0.105
	Vapour 500-10,000	0.36 mg/m ³ (TRA Workers) RCR = 0.022	
	Vapour > 10,000 Pa	0.018 mg/m ³ (TRA Workers) RCR = 1.07E-3	
Inhalation, systemic, acute	Vapour 10-500 Pa	5.355 mg/m ³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	Vapour 500-10,000	1.442 mg/m ³ (TRA Workers) RCR = 9.61E-4	
	Vapour > 10,000 Pa	0.07 mg/m ³ (TRA Workers) RCR = 4.68E-5	
Dermal, systemic, long term	Skin	1.37 mg/kg bw/day (TRA Workers) RCR = 0.471	Final RCR = 0.471
Combined routes of exposure, systemic, long term			Final RCR = 0.576
Combined routes of exposure, systemic, acute			Final RCR < 0.01

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

4.2. Environment

Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1] Required removal efficiency for wastewater can be achieved using on-site/off-site technologies, either alone or in combination. [DSU2] Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. [DSU3] Further details on scaling and control technologies can be found in the SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>). [DSU4]

Maximum risk characterisation ratio for air emissions RCRair	2.1E-04
Maximum risk characterisation ratio for wastewater emissions RCRwater	4.5E-03

ATZ FLUX GAS OIL

REV.: G

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12c - Use in fuels; Consumers

Section 1	
Title	
12c - Use in fuels; Consumers	
Use descriptor	
Sector of use	
Product Categories	13
Environmental release categories	9a, 9b
Specific environmental release categories	ESVOC SpERC 9.12c.v1
Processes, tasks, activities covered	
Covers the consumer use of liquid fuels.	
Evaluation Method	
See section 3	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of consumer exposure	
Product Characteristics	
Physical state of product	Liquid
Vapour pressure	-
Concentration of substance in product	Covers concentrations up to 100.0 %
Frequency and duration of use/exposure	Covers the use of up to 1.0 event per day
Other operating conditions affecting exposure	-
Contributing Scenarios	Specific risk management measures and operational conditions
General measures (flammability)	see section 2 of the SDS; For measures to control risks arising from physical and chemical properties, refer to the main body of the SDS, section 7 and/or 8.
General measures (aspiration hazard)	see section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
Fuels; Liquid; Automotive refuelling; (Diesel) (PC_13) Based on Concawe_SCED_13_3_a	For each use event, covers use amounts up to 44,000.0 g / event Exposure duration = 0.05 h / event Outdoor use Potential dermal contact is assumed to be limited to the palm of one hand
Fuels; Liquid; Recreational vehicles; (Quads or similar) (PC_13) Based on Concawe_SCED_13_7_a	For each use event, covers use amounts up to 7500.0 g / event Exposure duration = 0.017 h / event Outdoor use Potential dermal contact is assumed to be limited to the palm of one hand
Fuels; Liquid; Garden equipment (PC_13) Based on Concawe_SCED_13_4_a	For each use event, covers use amounts up to 750.0 g / event Exposure duration = 0.033 h / event Potential dermal contact is assumed to be limited to the inside of the hands / one hand / the palm of the hands.
Section 2.2 Environmental exposure control	
Product Characteristics	
Substance is complex UVCB. [PrC3] Predominantly hydrophobic. [PrC4a]	

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Amounts used			
Fraction of EU tonnage used in region:			0.1
Regional use tonnage (tonnes/year)			1.4E+04
Fraction of Regional tonnage used locally			5.0E-04
Annual site tonnage (tonnes/year)			7.2E+00
Maximum daily site tonnage (kg/day)			2.0E+01
Frequency and duration of use			
Continuous release. [FD2]			
Emission days (days/year)			365
Environmental factors not influenced by risk management			
Local freshwater dilution factor			10
Local marine water dilution factor			100
Other given operating conditions affecting environmental exposure			
Fraction released to air by wide dispersive use (regional use only)			1.0E-04
Fraction released to wastewater by wide dispersive use			1.0E-05
Fraction released to soil by wide dispersive use (regional use only)			0.00001
Conditions and measures related to municipal sewage treatment plant			
Not applicable as there is no release to wastewater [STP1]			
Estimated substance removal from wastewater via domestic sewage treatment (%)			93.0
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/day)			4.3E+03
Assumed flow rate of the domestic sewage treatment plant (m3/day)			2.0E+03
Conditions and measures related to external treatment of waste for disposal			
Combustion emissions limited by mandatory exhaust emission testing. [ETW1] Combustion emissions considered in regional exposure assessment. [ETW2] External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]			
Conditions and measures related to external recovery of waste			
This substance is consumed during use and no waste of the substance is generated. [ERW3]			
Section 3 Exposure estimate			
3.1. Health			
The ECETOC TRA tool has been used to estimate consumer exposure unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model. [EE2]			
Section 4 Guidance to check compliance with the exposure scenario			
4.1. Health			
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in Section 2 are implemented. Available hazard data do not enable the derivation of a DNEL for aspiration effects. Risk management measures are based on qualitative risk characterisation.			
RCR Cons CS 1: Fuels; Liquid; Automotive Refuelling; (Diesel) (PC 13)			
Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

PREPARED BY: ICARO S.r.l

FOR: ALMA PETROLI S.p.A.

Inhalation, systemic, long term	Vapour 10-500 Pa	0.222 mg/m ³ (TRA Consumers) RCR = 0.046	Final RCR = 0.046
Inhalation, systemic, acute	Vapour 10-500 Pa	106.6 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.118	Final RCR = 0.118
Dermal, systemic, long term	Skin	0.175 mg/kg bw/day (TRA Consumers) RCR = 0.14	Final RCR = 0.14
Oral, systemic, long term	Skin	0 mg/kg bw/day (TRA Consumers) RCR = 0	Final RCR < 0.01
Combined routes of exposure, systemic, long term			Final RCR = 0.186
Combined routes of exposure, systemic, acute			Final RCR = 0.118

RCR Cons CS 2: Fuels; Liquid; Recreational vehicles (Quads or similar) (PC 13)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.068 mg/m ³ (TRA Consumers) RCR = 0.014	Final RCR = 0.014
Inhalation, systemic, acute	Vapour 10-500 Pa	98.12 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.109	Final RCR = 0.109
Dermal, systemic, long term	Skin	0.35 mg/kg bw/day (TRA Consumers) RCR = 0.28	Final RCR = 0.28
Oral, systemic, long term	Skin	0 mg/kg bw/day (TRA Consumers) RCR = 0	Final RCR < 0.01
Combined routes of exposure, systemic, long term			Final RCR = 0.294
Combined routes of exposure, systemic, acute			Final RCR = 0.109

RCR Cons CS 3: Fuels; Liquid; Garden equipment (PC 13)

Routes of exposure and types of effect	Subject of evaluation	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour 10-500 Pa	0.209 mg/m ³ (TRA Consumers) RCR = 0.043	Final RCR = 0.043
Inhalation, systemic, acute	Vapour 10-500 Pa	150.4 mg/m ³ (ECETOC TRA Consumers 3.1) RCR = 0.167	Final RCR = 0.167
Dermal, systemic, long term	Skin	0.071 mg/kg bw/day (TRA Consumers) RCR = 0.057	Final RCR = 0.057
Oral, systemic, long term	Skin	0 mg/kg bw/day (TRA Consumers) RCR = 0	Final RCR < 0.01
Combined routes of exposure, systemic, long term			Final RCR = 0.1

ATZ FLUX GAS OIL

REV.: G

DATE: 20/11/2020

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FOR: ALMA PETROLI S.p.A.

Combined routes of exposure, systemic, acute			Final RCR = 0.167
4.2. Environment			
Guidance is based on assumed operating conditions that may not be applicable to all sites; therefore, scalability may be required to define appropriate site-specific risk management measures. [DSU1]			
Maximum risk characterisation ratio for air emissions RCR _{air}			2.8E-04
Maximum risk characterisation ratio for wastewater emissions RCR _{water}			4.6E-03